Komoditas : Bunga-bungaan
Tahun 2004-2008 (467 judul)

Jinze Noordijk, Katrien Delille, Andre P. Schaffers, Karle V. Sykora, Optimizing grassland management for flower-visiting insects in roadside verges, Biological Conservation, Volume 142, Issue 10, October 2009, Pages 2097-2103, ISSN 0006-3207, DOI: 10.1016/j.biocon.2009.04.009.
(http://www.sciencedirect.com/science/article/B6V5X-4WBB71H-1/2/3622bace9a5f6c088d770bcaa28dcc2f)
Abstract:
The decline of flower-visiting insects is a threat to ecological processes and to the services these insects provide. Roadside verges in the Netherlands span approximately 80,000 km and are often covered with semi-natural grasslands. As such, they also provide a suitable habitat for many insects, but this has received little attention so far. We investigated the effects of different management treatments on flower-visiting insects. We studied flower visitation in a 3 years old experimental set-up with five mowing treatments each replicated five times. Management types were: no management and mowing once or twice per year with and without the removal of hay, representing common forms of management and neglect. During an entire growing season, both flowers (number of species and inflorescences) as well as insects (total abundance and actual flower visits) were investigated. Mowing twice per year with removal of hay showed highest values for all measured variables and this effect persisted throughout the growing season. The early summer cut proved to be very important for insect feeding opportunities, due to the re-flowering of plants later in the growing season. Flower abundance showed high correlations with both plant species richness and the number of insect visits. Although overall, mowing twice a year with hay removal was the most beneficial treatment for flower-visiting insects, these plots were entirely devoid of flowers for some period right after mowing, indicating that a rotational scheme might further promote insect diversity and abundance.
Keywords: Diversity; Flower-abundance; Semi-natural grassland; Insect conservation; Mowing; Roadside verge; Vegetation management

Ziyin Yang, Youying Tu, Susanne Baldermann, Fang Dong, Yi Xu, Naoharu Watanabe, Isolation and identification of compounds from the ethanolic extract of flowers of the tea (Camellia sinensis) plant and their contribution to the antioxidant capacity, LWT - Food Science and Technology, Volume 42, Issue 8, October 2009, Pages 1439-1443, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.03.017.
(http://www.sciencedirect.com/science/article/B6WMV-4W04KS5-4/2/b02c39e16e3c25208dd3df444d6ebce6)
Abstract:
While beneficial health properties of tea leaves have been extensively studied, less attention has been given to that of flowers of the tea (Camellia sinensis) plant. In this work, the ethanolic extract and its ethyl acetate-soluble fraction (EEA) from the tea flowers were found to possess the potent antioxidant activity using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical-scavenging assay. The compounds present in EEA had comparatively strong DPPH scavenging activity and strongly contributed to the antioxidant activity of the tea flowers. From EEA, besides eight catechins, five flavonol glycosides were isolated and their structures were elucidated on the basis of mass spectrometry and nuclear magnetic resonance spectroscopy as myricetin 3-O-[beta]-d-galactopyranoside, quercetin 3-O-[beta]-d-galactopyranoside, kaempferol 3-O-[beta]-d-galactopyranoside, kaempferol 3-O-[beta]-d-glucopyranoside, and kaempferol 3-O-[[alpha]-l-rhamnopyranosyl-(1-6)-[beta]-d-glucopyranoside]. In addition, epigallocatechin gallate and epicatechin gallate were found as the major active components responsible for the antioxidant

activity of tea flowers through the use of a combination of preparative liquid chromatography separation and DPPH assay.
Keywords: Tea (Camellia sinensis) flower; Catechins; Flavonol glycosides; Antioxidant activity; Active components

Jiping Liu, Shenggen He, Zhaoqi Zhang, Jinping Cao, Peitao Lv, Sudan He, Guiping Cheng, Daryl C. Joyce, Nano-silver pulse treatments inhibit stem-end bacteria on cut gerbera cv. Ruikou flowers, Postharvest Biology and Technology, Volume 54, Issue 1, October 2009, Pages 59-62, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2009.05.004.
(http://www.sciencedirect.com/science/article/B6TBJ-4WWFN41-1/2/2542334da441024a41dd2810623883d7)
Abstract:
Nanometer-sized silver (Ag+) particles (NS) are used in various applications as an anti-microbial. Effects of NS (2-5 nm diam.) pulse solution treatments on vase life of cut gerbera (Gerbera jamesonii) cv. Ruikou flowers were investigated. Compared with the control [pulsed with deionised water (DI) and subsequently held in DI] pulsing for 24 h with 5 mg/L NS solution followed by holding in DI maintained water uptake and extended vase life. From in vitro and microscopy assessments, NS pulse treatment inhibited bacteria growth in the vase solution and at cut stem ends during the first 2 d of the vase period.
Keywords: Anti-microbial; Cut flower; Gerbera; Microorganism

Matthew G. Blanchard, Erik S. Runkle, Use of a cyclic high-pressure sodium lamp to inhibit flowering of chrysanthemum and velvet sage, Scientia Horticulturae, Volume 122, Issue 3, 1 October 2009, Pages 448-454, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.06.016.
(http://www.sciencedirect.com/science/article/B6TC3-4WPS9P3-1/2/a377ee4be6537dda938823a6a06bfc50)
Abstract:
Photoperiod is commonly controlled in the commercial production of ornamental crops to induce or prevent flowering. Flower induction in short-day (SD) plants can be prevented or delayed when the natural daylength is short by providing low-intensity lighting during the dark period. A stationary high-pressure sodium (HPS) lamp with an oscillating aluminum parabolic reflector (cyclic HPS) has been developed to provide intermittent lighting to greenhouse crops. We determined the efficacy of a cyclic HPS lamp at preventing flowering in SD plants garden chrysanthemum [Chrysanthemum x grandiflorum (Ramat.) Kitam.] `Bianca', pot chrysanthemum `Auburn', and velvet sage (Salvia leucantha L.) relative to traditional night interruption (NI) lighting strategies. Plants were grown in a glass-glazed greenhouse at a mean daily temperature of 19.5-20.7 [degree sign]C with natural SD photoperiods. NI lighting was delivered during the middle of the night (2230-0230 h) from a 600 W cyclic HPS lamp mounted at one gable end of the greenhouse or from incandescent (INC) lamps that were illuminated for the entire 4 h (CONT INC) or for 6 min every 30 min for 4 h. Plants under cyclic HPS were grown at lateral distances of 1, 4, 7, 10, or 13 m from under the lamp. Control plants were grown under an uninterrupted 15 h skotoperiod. As the distance from the cyclic HPS lamp increased from 1 to 13 m, the maximum irradiance measured during the NI decreased from 25.4 to 0.3 [mu]mol m-2 s-1 and time to visible inflorescence (VI) and the number of nodes at VI decreased. All species had a VI within 54 d, but <=10% of plants flowered when grown at a lateral distance of 1 or 4 m from the cyclic HPS lamp or under CONT INC. Plants grown without NI had a VI 2 to 15 d earlier and flowered 7 to 24 d earlier than plants grown at 10 or 13 m from the cyclic HPS. All garden chrysanthemums flowered under cyclic INC, whereas velvet sage and pot chrysanthemum had 15% and 35% flowering, respectively. These results indicate that a cyclic HPS lamp can be used effectively to delay flower induction and prevent flowering in these species when NI is delivered at >=2.4 [mu]mol m-2 s-1.

Keywords: Chrysanthemum x grandiflorum; Incandescent lamp; Mexican bush sage; Night interruption; Photoperiodic lighting; Salvia leucantha; Short day

V. Andriessa Prameswara, Margaret Johnston, Melinda Perkins, Victor Robertson, Diah Ratnadewi, Ethylene influences development and flowering of Ptilotus spp. in vitro and ex vitro, Scientia Horticulturae, Volume 122, Issue 2, 17 September 2009, Pages 227-232, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.05.004.
(http://www.sciencedirect.com/science/article/B6TC3-4WDFCFJ-2/2/3cbd275447932e6a97ba809154f8a690)
Abstract:
The genus Ptilotus has immense potential for ornamental horticulture but its commercial development has been hindered by propagation limitations. Poor seed quality and germination are reported. Cutting propagation is limited by cutting supply as the juvenile phase of Ptilotus is short. Micropropagation has been used in an attempt to overcome these difficulties but explants become floral in vitro and this causes plantlets to elongate. Ethephon has been used to control flowering of stock plants of many ornamental species. This study investigated the effect of ethephon applied to young (3-week-old, deflasked from tissue culture) and mature (1-year-old) Ptilotus plants in a greenhouse. A system of applying gaseous ethylene at 0, 100, 200 and 300 mg l-1 to the headspace of in vitro plantlets in glass jars was developed and the response of in vitro plantlets to ethylene studied. One-year-old Ptilotus plants were treated with 500 mg l-1 ethephon 2 days before pruning or 1 or 2 weeks after pruning. Ethephon application 2 days before pruning decreased the number of inflorescences and increased the number of shoots (compared to the control) but was phytotoxic. Ethephon applications of 150 or 300 mg l-1 applied weekly or fortnightly to 3-week-old plants deflasked from tissue culture reduced plant height and number of inflorescences and at low concentrations increased the number of new shoots. A fortnightly application at 150 mg l-1 is recommended. Previous reports on the effects of ethylene on inflorescence production on plantlets in vitro are limited. Our study showed that exposure of in vitro plantlets of P. nobilis to ethylene gas at 100 mg l-1 for 1 h significantly increased the number of shoots and plant height but this did not occur for plantlets of P. spicatus. Plantlets of P. spicatus exposed to transient ethylene at 200 and 300 mg l-1 showed significantly greater rooting (52.4%) than the control (13.6%).
Keywords: Amaranthaceae; Ethephon; Headspace; Ptilotus nobilis; Ptilotus spicatus; Vegetative propagation

John M. Dole, Lane Greer, Production protocol development for greenhouse cut Linaria, Lupinus, and Papaver flowers, Scientia Horticulturae, Volume 122, Issue 2, 17 September 2009, Pages 233-237, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.05.005.
(http://www.sciencedirect.com/science/article/B6TC3-4WDNBXR-1/2/23eae9c007a357617dda45632f7ff58c)
Abstract:
Linaria maroccana Hook. f. Ann., `Lace Violet', Lupinus hartwegii ssp. cruikshankii Lindl. `Sunrise' and Papaver nudicaule L. `Meadow Pastels' seeds were directly sown into 105 cell plug trays and received either ambient light or supplemental high intensity discharge (HID) lighting. For each species, a 2 x 3 x 3 factorial was used with two light intensities during propagation, three transplant stages, and three night temperatures. Seedlings were transplanted at the appearance of 2-3, 5-6, or 8-9 true leaves. Transplanted Linaria and Papaver seedlings were placed at 5/11, 10/16, or 15/21 +/- 1 [degree sign]C night/day temperatures and Lupinus seedlings were placed at 15/24, 18/25, or 20/26 +/- 2 [degree sign]C night/day temperatures. For this study, the optimum production temperature for Linaria was 10/16 [degree sign]C as the cut stems produced at 15/21 [degree sign]C were unmarketable and production time was excessively long at 5/11 [degree sign]C. At 10/16 [degree sign]C, Linaria seedlings should be transplanted at the 2-3 leaf stage to

maximize stem number, stem length and profitability. For Lupinus the optimum temperature was 15/24 [degree sign]C due to long stems and high profitability per plant. Lupinus seedlings should be transplanted at the 2-3 leaf stage when grown at 15/24 [degree sign]C to obtain the longest and thickest stems; however, $/m2 week was higher for plants transplanted at the 8-9 leaf stage due to less time in finishing production space. For Papaver, the 15/21 [degree sign]C temperature was optimal as that temperature produced the longest stems in the shortest duration, resulting in the highest $/m2 week. At 15/21 [degree sign]C Papaver plants should be transplanted at the 2-3 leaf stage. Supplemental HID lighting had no effect on any of the species.
Keywords: Linaria maroccana; Lupinus hartwegii; Papaver nudicaule; Toadflax; Lupine; Poppy; High intensity discharge lighting; Temperature

Sisi Chen, Hao Liu, Wei Chen, Dongli Xie, Shaoquan Zheng, Proteomic analysis of differentially expressed proteins in longan flowering reversion buds, Scientia Horticulturae, Volume 122, Issue 2, 17 September 2009, Pages 275-280, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.05.015.
(http://www.sciencedirect.com/science/article/B6TC3-4WK4B5B-1/2/9d574c750253a90946ece2add53970f1)
Abstract:
A proteomic approach was taken to compare the proteomes of normal flowering buds and flowering reversion buds in longan (Dimocarpus longan Lour. cv. Longyou). Two-dimensional gel electrophoresis (2-DE), coupled with mass spectroscopy and protein database searching, recognized 18 proteins that were differentially expressed in flowering reversion buds. Eleven of these were down-regulated, whereas seven were up-regulated. A subset of 13 proteins was identified by MALDI-TOF-TOF/MS and classified into regulatory proteins (kinase, 20S proteasome alpha 6 subunit, putative alpha 7 proteasome subunit, auxin-induced protein, and abscisic stress ripening-like protein), antioxidant-related proteins (Chain A, GDP-mannose-3',5'-epimerase, putative lactoylglutathione lyase, and Chain A, ascorbate peroxidase), pollen fertility-related proteins (putative leucoanthocyanidin reductase 2, and putative isoflavone reductase), photosynthesis-related proteins (large subunit, ribulose-bisphosphate carboxylase-oxygenase), and molecular chaperones (disulfide isomerase). Among them, regulatory and antioxidant-related proteins accounted for almost two-thirds of these proteins, suggesting that they may play a more important role in bud differentiation. Identification of these proteins provides insights that may lead to a better understanding of the molecular basis for flowering reversion in longan.
Keywords: Longan; Flowering reversion buds; Differential proteins; Proteomic analysis; 2-DE

Z.H. Wang, L. Wang, Q.S. Ye, High frequency early flowering from in vitro seedlings of Dendrobium nobile, Scientia Horticulturae, Volume 122, Issue 2, 17 September 2009, Pages 328-331, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.05.018.
(http://www.sciencedirect.com/science/article/B6TC3-4WM68JV-2/2/921000e3af000989bbfebd811f895101)
Abstract:
Dendrobium nobile Lindl. is a popular temperate Chinese orchid commonly marketed as a traditional medicinal plant. Seedlings of Dendrobium nobile Lindl. produced floral buds (33.3-34.8%) precociously on a defined basal medium (1/2 MS) containing paclobutrazol (PP333) at 0.5 mg L-1 or thidiazuron (TDZ) at 0.1 mg L-1 within 4 months of culturing. The frequency of floral buds formation can be further increased to 95.6% by growing seedlings in a PN (PP333 0.3 mg L-1 + NAA 0.5 mg L-1)-containing medium followed by transfer onto 1/2 MS medium with PP333 and TDZ (PP333 + TDZ). However, flower developed was deformed under 25 [degree sign]C but it developed fully when grown in a lower temperature regime (23 [degree sign]C/18 [degree sign]C, light/dark) for 45 days. Under optimal condition, in vitro flowering was observed about 6 months after seed sowing.
Keywords: Dendrobium nobile Lindl.; In vitro flowering; Seedlings; Temperate orchid

Rachel J. Mayberry, Elizabeth Elle, Effects of forest structure and microhabitat on the distribution and flowering of a rare understory plant, Actaea elata, Forest Ecology and Management, Volume 258, Issue 7, 15 September 2009, Pages 1102-1109, ISSN 0378-1127, DOI: 10.1016/j.foreco.2009.05.042.
(http://www.sciencedirect.com/science/article/B6T6X-4WP4BGP-2/2/df2e12d523c3a90c0a01806472787691)
Abstract:
Knowing which environmental characteristics constrain forest understory species' distribution and reproduction can inform conservation decisions about habitat management and locations for reintroduction efforts. Differential plant performance is common in varying environmental conditions, such as levels of canopy closure. Actaea elata (tall bugbane) is a rare, perennial, forest understory herb found from Oregon to British Columbia. Populations throughout this species' range commonly occur in managed forests. We assessed the importance of environmental variation on the distribution and flowering of A. elata at both microhabitat and site-level scales. At four sites encompassing a variety of forest types, we measured several biotic and abiotic variables at vegetative and reproductive plants, as well as at random points. We measured these same variables at three sites where A. elata has been extirpated. Within occupied sites, reproductive plants were more likely to be located in canopy gaps than were vegetative plants. Both vegetative and reproductive plants were more likely to be found in areas of high herb cover compared to random points. These results indicate that gaps in the canopy may be critical for this species' ability to reproduce, but survival may be possible in a broader range of forest understory conditions (similar to other co-occurring herb species). Random points at extirpated and occupied sites both tended to be located in areas of lower canopy openness and moisture availability than points in occupied sites where A. elata was present. Extirpated sites were either densely forested or clearcut, while occupied sites contained stands of intermediate density. Circaea alpina, Geranium robertianum, and Lactuca muralis were indicator species for A. elata and normally indicate moist soils, with Circaea alpina being a strong indicator of the presence of flowering A. elata. Taken together, our results suggest that maintenance of canopy gaps is important to promote flowering, and understory species that indicate moist sites, particularly Circaea alpina, can be used as aids to locate new populations of A. elata.
Keywords: Tall bugbane; Canopy gaps; Environmental variation; Conservation biology

Kevin R. Abbott, Reuven Dukas, Honeybees consider flower danger in their waggle dance, Animal Behaviour, Volume 78, Issue 3, September 2009, Pages 633-635, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2009.05.029.
(http://www.sciencedirect.com/science/article/B6W9W-4WTYY12-1/2/20c9f8e576c35f9afd26f6e3a9b546db)
Abstract:
Like most animals, honeybees, Apis mellifera, possess a suite of antipredatory adaptations used to defend their colony against intruders and to avoid flowers associated with predation risk. Honeybees also possess a remarkable ability to communicate the direction, distance and relative profitability of flower patches to hivemates using the well-studied waggle dance. Here we show that honeybees returning from foraging on dangerous flowers are less likely to perform the waggle dance and engage in fewer waggle runs than foragers returning from equally rewarding, safe flowers. Our results indicate that experienced foragers effectively steer naive recruits away from dangerous flowers and raise interesting questions as to how information about the reward and risk properties of patches are integrated into the waggle dance.
Keywords: Apis mellifera; communication; honeybee; insects; predation; waggle dance

Karin Winkler, Felix L. Wackers, Leyla V. Kaufman, Virginia Larraz, Joop C. van Lenteren, Nectar exploitation by herbivores and their parasitoids is a function of flower species and relative humidity, Biological Control, Volume 50, Issue 3, September 2009, Pages 299-306, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.04.009.
(http://www.sciencedirect.com/science/article/B6WBP-4W4CWN3-2/2/8438d8d99f2fed17462e4e4ebae12396)
Abstract:
In conservation biological control, diversification of the agro ecosystem with flowering vegetation is seen as an important tool to support the broad range of predators and parasitoids that require nectar and pollen sources to survive and reproduce. In order to identify flowering plants that provide suitable food sources for natural enemies without supporting the pest species, we analyzed the exploitation of 19 flowering plants by two important lepidopteran cabbage pests, Pieris rapae and Plutella xylostella, and their hymenopteran parasitoids, Cotesia glomerata and Diadegma semiclausum. The experiments were conducted at 90% r.h., while Pieris rapae was tested both at 45% r.h. and at 90% r.h. At 45 +/- 5% r.h., corresponding with field conditions at which P. rapae is predominantly active, the butterfly was unable to feed on a number of exposed floral nectar sources whose nectar was successfully exploited at 90% r.h. The broader nectar exploitation by P. rapae at the high humidity is presumably explained by the resulting decrease in nectar viscosity. When comparing D. semiclausum and its herbivorous host P. xylostella, the herbivore exploited a broader range of plants. However, those plants that benefited both the parasitoid and the herbivore had a much stronger effect on the longevity of the parasitoid. The results from the accessibility bioassay suggest that flowers where nectar is not accessible can have a negative impact on insect survival presumably by stimulating foraging without providing accessible nectar. Our results underline the importance of considering species-specific environmental conditions when fine-tuning the choice of nectar sources to be used in conservation biological control programs.
Keywords: Conservation biological control; Nectar; Cabbage; Pieris rapae; Plutella xylostella; Cotesia glomerata; Diadegma semiclausum; Herbivore; Parasitoid; Accessibility; Longevity; Selectivity

Luis Gracia, Carlos Perez-Vidal, Carlos Gracia-Lopez, Automated cutting system to obtain the stigmas of the saffron flower, Biosystems Engineering, Volume 104, Issue 1, September 2009, Pages 8-17, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.06.003.
(http://www.sciencedirect.com/science/article/B6WXV-4WPS9KW-2/2/107b3a9559314b1388080ec00c61616e)
Abstract:
This work presents a new system or machine for automated cutting of saffron flowers in order to obtain their stigmas. The conceptual design of this machine together with an efficient implementation is described. The key point of the invention is the use of a vision system to obtain, using image analysis, the optimal cutting point. An effective and flexible computer program processes the flower image and sends the computed value to a driver that positions a simple mechanical cutting system to make a clean cut of the saffron flower. A prototype machine is used for experimentation in order to validate the proposed approach. In particular, the tests show that the method was robust with a high percentage success in flower cutting regardless of the shape and size of the flower, the flower transporter velocity, the flower orientation (upward/downward), etc. An important benefit of the proposed automated cutting system is that the flower cutting rate is increased approximately eight times over that obtained with the traditional hand method.

Miroslav Repcak, Tatiana Krausova, Phenolic glucosides in the course of ligulate flower development in diploid and tetraploid Matricaria chamomilla, Food Chemistry, Volume 116, Issue 1, 1 September 2009, Pages 19-22, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.01.085.

(http://www.sciencedirect.com/science/article/B6T6R-4VJ0DSD-C/2/fd4d2371c06ce3018f62c1bf61d692ee)
Abstract:
The main secondary metabolites of Matricaria chamomilla ligulate flowers are apigenin-7-O-glucoside derivatives and (Z)- and (E)-2-[beta]-d-glucopyranosyloxy-4-methoxy cinnamic acids (GMCAs), which are the precursors of herniarin. The quantities of these compounds were determinated in six phases of development of ligulate flowers in diploid and tetraploid cultivar. The content of the apigenin glucoside and its main acylated derivatives in ligulate flowers of diploid plants was found to be significantly higher before the start of flowering in comparison with tetraploid plants. During the flowering and post-flowering phase their content decreased and no difference between diploid and tetraploid plants was observed. The (E)-izomer was the dominant form of 2-[beta]-d-glucopyranosyloxy-4-methoxy cinnamic acid. These secondary stress metabolite precursors were accumulated in higher concentrations in young growing ligulate flowers, but during flowering and post-flowering phases their content decreased. Significantly higher content was found in tetraploid plants in comparison with diploid plants. Aglycones of glycosides were found in low concentrations.
Keywords: Apigenin-7-O-glucoside; (Z)- and (E)-2-[beta]-d-glucopyranosyloxy-4-methoxy cinnamic acids; Ligulate flower; Matricaria chamomilla; Ploidy

Mousa Solgi, Mohsen Kafi, Toktam Sadat Taghavi, Roohangiz Naderi, Essential oils and silver nanoparticles (SNP) as novel agents to extend vase-life of gerbera (Gerbera jamesonii cv. `Dune') flowers, Postharvest Biology and Technology, Volume 53, Issue 3, September 2009, Pages 155-158, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2009.04.003.
(http://www.sciencedirect.com/science/article/B6TBJ-4WMD2HK-1/2/8f38a5b5f47deec62c4b3b23c6ed71af)
Abstract:
The aim of this study was to evaluate the efficacy of silver nanoparticles (SNP) and essential oils as novel antimicrobial agents in extending the vase-life of gerbera (Gerbera jamesonii cv. `Dune') flowers. The vase-life of flowers held in a solution containing 5 mg L-1 SNP plus 6% sucrose was found to be significantly higher than with 8-HQC (8-hydroxyquinoline citrate) or control treatments. However, the vase-life was not different to that of flowers held in similar concentrations of silver nitrate. All gerbera flowers held in SNP solutions showed significantly higher relative fresh weight than the control. Vase-life of gerbera flowers was extended by addition of either 50 or 100 mg L-1 carvacrol and either 1 or 2 mg L-1 SNP from 8.3 to 16 d. In addition, the relative fresh weight and solution uptake of gerbera flowers were increased by addition of 100 mg L-1 essential oils and 1 or 2 mg L-1 SNP as compared to that of control flowers. Our results suggest the potential application of essential oils or SNP as novel alternatives to common chemicals used in preservative solutions for gerbera flowers.
Keywords: Antimicrobial; Carvacrol; Preservative solution; Silver nanoparticles; Thymol; Water uptake

Saneyuki Kawabata, Yuhua Li, Taku Saito, Bo Zhou, Identification of differentially expressed genes during flower opening by suppression subtractive hybridization and cDNA microarray analysis in Eustoma grandiflorum, Scientia Horticulturae, Volume 122, Issue 1, 1 September 2009, Pages 129-133, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.03.011.
(http://www.sciencedirect.com/science/article/B6TC3-4W207K1-3/2/47e8d09ce2bf08561bc03e09f021ba9f)
Abstract:
The forward and reverse suppression subtractive cDNA libraries were constructed in petals of Eustoma grandiflorum at bud stage (stage 1) and anthesis (stage 7). Approximately 1000 clones were isolated from stage 1- (S1) and stage 7-specific (S7) libraries. The clones were sequenced

and assembled, which yielded 98 contigs and 444 singletons. BLAST search was conducted on these assembled sequences. Generally, probes isolated from the S7 library exhibited higher expression at stage 7 by microarray analysis, as did those of the S1 library at stage 1. A clone set from the S7 library contained genes from later steps of anthocyanin biosynthesis pathway, terpene synthases, GAST (gibberellic acid-stimulated) family proteins, xyloglucan endotransglucosylase/hydrolase, glycosidases, and stress- and senescence-related proteins. In contrast, the S1 library contained genes associated with flavonol biosynthesis, phenylpropanoid metabolism, terpenoid metabolism, and floral organ development. Gene expression profiling for flavonoid biosynthesis was in accordance with preferential accumulation of flavonols at bud stages and anthocyanins at anthesis.
Keywords: Anthocyanin; Flavonoid; Floral development; GAST; Lisianthus; SSH library; Terpenoid

Xinlin Wei, Lan Yu, Jianbo Xiao, Miaoai Chen, Ying Liu, Yuanfeng Wang, Composition and Bioactivity of Tea Flower Polysaccharides Obtained by Different Methods, Carbohydrate Polymers, In Press, Accepted Manuscript, Available online 27 August 2009, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2009.08.030.
(http://www.sciencedirect.com/science/article/B6TFD-4X3DMX2-3/2/ec9ed3dbbe6ac2ccb15e6c1680059774)
Abstract:
The effects of different extraction methods on the composition and bioactivity of tea flower polysaccharides (TFPS) were investigated. Traditional water extraction (TWE), microwave-assisted water extraction (MAE), and ultrasound-assisted water extraction (UAE) were compared to extract TFPS. TWE was found to be the optimal method with highest yield of TFPS and highest neutral and acid saccharides contents in TFPS. TFPS obtained by TWE mainly consisted of two kinds of polysaccharides with the molecular weight of 31 kD and 5000 D. TFPS obtained by MAE and UAE generally had very low inhibitory effects on [alpha]-glucosidase. TFPS (2 mg/mL) obtained by TWE exhibited a strong inhibitory effect on [alpha]-glucosidase with the inhibitory rate of 83.3%. TFPS obtained by TWE had stronger proliferation effect on lymphocyte at the concentration of 3.0 [mu]g/mL than that of tea leave polysaccharides (TPS).
Keywords: Water extraction; Microwave-assisted extraction; Ultrasound-assisted extraction; Tea flower polysaccharides; bioactivity

Christian Jung, Andreas E. Muller, Flowering time control and applications in plant breeding, Trends in Plant Science, In Press, Corrected Proof, Available online 27 August 2009, ISSN 1360-1385, DOI: 10.1016/j.tplants.2009.07.005.
(http://www.sciencedirect.com/science/article/B6TD1-4X3H2JC-5/2/cc77c88f14b01bae91c8d31b832e7e5e)
Abstract:
Shifting the seasonal timing of reproduction is a major goal of plant breeding efforts to produce novel varieties that are better adapted to local environments and changing climatic conditions. The key regulators of floral transition have been studied extensively in model species, and in recent years a growing number of related genes have been identified in crop species, with some notable exceptions. These sequences and variants thereof, as well as several major genes which were only identified in crop species, can now be used by breeders as molecular markers and for targeted genetic modification of flowering time. This article reviews the major floral regulatory pathways and discusses current and novel strategies for altering bolting and flowering behavior in crop plants.

Rolf Brechbuhl, Christian Kropf, Sven Bacher, Impact of flower-dwelling crab spiders on plant-pollinator mutualisms, Basic and Applied Ecology, In Press, Corrected Proof, Available online 22 August 2009, ISSN 1439-1791, DOI: 10.1016/j.baae.2009.07.001.

(http://www.sciencedirect.com/science/article/B7GVS-4X2BVB9-1/2/c92335dab843265c8ed1b0a464144ed9)
Abstract:
Indirect effects in interactions occur when a species influences a third species by modifying the behaviour of a second one. It has been suggested that indirect effects of crab spiders (Thomisidae) on pollinator behaviour can cascade down the food web and negatively affect plant fitness. However, it is poorly understood how different pollinator groups react to crab spiders and, thus, when a reduction in plant fitness is likely to occur. Using continuous video surveillance, we recorded the behaviour of pollinators on two flower species and the pollinators' responses to three crab spider treatments: inflorescences (1) with a pinned dried spider, (2) with a spider model made of paper, and (3) without spiders (control). We found that pollinators avoided inflorescences with dried spiders only on one plant species (Anthemis tinctoria). Pollinators showed no significant avoidance of paper spiders. Honeybees and bumblebees did not react to dried spiders, but solitary bees and syrphid flies showed a strong avoidance. Finally, we found no evidence that inflorescences with dried spiders suffered from a decrease in fitness in terms of a reduced seed set. We hypothesise that top-down effects of predators on plants via pollinators depend on the degree of specialisation of pollinators and their tendency to avoid spiders.
Keywords: Indirect effects; Multitrophic interactions; Plant fitness; Predation; Xysticus

C.I. Peter, S.D. Johnson, Pollination by flower chafer beetles in Eulophia ensata and Eulophia welwitschii (Orchidaceae), South African Journal of Botany, In Press, Corrected Proof, Available online 20 August 2009, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.07.008.
(http://www.sciencedirect.com/science/article/B7XN9-4X1XYS4-1/2/6ebc299998e7d0fb330c1e60d7837614)
Abstract:
Little is known about the pollination biology of the large (c. 230 species) African orchid genus, Eulophia. Here we report the discovery of pollination by flower chafer beetles (Cetoniinae; Scarabaeidae) in two color forms of E. ensata and in E. welwitschii. Both species have congested, capitate inflorescences, traits that are generally associated with pollination by flower chafer beetles in Eulophia and other plant genera. Pollinarium reconfiguration, including pollinarium bending and anther cap retention, in these beetle-pollinated species is slow. Such slow reconfiguration is predicted by Darwin's hypothesis to be a mechanism that limits geitonogamous self-pollination by slow moving beetles. A breeding system experiment conducted on E. welwitschii showed that this species, like most others in the genus, is self-compatible, but is dependent on pollinators for fruit set. As all Eulophia species are non-rewarding, the basis of attraction of beetles to flowers of the study species seems to be the generalized resemblance of their inflorescence in terms of flower arrangement and color to the capitula of sympatric rewarding Asteraceae that are utilized as food or rendezvous sites (or both) by flower chafer beetles.
Keywords: Beetle pollination; Cetoniidae; Eulophia; Floral mimicry; Orchidaceae; Pollinarium reconfiguration; South Africa

S.M. Shahidullah, M.M. Hanafi, M. Ashrafuzzaman, M.A. Salam, A. Khair, Flowering response and crop duration of aromatic rices in diverse environments, Comptes Rendus Biologies, In Press, Corrected Proof, Available online 19 August 2009, ISSN 1631-0691, DOI: 10.1016/j.crvi.2009.07.003.
(http://www.sciencedirect.com/science/article/B6X1F-4X1R2YN-2/2/7ca2584a78d250ef1b725ae50def6bea)
Abstract:
Crop duration of a rice plant, essentially dictated by flowering response, is an important selection criterion. It is determined by the interaction of genotype and environment. A field experiment was conducted with 40 rice genotypes to assess the fluctuation and/or stability of crop duration in a

series of 16 environmental conditions. The effects of genotype, environment and all the components of GxE interaction were highly significant. Among the genotypes Benaful and Gandho kasturi were most sensitive to environmental changes, and indicating lower adaptability over the environments. Crop durations of 17 genotypes were comparatively stable against environmental changes. Four genotypes viz. Basmati PNR346, BR28, Neimat and Sarwati showed only nonlinear sensitivity and thus unpredictable fluctuation. Seventeen genotypes indicated average stability over the environments. The AMMI analysis identified Badshabhog, Basmati Tapl-90, Bhog ganjia, BR38, Elai, Jata katari and Radhuni pagal as most stable genotypes over the environment series. It also advocated three comparatively stable environments for all the genotypes. To cite this article: S.M. Shahidullah et al., C. R. Biologies --- (----).
Keywords: Aromatic rice; Flowering response; Crop duration; AMMI analysis; GxE interaction

Un Taek Lim, Bishwo Prasad Mainali, Optimum density of chrysanthemum flower model traps to reduce infestations of Frankliniella intonsa (Thysanoptera: Thripidae) on greenhouse strawberry, Crop Protection, In Press, Corrected Proof, Available online 19 August 2009, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.07.012.
(http://www.sciencedirect.com/science/article/B6T5T-4X1R2MX-2/2/3a18400e2c711d117f2be97bef3b0893)
Abstract:
In a previous study, we showed that a chrysanthemum flower model trap, developed by modifying an artificial yellow chrysanthemum flower, was more attractive to the flower thrips Frankliniella intonsa Trybom (Thysanoptera: Thripidae) than a commercial yellow sticky trap. In this study, the optimum deployment density of the chrysanthemum flower model trap for reducing thrips infestation was investigated in commercial strawberry greenhouses. The traps were installed within the plant canopy at different densities (0, 5, 10, 20 traps per 50 m2 plot) in three greenhouses using a randomized complete block design. The highest density of traps reduced seasonal populations of F. intonsa on strawberry flowers by 82% compared to the untreated control. The traps caught approximately 4.6 times more female than male F. intonsa, though the numbers of females and males in the flowers were similar and were both equally reduced with increasing trap density. A weak correlation (r = 0.54) was found between the number of female F. intonsa trapped and numbers in strawberry flowers, but there was no correlation (r = -0.03) for males. The results indicate flower model trap can be an additional tool for monitoring and/or management tactics against this anthophilous thrips.
Keywords: Thrips; artificial flower; sticky trap; visual attraction

Taotao Wang, HanXia Li, Junhong Zhang, Bo Ouyang, Yongen Lu, Zhibiao Ye, Initiation and development of microspore embryogenesis in recalcitrant purple flowering stalk (Brassica campestris ssp. chinensis var. purpurea Hort.) genotypes, Scientia Horticulturae, Volume 121, Issue 4, 4 August 2009, Pages 419-424, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.03.012.
(http://www.sciencedirect.com/science/article/B6TC3-4W2V4NS-2/2/82c5b56c3e114b7c72c6467233454f9b)
Abstract:
Purple flowering stalk (Brassica campestris ssp. chinensis var. purpurea Hort.) was generally regarded as a recalcitrant species for microspore culture in Brassica crops. Conditions for reliable induction of microspore embryogenesis were studied in 12 genotypes of purple flowering stalk. A treatment of short heat shock to microspore by incubating at 32 [degree sign]C for 18 h was suitable for the survival of microspores, sustained cell divisions, and further induced embryogenesis. Subsequently, the reduced concentration of macro salts (1/2 NLN) provided an optimal condition for the development of embryoids. Under the optimized conditions for microspore embryoid development, 10 genotypes responded to microspore culture with the frequencies ranging from 2.7 to 70.5 embryoids per dish. However, regenerated plants were obtained from 9

genotypes, and more than 75% these regenerated plants were double haploid. This report establishes an efficient protocol for microspore culture and offers great potential for DH breeding in purple flowering stalk.
Keywords: Embryogenesis; Microspore culture; Heat shock; Purple flowering stalk

D.L. Wu, S.W. Hou, P.P. Qian, L.D. Sun, Y.C. Zhang, W.J. Li, Flower color chimera and abnormal leaf mutants induced by 12C6+ heavy ions in Salvia splendens Ker-Gawl., Scientia Horticulturae, Volume 121, Issue 4, 4 August 2009, Pages 462-467, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.02.022.
(http://www.sciencedirect.com/science/article/B6TC3-4VY16GH-3/2/400eefe67a0cb48bd58fc0c38f148f6a)
Abstract:
The effect of 12C6+ heavy ions bombardment on mutagenesis in Salvia splendens Ker-Gawl. was studied. Dose-response studies indicated that there was a peak of malformation frequency of S. splendens at 200 Gy. Abnormal leaf mutants of the bileaf, trileaf and tetraleaf conglutination were selected. Meanwhile, a bicolor flower chimera with dark red and fresh red flower was isolated in M1 generation of S. splendens. Random amplified polymorphic DNA (RAPD) analysis demonstrated that DNA variations existed among the wild-type, fresh and dark red flower shoots of the chimera. The dark red flower shoots of the chimera were conserved and cultivated at a large-scale through micropropagation. MS supplemented with 2.0 mg/L BA and 0.3 mg/L NAA was the optimal medium in which the maximum proliferation ratio (5.2-fold) and rooting rate (88%) were achieved after 6 weeks. Our findings provide an important method to improve the ornamental quality of S. splendens.
Keywords: Salvia splendens Ker-Gawl.; Leaf mutants; Flower color chimera; RAPD; Micropropagation

F. Tatsuzawa, K. Ichihara, K. Shinoda, K. Miyoshi, Flower colours and pigments in Disa hybrid (Orchidaceae), South African Journal of Botany, In Press, Corrected Proof, Available online 3 August 2009, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.06.017.
(http://www.sciencedirect.com/science/article/B7XN9-4WXBTXM-1/2/e12e368eeb8f5f167d72c412f14cd8de)
Abstract:
Flower colours and the composition of pigments in the perianths of five cultivars of Disa orchids were analyzed. Carotenoids were major pigment components in the orange-red flowers of `Dawn Angel'. We identified two types of pigment composition in the red flowered cultivars: `San Francisco' contained more carotenoids and less anthocyanins, while `Marlene' contained more anthocyanins than carotenoids. The red-purple flowered cultivars, only contained slight amounts of carotenoids, and the red-purple colour was attributed to the relatively high density of a cyanidin-based anthocyanin. The importance of the characterization of pigments in the perianths of orchid has been discussed in both breeding for flower colour improvement and chemotaxonomy.
Keywords: Anthocyanin; Carotenoid; Disa; Flower colour; Orchidaceae

Mika Leon-Beck, Moshe Coll, The mating system of the flower bug Orius laevigatus, Biological Control, Volume 50, Issue 2, August 2009, Pages 199-203, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.03.016.
(http://www.sciencedirect.com/science/article/B6WBP-4W0WJ6N-1/2/0b7e6b15e0ac99e3424093f1c303e1bb)
Abstract:
Many studies have examined the reproductive output of Orius species, predaceous biological control agents of several important agricultural pests. Little is known, however, about their mating system. We therefore studied the mating system of Orius laevigatus and examined the

implications of intersexual interactions for the reproduction of this species. Virgin females were never found to lay eggs and copulations shorter than 105 s did not induce egg deposition. Female were found to be monandrous; mated females avoided any additional mating, 1, 7, and 14 days after the first mating. Females deposited significantly fewer eggs in the presence of five virgin males than in their absence. Male copulation and insemination abilities were tested when a virgin male was allowed to copulate sequentially with three virgin females in 1 day or with 1- or 2-day intervals between matings. Results indicated the males to be polygamous: they successfully inseminated all the offered females. Yet the total number of eggs laid by the first female to mate was significantly higher than the number laid by subsequent females. Time elapsed between matings had no significant effect on the reproductive output of the males. Implications of these results for mass rearing and field release of Orius laevigatus are discussed.
Keywords: Biological control; Mass rearing; Monandry; Orius laevigatus; Polygamy; Reproductive biology

G. Molle, M. Decandia, V. Giovanetti, A. Cabiddu, N. Fois, M. Sitzia, Responses to condensed tannins of flowering sulla (Hedysarum coronarium L.) grazed by dairy sheep: Part 1: Effects on feeding behaviour, intake, diet digestibility and performance, Livestock Science, Volume 123, Issues 2-3, August 2009, Pages 138-146, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.11.018.
(http://www.sciencedirect.com/science/article/B7XNX-4V9RHY0-1/2/190f93213b8d8581dc44cfbd65898e6b)
Abstract:
The concentration of condensed tannins (CT) in sulla (Hedysarum coronarium L.) is moderate and overall regarded as beneficial. However, the intake of this forage can reduce diet digestibility, particularly during flowering phase. An experiment was run to assess the effect of CT on feeding behaviour, intake, diet digestibility and performance of dairy sheep rotationally grazing sulla at flowering phase. Twenty-four late-lactating sheep were blocked in two homogeneous groups and submitted to the following treatments: i) twice daily drenching with 200 g/day of a 50% w/v water solution of an anti-tannic substance, polyethylene glycol, group PEG; ii) twice daily drenching with 200 g/day of water, group CON (Control group). All the sheep rotationally grazed as a flock two sulla plots from April to June (8 weeks in total). Sward height, herbage mass, botanical and chemical composition of the herbage were measured at the beginning and the end of each grazing period. The feeding behaviour (3 sheep per group) was continuously monitored for 24 h in 6 weeks using the IGER behaviour recorders. Herbage DM intake (DMI), dietary DM digestibility (DMD) and apparent CP digestibility (CPD) were estimated on 8 sheep per group by the n-alkane method. On average, PEG group had longer total grazing (503 +/- 12 vs 460 +/- 12 min, $P < 0.05$) and eating time (425 +/- 13 vs 391 +/- 13 min, $P < 0.07$) than CON group. Moreover PEG group showed shorter inter-meal intervals (41 +/- 3 vs 52 +/- 3, min, $P < 0.05$) and higher number of daily meals than CT-exposed group (24 +/- 1 vs 19 +/- 1 min, $P < 0.01$). The herbage DMI was not affected by the treatment whereas DMD (74.60 +/- 3.48 vs 58.30 +/- 3.01%), and CPD (60.14 +/- 4.83 vs 38.21 +/- 4.83%) were both increased by PEG administration ($P < 0.05$) confirming the negative effect of sulla CT on these variables. Milk yield tended to be higher in PEG than CON (1331 +/- 45 vs 1205 +/- 59 ml, $P < 0.11$). Milk protein content was similar between groups while milk fat content was higher in CON than PEG ewes (6.61 +/- 0.15 vs 6.11 +/- 0.15%, $P < 0.05$), being the reverse true for milk urea (46.04 +/- 1.27 vs 53.04 +/- 0.76%, $P < 0.001$). To conclude, this experiment shows that when sulla is grazed at flowering as monoculture, dietary CT can exert negative effects on DM and CP apparent digestibility, in this study partially counterbalanced by a better metabolic utilisation of the nutrients up-taken.
Keywords: Hedysarum coronarium; Grazing; Tannins; Sheep; Polyethylene glycol; Milk production

A. Cabiddu, G. Molle, M. Decandia, S. Spada, M. Fiori, G. Piredda, M. Addis, Responses to condensed tannins of flowering sulla (Hedysarum coronarium L.) grazed by dairy sheep: Part 2:

Effects on milk fatty acid profile, Livestock Science, Volume 123, Issues 2-3, August 2009, Pages 230-240, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.11.019.
(http://www.sciencedirect.com/science/article/B7XNX-4VBM4K3-2/2/33344ddbd4fe18baae405a92b8fc8958)
Abstract:
A grazing experiment was undertaken to evaluate the effect of PEG supplementation on the fatty acid composition of milk from Sarda sheep grazing sulla. Twenty-four late-lactating sheep (12 per group), were paired and split into two groups: group control (CON), dosed daily with a quenching gun with 200 ml of water, and group PEG, dosed with 200 ml of a 50/50 w/v water solution of PEG. The sheep grazed two 0.8 ha plots of sulla under a rotational grazing scheme.
The contents of c-9, t-11 CLA and t-11 C18:1 in milk fat were on average 40% higher ($P < 0.01$) in the PEG group than in the CON group. This can be explained by the higher biohydrogenation activity of ruminal bacteria in the PEG group, due to the partial inactivation of the tannins. Odd-branched chain fatty acids (OBCFA) were higher in PEG than in the control group (+ 20%; $P < 0.01$) and this confirms the hypothesis that tannin in sulla reduced ruminal microbial activity. Both linoleic (C18:2 c-9 c-12) and linolenic (C18:3 c-9 c-12 c-15) fatty acids were lower ($P < 0.05$) in milk from PEG, than in the CON-group (- 12% and - 30% for linoleic and linolenic acids, respectively). The mitigating effect on tannins of PEG increased the ratio of [omega]6/[omega]3 by 24%; ($P < 0.01$) and total trans FA content in milk by 20% ($P < 0.01$). In conclusion, condensed tannins in sulla at flowering are conducive to lower c-9, t-11 CLA and t-11 C18:1 but also lower total trans FA, [omega]6/[omega]3 ratio and higher linoleic and linolenic acid.
Keywords: Hedysarum coronarium; PEG; Milk; Sheep; OBCFA; CLA; Tannins

Daiki Mizuta, Takuya Ban, Ikuo Miyajima, Akira Nakatsuka, Nobuo Kobayashi, Comparison of flower color with anthocyanin composition patterns in evergreen azalea, Scientia Horticulturae, In Press, Corrected Proof, Available online 22 July 2009, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.06.027.
(http://www.sciencedirect.com/science/article/B6TC3-4WTRWRS-2/2/1992ba28b0d7ee68cf8381eac78d76e4)
Abstract:
In evergreen azaleas, major anthocyanins were detected from petals of wild species and cultivars by HPLC analysis. Depending on flower color, all samples were divided into three groups: red, purple or white, using the Japan color standard for horticultural plants. The chromatic components a* and b* values of red group samples showed a convergent distribution, whereas those of purple group samples showed a wider distribution. According to the HPLC analysis, red group samples had two to four major anthocyanins, and those of the purple group had two to six major ones. In contrast, no anthocyanins were detected in the white group petals, although anthocyanidins were detected. These results suggest that the anthocyanin constitution of the purple group flowers is more varied than that of the red group flowers, and this wider variety among purple flowers contributes to extending the diversity of flower color in evergreen azalea.
Keywords: Anthocyanin; Evergreen azalea; Flower color; HPLC analysis

P.G. Alizoti, K. Kilimis, P. Gallios, Temporal and spatial variation of flowering among Pinus nigra Arn. clones under changing climatic conditions, Forest Ecology and Management, In Press, Corrected Proof, Available online 19 July 2009, ISSN 0378-1127, DOI: 10.1016/j.foreco.2009.06.029.
(http://www.sciencedirect.com/science/article/B6T6X-4WT39S1-1/2/9bd2c4dd6176a29d3b30fbb3306cda71)
Abstract:
Until recently, the most important factors affecting the economics and genetics of the seed crop from seed orchards were considered to be the timing and duration of flowering, variation in fertility

and the total number of clones used to establish the seed orchards. Change in climatic conditions however is an emerging factor that could prove crucial regarding the timing of flowering and synchronization among clones and thus, the quality and quantity of seed production. The temporal and spatial variation in flowering phenology and the duration of flowering were studied in consecutive years in a Pinus nigra Arn. seed orchard. Sixty plus trees representing the distribution of the species in Northern Greece were used to establish the seed orchard, and nineteen ramets per clone were planted in a honeycomb experimental design in order to avoid kinship. Temporal variation among clones, as well as spatial variation among ramets within clones growing at different sites of the orchard were recorded, for initiation and duration of male and female flowering. The majority of clones were synchronized in dates of flowering during the year with weather conditions close to the long-term climatic conditions, except for a limited number of clones that were precocious or late flowering. The pronounced variability in climatic conditions over the 2 years strongly affected the flowering and synchronization among clones, resulting in almost complete asynchrony during the xerothermic year, which was characterized by a prolonged mean monthly temperature increase of 2.3 [degree sign]C and a water deficit of 53% in a 7-month-period (November to May). These results suggest that one of the effects of a warmer and drier climate may be the lack of flowering synchronization, as pollen shedding might be completed before female conelets reach the phase of receptivity. The restriction of male parentage to a limited number of clones severely violates the panmixia assumption and could result in fertilization failure. The projected climate change for the Mediterranean region could potentially prove detrimental for fertility and flowering synchronization of forest trees, having consequences on the quantity and genetic diversity of the seed crop in seed orchards, and the natural regeneration of forest trees in forest ecosystems due to the reduced percentage of sound seed.
Keywords: Climate change; Floral phenology; Flowering variation; Flowering receptivity; Flowering asynchrony; Pollen shedding; Synchronization; Panmixia; Seed orchard; Quantitative traits; Clonal heritability; Pinus nigra Arn

Yung-Shin Shyu, Jau-Tien Lin, Yuan-Tsung Chang, Chia-Jung Chiang, Deng-Jye Yang, Evaluation of antioxidant ability of ethanolic extract from dill (Anethum graveolens L.) flower, Food Chemistry, Volume 115, Issue 2, 15 July 2009, Pages 515-521, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.12.039.
(http://www.sciencedirect.com/science/article/B6T6R-4V74VMK-C/2/e591d9c68fc4d220fba96bb39b4de9e1)
Abstract:
Antioxidant activities of ethanolic extract from dill flower and its various fractions were evaluated with 2,2-diphenyl-1-picrylhydrazyl radical scavenging, Trolox equivalent antioxidant capacity, reducing power, chelating power, and [beta]-carotene bleaching assays. The flower extract was successively separated into n-hexane, ethyl acetate and ethanol soluble fractions by liquid-liquid partition. Dill leaf and seed extracts were used for comparison. In all assays, the flower extract showed higher antioxidant activity than the leaf and seed extracts. With regard to various fractions of the flower extract, the sequence for antioxidant activity was ethyl acetate fraction > ethanol fraction > original flower extract > n-hexane fraction. Phenols including flavonoids and proanthocyanidins should be responsible for antioxidant abilities of the flower extract. Chlorogenic acid, myricetin, and 3,3',4',5,7-pentahydoxyflavan (4 --> 8)-3,3',4',5,7-pentahydoxyflavan were the major phenolic acid, flavonoid, and proanthocyanidin, respectively, in the dill flower extract.
Keywords: Antioxidant; Flavonoid; Proanthocyanidin; Phenol; Anethum graveolens L.; Dill flower

J.W. Patrick, F.L. Stoddard, Physiology of flowering and grain filling in faba bean, Field Crops Research, In Press, Corrected Proof, Available online 3 July 2009, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.005.

(http://www.sciencedirect.com/science/article/B6T6M-4WNPDJR-2/2/a06a86c8460e272a987504cb73c9aa8e)
Abstract:
The development of flowers and then that of seeds are key processes in the formation of yield in faba bean (Vicia faba L.), as in other grain legumes. Winter faba bean generally has a quantitative vernalization requirement, allowing flowering to occur at a lower node than in unvernalized plants. Some germplasm is day-neutral, other germplasm is long-day with a critical daylength between 9.5 and 12 h. Progress toward flowering follows a conventional thermal-time model, with 830-1000 [degree sign]C-d above 0 [degree sign]C required for the onset of flowering and an optimum temperature of 22-23 [degree sign]C. Flowers may abscise from the crop because of lack of pollination, because proximal flowers on the same raceme are fertilized, because of vegetative-reproductive competition for assimilate, or because of stresses such as drought.
The large seed size of faba bean has enabled this species to be a model for studies of the molecular physiology of seed development. Seed filling in the retained pods proceeds through well defined pre-storage and storage phases. During the pre-storage phase, cell expansion occurs mostly in the endosperm and seed coat while the embryo is in a cell division phase. Extracellular invertase from the inner cell layers of the seed coat acts on sucrose unloaded from the phloem, ensuring that the rapidly dividing embryo cells are bathed in hexose-rich fluid. With further development of the embryo, endosperm sugar levels become depleted and the embryo relies more directly on nutrients released by the seed coat. In the transition to the storage phase, the cotyledon cells expand, synthesize storage proteins and starch, and undergo endopolyploidization. Thin-walled parenchyma cells in the seed coats differentiate into transfer cells and the enhanced area of plasma membrane results in increased nutrient flow to the rapidly growing embryo. Release of sucrose and potassium into the seed apoplasm is energy-coupled through a plasma membrane H+-ATPase and a sucrose/H+-antiport. Subsequent radial transfer of nutrients to the storage parenchyma cells of the cotyledons follows a symplastic pathway through numerous plasmodesmata. Cotyledon cell expansion stops when the mechanical restraints of the seed coat and space within the pod cavity are met. It is now possible to identify genes for manipulation that may make seed setting and final seed size less susceptible to environmental stresses.
Keywords: Vernalization; Photoperiod; Thermal time; Transfer cells; Seed filling; Sucrose/H+ antiport; Embryo; Endosperm; Seed coat; Vicia faba

Arpad S. Nyari, A. Townsend Peterson, Nathan H. Rice, Robert G. Moyle, Phylogenetic relationships of flowerpeckers (Aves: Dicaeidae): Novel insights into the evolution of a tropical passerine clade, Molecular Phylogenetics and Evolution, In Press, Corrected Proof, Available online 2 July 2009, ISSN 1055-7903, DOI: 10.1016/j.ympev.2009.06.014.
(http://www.sciencedirect.com/science/article/B6WNH-4WNGW84-1/2/6a821db5f361a5f1160e9efef36331ed)
Abstract:
Understanding the relationships and evolution of flowerpeckers has been challenging, particularly as no phylogenetic study has as yet assessed the group. Here, we present a first such analysis of this clade based on sequences of two mitochondrial genes and one nuclear intron. Our analyses offer strong support for monophyly of the Dicaeidae. Within the family, 4 Dicaeum species (D. chrysorrheum, D. melanoxanthum, D. agile, and D. everetii) had closer affinity to Prionochilus, although tests of alternative topologies could not reject reciprocal monophyly of the two genera. Across the family, overall bill shape trends from more stout bills basally to more slender and medium bills, whereas sexual dichromatism and plumage patterns show much more homoplasy. Taxonomically, generic allocations may need to be changed to reflect historical relationships better.
Keywords: Dicaeidae; Dicaeum; Prionochilus; Flowerpeckers; Molecular phylogeny; Monophyly; Taxonomy; Morphological evolution

M.L. Alcaraz, J.I. Hormaza, Selection of potential pollinizers for `Hass' avocado based on flowering time and male-female overlapping, Scientia Horticulturae, Volume 121, Issue 3, 2 July 2009, Pages 267-271, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.02.001.
(http://www.sciencedirect.com/science/article/B6TC3-4VRWNRN-3/2/a208401134af9240623600118f4ff084)
Abstract:
Avocado production is dependent on the singular synchronous protogynous dichogamy of the species that promotes outcrossing. With the objective of selecting potential pollinizer avocado genotypes for `Hass', the most important avocado cultivar worldwide, we have monitored during two consecutive years the flowering phenology of 27 avocado genotypes in South-eastern Spain. The average length of the flowering season was 45 days ranging from 18 days for `Harvest' to 50 days for `Fuerte'. The earliest genotypes to flower were `Fuerte' and `Shepard' that started blooming during the third week of March. The latest genotypes to flower were `Colin V-33', `Adi', `OA184' and `Harvest', which started blooming in the second week of April. `Hass' blooming lasted 30 days, from the first week of April until the second week of May. Since a good pollinizer must present not only an overlapping in the flowering season but also an overlapping in sexual stages with the pollinated cultivar, a group of 12 genotypes (`Hass', `Fuerte' and 10 genotypes producing `Hass-like' fruit with good overlapping in the flowering season with `Hass') was studied with more detail determining daily the stages of male and female overlapping every 2 h. Results herein indicate that `Marvel' and `Nobel' showed a high sexual overlapping with `Hass'. Taking into account the flowering phenology, the overlapping in sexual stages and the fruit set obtained with hand-pollinated flowers in the field, those two genotypes could be an interesting alternative to the current use of `Fuerte' as pollinizer for `Hass' in South-eastern Spain.
Keywords: Bloom; Dioecy; Lauraceae; Persea americana; Pollination

L. Soler, J. Cuevas, Early flower initiation allows ample manipulation of flowering time in cherimoya (Annona cherimola Mill.), Scientia Horticulturae, Volume 121, Issue 3, 2 July 2009, Pages 327-332, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.02.005.
(http://www.sciencedirect.com/science/article/B6TC3-4VS3P5B-2/2/3a6a268e549676071d9cfec2858b0f78)
Abstract:
Flower initiation date and readiness to flowering in buds of different age were studied in `Fino de Jete' cherimoya (Annona cherimola) cultivar in order to establish the limits for the manipulation of its flowering date. Flower initiation was analyzed by light and scanning electron microscopy (SEM) collecting axillary buds from May to the following February, whereas the bud readiness to produce perfect flowers was determined by forcing buds of different age to sprout by means of leaf removal and tipping the new growth. SEM images confirm that cherimoya buds are differentiated into flowers almost a year before blooming. In this regard, axillary buds have already formed the sepals when the subtending leaf has just begun unfolding (week 0), while the petals are clearly visible in 1-week-old buds. Sectioning of paraffin-embedded buds illustrate that cherimoya buds are in fact a bud complex that 1 week after its inception comprises 4-5 buds of different size of which the two largest ones are reproductive, while the 2-3 smallest buds often remain undifferentiated at that time. The high capacity of flowering expressed by young buds that have been forced to grow proves that cherimoya meristems are early competent for flowering. No differences in fertility or in the time needed to reach anthesis after leaf removal were found among buds of different ages. Node position had no effect on bud break and flowering potential. The early flower initiation in cherimoya deduced from this work opens a wide temporal window for the experimental manipulation of flowering and harvest dates in this crop.
Keywords: Annona cherimola; Flower initiation; Bud complex; Defoliation; Out of season crop

Bayzid Yousefi, Seyed Reza Tabaei-Aghdaei, Farrokh Darvish, Mohammad Hassan Assareh, Flower yield performance and stability of various Rosa damascena Mill. landraces under different ecological conditions, Scientia Horticulturae, Volume 121, Issue 3, 2 July 2009, Pages 333-339, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.02.004.
(http://www.sciencedirect.com/science/article/B6TC3-4VRWNRN-1/2/d18c9f40241f4b518a607d022d23aaae)
Abstract:
The flower yield stability of Damask rose as an important medicinal and aromatic plant at different environments has not been well documented. In order to evaluate flower yield and stability, 35 landraces of Damask rose were studied at 8 locations in Iran during 2007-2008. Analysis of variance revealed significant differences ($p <= 0.01$) among landraces (G), environments (E), locations (L) and for landrace x environment (GE) and landrace x location (GL) interactions. Both GE and GL interactions were mainly crossover, a large portion of which was accounted for by non-linear (unpredictable) component. The landraces of IS9, YZ2, WA1, IS7 and IS1 with 3120.63, 2941.63, 2894.62, 2769.15 and 2716.92 kg/ha respectively produced the highest flower yield among studied landraces. Kerman with average flower yield of 3635.46 kg/ha produced the highest yield among studied locations. According to the results, most of landraces that originated from temperate, warm temperate and arid regions produced higher flower yield than those from cool, cool temperate, semi-arid and humid regions. The landraces of YZ2, IS5, IS8, IS4, KZ1, AR1, IS3 and BA1 were stable and YZ2, IS5, IS8, IS4, KZ1, AR1 IS6, IS3, BA1, IS10 and YZ1 were adaptable landraces for flower yield according to Eberhart and Russell (1966) model. The presence of some high flower yield and stable landraces such as YZ2 and IS5 suggests that a genotype can demonstrate high flower yield and stability for yield simultaneously. Thus, simultaneous selection for flower yield and stability using nonparametric methods could be possible. In addition, taking into consideration flower yield and stability potential, the landraces of YZ2, IS5, IS8, IS4 and KZ1 as general stable, adaptable, and high flower yield are recommended. Furthermore, the landraces of IS9 and WA1 as high flower yield and specific adaptable landraces can be recommended for temperate and arid areas and the landraces of IS7 and IS1 for semitemperate and cool areas.
Keywords: Damask rose (Rosa damascena Mill.); Flower yield; Stability analysis; Adaptability

Jan Thiele, Rikke B. Jorgensen, Thure P. Hauser, Flowering does not decrease vegetative competitiveness of Lolium perenne, Basic and Applied Ecology, Volume 10, Issue 4, July 2009, Pages 340-348, ISSN 1439-1791, DOI: 10.1016/j.baae.2008.04.002.
(http://www.sciencedirect.com/science/article/B7GVS-4SSP7BN-G/2/042d98bfdd8f9ba5dbd52b161abf4732)
Abstract:
The theory of life-history evolution commonly assumes a trade-off between sexual and vegetative reproduction. Hence, production of flowers and fruits should have measurable costs in terms of reduced vegetative growth. This trade-off may be meaningful for breeding of forage and turf grasses as reduced flowering could free resources and increase productivity. But if so, less-flowering cultivars might be more competitive and invade natural swards. We tested for costs of sexual reproduction on vegetative propagation and competitiveness of the perennial grass Lolium perenne, one of the most important forage and turf grasses worldwide. We used the differences in vernalisation requirement between northern and southern European provenances to manipulate the degree of flowering. Over three growing seasons, we counted the number of flower stems and measured the clone diameter. The vernalisation treatments were successful in producing clones with largely differing degrees of flowering. However, we found no negative correlation between flowering and vegetative propagation and competitiveness. Early and strongly flowering southern provenances showed less clonal growth and higher mortality, but within provenances the response of clone diameter to flowering was positive or neutral. We conclude that investment of resources

into flowering has no measurable costs on vegetative propagation and competitiveness of L. perenne. The apparent lack of costs of sexual reproduction could be explained by bet-hedging strategy that is focused on survival and growth rather than reproductive effort in order to maximise the life-time fitness.
Keywords: Allocation trade-off; Bet-hedging; Clonal propagation; Costs of sexual reproduction; Forage productivity; Invasion; Plant breeding; Turf grass; Vernalisation

Jin Chen, Miaogen Shen, Xiaolin Zhu, Yanhong Tang, Indicator of flower status derived from in situ hyperspectral measurement in an alpine meadow on the Tibetan Plateau, Ecological Indicators, Volume 9, Issue 4, July 2009, Pages 818-823, ISSN 1470-160X, DOI: 10.1016/j.ecolind.2008.09.009.
(http://www.sciencedirect.com/science/article/B6W87-4TXDXK7-1/2/f693d801aa19fff9b130b1ab0b0ef5c7)
Abstract:
Flowering status including flowering date and flower amount could reflect ecological process in assessing plant phenological response to global warming. However, little information is available so far for monitoring flowering status through remote sensing. To provide an ecological indicator for monitoring plant phenology from remotely sensed data, we conducted a field survey in an alpine meadow on the Tibetan Plateau where flower color in July is dominantly yellow due to flowering of Halerpestes tricuspis (Ranunculaceae). We used flower coverage to indicate the flowering status of this species and proposed a flower index derived from in situ hyperspectral data (HFI) to estimate the flower coverage. Results demonstrate that the flower coverage of H. tricuspis can be estimated with high accuracy from the hyperspectral measurements. The indicating ability was further improved when the flower coverage was higher than 0.10 or the fractional coverage of soil was low or known in advance. A simulation also shows that a quadrat or pixel with flower coverage higher than 0.066 can be detected with existence of flower by HFI if soil fraction is less than 50%. These results indicate that HFI is applicable for estimating flower coverage of this species from hyperspectral measurement. The study suggests that the hyperspectral remote sensing technique can be applied for monitoring flowering status, and therefore the technique can provide an important ecological indicator for monitoring plant phenology.
Keywords: Flower coverage; Flowering status; Halerpestes tricuspis; Hyperspectral remote sensing; Tibetan Plateau

Ali Mahjoub, Michel Hernould, Jerome Joubes, Alain Decendit, Mohamed Mars, Francois Barrieu, Said Hamdi, Serge Delrot, Overexpression of a grapevine R2R3-MYB factor in tomato affects vegetative development, flower morphology and flavonoid and terpenoid metabolism, Plant Physiology and Biochemistry, Volume 47, Issue 7, July 2009, Pages 551-561, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2009.02.015.
(http://www.sciencedirect.com/science/article/B6VRD-4VT5TJ6-2/2/68a6b480e928685505d5757ab2f892e2)
Abstract:
Although the terpenoid pathway constitutes, with the phenylpropanoid metabolism, the major pathway of secondary metabolism in plants, little is known about its regulation. Overexpression of a Vitis vinifera R2R3-MYB transcription factor (VvMYB5b) in tomato induced pleiotropic changes including dwarfism, modified leaf structure, alterations of floral morphology, pigmented and glossy fruits at the 'green-mature' stage and impaired seed germination. Two main branches of secondary metabolism, which profoundly influence the organoleptic properties of the fruit, were affected in the opposite way by VvMYB5b overexpression. Phenylpropanoid metabolism was down regulated whereas the amount of beta-carotene was up regulated. This is the first example of the independent regulation of phenylpropanoid and carotenoid metabolism. The strongest modification concerns a decrease in beta-amyrin, the precursor of the oleanolic acid, which is the major

component of grape waxes. Scanning electron microscopy analysis of fruits and leaves confirms the alteration of wax metabolism and a modification of cell size and shape. This may potentially impact resistance/tolerance to biotic and abiotic stresses. The results are compared with a similar approach using heterologous expression of VvMYB5b in tobacco.
Keywords: Flavonoids; Grapes ripening; R2R3-MYB transcription factor; Terpenoids; Wax

Paulina Glazinska, Agnieszka Zienkiewicz, Waldemar Wojciechowski, Jan Kopcewicz, The putative miR172 target gene InAPETALA2-like is involved in the photoperiodic flower induction of Ipomoea nil, Journal of Plant Physiology, In Press, Corrected Proof, Available online 27 June 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.05.011.
(http://www.sciencedirect.com/science/article/B7GJ7-4WMD2DK-1/2/42bd079f339c33953e1f5b57cca7dc75)
Abstract:
The miR172 gene is involved in the regulation of flowering time and floral organ identity in Arabidopsis thaliana through regulation of APETALA2 (AP2)-like genes' activity. AP2 plays critical roles in establishing meristem and organ identity during floral development. Additionally, the AP2-like genes including TARGET OF EAT1 (TOE1), TOE2, SMZ, SNZ are involved in the timing of flowering in Arabidopsis thaliana. In our study, a full-length cDNA encoding InAP2-like transcription factor was isolated from cotyledons of morning glory (Ipomoea nil named also Pharbitis nil), a model short day plant. The identified sequence shows significant similarity to the cDNA of TOE1 from Arabidopsis thaliana and contains nucleotides complementary to miR172. Semi-quantitative RT-PCR analysis and in situ hybridization showed that the accumulation of InAP2-like transcripts was high, especially in cotyledons of 5-d-old seedlings. During the 16 h-long inductive night, an increase in the expression of InAP2-like and a decrease in the accumulation of miR172 were observed. Auxin and ethylene treatment, as well as a 'night-break', which completely eliminated flowering induction of Ipomoea nil, caused a decrease in the InAP2-like mRNAs levels in cotyledons of Ipomoea nil. These results suggest the potential involvement of miR172 and InAP2-like in the mechanism of flowering induction in Ipomoea nil.
Keywords: Flowering; InAPETALA2-like; Ipomoea nil; miR172

Bo Chen, Ochieng A. Adimo, Zhiyi Bao, Assessment of aesthetic quality and multiple functions of urban green space from the users' perspective: The case of Hangzhou Flower Garden, China, Landscape and Urban Planning, In Press, Corrected Proof, Available online 25 June 2009, ISSN 0169-2046, DOI: 10.1016/j.landurbplan.2009.06.001.
(http://www.sciencedirect.com/science/article/B6V91-4WM04VT-2/2/df63187ec83bd1d24e9c87ba79907117)
Abstract:
This paper presents results of an attempt to evaluate aesthetic quality (visual, auditory, tactile and olfactory factors) of urban green space comprehensively, and assesses a proposed systematic simulation assessment approach for estimating near view scenic beauty. Quantitative holistic evaluation techniques were used. On-the-spot survey technique was employed by administering questionnaires to selected respondents who were also provided visual photo stimuli for evaluation. The photos were taken and presented to respondents in a defined and systematic way. The photo-based assessments gave no statistically significant difference ($P < 0.05$) in terms of the evaluated average visual quality among the panels. This suggested that the proposed approach for systematic simulation assessment allowed for only expected random variation to be measured, thus the panel was not a source of variability. Salient and non-salient features were captured as reflected by significant differences ($P < 0.05$) in different scenes. There was strong indication that the respondents had different expectations of what a functional urban green space should be in terms of auditory, tactile, olfactory and visual quality, and general recreational needs.

Keywords: Urban green space; Aesthetic assessment; Human natural perspective; Photograph method

Veronica Andrea Fernandez, Leonardo Galetto, Julia Astegiano, Influence of flower functionality and pollination system on the pollen size-pistil length relationship, Organisms Diversity & Evolution, Volume 9, Issue 2, 25 June 2009, Pages 75-82, ISSN 1439-6092, DOI: 10.1016/j.ode.2009.02.001.
(http://www.sciencedirect.com/science/article/B7GJ9-4WDG798-2/2/a921f5f3a01d2d174554d8c925dae7c2)
Abstract:
Twenty-five biotically pollinated plants of the Chaco Serrano Forest (Cordoba, Argentina) were studied in order to analyze whether `flower functionality' is related to the relationship between pollen size and pistil length. Because flower functionality may act on the respective mean values of pollen size and pistil length rather than on intraspecific variation in these traits, we expected (1) a high positive correlation between pollen size and pistil length in a set of sympatric species, independent of their degree of pollination specialization or generalization; and (2) no interspecific correlation between the coefficients of variation (CVs) of those traits. On the other hand, on the assumption that pollinators are influencing the variation in floral traits (e.g. in pistil length) we expected lower mean phenotypic variation of pollen size and pistil length in pollination-specialist plants than in pollination-generalist ones. A positive correlation between pollen size and pistil length was found for the set of species, but not between the CVs of these traits. This trend was maintained when pollination-specialist plants were analyzed separately, but no statistical significance was obtained for the correlation in pollination-generalist plants. Contrary to our expectations, pollination-specialist plants did not show less mean intraspecific variation in floral traits than pollination-generalist plants. Therefore, the relationship between pollen size and pistil length among species suggests that the pollination system may be of less importance as a selective force than flower functionality.
Keywords: Coefficient of variation; Functional correlation; Pistil length; Pollen size; Pollination systems; Pollinators

Jolanta Nazaruk, Flavonoid compounds from Cirsium palustre (L.) Scop. flower heads, Biochemical Systematics and Ecology, In Press, Corrected Proof, Available online 21 June 2009, ISSN 0305-1978, DOI: 10.1016/j.bse.2009.05.012.
(http://www.sciencedirect.com/science/article/B6T4R-4WK3YP0-1/2/362700c83eece1fe81581e06eaa5e78c)
Keywords: Cirsium palustre; Asteraceae; Flavonoids

Hideo Ezoe, Nami Washizu, Effect of stochasticity in the availability of pollinators on the resource allocation within a flower, Journal of Theoretical Biology, Volume 258, Issue 4, 21 June 2009, Pages 630-636, ISSN 0022-5193, DOI: 10.1016/j.jtbi.2009.02.011.
(http://www.sciencedirect.com/science/article/B6WMD-4VPV5P4-1/2/744d00e3420f07bf901e857de52a4066)
Abstract:
In this article, we develop a simple model to study the effect of stochasticity in pollination on evolutionarily stable (ES) resource allocation within a hermaphrodite flower of animal-pollinating plants. For simplicity, we consider trade-off in resource allocation between attractive structure (petals etc.) and female function (seeds and fruits) with neglecting the amount of resource allocated to male function (pollens and stamens). We show that ES resource allocation does not much depend on the detail of the probability distribution of the number of pollinator visit on a flower, but on the probability that a flower fails to be visited. We also find that: (1) When the flowers are self-incompatible, the ES allocation to the attractive structure monotonically increases

as the availability of pollinators in the environment decreases. (2) When there is strong positive correlation among flowers in the number of pollinator visit, the ES allocation is larger than the case without the correlation. (3) When the flowers are self-compatible and engage prior selfing, the ES allocation monotonically increases as the availability of pollinators in the environment decreases to a threshold, under which it suddenly decreases to zero.
Keywords: Animal pollination; Attractive structure; Pollen dynamics; Pollen limitation; Sex allocation theory

Elly Kesumawati, Munetaka Hosokawa, Takushi Kimata, Tatsuya Uemachi, Susumu Yazawa, Flower greening in phytoplasma-infected Hydrangea macrophylla grown under different shading conditions, Scientia Horticulturae, Volume 121, Issue 2, 17 June 2009, Pages 199-205, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.01.025.
(http://www.sciencedirect.com/science/article/B6TC3-4VKDGXM-2/2/c3ab192aa97ac0fb3a31e75a39ce3b31)
Abstract:
To determine the effect of light intensity on flower greening, the Japanese hydrangea phyllody (JHP) phytoplasma-infected hydrangea cultivars `Midori', `Libelle', `Rosea' and `Madame E. Mouillere' plants were grown under different shade conditions. In the first-year experiment, the results indicate that the flowers of the JHP-phytoplasma-infected hydrangea become green under shaded conditions (70% and 49% sunlight intensities). On the other hand, under full sunlight intensity (100% sunlight intensity), the flowers of `Midori', `Rosea', and `Libelle' plants were blue, pink or white. To calculate the percentage of flower greening, inflorescences of these plants were separated and divided into individual flowers, and classified into four types by green-area ratio, calculated using Adobe Photoshop. Under shading with one sheet of cheesecloth (70% sunlight intensity), the inflorescences of `Midori', `Libelle' and `Madame E. Mouillere' plants were composed of more than 40% completely green flowers (0.8 [less-than over equal to] green-area ratio), whereas those of `Rosea' plant had 0% completely green flowers. Under shading with two sheets of cheesecloth (49% sunlight intensity), the inflorescences of `Midori', `Libelle' and `Madame E. Mouillere' plants had more than 75% completely green flowers; `Rosea' plants had 28%. In the second-year experiment, under full sunlight intensity, `Midori' plants had four types of flower depending on their green-area ratio, namely, completely blue or pink, pink-green, greenish and completely green flowers. Under shading with two sheets of cheesecloth, `Midori' plants had more than 90% completely green flowers. The JHP-phytoplasma could not be identified by PCR analysis in flowers with a green-area ratio = 0 (completely blue/pink/white flowers). On the other hand, in flowers with a green-area ratio > 0, the JHP-phytoplasma was detected by PCR analysis. Thus, we conclude that shading enhances flower greening in hydrangea by increasing the JHP-phytoplasma concentration in the flowers.
Keywords: Hydrangea; Saxifragaceae; Light intensity; Flower greening; JHP-phytoplasma; Polymerase chain reaction (PCR); Green-area ratio

Saneyuki Kawabata, Mihoshi Yokoo, Kaeko Nii, Quantitative analysis of corolla shapes and petal contours in single-flower cultivars of lisianthus, Scientia Horticulturae, Volume 121, Issue 2, 17 June 2009, Pages 206-212, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.01.024.
(http://www.sciencedirect.com/science/article/B6TC3-4VJS6YD-2/2/ef87d8f494dfd13ce284a2ff1ad31c46)
Abstract:
The shape of the corolla was quantitatively evaluated in 216 cultivars of lisianthus by the use of elliptic Fourier descriptors followed by principal component (PC) analysis. The corolla's shape could be described by using the first and second PC scores, which corresponded to the corolla opening angle and the curvature of the corolla contour, respectively. The scatter plot of these PC scores for all 216 cultivars showed a continuous distribution, rather than any obvious clusters.

Using these two parameters, four typical shapes of the corolla could be reconstructed: funnel-shape, bell-shape, shallow-bowl-shape, and cup-shape. Based on this analysis, 8 cultivars representing these four corolla shapes were chosen for the analysis of petal shapes. The petal shapes could be described by using the first and second PC scores representing the petal width and the position of the weighted center, respectively. The first PC was high in funnel- and bell-shaped cultivars, and low in shallow-bowl- and cup-shaped cultivars. The second PC tended to be lower in cup-shaped cultivars than shallow-bowl-shaped cultivars. However, petal shapes could not be discriminated between bell- and funnel-shaped cultivars. The data suggested a close correlation between shapes of individual petals and overall corolla shapes at anthesis, but that some cultivars have the similar petal contours with different three-dimensional curvature.
Keywords: Elliptic Fourier descriptor; Eustoma grandiflorum; Petal shape; Three-dimensional shape

Maorun Fu, Zhiping He, Yuying Zhao, Jing Yang, Linchun Mao, Antioxidant properties and involved compounds of daylily flowers in relation to maturity, Food Chemistry, Volume 114, Issue 4, 15 June 2009, Pages 1192-1197, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.10.072.
(http://www.sciencedirect.com/science/article/B6T6R-4TVTJWR-6/2/4fd0e1cabe026fecad43b9b83e8adc76)
Abstract:
The antioxidant properties of methanol extracts from daylily flowers during maturation were determined with antioxidant assays, including antioxidant activity, DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging, superoxide anion radical scavenging and reducing power. Antioxidant compounds, such as phenolic compounds, ascorbic acid and [beta]-carotene were also analysed. Significant variation in antioxidant properties and involved compounds was observed between different maturity stages of daylily flowers. The highest antioxidant activity was observed at stage III (flower opening) accompanying the highest content of ascorbic acid and phenolic compounds, while no significant difference of [beta]-carotene contents was observed among the four maturity stages. Four individual phenolics, such as (+)-catechin, chlorogenic acid, rutin and quercetin were identified and quantified by HPLC. (+)-Catechin was the main phenolic compound identified in daylily flowers, accounting for about 74.11% of total phenolics. Overall, daylily flowers at opening stage possess the highest functional benefit and thus would be the appropriate harvesting stage in view of the nutritional consideration.
Keywords: Daylily; Maturity; Antioxidant properties; Phenolic compounds

Tzong-Der Way, Hui-Yi Lin, Kuo-Tai Hua, Jang-Chang Lee, Wen-Hsin Li, Maw-Rong Lee, Chung-Hsiang Shuang, Jen-Kun Lin, Beneficial effects of different tea flowers against human breast cancer MCF-7 cells, Food Chemistry, Volume 114, Issue 4, 15 June 2009, Pages 1231-1236, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.10.084.
(http://www.sciencedirect.com/science/article/B6T6R-4TX33V1-1/2/7e5ccee1e3349e5ead46fb7233a65fae)
Abstract:
Tea is a popular beverage with health benefits. The enriched tea polyphenols including catechins have been reported to perform anti-cancer, anti-oxidant, anti-inflammatory and anti-bacterial activity. In this study, we compared the levels of catechins and caffeine in tea flowers from six different species of Camellia japonica, Camellia tenuifolia, Camellia oleifera, 2 savoury Camellias and Camellia sinensis. C. sinensis detected a variety of catechins, while only (+)-catechin and (-)-epicatechin can be detected by the isocratic HPLC system in other tea flowers. The total catechin content was also lower in these tea flowers. In addition, the water extract of tea flowers was used to test the biological functions including anti-proliferative and apoptotic effects in human breast cancer MCF-7 cells. The water extract of C. sinensis remained most active among six different species using both MTT assays and the cleavage analysis of apoptosis-related molecules, PARP

and Bid. The major bioactivity of C. sinensis comes from (-)-epigallocatechin-3-gallate and (-)-epigallocatechin, not detected in other five species. Interestingly, we found that C. tenuifolia still had potent bioactivity. It is likely that bioactive molecules other than catechins exist in C. tenuifolia.
Keywords: Tea flowers; Tea leaves; Catechins; Caffeine; MCF-7

Jeong-Sun Lee, Song-Hae Bok, Seon-Min Jeon, Hye-Jin Kim, Kyung-Min Do, Yong-Bok Park, Myung-Sook Choi, Antihyperlipidemic effects of buckwheat leaf and flower in rats fed a high-fat diet, Food Chemistry, In Press, Corrected Proof, Available online 13 June 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.06.014.
(http://www.sciencedirect.com/science/article/B6T6R-4WHFDB3-4/2/c3e1f5b9565b0909b19d2850605a9c15)
Abstract:
This study was conducted to investigate the hypolipidemic effects of a powdered whole buckwheat leaf and flower mixture in rats fed a high-fat diet. Male Sprague-Dawley rats were divided into three groups: normal control (NC), high-fat (HF), and high-fat supplemented with a mixture of powdered buckwheat leaf and flower (BLF; 5%, wt/wt) groups. The plasma total cholesterol and triglyceride concentrations were significantly lower in the BLF group than in the other groups. Hepatic cholesterol and triglyceride values of the BLF group were similar to those of the NC group. This plant part mixture elevated the faecal triglyceride and acidic sterol level in the BLF group. The result suggest that the beneficial effect of this buckwheat plant portion on plasma and hepatic lipid profiles in high-fat fed rats is partly mediated by higher excretion of faecal lipids and synergistic effect of phenolic compounds and fibre present in the BLF.
Keywords: Buckwheat leaf and flower; Hypolipidemic effect; High-fat diet; Adipose tissue

Pat Willmer, Dara A. Stanley, Karin Steijven, Iain M. Matthews, Clive V. Nuttman, Bidirectional Flower Color and Shape Changes Allow a Second Opportunity for Pollination, Current Biology, Volume 19, Issue 11, 9 June 2009, Pages 919-923, ISSN 0960-9822, DOI: 10.1016/j.cub.2009.03.070.
(http://www.sciencedirect.com/science/article/B6VRT-4W62RGG-5/2/3038988e1ca2dae132c0d6edb358ac88)
Abstract: Summary
Flowers act as 'sensory billboards' with multiple signals (color, morphology, odor) attracting and manipulating potential pollinators [1]. Many use changing signals as indicators that visitation and/or pollination have occurred [2] and [3]). Floral color change is commonly used to transmit this information [3], [4], [5], [6] and [7] (often correlated with reduced nectar reward [8] and [9]) and can be specifically triggered by pollination or visitation. By retaining color-changed flowers, plants benefit from larger floral displays but also indicate at close range which flowers are still rewarding (and still unpollinated), so that visitors forage more efficiently [5] and [6]. However, the legume Desmodium setigerum shows a unique ability, if inadequately pollinated, to reverse its flowers' color and shape changes. Single visits by bees mechanically depress the keel and expose stigma and anthers (termed 'tripping'); visits also initiate a rapid color change from lilac to white and turquoise and a slower morphological change, the upper petal folding downwards over the reproductive parts. But flowers receiving insufficient pollen can partially reopen, re-exposing the stigma, with a further color change to deeper turquoise and/or lilac. Thus, most flowers achieve pollination from one bee visit, but those with inadequate pollen receipt can reverse their signals, earning a 'second chance' by eliciting attention from other potential pollinators.
Keywords: EVO_ECOL

Heather M. Whitney, Lars Chittka, Toby J.A. Bruce, Beverley J. Glover, Conical Epidermal Cells Allow Bees to Grip Flowers and Increase Foraging Efficiency, Current Biology, Volume 19, Issue 11, 9 June 2009, Pages 948-953, ISSN 0960-9822, DOI: 10.1016/j.cub.2009.04.051.

(http://www.sciencedirect.com/science/article/B6VRT-4W929HC-3/2/efa42c26174017e27083b41f40910a8a)
Abstract: Summary
The plant surface is by default flat, and development away from this default is thought to have some function of evolutionary advantage. Although the functions of many plant epidermal cells have been described, the function of conical epidermal cells, a defining feature of petals in the majority of insect-pollinated flowers, has not [1] and [2]. The location and frequency of conical cells have led to speculation that they play a role in attracting animal pollinators [1], [3] and [4]. Snapdragon (Antirrhinum) mutants lacking conical cells have been shown to be discriminated against by foraging bumblebees [4]. Here we investigated the extent to which a difference in petal surface structure influences pollinator behavior through touch-based discrimination. To isolate touch-based responses, we used both biomimetic replicas of petal surfaces and isogenic Antirrhinum lines differing only in petal epidermal cell shape. We show that foraging bumblebees are able to discriminate between different surfaces via tactile cues alone. We find that bumblebees use color cues to discriminate against flowers that lack conical cells--but only when flower surfaces are presented at steep angles, making them difficult to manipulate. This facilitation of physical handling is a likely explanation for the prevalence of conical epidermal petal cells in most flowering plants.
Keywords: EVO_ECOL

Akira Nakatsuka, Masumi Yamagishi, Michiharu Nakano, Keisuke Tasaki, Nobuo Kobayashi, Light-induced expression of basic helix-loop-helix genes involved in anthocyanin biosynthesis in flowers and leaves of Asiatic hybrid lily, Scientia Horticulturae, Volume 121, Issue 1, 2 June 2009, Pages 84-91, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.01.008.
(http://www.sciencedirect.com/science/article/B6TC3-4VJ4FSY-1/2/869138465efd0761798740a2161f284f)
Abstract:
Transcription of anthocyanin biosynthetic genes is usually controlled by transcription factors such as basic-helix-loop-helix (bHLH) and R2R3-MYB. To know the regulatory mechanisms of anthocyanin accumulation in Asiatic hybrid lily (Lilium spp.), cDNA clones encoding bHLH transcription factors were isolated from tepals and their expression was examined in this study. This is the first report about cDNAs for bHLH genes among the species in monocots other than Gramineae. Two cDNAs corresponding to LhbHLH1 and LhbHLH2 genes were isolated; the former encoded the protein having the similarity to AmDELILA and PhJAF13 and the latter one did to PhAN1. LhbHLH1 and LhbHLH2 were expressed in tepals, stems and leaves. In filaments and pistils, only LhbHLH2 was transcribed. During tepal development, transcriptions of LhbHLH genes were always detected, and the peak of LhbHLH2 expression preceded the peak of LhDFR expression. When lily buds were exposed to light, anthocyanin accumulation was induced in leaves and peaked at 4 days after light exposure. The transcription of LhbHLH2 peaked at 2 days after light exposure and decreased after that. LhbHLH1 transcription was affected by light to a lesser extent than LhbHLH2 at 2 days. These expressional changes preceded the change of anthocyanin amount. Similarly in tepals, both anthocyanin amount and the transcription of LhDFR and LhbHLH2 decreased in the dark after 6 days, but LhbHLH1 transcription was not affected. These results suggest that LhbHLH1 and LhbHLH2, especially LhbHLH2, are involved in anthocyanin biosynthesis, and that response to light exposure was different between LhbHLH1 and LhbHLH2.
Keywords: Anthocyanin accumulation; Basic-helix-loop-helix; Lilium spp.; Transcription factor

T.A. Re, D. Mooney, E. Antignac, E. Dufour, I. Bark, V. Srinivasan, G. Nohynek, Application of the threshold of toxicological concern approach for the safety evaluation of calendula flower (Calendula officinalis) petals and extracts used in cosmetic and personal care products, Food and

Chemical Toxicology, Volume 47, Issue 6, June 2009, Pages 1246-1254, ISSN 0278-6915, DOI: 10.1016/j.fct.2009.02.016.
(http://www.sciencedirect.com/science/article/B6T6P-4VPM5HR-1/2/ccec66630aa93b0951994fdea5fb2a7c)
Abstract:
Calendula flower (Calendula officinalis) (CF) has been used in herbal medicine because of its anti-inflammatory activity. CF and C. officinalis extracts (CFE) are used as skin conditioning agents in cosmetics. Although data on dermal irritation and sensitization of CF and CFE's are available, the risk of subchronic systemic toxicity following dermal application has not been evaluated. The threshold of toxicological concern (TTC) is a pragmatic, risk assessment based approach that has gained regulatory acceptance for food and has been recently adapted to address cosmetic ingredient safety. The purpose of this paper is to determine if the safe use of CF and CFE can be established based upon the TTC class for each of its known constituents. For each constituent, the concentration in the plant, the molecular weight, and the estimated skin penetration potential were used to calculate a maximal daily systemic exposure which was then compared to its corresponding TTC class value. Since the composition of plant extracts are variable, back calculation was used to determine the maximum acceptable concentration of a given constituent in an extract of CF. This paper demonstrates the utility and practical application of the TTC concept when used as a tool in the safety evaluation of botanical extracts.
Keywords: TTC; Safety evaluation; Calendula; Cosmetics

Kazuo Ichimura, Hiroko Shimizu-Yumoto, Rie Goto, Ethylene production by gynoecium and receptacle is associated with sepal abscission in cut Delphinium flowers, Postharvest Biology and Technology, Volume 52, Issue 3, June 2009, Pages 267-272, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.12.008.
(http://www.sciencedirect.com/science/article/B6TBJ-4VW91FW-1/2/a2d38179498b14074de06314921ac787)
Abstract:
Delphinium flowers are sensitive to ethylene, and exposure to ethylene is known to accelerate sepal abscission. The relationship of ethylene to sepal abscission in cut Delphinium flowers was investigated. The gynoecium and receptacle each contributed to climacteric-like increases in ethylene production whereas the sepals, petals and stamens did not. 1-Aminocyclopropane-1-carboxylic acid (ACC) concentration, ACC synthase and ACC oxidase activities in the gynoecium and receptacle increased in the senescing flowers. Wounding of the gynoecium or receptacle accelerated abscission of sepals, which was accompanied by a marked increase in ethylene production. Accelerated sepal abscission was counteracted by treatment with silver thiosulphate complex (STS), an inhibitor of ethylene action. The results of this study show that ethylene produced by the gynoecium and receptacle is closely associated with sepal abscission in cut Delphinium flowers.
Keywords: 1-Aminocyclopropane-1-carboxylic acid (ACC); ACC synthase; ACC oxidase; Delphinium; Ethylene; Wounding

Koji Tanase, Koji Tokuhiro, Masayuki Amano, Kazuo Ichimura, Ethylene sensitivity and changes in ethylene production during senescence in long-lived Delphinium flowers without sepal abscission, Postharvest Biology and Technology, Volume 52, Issue 3, June 2009, Pages 310-312, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.12.002.
(http://www.sciencedirect.com/science/article/B6TBJ-4VPKPWC-2/2/b9253e599f3da8a4242ecb749ae82f50)
Abstract:
We investigated changes in ethylene production, sensitivity, effects of ethylene inhibitors and levels of ethylene receptor genes to determine factors responsible for long-lived flowers in a

Delphinium line `B-10'. Flower longevity of `B-10' was clearly longer than that of the control cultivar `Bellamosum', and sepals of `B-10' did not abscise. `B-10' did not show the climacteric-like ethylene production during flower senescence but constitutively produced ethylene from days 0 to 9. The ethylene inhibitors silver thiosulfate (STS) and aminoethoxyvinylglycine (AVG) extended flower longevity in both cultivars. Exogenous ethylene treatment did not affect flower longevity but did increase ethylene production in `B-10'. These results suggest that low sensitivity to ethylene is responsible for long-lived `B-10' flowers, and may suppress climacteric-like ethylene production.
Keywords: Abscission; Delphinium; Ethylene production; Ethylene sensitivity

Ayako Koizumi, Kahori Yamanaka, Shigeyuki Kawano, Carpel development in a floral mutant of dioecious Silene latifolia producing asexual and female-like flowers, Journal of Plant Physiology, In Press, Corrected Proof, Available online 19 May 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.04.004.
(http://www.sciencedirect.com/science/article/B7GJ7-4WB3767-1/2/3c453e7fb9d4cc0f70b50e616a046239)
Abstract: Summary
The genes SlSTM1 and SlSTM2 (orthologs of Arabidopsis SHOOT MERISTEMLESS) and SlCUC (an ortholog of CUP-SHAPED COTYLEDON1 and CUC2) of the dioecious species Silene latifolia have been proposed to control the gynoecium suppression pathway in developing flowers. In a mutant of S. latifolia (K034) that produces no males but only asexual and imperfect female (female-like) flowers, both on the same individual, gynoecia are completely suppressed in asexual flowers and partially suppressed in female-like flowers. To determine whether these two epigenetic phenotypes in gynoecium development are caused by changes in SlSTM and SlCUC expression, we performed in situ hybridization with probes of SlSTM and SlCUC. We found two different pattern of gene expression in flower buds prior to the onset of phenotypic differentiation, which were similar to the reciprocal expression of the two genes described in male and female wild-type plants. In young K034 flower buds, 14.3% of developing structures showed female and the rest male determination. This ratio corresponds to the ratio of female-like to asexual flowers eventually produced by the K034 plants. The same ratio (7-16%) was not only found in the original mutants but also in the first and second backcross generations and in vegetative clones of the original mutant line. Hence, the switch-like and reciprocal SlSTM and SlCUC expression patterns in K034 correspond to the gynoecium suppression patterns in the wild type, suggesting that the mutation(s) responsible for the two mutant genotypes acts upstream of SlSTM and SlCUC.
Keywords: CUP-SHAPED COTYLEDON; Dioecy; Gynoecium development; SHOOT MERISTEMLESS

R.G. Sharp, M.A. Else, R.W. Cameron, W.J. Davies, Water deficits promote flowering in Rhododendron via regulation of pre and post initiation development, Scientia Horticulturae, Volume 120, Issue 4, 19 May 2009, Pages 511-517, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.12.008.
(http://www.sciencedirect.com/science/article/B6TC3-4VCH3KJ-2/2/770da5c9320add81ffad1c956877b09e)
Abstract:
Flowering is generally considered to be advanced by water deficits in many woody perennial species. A long-standing paradigm being that as a plant senses severe environmental conditions resources are diverted away from vegetative growth and towards reproduction before death. It is demonstrated that in Rhododendron flowering is promoted under water deficit treatments. However, the promotion of flowering is not achieved via an increase in floral initiation, but through separate developmental responses. If regulated deficit irrigation (RDI) is imposed prior to the time of initiation, fewer vegetative nodes are formed before the apical meristems switch to floral initiation, and chronologically, floral initiation occurs earlier. Both RDI and partial rootzone drying

(PRD) treatments stimulate the development of more flowers on each inflorescence if the treatments are continued after the plant has undergone floral initiation. However, floral initiation is inhibited by soil water deficits. If the soil water deficit continues beyond the stages of floral development then anthesis can occur prematurely on the fully formed floral buds without a need for a winter chilling treatment. It is hypothesised that inhibition of floral initiation in plants experiencing severe soil water deficits results from the inhibitory action of ABA transportation to the apical meristem from stressed roots. It is demonstrated that ABA applications to well-watered Rhododendron inhibit floral initiation.
Keywords: Water deficits; Rhododendron; Floral initiation; Partial rootzone Drying; Regulated deficit irrigation

Shih-Chuan Liu, Jau-Tien Lin, Chin-Kun Wang, Hsin-Yi Chen, Deng-Jye Yang, Antioxidant properties of various solvent extracts from lychee (Litchi chinenesis Sonn.) flowers, Food Chemistry, Volume 114, Issue 2, 15 May 2009, Pages 577-581, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.088.
(http://www.sciencedirect.com/science/article/B6T6R-4TK92KM-9/2/a4c86fba2d0e6b3b5c45699158ebc872)
Abstract:
The antioxidant capacities of the acetone, methanol and water extracts of hot-air dried lychee (Litchi chinenesis Sonn.) flowers were estimated with Trolox equivalent antioxidant capacity (TEAC) assay, reducing power and 2,2-diphenyl-2-picrylhydrazyl hydrate (DPPH) radical-scavenging assay. The contents of antioxidant components in these extracts were also determined. Results showed that the highest and lowest contents of these components including phenols, flavonoids and condensed tannins were found in acetone and water extracts, respectively. The antioxidant activities of the lychee flower extracts for all assays were in the order: acetone extract > methanol extract > water extract. The contents of antioxidant components in these extracts were correlated with antioxidant activities.
Keywords: Antioxidant; Flavonoid; Lychee flower; Litchi chinenesis Sonn.; Phenol; Tannin

Ziyin Yang, Miwa Sakai, Hironori Sayama, Taku Shimeno, Koji Yamaguchi, Naoharu Watanabe, Elucidation of the biochemical pathway of 2-phenylethanol from shikimic acid using isolated protoplasts of rose flowers, Journal of Plant Physiology, Volume 166, Issue 8, 15 May 2009, Pages 887-891, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.11.001.
(http://www.sciencedirect.com/science/article/B7GJ7-4V64YHK-1/2/b556ec1456a4efa3d58bb76004d689ac)
Abstract: Summary
The isolated protoplasts of rose flowers were used to investigate the metabolic pathway in rose flower leading from shikimic acid or l-phenylalanine (l-Phe) to 2-phenylethanol (2PE), a dominant volatile compound in hybrid roses such as Rosa damascena Mill., R. `Hoh-Jun', and R. `Yves Piaget'. Deuterium-labeled l-Phe ([2H8]l-Phe) was supplied to the protoplasts isolated from R. `Yves Piaget' petals. The volatile end products ([2Hn]-2PE, n=6-8) and their related intermediates ([2Hn]phenylacetaldehyde, n=6-8) were detected in the protoplasts by gas chromatography-mass spectrometry (GC-MS). In addition, we chemically synthesized [2,3,4,5,6-13C5]shikimic acid, a new stable isotopomer, to investigate the formation of 2PE from shikimic acid by GC-MS and nuclear magnetic resonance. We proposed the hypothetical biochemical pathway of 2PE from shikimic acid via chorismic acid, l-Phe, and phenylacetaldehyde. This protoplast system facilitates findings of metabolic intermediates and simplifies the complex branching biosynthetic pathways of floral scents to distinct individual events.
Keywords: l-Phenylalanine; Phenylacetaldehyde; 2-Phenylethanol; Protoplast; [2, 3, 4, 5, 6-13C5]shikimic acid

J. Cuevas, V. Pinillos, M.L. Canete, M. Gonzalez, F. Alonso, M.D. Fernandez, J.J. Hueso, Optimal levels of postharvest deficit irrigation for promoting early flowering and harvest dates in loquat (Eriobotrya japonica Lindl.), Agricultural Water Management, Volume 96, Issue 5, May 2009, Pages 831-838, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.11.002.
(http://www.sciencedirect.com/science/article/B6T3X-4V8FFDV-1/2/f65508e62361b41b2e885fe2ce7b8f2b)
Abstract:
Deficit irrigation after harvest has been proven to be a more profitable strategy for producing loquats due to its effects on promoting earlier flowering and harvest date next season. To determine water savings which most advance flowering and harvest dates, an experiment was established to compare phenology, fruit quality and yield in `Algerie' loquats over two consecutive seasons. In this experiment some trees were programmed to receive 50%, 25% or 0% of the water applied to controls (RDI50%, RDI25%, and RDI0%, respectively) from mid-June to the end of July (6 weeks). Fully irrigated trees acted as first controls while trees undergoing previously tested postharvest deficit irrigation (25% of water applied to controls; RDILong) from early June up to the end of August (13 weeks of RDI total) acted as second controls. All deficit irrigation treatments promoted earlier flowering when compared to fully irrigated trees; the greatest advancement in full bloom date (27 days) was achieved with severe short term RDI (RDI0% and RDI25%). The trees suffering an extended period of water stress advanced full bloom date but to a lesser extent (13 and 18 days; 2004/2005 and 2005/2006, respectively). Earlier bloom derived in an earlier harvest date without detrimental effects on fruit quality and productivity. In this regard, the most severe RDI (RDI0%) advanced mean harvest date the most (7 and 9 days, depending on the season), and increased the percentage of precocious yield to the highest extent. Productivity was not diminished by reduced irrigation in either season. Fruit size and grading was enhanced thanks to RDI in both seasons. Earliness and better fruit class distribution under RDI also improved fruit value and gross revenue enabling farmers both to increase earning and economize on water.
Keywords: Eriobotrya japonica; Regulated deficit irrigation; Reproductive phenology; Flower quality; Water deficit; Water stress

M.T. Mmbaga, R.J. Sauve, Epiphytic microbial communities on foliage of fungicide treated and non-treated flowering dogwoods, Biological Control, Volume 49, Issue 2, May 2009, Pages 97-104, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.01.003.
(http://www.sciencedirect.com/science/article/B6WBP-4VDS8F6-2/2/49b46388484bedc8eee83fd032a797a5)
Abstract:
Microbial populations on leaves of Cornus florida (flowering dogwood) in two state parks, a commercial nursery (CN) and at Tennessee State University (TSU) were assessed monthly from May through September. Trees at the TSU location were treated with propiconazole or thiophanate-methyl, at the CN with thiophanate-methyl in rotation with propiconazole at 12-14 days intervals. The highest numbers of colony forming units (CFU) were detected in Rock Island State Park (RISP) and in the CN while the lowest numbers were in Fall Creek Falls State Park (FCFSP) and TSU. Incidence of powdery mildew caused by Erysiphe pulchra was severe in non-treated flowering dogwood at CN and TSU, not in the state parks. Fungicides treatments were highly effective in controlling powdery mildew, but did not significantly affect the microbial populations as indicated by total CFU counts. Because E. pulchra is a biotroph and does not grow on artificial media, it was not included in the tabulation. Experimental data suggest that fungicide treatments did not kill all epiphytes; if they did, there was a rapid re-colonization and replacement with new organisms. Bacteria and yeasts CFU counts were higher than for filamentous fungi. No difference in microbial diversity was detected between fungicide-treated and non-treated trees. In addition to Cladosporium spp. isolated from fungicide treated plots at CN and TSU, several

epiphytes known to suppress foliar diseases were isolated from the two state parks where fungicides were not applied.
Keywords: Population dynamics; Yeasts; Filamentous fungi; Bacteria; Erysiphe pulchra; Natural forest settings; Commercial nurseries

Xiangming Xu, Joyce D. Robinson, Angela M. Berrie, Infection of blackcurrant flowers and fruits by Botrytis cinerea in relation to weather conditions and fruit age, Crop Protection, Volume 28, Issue 5, May 2009, Pages 407-413, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.12.010.
(http://www.sciencedirect.com/science/article/B6T5T-4VJJW5B-1/2/f2841704bc46587ca7ef1dcbb63c9e00)
Abstract:
Experiments were conducted to investigate infection of blackcurrant flowers and fruits in relation to environmental conditions and fruit age on cvs. Baldwin and Ben Hope. The two cultivars did not differ significantly in the susceptibility of flowers to Botrytis infection. Nearly 75% of flowers were infected or abscised 1 week after inoculation and nearly all remaining flowers failed to develop into mature fruit. Fruits were inoculated at different growth stages and then incubated under different initial conditions: 10, 15, 20 and 25 [degree sign]C each with four wet periods (4, 8, 12 and 24 h). Infection of fruit was not significantly affected by the temperature and duration of wetness. The two cultivars differed significantly in their responses to Botrytis infection depending on the fruiting stage at the time of inoculation. Inoculation of young fruitlets resulted in nearly 50% of fruits aborted on cv. Baldwin, compared to ca. 10% on cv. Ben Hope. Inoculation of fruit near harvest resulted in significantly fewer fruit aborted. The incidence of latent infection decreased with increasing fruit age at the time of inoculation. Sampling of blackcurrant fruit and spraying timing trials in planting of these two cultivars in open-field and under-protected conditions supported the main conclusions drawn from the controlled inoculation studies. Thus irrespective of weather conditions, strategies must be adopted to reduce inoculum and the extent of flower infections.
Keywords: Latent infection; Fruit maturity; Resistance

F. Zurita, J. De Anda, M.A. Belmont, Treatment of domestic wastewater and production of commercial flowers in vertical and horizontal subsurface-flow constructed wetlands, Ecological Engineering, Volume 35, Issue 5, May 2009, Pages 861-869, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2008.12.026.
(http://www.sciencedirect.com/science/article/B6VFB-4VJBCJC-1/2/8191eacc66bf06a9c8d5db22a5823c8d)
Abstract:
In developing countries, the use of non-conventional plant species as emergent plants in constructed wetlands may add economic benefits besides treating wastewater. In this work, the use of four commercial-valuable ornamental species (Zantedeschia aethiopica, Strelitzia reginae, Anturium andreanum and Agapanthus africanus) was investigated in two types of subsurface wetlands for domestic wastewater treatment. Several water quality parameters were evaluated at the inlet and outlets of a pilot-scale system. Physical measurements were used to evaluate and compare the development of the ornamental plants under two patterns of flow in subsurface wetlands.
The results for pollutant removal were significantly higher in the vertical subsurface-flow constructed wetlands (VFCW) for most pollutants. The average removals were more than 80% for BOD and COD; 50.6% for Org-N; 72.2% for NH4+, 50% for Total-P and 96.9% for TC. Only two pollutants were removed in statistically higher percentages in the horizontal subsurface-flow constructed wetlands (HFCW) (NO3-, 47.7% and TSS, 82%). The pollutant removal efficiencies were similar to the results obtained in many studies with conventional macrophytes. Most ornamental plants survived the 12-month period of experimentation and their development depended on the type of constructed wetland they were planted. Z. aethiopica looked healthier

and produced around 60 flowers in the HFCW. The other three species developed better in the VFCW, although A. andreanum died during the winter. S. reginae produced healthier flowers (and more) and bigger leaves and A. Agapanthus produced more leaves and more lasting flowers. This suggests that it is possible to produce commercial flowers in constructed wetlands without reducing the efficiency of the treatment system.
Keywords: Developing countries; Treatment wetlands; Constructed wetlands; Horizontal flow; Vertical flow; Subsurface flow; Ornamental plants

G.A. Garzon, R.E. Wrolstad, Major anthocyanins and antioxidant activity of Nasturtium flowers (Tropaeolum majus), Food Chemistry, Volume 114, Issue 1, 1 May 2009, Pages 44-49, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.013.
(http://www.sciencedirect.com/science/article/B6T6R-4TDC0JG-1/2/543fda31a40fdd4b4f721f4843476124)
Abstract:
Major anthocyanins, ascorbic acid content, total phenolic content, and the radical scavenging activity against ABTS and DPPH radicals in petals of orange Nasturtium flowers (Tropaeolum majus), were investigated. Anthocyanin (ACN) content in the petals was 72 mg/100 g FW and pelargonidin 3-sophoroside represented 91% of the total ACN content. The ascorbic acid content was 71.5 mg/100 g and the total phenolic content as determined by the Folin-Ciocalteau method was 406 mg GAE/100 g FW. The radical scavenging activities against ABTS and DPPH radicals were 458 and 91.87 [mu]m trolox eq/g FW, respectively. The excellent free radical scavenging activities along with high phenolic and ascorbic acid content of Nasturtium flowers suggest that they could be source of natural pigments and antioxidants for applications in functional foods.
Keywords: Anthocyanins; Nasturtium flowers; Tropaeolum majus; DPPH; ABTS; Antioxidant activity; Total phenolics content

Li-mei Wang, Mao-teng Li, Wen-wen Jin, Shuo Li, Shuai-qi Zhang, Long-jiang Yu, Variations in the components of Osmanthus fragrans Lour. essential oil at different stages of flowering, Food Chemistry, Volume 114, Issue 1, 1 May 2009, Pages 233-236, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.044.
(http://www.sciencedirect.com/science/article/B6T6R-4THC1HM-5/2/b1ffd5f3e348b7451c864765655ac4d8)
Abstract:
A headspace solid-phase microextraction (HS-SPME) method was used to extract the essential oil of Osmanthus fragrans Lour., which was then analysed by gas chromatography-mass spectrometry (GC-MS) at four different stages of flowering. The primary chemical components of the essential oil extracted from O. fragrans were linalool and its oxide, [alpha]-ionone, [beta]-ionone, nerol, [gamma]-decalactone, 9,12,15-octadecatrienoic acid, and hexadecanoic acid, most of which were at their highest concentrations in extracts obtained from flowers at the initial flowering stage. HS-SPME using a PDMS/DVB fibre is a simple, rapid, and solvent-free method for the extraction of volatile compounds emitted from living O. fragrans. HS-SPME with GC-MS can be used to determine the aromatic maturity in O. fragrans, to decide the optimal harvest date. The initial flowering stage was the best time to harvest O. fragrans.
Keywords: Osmanthus fragrans Lour.; Headspace solid-phase microextraction; Gas chromatography-mass spectrometry; Chemical components

Katsuhiko Sumitomo, Tuoping Li, Tamotsu Hisamatsu, Gibberellin promotes flowering of chrysanthemum by upregulating CmFL, a chrysanthemum FLORICAULA/LEAFY homologous gene, Plant Science, Volume 176, Issue 5, May 2009, Pages 643-649, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.02.003.

(http://www.sciencedirect.com/science/article/B6TBH-4VKDMP8-1/2/077907ca4c6d56048ad34675894dd999)
Abstract:
The plant hormone gibberellin (GA) induces flower formation in several long-day (LD) plants, and exogenous GA can partly substitute for chilling treatment in cold-dependent plants. Both chilling and GA are required to promote flowering of a short-day (SD) plant chrysanthemum as observed in many plants. Chilling and GA requirement for flowering of four cultivars were examined, and genetic variation in them was shown: those that required GA also required chilling for flowering, but those that did not require GA showed no chilling requirement. With regard to LEAFY in Arabidopsis thaliana, GA promoted the expression of CmFL, a FLORICAULA/LEAFY homologous gene from chrysanthemum, and the upregulation of CmFL required GA in cultivars with a chilling requirement. Therefore, this GA requirement can be principally attributed to the chilling requirement for flowering.
Keywords: Chilling requirement; Chrysanthemum; FLORICAULA/LEAFY homologous gene; Flowering; Gibberellin

Takateru Ishimori, Yoshiji Niimi, Dong-Sheng Han, In vitro flowering of Lilium rubellum Baker, Scientia Horticulturae, Volume 120, Issue 2, 2 April 2009, Pages 246-249, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.11.017.
(http://www.sciencedirect.com/science/article/B6TC3-4V6RNSM-4/2/6dc26deda647791ba89903ad1285f260)
Abstract:
Scales excised from in vitro cultured bulblets of Lilium rubellum were cultured on MS medium supplemented with 0.044 or 4.4 [mu]M BA in the dark for 300 days, the culture period of which was divided into three stages, with temperatures in each stage as follows: 25 [degree sign]C in stage 1 (days 0-60); 25 [degree sign]C or 8 [degree sign]C in stage 2 (days 61-210); 20 [degree sign]C in stage 3 (days 211-300). Numbers of bulblets per scale and bulblets with elongated stem (the transition from juvenile to vegetative adult phase) depended on the culture condition. The highest number of bulblets and the percentage of bulblets with elongated stems were obtained in scales cultured in medium with 4.4 [mu]M BA at 25 [degree sign]C in stage 2. On the other hand, BA concentration (0.044 and 4.4 [mu]M) and/or temperatures (25 and 8 [degree sign]C) in stage 2 influenced flowering in the bulblets with elongated stems (the transition from vegetative adult to flowering phase). Flowering occurred in bulblets with elongated stems when bulblets on scale were cultured in medium with 4.4 [mu]M BA at 8 [degree sign]C in stage 2, whereas no flowering occurred in bulblets cultured in any other culture conditions. In conclusion, the concentration of BA affects the transition from juvenile to vegetative adult phase, and the exposure of in vitro developed bulblets to low temperature is indispensable to initiate the flowering process.
Keywords: BA; Low temperature; Stem elongation; Flowering phase

Thomas Rath, Marco Kawollek, Robotic harvesting of Gerbera Jamesonii based on detection and three-dimensional modeling of cut flower pedicels, Computers and Electronics in Agriculture, Volume 66, Issue 1, April 2009, Pages 85-92, ISSN 0168-1699, DOI: 10.1016/j.compag.2008.12.006.
(http://www.sciencedirect.com/science/article/B6T5M-4VGDNJJ-1/2/532e357601538b1a3ff0f943a9992ef7)
Abstract:
Within the present study, a system for the automated harvest of Gerbera jamesonii pedicels with the help of image analytic methods was developed. The study can be divided mainly into two parts: the development of algorithms for the identification of pedicels in digital images and the development of procedures for harvesting these pedicels with a robot. Images of plants were taken with a stereo camera system, which consisted of two high-resolution CCD-cameras with near-

infrared filters. The plant was positioned on a rotatable working desk and images of eight different positions were shot. The developed image processing algorithm segmented the potential pedicel regions in the images, removed noise, differentiated overlapping pedicels by using different algorithms and combined the remaining regions to pedicel objects. From the data of both images and eight plant positions three-dimensional models of the pedicels were created by triangulation. The remaining parts of the plants were modeled in a simple fashion. The evaluated 3D model is used to calculate spatial coordinates for the applied robot control. For harvesting the pedicels, an industrial robot with six axes (plus an additional linear axis) was used. A pneumatic harvest grabber was developed, which harvested the pedicels by cutting them off. In order to guarantee the collision free path of the robot, a path planning module was integrated, which includes the three-dimensional model of the plant and the test facility. With the applied techniques it was possible to correctly detect all pedicels on about 72% of the images. Regarding the whole image series of the respective plant, all pedicels could be detected in at least one photographing position in 97% of all cases. In the harvest experiments 80% of all pedicels could be harvested. The harvest rates decreased with increasing numbers of pedicels on a plant. Therefore, 98% of the pedicels could be harvested of plants with one or two pedicels, but only 51% were harvested of plants with five or more pedicels. In horticultural practice, an identification system for evaluating the stage of maturity should be included. An implementation for harvesting pedicels of different species with similar basic characteristics is imaginable.
Keywords: Robotics; Automated harvest; Image processing; Three-dimensional modeling; Gerbera

A Distelfeld, C Li, J Dubcovsky, Regulation of flowering in temperate cereals, Current Opinion in Plant Biology, Volume 12, Issue 2, Genome Studies and Molecular Genetics - Edited by Masahiro Yano and Roberto Tuberosa, April 2009, Pages 178-184, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.12.010.
(http://www.sciencedirect.com/science/article/B6VS4-4VHWB0X-1/2/e4382418e22c9c4430f76e250798ac99)
Abstract:
Long exposure to cold (vernalization) accelerates flowering in winter cereals, a process regulated by the VRN1 ([approximate]AP1), VRN2, and VRN3 ([approximate]FT) vernalization genes. Flowering during the fall is prevented by the VRN2 downregulation of VRN3 and low VRN1 transcription. Vernalization induces VRN1, which is followed by the downregulation of VRN2, thereby releasing VRN3. In the longer days of spring, photoperiod genes PPD1 and CO upregulate VRN3, which induces VRN1 above the threshold levels required for flowering initiation. VRN3 transcription is modulated through interactions involving CCT-domain proteins and HAP2/HAP3/HAP5 complexes coded by multiple genes. The vast number of HAP-CCT combinations can provide the flexibility required for integrating seasonal cues and different stress signals in the regulation of the transition to flowering.

Alena Gaudinova, Jiri Malbeck, Petre Dobrev, Darina Kubelkova, Josef Spak, Radomira Vankova, Cytokinin, auxin, and abscisic acid dynamics during flower development in white and red currants infected with Blackcurrant reversion virus, Physiological and Molecular Plant Pathology, In Press, Corrected Proof, Available online 1 April 2009, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2009.03.004.
(http://www.sciencedirect.com/science/article/B6WPC-4VYXMKC-1/2/50f1aa81eb1d99aae43db05622718af3)
Abstract:
Blackcurrant reversion virus (BRV) infection, characteristic by flower malformation, resulted at the early flower stage in elevated levels of bioactive cytokinins and their biosynthetic precursors in flowers of white currant `Blanka' and red currant `Vitan'. In healthy flowers, flower-to-berry transition was accompanied by an increase in bioactive cytokinins that was not observed in

infected flowers, which were incapable of further development. Auxin levels increased during flower development, in `Vitan' only in flowers with normal morphology (both healthy and infected). BRV infection did not have a significant effect on cytokinin or auxin levels in the leaves of either cultivar, it coincided with a mild elevation in the content of abscisic acid in the flowers of both cultivars.
Keywords: Full blossom disease; Cytokinin; Auxin; Abscisic acid; Ribes; Comovirus

Monica Jordheim, Oyvind M. Andersen, Constance Nozzolillo, Virginie Treyvaud Amiguet, Acylated anthocyanins in inflorescence of spider flower (Cleome hassleriana), Phytochemistry, Volume 70, Issue 6, April 2009, Pages 740-745, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2009.03.017.
(http://www.sciencedirect.com/science/article/B6TH7-4W7DD7N-1/2/9b1bab93921a1a6329555650f562e185)
Abstract:
Five anthocyanins, cyanidin 3-(2''-(6'''-caffeoyl-[beta]-glucopyranosyl)-6''-(E-p-coumaroyl)-[beta]-glucopyranoside)-5-[beta]-glucopyranoside, cyanidin 3-(2''-(6'''-E-sinapoyl-[beta]-glucopyranosyl)-6''-(E-p-coumaroyl)-[beta]-glucopyranoside)-5-[beta]-glucopyranoside, cyanidin 3-(2''-(6'''-feroyl-[beta]-glucopyranosyl)-6''-(E-p-coumaroyl)-[beta]-glucopyranoside)-5-[beta]-glucopyranoside, pelargonidin 3-(2''-(6'''-E-sinapoyl-[beta]-glucopyranosyl)-6''-(E-p-coumaroyl)-[beta]-glucopyranoside)-5-[beta]-glucopyranoside, and pelargonidin 3-(2''-(6'''-E-p-coumaroyl-[beta]-glucopyranosyl)-6''-(E-p-coumaroyl)-[beta]-glucopyranoside)-5-[beta]-glucopyranoside, together with five known anthocyanins have been identified in flowers of Cleome hassleriana Queen line. One monoacylated and four diacylated cyanidin 3-sophoroside-5-glucosides were identified as the main anthocyanins in flowers with mauve colouration, while a homologous glycosidic pattern based on pelargonidin was found in the five main anthocyanins from flowers with pink colouration. The anthocyanins identified in C. hassleriana share the same glycosidic pattern as anthocyanins isolated from the genera Raphanus, Brassica and Iberis in the sister family Brassicaceae.
Keywords: Cleome hassleriana; Spider flower; Acylated anthocyanins; Chemotaxonomy; 2D NMR

Severine Gagne, Soizic Lacampagne, Olivier Claisse, Laurence Geny, Leucoanthocyanidin reductase and anthocyanidin reductase gene expression and activity in flowers, young berries and skins of Vitis vinifera L. cv. Cabernet-Sauvignon during development, Plant Physiology and Biochemistry, Volume 47, Issue 4, April 2009, Pages 282-290, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.12.004.
(http://www.sciencedirect.com/science/article/B6VRD-4V59VVP-4/2/75278ba3d5f690228bbcdfacd26131a9)
Abstract:
Proanthocyanidins, or condensed tannins, are crucial polyphenolic compounds for grape and wine quality. Recently, significant advances were achieved in understanding the biosynthesis of their main subunits: (+)-catechin and (-)-epicatechin, produced by catalysis of leucoanthocyanidin reductase (LAR) and anthocyanidin reductase (ANR), respectively. Expression studies had been published but no data were available on enzyme activity. In our work, we devised assays to measure LAR and ANR activity and determine their development throughout the growth of flowers, young berries, and skins of Vitis vinifera L. cv. Cabernet-Sauvignon. We also investigated the accumulation of compounds in these tissues and focused on the expression of both the structural genes and the transcription factors involved in regulating them: VvMYB5a and VvMYBPA1. Biosynthetic genes were expressed early and LAR and ANR were already active during flowering and at the beginning of berry growth, as well as during colour-change in skins. The profiles we determined correlated with total tannin, catechin, and epicatechin concentrations. The involvement of VvMYB5a and VvMYBPA1 was confirmed and specific expression patterns were also established for VvLAR transcripts.

Keywords: Vitis vinifera L.; Proanthocyanidin; Leucoanthocyanidin reductase; Anthocyanidin reductase; Skin; Flowers

S. Vogel, The non-African oil-flowers and their bees: A brief survey, South African Journal of Botany, Volume 75, Issue 2, April 2009, Pages 389-390, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.018.
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H.A. Abdelgadir, S.D. Johnson, J. Van Staden, Effect of foliar application of plant growth regulators on flowering and fruit set in Jatropha curcas -- A potential oil seed crop for biodiesel, South African Journal of Botany, Volume 75, Issue 2, April 2009, Page 391, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.022.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-G/2/4f4741eeb370fbd8306b11386ded6680)

G.D. Ascough, L.J. Rice, J. Van Staden, Carbohydrates and the regulation of flower abscission in potted Plectranthus, South African Journal of Botany, Volume 75, Issue 2, April 2009, Pages 392-393, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.026.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-M/2/7013732e9e9a9ad27d925be0adef6152)

M.L. de Jager, A.G. Ellis, L.L. Dreyer, The assembly of flower colour within communities of Oxalis (Oxalidaceae) through pollinator-mediated selection, South African Journal of Botany, Volume 75, Issue 2, April 2009, Pages 397-398, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.040.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-14/2/e67a856bbe6e02f0e7038beb0b0cfebd)

J.L. Arnolds, C.F. Musil, G.H.J. Kruger, The effects of experimental warming on flowering phenology, seed production and physiology of 24 fynbos species, South African Journal of Botany, Volume 75, Issue 2, April 2009, Page 429, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.132.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-4D/2/bc3b1d4a07e6b751c84248cc5d9aba09)

M.R. Pretorius, M.J. Samways, Short term impact of commercial Cape honeybee (Apis mellifera capensis) colony congregations on invertebrate flower visitors within a near pristine Fynbos habitat in the Cape Floristic Region, South African Journal of Botany, Volume 75, Issue 2, April 2009, Pages 438-439, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.160.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-5D/2/b602fe077734fced6bc58c0e42ee9679)

Qian Liang, Zong-Suo Liang, Jun-Ru Wang, Wen-Hui Xu, Essential oil composition of Salvia miltiorrhiza flower, Food Chemistry, Volume 113, Issue 2, 15 March 2009, Pages 592-594, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.08.035.
(http://www.sciencedirect.com/science/article/B6T6R-4T7XGWK-2/2/9b6426da1eff38ffca2e960954f590ea)
Abstract:
Hydrodistillation of the flower of seven populations of Salvia miltiorrhiza Bge. collected in different locations in China afforded a pale yellowish oil in a yield of approximately 0.2%. A total of 82 compounds were identified across all the samples, accounting for 98-100% of the total compositions of each sample. Components were mainly monoterpenes, sesquiterpenes, fatty

acids and alkanes. GC and GC-MS analysis indicated that the predominant components of the essential oils are [beta]-caryophyllene (12.2-31.7%), [beta]-caryophyllene oxide (1.4-11.6%), [alpha]-caryophyllene (4.8-10.6%), cadinadiene (7.4-29.3%), and hexadecanoic acid (3.9-18.8%).
Keywords: Salvia miltiorrhiza flower; Essential oil; GC; GC-MS; [beta]-Caryophyllene

M[feminine ordinal indicator] Jesus Sanchez-Blanco, Sara Alvarez, Alejandra Navarro, Sebastian Banon, Changes in leaf water relations, gas exchange, growth and flowering quality in potted geranium plants irrigated with different water regimes, Journal of Plant Physiology, Volume 166, Issue 5, 15 March 2009, Pages 467-476, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.06.015.
(http://www.sciencedirect.com/science/article/B7GJ7-4TCXG8G-5/2/a51fb339696620300e0995753c76fe5d)
Abstract: Summary
Geranium plants are an important part of urban green areas but suffer from drought, especially when grown in containers with a limited volume of medium. In this experiment, we examined the response of potted geraniums to different irrigation levels. Geranium (Pelargoniumxhortorum L.) seedlings were grown in a growth chamber and exposed to three irrigation treatments, whereby the plants were irrigated to container capacity (control), 60% of the control (moderate deficit irrigation, MDI), or 40% of the control (severe deficit irrigation, SDI). Deficit irrigation was maintained for 2 months, and then all the plants were exposed to a recovery period of month. Exposure to drought induced a decrease in shoot dry weight and leaf area and an increase in the root/shoot ratio. Height and plant width were significantly inhibited by the SDI, while flower color parameters were not affected by deficit treatment. The number of wilting and yellow leaves increased, coinciding with the increase in the number of inflorescences and open flowers. Deficit irrigation led to a leaf water potential of about -0.8 MPa at midday, which could have caused an important decrease in stomatal conductance, affecting the photosynthetic rate (Pn). Chlorophyll fluorescence (Fvm) values of 0.80 in all treatments throughout the experiment demonstrate the lack of drought-induced damage to PSII photochemistry. Pressure-volume analysis revealed low osmotic adjustment values of 0.2 MPa in the SDI treatment, accompanied by increases in the bulk tissue elastic modulus ([epsilon], wall rigidity) and resulting in turgor loss at lower leaf water potential values (-1.38 MPa compared with -1.0 MPa for the control). Leaf water potential values throughout the experiment below those for [Psi]tlp were not found at any sampling time. By the end of the recovery period, the leaf water potential, stomatal conductance and net photosynthesis had recovered. We infer from these results that moderate deficit irrigation in geranium reduced the consumption of water, while maintaining the good overall quality of plants. However, when SDI was applied, a reduction in the number of flowers per plant was observed.
Keywords: Deficit irrigation; Ornamental characters; Potted floricultural crops; Stomatal conductance; Water potential components

Tapio Linkosalo, Risto Hakkinen, Juhani Terhivuo, Heikki Tuomenvirta, Pertti Hari, The time series of flowering and leaf bud burst of boreal trees (1846-2005) support the direct temperature observations of climatic warming, Agricultural and Forest Meteorology, Volume 149, Issues 3-4, 11 March 2009, Pages 453-461, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.09.006.
(http://www.sciencedirect.com/science/article/B6V8W-4TVHYY4-1/2/0448519156fe7a18a374fa860f35be78)
Abstract:
The timing of spring phenological events of boreal trees, such as flowering and leaf bud burst, is controlled to a great extent by the ambient air temperature, and these events are already showing an advancement that can be attributed to climatic warming. In this paper we utilised this phenomenon to verify direct observations of climatic warming. We constructed eight phenological time series using observations covering 160 years of the leaf bud burst of two species and of the flowering of six species of native deciduous trees growing in Finland. To eliminate the effect of

urbanization on local temperature, we rejected the observations made in densely populated areas. When analyzing the trends in the timing of leaf bud burst and flowering we found an advancement of these phenological events ranging from 3.3 to 11.0 days per century. We then converted the observed phenological trends into temperature trends by using thermal time-type models that link the timing of bud burst and flowering to the temperature conditions during bud development. Warming estimates derived from the phenological trends suggested that the mean spring temperature increase in Finland has been 1.8 [degree sign]C per century, which is very close to the value of 1.5 [degree sign]C per century indicated by long-term temperature records.
Keywords: Leaf bud burst; Flowering; Climatic warming; Temperature measurements; Boreal deciduous trees

B. Van de Poel, J. Ceusters, M.P. De Proft, Determination of pineapple (Ananas comosus, MD-2 hybrid cultivar) plant maturity, the efficiency of flowering induction agents and the use of activated carbon, Scientia Horticulturae, Volume 120, Issue 1, 3 March 2009, Pages 58-63, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.09.014.
(http://www.sciencedirect.com/science/article/B6TC3-4TRHC92-2/2/dc40d46234b8698cb2b5125d4c6b9062)
Abstract:
Natural flowering is one of the major agronomic problems in pineapple (Ananas comosus) cultivation. It causes heterogeneous flowering and fruit development with multiple harvest passes of the same field as an inevitable consequence. To avoid natural flowering, pineapple plants are induced to synchronize flowering by external ethylene treatments. In this research it is shown that pineapple plants (MD-2 hybrid cultivar) are already sensitive to external ethylene treatments at an early developmental stage, i.e. 3 months after planting, although no natural flowering occurs during this early stage of plant development. These results indicate that young pineapple plants already posses all the necessary factors to induce flowering in response to ethylene treatments. Additionally the efficiencies of flowering induction of different external ethylene treatments, including a novel agent developed at our lab, called `zeothene', were evaluated. Zeothene (=zeolite containing ethylene gas) and ethylene dissolved in water (both applied in the central cup of the plant) were proved to be very efficient flowering induction agents. The commercial cultivation practice, in which ethylene gas is sprayed with water over whole plants, was found less efficient confirming that central cup applications are more efficient than whole plant spraying. Cup applications allow the active ingredient (ethylene or ethephon) to be taken up immediately by the apical meristem resulting in an efficient flowering induction signal. The addition of activated carbon to enhance the flowering induction treatment was found to be useful only with a very high dose of activated carbon (5%) and a long interaction time (at least 5-30 min) between the activated carbon and the flowering induction solution.
Keywords: Pineapple; Ananas comosus; Flowering; Ethylene; Maturity; Activated carbon

Asuka Yamada, Takahiro Tanigawa, Takuro Suyama, Takatoshi Matsuno, Toshihiro Kunitake, Red:far-red light ratio and far-red light integral promote or retard growth and flowering in Eustoma grandiflorum (Raf.) Shinn, Scientia Horticulturae, Volume 120, Issue 1, 3 March 2009, Pages 101-106, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.09.009.
(http://www.sciencedirect.com/science/article/B6TC3-4TR00D8-1/2/5c285b5a486fc0fb42ba2de30e570512)
Abstract:
Night break treatment was applied to Eustoma grandiflorum `Nail Peach Neo' using light sources with different red (R: 660 +/- 30 nm): far-red (FR: 730 +/- 30 nm) ratios or FR light intensities in order to investigate growth and flowering responses. Flower initiation and induction were promoted by night break treatment with a low R:FR light source, but was delayed by a high R:FR ratio. The promotion or delay of flower bud formation was accompanied by a decrease or an increase,

respectively, in the number of nodes on the main stem at anthesis to the first floret. The difference between date of visible bud with plants under night break treatment and that of the control was approximated with high accuracy by a sigmoid function of the logarithms of R:FR ratio. The threshold R:FR ratio demarcating the promotion and delay of date of visible bud was about 5.3 under the experimental conditions used. The critical R:FR ratios for promotion or delay of visible bud would be about 0.5 and 50.0, respectively. In addition, the time from planting to visible bud was approximated with an exponential function of FR light intensity. The maximum acceleration of date of visible bud by long-day treatment would be 20 days, and the critical FR light intensity would be 2.0 [mu]mol m-2 s-1. It is concluded that growth and flowering of E. grandiflorum can be regulated by long-day treatment using light sources with different R:FR ratios or FR light intensities.
Keywords: Light quality; Lisianthus; Long-day treatment; Photomorphogenesis; Red:far-red ratio

T. Noy-Porat, M.A. Flaishman, A. Eshel, D. Sandler-Ziv, R. Kamenetsky, Florogenesis of the Mediterranean geophyte Narcissus tazetta and temperature requirements for flower initiation and differentiation, Scientia Horticulturae, Volume 120, Issue 1, 3 March 2009, Pages 138-142, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.09.016.
(http://www.sciencedirect.com/science/article/B6TC3-4TS576V-1/2/71f40e7cce0e8af5523118560d73348d)
Abstract:
Plant florogenesis is determined by the interaction between the genetics of the individual plant and environmental factors. Flower initiation and development of many studied plant species require low temperatures. However, some geophytes form flowers within the bulb during the summer quiescence period and do not require low temperatures for florogenesis. Narcissus tazetta was employed to study, in detail, the stages of flower development during the summer period, with special emphasis on the effect of temperature on inflorescence initiation. The sequence of morphological processes occurring during floral initiation and development was observed by SEM. During 3 years, the bulbs were subjected to different storage temperatures during the summer, and records were taken of the percentage of apical meristems that shifted from vegetative to reproductive development. Flowering and inflorescence quality were recorded after planting. It was concluded that, under natural conditions, the temperature increase in June, during the growth of the mother plant, leads to the transition of the apical meristem to the reproductive stage. Floral initiation and reproductive development in N. tazetta is promoted by high temperatures with an optimum of 25 [degree sign]C. Sub- and supra-optimal temperatures (20 and 30 [degree sign]C) delayed differentiation, while lower temperatures (12 [degree sign]C) inhibited florogenesis completely.
Keywords: Flowering initiation; Narcissus tazetta; Differentiation; Bulb; Geophyte; Storage temperature

Jiayi Shi, Jinyan Gong, Ji'er Liu, Xiaoqin Wu, Ying Zhang, Antioxidant capacity of extract from edible flowers of Prunus mume in China and its active components, LWT - Food Science and Technology, Volume 42, Issue 2, March 2009, Pages 477-482, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.09.008.
(http://www.sciencedirect.com/science/article/B6WMV-4TJ1HTY-1/2/3ea7dd8c4b2c32bfccadb13188c1c4a6)
Abstract:
Prunus mume flowers are used as traditional edible and medicinal materials in China. In this study, phenolic compounds and antioxidant activity of ethanolic extract from flowers of P. mume in China were investigated for the first time. The total phenol content was estimated as gallic acid equivalents by the Folin-Ciocalteu reagent method. The antioxidant activity was measured by DPPH, ABTS+, and OH free radicals scavenging and ferric-reducing antioxidant power (FRAP).

Three chlorogenic acid isomers, namely, 3-O-caffeoylquinic, 4-O-caffeoylquinic and 5-O-caffeoylquinic acids, were isolated and purified by preparative HPLC from the ethanolic extract and identified by UV, MS and NMR. The contents of these isolated compounds were quantified by HPLC. Results showed that 5-O-caffeoylquinic acid was of the highest level in these three isomers. The ethanolic extract demonstrated activity to some degree in all the antioxidant assays. In all tested assays, all of the isolated chlorogenic acid isomers exhibited strong antioxidant activities, which were almost the same. The results showed that chlorogenic acid isomers are the key phenolic compounds which are responsible for antioxidant activity of the ethanolic extract from Chinese P. mume flowers.
Keywords: Prunus mume; Chlorogenic acid isomers; Antioxidant activity; Free radical; Reducing ability

Fumi Tatsuzawa, Norio Saito, Yuki Mikanagi, Koichi Shinoda, Kenjiro Toki, Atsushi Shigihara, Toshio Honda, An unusual acylated malvidin 3-glucoside from flowers of Impatiens textori Miq. (Balsaminaceae), Phytochemistry, Volume 70, Issue 5, March 2009, Pages 672-674, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2009.03.005.
(http://www.sciencedirect.com/science/article/B6TH7-4W0SNKX-1/2/e92217639c5fc6b2d7b41f837132c801)
Abstract:
Acylated malvidin 3-glucoside was isolated from the purple flowers of Impatiens textori Miq. as a major anthocyanin component along with malvidin 3-(6''-malonyl-glucoside). Its structure was elucidated to be malvidin 3-O-[6-O-(3-hydroxy-3-methylglutaryl)-[beta]-glucopyranoside] by chemical and spectroscopic methods.
Keywords: Impatiens textori Miq.; Balsaminaceae; Floral anthocyanins; Acylated anthocyanins; Malvidin 3-glucosides; 3-Hydroxy-3-methylglutaric acid

Jingqi Xue, Feng Yang, Junping Gao, Isolation of Rh-TIP1;1, an aquaporin gene and its expression in rose flowers in response to ethylene and water deficit, Postharvest Biology and Technology, Volume 51, Issue 3, March 2009, Pages 407-413, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.08.011.
(http://www.sciencedirect.com/science/article/B6TBJ-4TYXM1Y-1/2/a52bae78b2fdb6e4601ec8e8502245bc)
Abstract:
Flower opening is a process that involves water uptake by petal cells, during which aquaporins serve as the channels for water transport across the cell membranes. In this study, we isolated a TIP type aquaporin gene, Rh-TIP1;1, from rose (Rosa hybrida cv. Samantha). The Rh-TIP1;1 transcript is 1142 bp in length and encodes a deduced protein of 253 amino acids. Through a prokaryotic expression system, we obtained a predominant ~32 kDa protein band which is consistent with the predicted molecular weight of Rh-TIP1;1. Rh-TIP1;1 was mainly expressed in petals among all floral tissues at the fully opened bud stage. Its expression was maintained at a high level during rapid flower opening, and decreased when the flowers were fully opened. Ethylene and water deficit both decreased the expression of Rh-TIP1;1. Flowers treated with 1-methylcyclopropene (1-MCP), an ethylene action inhibitor, maintained the transcript at a high level for longer than untreated controls. These results indicated that the effects of ethylene and water deficit on flower opening may be related to their influence on the expression of the Rh-TIP1;1 gene.
Keywords: Aquaporin; Cut roses; Ethylene; Flower opening; Rh-TIP1 ;1; Water deficit

Yun LI, Pei-zhou XU, Hong-yu ZHANG, Shao-hong FU, Jin YANG, Ru-quan ZHANG, Xian-jun WU, Characterization and Genetic Analysis of a Novel Mutant mst of Rice Defective in Flower

Development, Rice Science, Volume 16, Issue 1, March 2009, Pages 75-78, ISSN 1672-6308, DOI: 10.1016/S1672-6308(08)60060-8.
(http://www.sciencedirect.com/science/article/B8JG8-4W26FGK-C/2/520c43207edb592dc908d507d8203cf0)
Abstract:
A spontaneous mutant with multiple stigmas (mst) was found in an indica rice line 466. The mst mutant exhibits normal at the vegetative development stage and produces normal inflorescence structures. The difference between the mutant and the wild type was observed when the stamen primordium began to develop. In the mst florets, palea and lemma opened, lodicules were homeotically transformed into palea/lemma-like structures, and stamens were homeotically transformed into carpel-like structures. It looked like multiple stigmas being full of the whole floret. The phenotypic changes of mst were very similar to that of B-like mutant spw1. Compared with other mutants with pistillate morphologies, the severe mst florets showed that the inner three floral organs were completely changed into palea/lemma-like structures. Moreover, the mutant was female sterile. Occasionally, with the changing environment, one or two stamens were fertile. Genetic analysis indicated that the mutant traits were controlled by a single recessive gene.
Keywords: rice; flower development; multiple stigmas mutant; floral organ identity

Douglas E. Soltis, Flowers and Flowering, Trends in Ecology & Evolution, Volume 24, Issue 3, March 2009, Pages 124-125, ISSN 0169-5347, DOI: 10.1016/j.tree.2008.10.010.
(http://www.sciencedirect.com/science/article/B6VJ1-4VGTGRP-1/2/b5a1f7656536ff6e4e5ddf652aeba2ba)

A. Hedhly, J.I. Hormaza, M. Herrero, Flower emasculation accelerates ovule degeneration and reduces fruit set in sweet cherry, Scientia Horticulturae, Volume 119, Issue 4, 17 February 2009, Pages 455-457, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.08.020.
(http://www.sciencedirect.com/science/article/B6TC3-4TJTTPP-4/2/43260e190a348df412c6d0bde9ead696)
Abstract:
Flower emasculation is commonly used to make flowers unattractive to pollinating insects and to carry out controlled pollinations. In sweet cherry, we have observed recurrent low fruit set after flower emasculation and compatible pollination without apparent causes. This led us to evaluate its effect on the progress of the reproductive phase and on fruit set in this species. Flower emasculation reduced by more than a half the fruit set obtained in crosses made during two consecutive years. This effect could be traced back to the first week after anthesis where weight increase of pistils from emasculated flowers was smaller and ovule degeneration was accelerated compared to pistils from non-emasculated flowers. Pollen tubes, which behaved similarly at the stigma-style level in emasculated and non-emasculated flowers, lost their directionality in the area close to the degenerated ovule in the ovary. While flower emasculation is valid to evaluate pollen tube performance in the style and to determine incompatibility relationships, the lower fruit set registered after emasculation alerts on its use in fruit set experiments and breeding programs.
Keywords: Sweet cherry; Prunus avium; Emasculation; Ovule viability; Pollen tube growth; Fruit set

Farzad Nazari, Morteza Khosh-Khui, Hassan Salehi, Growth and flower quality of four Rosa hybrida L. cultivars in response to propagation by stenting or cutting in soilless culture, Scientia Horticulturae, Volume 119, Issue 3, 3 February 2009, Pages 302-305, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.08.004.
(http://www.sciencedirect.com/science/article/B6TC3-4TJ5YW5-1/2/7b7bcda8e9a28b8184cfa0843d27fab2)
Abstract:

Performance of four Rosa hybrida L. cultivars (`African Dawn', `Ilios', `Maroussia' and `Soprano') was evaluated. They were grown either on their own roots or grafted (stenting) onto Rosa canina L. `Inermis' rootstock in a polyethylene greenhouse with hydroponics system. Parameters of plant growth and flower quality were investigated for two successive harvesting years (2005 and 2006). Results indicated that, all the cultivars were superior for most of the parameters studied when grafted onto rootstock compared to being on their own roots. Flowering stem fresh weight and diameters, flower fresh and dry weight, flower diameter and length, petal number, leaf chlorophyll content and quality index were higher in grafted plants compared to those propagated by cuttings. However, highest flowering stem length and number were observed in plants propagated by cutting, although not significant as compared with stenting method.
Keywords: Cutting-graft; Soilless culture; Hybrid roses; Propagation

F. Gresta, G. Avola, G.M. Lombardo, L. Siracusa, G. Ruberto, Analysis of flowering, stigmas yield and qualitative traits of saffron (Crocus sativus L.) as affected by environmental conditions, Scientia Horticulturae, Volume 119, Issue 3, 3 February 2009, Pages 320-324, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.08.008.
(http://www.sciencedirect.com/science/article/B6TC3-4TGY46R-3/2/6dba79d4c6cb6d881671afd1ae0ba0f5)
Abstract:
Saffron is well known for its use as a condiment spice, as a dye and traditional medicine. Saffron is experiencing an increasing interest mainly due to its peculiar and manifold properties of the metabolic pool of its stigmas, mainly crocetin esters and picrocrocin. This species is cultivated in environments with very different climatic conditions and with very different corm rates from place to place, passed down over the centuries. The aim of this study was therefore the evaluation of the influence of rainfall, temperature and corm density on flower phenology, stigmas yield and main compositional characteristics of two saffron corms provenience. Flowering beginning in saffron seems to be influenced by the combination of temperature and soil moisture, whilst its flowering calendar proves independent of corm provenance, environment and plant density. On the contrary, the studied factors exert a strong effect on both total stigmas yield and qualitative characteristics: colder environment resulted in a higher flower production, but lower quality of stigmas. Flower number was positively correlated with the stigmas yield, but negatively with its unitary weight. The content of crocetin esters and picrocrocin has been evaluated according to the spectrophotometric ISO normative, which ranked the samples into three qualitative decreasing categories (I-III). The spectrophotometric data showed positive correlation with the unitary stigmas weight and negative with stigmas production.
Keywords: Saffron; Stigmas; Crocetin esters; Picrocrocin; Rainfall; Soil moisture; Plant density

Scott D Michaels, Flowering time regulation produces much fruit, Current Opinion in Plant Biology, Volume 12, Issue 1, Growth and Development - Edited by Charles S. Gasser and Caroline Dean, February 2009, Pages 75-80, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.09.005.
(http://www.sciencedirect.com/science/article/B6VS4-4TPS7B4-1/2/f07163616fa5aa6fde8ac3ecbafe3bfd)
Abstract:
Many of the molecular details regarding the promotion of flowering in response to prolonged exposure to cold temperatures (vernalization) and daylength have recently been elucidated in Arabidopsis. The daylength and vernalization pathway converge in the regulation of floral promoters referred to as floral integrators. In the meristem, vernalization promotes flowering through the epigenetic repression of the floral repressor FLOWERING LOCUS C. This allows for the induction of floral integrators by CONSTANS under inductive long days. In the vasculature of leaves, CONSTANS protein is produced only in long days where it acts to promote the expression of FLOWERING LOCUS T (FT). FT protein is then translocated to the meristem where it acts to

promote floral induction. Thus a detailed molecular framework for the regulation of flowering time has now been established in Arabidopsis.

Kamil Frankowski, Jacek Kesy, Waldemar Wojciechowski, Jan Kopcewicz, Light- and IAA-regulated ACC synthase gene (PnACS) from Pharbitis nil and its possible role in IAA-mediated flower inhibition, Journal of Plant Physiology, Volume 166, Issue 2, 30 January 2009, Pages 192-202, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.02.013.
(http://www.sciencedirect.com/science/article/B7GJ7-4SPSPDF-1/2/891aa1f054444a90bd946ab0c5d77eb9)
Abstract: Summary
The light- and indole-3-acetic acid (IAA)-regulated 1-aminocyclopropane-1-carboxylic acid (ACC) synthase gene (PnACS) from Pharbitis nil was isolated. Here, it was shown that the gene was expressed in cotyledons, petioles, hypocotyls, root and shoot apexes both in light- and dark-grown seedlings. The highest expression level of PnACS was found in the roots. IAA applied to the cotyledons of P. nil seedlings caused a clear increase of PnACS messenger accumulation in all the organs examined. In this case, the most IAA-responsive were the hypocotyls. Our studies revealed that the PnACS transcript level in the cotyledons exhibited diurnal oscillations under both long-day (LD) and short-day (SD) conditions. IAA applied at the beginning of inductive darkness caused a dramatic increase in the expression of PnACS, suggesting that the inhibitory effect of IAA on P. nil flowering may result from its stimulatory effect on ethylene production.
Keywords: ACC synthase; Auxin; Ethylene; Flowering; Pharbitis nil (Ipomoea nil)

Koji Kawagishi, Tamayo Abe, Masao Ubukata, Syunsuke Kato, Inhibition of flower stalk elongation and abnormal flower development by short-day treatment in a Japanese variety of Chinese chive (Allium tuberosum Rottler ex Sprengel), Scientia Horticulturae, Volume 119, Issue 2, 6 January 2009, Pages 197-202, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.018.
(http://www.sciencedirect.com/science/article/B6TC3-4T8H3GB-2/2/3731ff6f7b5098f7a96d540f1272c762)
Abstract:
Chinese chive is produced year-round in Japan, therefore it is important to demonstrate the relationships of short-day (SD) conditions with flower stalk elongation and flower formation for optimizing the cropping system, e.g. the increase in harvests per year. To clarify the influence of short photoperiod on flower stalk elongation and flower formation in Chinese chive, 8 h SD treatments were applied at different developmental stages of flower stalk elongation and flower formation. When the SD treatment started from vegetative or floral-initiated stages, the earlier the SD treatment started, the fewer flower stalks appeared. Also, the earlier the SD treatment started, the less the flowers bloomed and the more the flower stalk elongation was inhibited at the end of SD treatments. Many involucres did not open and withered with death of florets in SD when the SD treatment started between the umbel or flower bud differentiation and the perianth to stamen-formation stages. Also, all or part of the florets aborted and there were no complete inflorescences in the later SD treatments. We found that, in Chinese chive, the development of flower stalk elongation and flower formation were inhibited with the earlier SD treatment, after vegetative or floral-initiated stages. Furthermore, it is considered that Chinese chive needs long-day (LD) for the flower stalk elongation and inflorescence formation after the initiation of the flower bud. The plant has a qualitative LD requirement with the same photoperiodic requirement for both flower bud initiation and flower development.
Keywords: Chinese chive; Short photoperiod; Flower stalk elongation; Flower formation

Stephan R. Harmsen, Nicole J.J.P. Koenderink, Multi-target tracking for flower counting using adaptive motion models, Computers and Electronics in Agriculture, Volume 65, Issue 1, January 2009, Pages 7-18, ISSN 0168-1699, DOI: 10.1016/j.compag.2008.07.004.

(http://www.sciencedirect.com/science/article/B6T5M-4TBVPMX-1/2/330273d70342196926b1b53666fbfa24)
Abstract:
Counting the number of flowers in a plant is an example of agricultural quality inspection issues in which a simple 2D image of the product does not suffice. It is essential to see the object under inspection from multiple viewpoints to get a clear estimation of the quality of the product. In order to use multiple viewpoints to obtain a proper quality assessment, a multi-target tracking algorithm that accurately identifies relevant features of the product under inspection is proposed in this paper. The approach is illustrated with an experiment in which the flowers in a number of plants are counted. For the presented method, the plant rotates in front of a camera and a number of consecutive images is taken. The tracking algorithm detects, predicts, and matches the (partially occluded) flowers in the image. The experiments provide a proof of principle of the proposed method. The conclusion of this paper is that the presented multi-target tracking algorithm can be used to solve many similar quality assessment issues for agricultural objects.
Keywords: Multi-target tracking; Flower counting; Adaptive motion model; Particle cloud

Ursula Ladinig, Johanna Wagner, Dynamics of flower development and vegetative shoot growth in the high mountain plant Saxifraga bryoides L., Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 204, Issue 1, 2009, Pages 63-73, ISSN 0367-2530, DOI: 10.1016/j.flora.2008.01.007.
(http://www.sciencedirect.com/science/article/B7GX0-4THS3FG-2/2/cd3249f5b9f2986c787be682b2af3dcb)
Abstract:
Saxifraga bryoides L. is an abundant species in the subnival and nival zone of the European mountains. First flowering occurs, at the earliest, 6 weeks after snowmelt. This is a remarkably long prefloration period in an environment with a short growing season. To gain more information about the developmental strategies of this species, the timing and the dynamics of flower bud formation and vegetative shoot growth were studied at sites with growing seasons of different lengths at two subnival locations (2650 and 2880 m a.s.l.) in the Tyrolean Alps. At an early, mid and late thawing site, individuals emerging from the winter snow were labelled. Reproductive and vegetative shoots were sampled at regular intervals throughout the growing season and analysed, using different microscopic techniques. Flower buds of S. bryoides develop in three cohorts. Provided the growing season is long enough, cohorts 1 and 2 come into flower, whereas cohort 3 buds remain primordial and continue to develop after winter. New flower primordia appear as day-length decreases from August on, which suggests a short-day requirement for floral initiation. At the end of the growing season, flower buds of different stages are present, but only primordial stages survive winter. Thus, flower buds of S. bryoides develop largely or even completely in the year of anthesis. Developmental dynamics were quite similar at the different sites. Time from flower initiation until anthesis took about 2 months, independently of whether flowers were formed within one or two seasons. All of the leaves on vegetative short-stem shoots turnover within a growing season. Leaves having passed winter continuously decline and are replaced by newly formed ones (21+/-3 at the mid-thawing site and 18+/-1 leaves at the short-season site). An individual leaf functions therefore, on average, about 12 months. In most years the seed crop of S. bryoides results mainly from the first cohort of flowers in an individual. In a changing climate with a prolonged growing season, the chance of two cohorts to develop mature seeds from flower cohorts 1 and 2 would increase.
Keywords: Floral development; Flower bud preformation; Leaf turnover; Prefloration period; Alpine plant; Global change

Priyanka Bagri, Mohd. Ali, Vidhu Aeri, Malay Bhowmik, Shahnaz Sultana, Antidiabetic effect of Punica granatum flowers: Effect on hyperlipidemia, pancreatic cells lipid peroxidation and

antioxidant enzymes in experimental diabetes, Food and Chemical Toxicology, Volume 47, Issue 1, January 2009, Pages 50-54, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.09.058.
(http://www.sciencedirect.com/science/article/B6T6P-4TKPVGH-1/2/8db4a626259ae1f250d2401ec48fe636)
Abstract:
The present study investigated the effects of Punica granatum aqueous extract (PgAq) on streptozotocin (STZ) induced diabetic rats by measuring fasting blood glucose, lipid profiles (atherogenic index), lipid peroxidation (LPO) and activities of both non-enzymatic and enzymatic antioxidants. Diabetes was induced by single intraperitoneal injection of STZ (60 mg/kg) to albino Wistar rats. The increase in blood glucose level, total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), very low density lipoprotein (VLDL), LPO level with decrease in high density lipoprotein cholesterol (HDL-C), reduced glutathione (GSH) content and antioxidant enzymes namely, glutathione peroxidase (GPx), glutathione reductase (GR), glutathione-S-transferase (GST), superoxide dismutase (SOD) and catalase (CAT) were the salient features observed in diabetic rats. On the other hand, oral administration of PgAq at doses of 250 mg/kg and 500 mg/kg for 21 days resulted in a significant reduction in fasting blood glucose, TC, TG, LDL-C, VLDL-C and tissue LPO levels coupled with elevation of HDL-C, GSH content and antioxidant enzymes in comparison with diabetic control group.
The results suggest that PG could be used, as a dietary supplement, in the treatment of chronic diseases characterized by atherogenous lipoprotein profile, aggravated antioxidant status and impaired glucose metabolism and also in their prevention.
Keywords: Punica granatum; Streptozotocin; Anti-hyperglycemic; Anti-hyperlipidemic; Antioxidant; Lipid peroxidation; Pancreas

Ismail Celik, Atilla Temur, Ismail Isik, Hepatoprotective role and antioxidant capacity of pomegranate (Punica granatum) flowers infusion against trichloroacetic acid-exposed in rats, Food and Chemical Toxicology, Volume 47, Issue 1, January 2009, Pages 145-149, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.10.020.
(http://www.sciencedirect.com/science/article/B6T6P-4TVJNPT-1/2/0b55898068b04247e6ff8eb13b394a14)
Abstract:
This study was designed to investigate the protective and antioxidant properties of Punica granatum (PG) beverage against trichloroacetic acid (TCA)-exposure in rats. The hepatopreventive and antioxidant potential of the plant's infusion was evaluated by measuring level of serum enzymes, antioxidant defense systems (ADS) and lipid peroxidation content in various organs of rats. Three experimental groups: A (untreated = control), B (only TCA-treated) and C (TCA+PG treated). According to the results, while the levels of AST and ALT increased significantly in B groups' they decreased significantly in the C groups'. LDH and CK did not change significantly in B groups' whereas decreased significantly in the C groups'. Liver, brain, kidney and heart tissues MDA content significantly increased in B groups', whereas no significant changes were observed in the C groups'. On the other hand, SOD decreased significantly in liver of the B group but did not change significantly in the C groups'. GST activity increased significantly in liver, brain and spleen of C group while significant decrease was observed for kidney as compared to those of control. Hence, the study reveals that constituents present in PG impart protection against carcinogenic chemical induced oxidative injury that may result in development of cancer during the period of a 52-day protective exposure.
Keywords: Punica granatum; Serum marker enzymes; Antioxidant defense system; Malondialdehyde; Rat

Rodante E. Tabien, Stanley Omar P.B. Samonte, Emmanuel R. Tiongco, Relationship of milled grain percentages and flowering-related traits in rice, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 122-127, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.015.
(http://www.sciencedirect.com/science/article/B6WHK-4T8SM0T-1/2/892f0fafe1c6c9f51cbb48a2eca8cdd2)
Abstract:
The economic value of harvested rice is determined by the grain yield and the percentages of head rice (at least 3/4 the length of a head or kernel) and total milled rice. This study was conducted to determine the effects of flowering-related traits such as duration of flowering, rate of flowering, heading, and duration from heading to maturity on head rice and total milling percentages of rice. Flowering data, gathered for two years from 105 long grain rice genotypes grown in Beaumont, Texas were analyzed for their effects on and relationship with milling traits. A positive linear relationship was obtained for rate of flowering and the duration from heading to maturity but negative for duration of flowering and days to heading. Genotypes with early heading had relatively shorter flowering durations, and genotypes with shorter flowering duration had higher head rice and total milled rice. A faster rate in attaining 100% flowering and more days from heading to maturity were favorable in increasing head rice and total milled grains. The duration from the start of flowering to heading or to 100% flowering can be used in the evaluation and selection for high head rice and total milled rice percentages in rice.
Keywords: Rice; Flowering duration; Milling qualities; Flowering traits

Ellen B. Sperr, Emanuel A. Fronhofer, Marco Tschapka, The Mexican mouse opossum (Marmosa mexicana) as a flower visitor at a neotropical palm, Mammalian Biology - Zeitschrift fur Saugetierkunde, Volume 74, Issue 1, January 2009, Pages 76-80, ISSN 1616-5047, DOI: 10.1016/j.mambio.2008.08.004.
(http://www.sciencedirect.com/science/article/B7GX2-4TP7H7V-1/2/4a95e442e18886426cd5ea25c51a9164)
Keywords: Arecaceae; Calyptrogyne ghiesbreghtiana; Costa Rica; Didelphidae; Pollination

Trevor J. Edwards, V.H. Heywood, R.K. Brummitt, A. Culhan and O. Seberg , Flowering Plant Families of the World, Kew Publishing (2007) Price: [pound sign]27.95 Hard cover; 424 pages; ISBN 13: 978-1-84246-165-5 / ISBN 10: 1-84246-165-6; Website: www.kew.org., South African Journal of Botany, Volume 75, Issue 1, January 2009, Pages 180-181, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.10.007.
(http://www.sciencedirect.com/science/article/B7XN9-4V1V4X8-2/2/e4eb900fc1ec7aba4d7d164d39818f00)

Anita Sonsteby, Ola M. Heide, Temperature responses, flowering and fruit yield of the June-bearing strawberry cultivars Florence, Frida and Korona, Scientia Horticulturae, Volume 119, Issue 1, 10 December 2008, Pages 49-54, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.005.
(http://www.sciencedirect.com/science/article/B6TC3-4T72K3M-2/2/253bad6247dcfc85488933bf43550127)
Abstract:
The effect of night temperature on short day (SD) floral induction has been studied in three June-bearing strawberry cultivars of different geographic origin and compared with yield performance in the cool Nordic environment. At the optimum day temperature of 18 [degree sign]C, the SD flowering response of the cultivars `Florence' and `Korona' increased significantly with increasing night temperature from 9 to 18 [degree sign]C, while an optimum was reached at 15 [degree sign]C in the cultivar `Frida' that is selected under cool-environment conditions in Norway. Also, while saturated flowering response was obtained with 3 weeks of SD treatment at all temperatures in `Frida', several plants of `Florence' and `Korona' failed to initiate flowers at 9 [degree sign]C

night temperature even with 5 weeks of SD. The effect of extended SD period was particularly pronounced in `Florence'. The slow SD floral induction response of `Florence' was associated with a 2 week delay of anthesis in subsequent long day (LD) conditions at 21 [degree sign]C. Yield performance of the same cultivars during 2 years under field conditions at Nes Hedmark and in North Norway also demonstrated that the yield potential of `Florence' was not realized under the climatic conditions prevailing at these locations. In both years the yields varied significantly among the cultivars, `Frida' having the highest yields followed by `Korona', with `Florence' far below. It is concluded that, in the Nordic environment, autumn (September) night temperatures are obviously sub-optimal for yield performance of some June-bearing strawberry cultivars, and that this effect is mediated by autumn temperature effects on flower initiation responses.
Keywords: Climate; Flowering; Fragaria; Night temperature; Strawberry; Fruit yield

You-Min Yap, Chiang-Shiong Loh, Bee-Lian Ong, Regulation of flower development in Dendrobium crumenatum by changes in carbohydrate contents, water status and cell wall metabolism, Scientia Horticulturae, Volume 119, Issue 1, 10 December 2008, Pages 59-66, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.06.029.
(http://www.sciencedirect.com/science/article/B6TC3-4T4J1FT-2/2/93cf0c718b96e5d4e8cdd893de7e4c08)
Abstract:
The involvement of carbohydrates, water potential, cell wall components and cell wall-based enzymes in regulating flower development in Dendrobium crumenatum was investigated. Plants were subjected to cold treatment to release floral buds from dormancy, and the various parameters were investigated from young floral bud stage till flower senescence. Development of floral buds was accompanied by progressive decrease in concentrations of fructans and starch. Upon full flower opening, concentration of soluble sugars was maximum, accompanied by a more negative water potential. High pectin methylesterase activity was observed during early bud development and decreased thereafter. Significant increase in activities of [beta]-galactosidase, [beta]-mannosidase and [beta]-xylosidase was also observed during floral bud development. The cell walls of sepals and petals were modified extensively during floral bud and flower development, as observed by changes in the amounts of celluloses, hemicelluloses and total pectin. Pectin solubilisation was also observed to commence during early floral bud development. These results indicated that carbohydrate hydrolysis, osmotic changes and cell wall dissolution that began early in young floral buds, all regulated flower development in this sympodial orchid. Possible applications of the findings in the horticultural industry are discussed.
Keywords: Orchid; Flower development; Carbohydrates; Osmolality; Cell wall composition; Cell wall hydrolases

Charles C. Davis, Floral Evolution: Dramatic Size Change Was Recent and Rapid in the World's Largest Flowers, Current Biology, Volume 18, Issue 23, 9 December 2008, Pages R1102-R1104, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.10.011.
(http://www.sciencedirect.com/science/article/B6VRT-4V3K67R-M/2/f903f01be2cc69efceb03a593bfdd048)
Abstract: Summary
Recent studies clarifying the closest relatives of the world's largest flowers, Rafflesiaceae, whose floral diameters range from ~11 to ~100 cm, indicated that they evolved from tiny-flowered ancestors in a burst of floral gigantism. New data now suggest that floral size evolution within Rafflesiaceae may be more dynamic than expected, with both recent and rapid changes in flower size.

Sarah Hake, Inflorescence Architecture: The Transition from Branches to Flowers, Current Biology, Volume 18, Issue 23, 9 December 2008, Pages R1106-R1108, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.10.024.
(http://www.sciencedirect.com/science/article/B6VRT-4V3K67R-P/2/3a5adc6d279812fb654a36121698062e)
Abstract: Summary
The shapes of flowers and their organization into branching systems, called inflorescences, dictate much of plant diversity. Recent studies have identified key regulators in this diversity, revealing that the inflorescence architecture of Solanaceous species depends on sequential and temporal expression of the WUSCHEL-RELATED HOMEOBOX (WOX) gene EVERGREEN (EVG)/ COMPOUND INFLORESCENCE (S) and the UNUSUAL FLORAL ORGANS (UFO) ortholog DOUBLE TOP (DOT)/ANANTHA (AN).

Mathilde Baude, Isabelle Dajoz, Etienne Danchin, Inadvertent social information in foraging bumblebees: effects of flower distribution and implications for pollination, Animal Behaviour, Volume 76, Issue 6, December 2008, Pages 1863-1873, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2008.08.010.
(http://www.sciencedirect.com/science/article/B6W9W-4TP7H8C-1/2/b9015a722fadd0f4b1f1b0267c6adfeb)
Abstract:
Pollinators are confronted with spatial heterogeneity in floral resources. Acquiring information about their environment enables pollinators to exploit floral resources optimally, and hence strongly affects their fitness. Despite their evolutionary importance, spatial resource distribution and social information use have never been addressed in a plant-pollinator framework. We experimentally tested the effects of inadvertent social information (ISI) use (without or with an experienced demonstrator) in relation to spatial flower distribution (random or patchy) in foraging Bombus terrestris. We studied naive bees' associative learning when confronted with rewarding and nonrewarding flowers that differed slightly in colour, reproducing the natural mimicry of deceptive species. Naive bees were more efficient foragers with than without a demonstrator in the patchy flower distribution, suggesting that they used ISI from conspecifics, probably in the form of social attraction at the patch scale. In the random flower distribution, however, ISI did not improve performance of naive bees, and could not replace individual sampling. Analyses of nonrewarding intraspecific transitions indicate that the efficiency of naive bees in deceptive species pollination was lowered when rewarding and nonrewarding inflorescences were patchily distributed and especially when bees relied on ISI. Thus, spatial flower distribution and ISI availability interact in determining pollinator behaviour, which has important consequences for plant community pollination. This suggests that bumblebees are adapted to exploit patchily distributed resources socially, a characteristic that might be exploited by deceptive plant species. By coupling behavioural and community ecology, this study offers promising perspectives for cognitive ecology studies in plant-pollinator interactions.
Keywords: Bombus terrestris; bumblebee; deceptive species pollination; foraging behaviour; inadvertent social information; plant-pollinator interaction; social attraction; spatial flower distribution

Antonis Giakountis, George Coupland, Phloem transport of flowering signals, Current Opinion in Plant Biology, Volume 11, Issue 6, Cell Biology - Edited by David Ehrhardt and Federica Brandizzi, December 2008, Pages 687-694, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.10.003.
(http://www.sciencedirect.com/science/article/B6VS4-4TTMS6P-1/2/bee243abf0a29b3f4dd7706d2abcf5e1)
Abstract:

Seasonal variability in environmental parameters such as day length regulates many aspects of plant development. The transition from vegetative growth to flowering in Arabidopsis is regulated by seasonal changes in day length through a genetically defined molecular cascade known as the photoperiod pathway. Recent advances were made in understanding the tissues in which different components of the photoperiod pathway act to regulate floral induction. These studies highlighted the key role of the FT protein, which is produced in the leaves in response to inductive day lengths and traffics through the phloem to initiate flowering at the shoot apex. Unveiling the cellular and molecular details of this systemic signaling process will be required for a complete understanding of flowering regulation and other photoperiodic processes.

Emilia Wilmowicz, Jacek Kesy, Jan Kopcewicz, Ethylene and ABA interactions in the regulation of flower induction in Pharbitis nil, Journal of Plant Physiology, Volume 165, Issue 18, December 2008, Pages 1917-1928, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.04.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4SSP70S-3/2/a51204db1412343ff589a570fa43d4f2)
Abstract: Summary
Hormones are included in the essential elements that control the induction of flowering. Ethylene is thought to be a strong inhibitor of flowering in short day plants (SDPs), whereas the involvement of abscisic acid (ABA) in the regulation of flowering of plants is not well understood. The dual role of ABA in the photoperiodic flower induction of the SDP Pharbitis nil and the interaction between ABA and ethylene were examined in the present experiments.
Application of ABA on the cotyledons during the inductive 16-h-long night inhibited flowering. However, ABA application on the cotyledons or the shoot apices during the subinductive 12-h-long night resulted in slight stimulation of flowering. Application of ABA also resulted in enhanced ethylene production. Whereas nordihydroguaiaretic acid (NDGA) - an ABA biosynthesis inhibitor - applied on the cotyledons of 5-d-old seedlings during the inductive night inhibited both the formation of axillary and of terminal flower buds, application of 2-aminoethoxyvinylglycine (AVG) and 2,5-norbornadiene (NBD) - inhibitors of ethylene action - reversed the inhibitory effect of ABA on flowering. ABA levels in the cotyledons of seedlings exposed to a 16-h-long inductive night markedly increased. Such an effect was not observed when the inductive night was interrupted with a 15-min-long red light pulse or when seedlings were treated at the same time with gaseous ethylene during the dark period. Lower levels of ABA were observed in seedlings treated with NDGA during the inductive night.
These results may suggest that ABA plays an important role in the photoperiodic induction of flowering in P. nil seedlings, and that the inhibitory effect of ethylene on P. nil flowering inhibition may depend on its influence on the ABA level. A reversal of the inhibitory effect of ethylene on flower induction through a simultaneous treatment of induced seedlings with both ethylene and ABA strongly supports this hypothesis.
Keywords: Abscisic acid; Ethylene; Flower induction; NDGA; Pharbitis nil

Masa Hojnik, Mojca Skerget, Zeljko Knez, Extraction of lutein from Marigold flower petals - Experimental kinetics and modelling, LWT - Food Science and Technology, Volume 41, Issue 10, December 2008, Pages 2008-2016, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.11.017.
(http://www.sciencedirect.com/science/article/B6WMV-4RDR1KM-15/2/971eef1f1a262ddac6f4b8d12c4ead46)
Abstract:
The extraction kinetics behaviour of lutein from Marigold flower petals and simultaneous alkali hydrolysis has been studied. Extraction was carried out by varying following operating conditions: type of organic solvent, temperature, ratio liquid: material, concentration of alkali solution, and particle size of plant material. Experimental extraction curves were analysed with a mathematical model derived from Fick's second law. The extraction of lutein appeared to be governed by slow

and fast diffusion processes. Results showed that the intra-particle diffusion was the rate-governing step of the extraction process, and that the chosen model gives very good approximation of experimental data.
Keywords: Lutein; Marigold; Conventional extraction; Diffusivity; Mass transfer

Ulf Swenson, Porter P. Lowry II, Jerome Munzinger, Catarina Rydin, Igor V. Bartish, Phylogeny and generic limits in the Niemeyera complex of New Caledonian Sapotaceae: evidence of multiple origins of the anisomerous flower, Molecular Phylogenetics and Evolution, Volume 49, Issue 3, December 2008, Pages 909-929, ISSN 1055-7903, DOI: 10.1016/j.ympev.2008.09.022.
(http://www.sciencedirect.com/science/article/B6WNH-4TK92F9-1/2/ccc06068daceb4b0000c1a1df2f1d8f4)
Abstract:
Traditional generic limits within the 'Niemeyera complex' (Sapotaceae: Chrysophylloideae) in Australia and New Caledonia do not correspond to natural groups. We analyzed nuclear (ETS, ITS) and chloroplast (trnH-psbA, trnS-G) sequence data, and 42 morphological characters, using a near-complete taxon sampling. The resulting phylogeny provides a new generic framework where Leptostylis and Sebertia are monophyletic, Niemeyera is recognized as a small genus confined to Australia, and the circumscriptions of Achradotypus and Pycnandra require significant modification. This framework allows about 20 recently discovered species to be described in appropriate genera and assessed for their conservation status. Evolutionary changes in two widely used characters, anisomerous flowers and the number of stamens inserted opposite each corolla lobe, have occurred multiple times. There is no evidence that anisomery originated through hybridization as suggested in other groups. Instead, the two characters are closely coupled and often mutually exclusive. The diagnostic value of morphological characters varies considerably; for example, the presence, absence, and type of malpighiaceous hairs convey more phylogenetic information than many traditionally used features. Criteria and options for a new generic classification are discussed, and a reconstruction of the hypothesized ancestor that likely colonized New Caledonia in the Oligocene is presented.
Keywords: Ancestral reconstruction; Anisomery; Character evolution; Conservation; Classification; IUCN

Norio Saito, Fumi Tatsuzawa, Eri Suenaga, Kenjiro Toki, Koichi Shinoda, Atsushi Shigihara, Toshio Honda, Tetra-acylated cyanidin 3-sophoroside-5-glucosides from the flowers of Iberis umbellata L. (Cruciferae), Phytochemistry, Volume 69, Issue 18, Tannin/Polyphenol Special Issue, December 2008, Pages 3139-3150, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2008.04.010.
(http://www.sciencedirect.com/science/article/B6TH7-4SMPB4G-1/2/814b71fd2919a9e18b0057fdb63de233)
Abstract:
The structures of 11 acylated cyanidin 3-sophoroside-5-glucosides (pigments 1-11), isolated from the flowers of Iberis umbellata cultivars (Cruciferae), were elucidated by chemical and spectroscopic methods. Pigments 1-11 were acylated with malonic acid, p-coumaric acid, ferulic acid, sinapic acid and/or glucosylhydroxycinnamic acids.
Pigments 1-11 were classified into four groups by the substitution patterns of the linear acylated residues at the 3-position of the cyanidin. In the first group, pigments 1-3 were determined to be cyanidin 3-O-[2-O-(2-O-(acyl)-[beta]-glucopyranosyl)-6-O-(trans-p-coumaroyl)-[beta]-glucopyranoside]-5-O-[6-O-(malonyl)-[beta]-glucopyranoside], in which the acyl moiety varied with none for pigment 1, ferulic acid for pigment 2 and sinapic acid for pigment 3. In the second one, pigments 4-6 were cyanidin 3-O-[2-O-(2-O-(acyl)-[beta]-glucopyranosyl)-6-O-(4-O-([beta]-glucopyranosyl)-trans-p-coumaroyl)-[beta]-glucopyranoside]-5-O-[6-O-(malonyl)-[beta]-glucopyranoside], in which the acyl moiety varied with none for pigment 4, ferulic acid for pigment 5 and sinapic acid for pigment 6. In the third one, pigments 7-9 were cyanidin 3-O-[2-O-(2-O-

(acyl)-[beta]-glucopyranosyl)-6-O-(4-O-(6-O-(trans-feruloyl)-[beta]-glucopyranosyl)-trans-p-coumaroyl)-[beta]-glucopyranoside]-5-O-[6-O-(malonyl)-[beta]-glucopyranoside], in which the acyl moiety varied with none for pigment 7, ferulic acid for pigment 8, and sinapic acid for pigment 9. In the last one, pigments 10 and 11 were cyanidin 3-O-[2-O-(2-O-(acyl)-[beta]-glucopyranosyl)-6-O-(4-O-(6-O-(4-O-([beta]-glucopyranosyl)-trans-feruloyl)-[beta]-glucopyranosyl)-trans-p-coumaroyl)-[beta]-glucopyranoside]-5-O-[6-O-(malonyl)-[beta]-glucopyranoside], in which acyl moieties were none for pigment 10 and ferulic acid for pigment 11.
The distribution of these pigments was examined in the flowers of four cultivars of I. umbellata by HPLC analysis. Pigment 1 acylated with one molecule of p-coumaric acid was dominantly observed in purple-violet cultivars. On the other hand, pigments (9 and 11) acylated with three molecules of hydroxycinnamic acids were observed in lilac (purple-violet) cultivars as major anthocyanins. The bluing effect and stability on these anthocyanin colors were discussed in relation to the molecular number of hydroxycinnamic acids in these anthocyanin molecules.
Keywords: Iberis umbellata L.; Cruciferae; Flower color; Acylated cyanidin 3-sophoroside-5-glucosides; Malonic acid; p-Coumaric acid; Ferulic acid; Sinapic acid

Jian-Bin Li, Fumio Hashimoto, Keiichi Shimizu, Yusuke Sakata, Anthocyanins from red flowers of Camellia cultivar `Dalicha', Phytochemistry, Volume 69, Issue 18, Tannin/Polyphenol Special Issue, December 2008, Pages 3166-3171, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2008.03.014.
(http://www.sciencedirect.com/science/article/B6TH7-4SFK1K2-2/2/be36ce7243dab98217c0671a34c3bca3)
Abstract:
Five anthocyanins, cyanidin 3-O-(2-O-[beta]-xylopyranosyl-6-O-(Z)-p-coumaroyl)-[beta]-galactopyranoside (2), cyanidin 3-O-(2-O-[beta]-xylopyranosyl-6-O-(E)-p-coumaroyl)-[beta]-galactopyranoside (3), cyanidin 3-O-(2-O-[beta]-xylopyranosyl-6-O-(E)-caffeoyl)-[beta]-galactopyranoside (4), cyanidin 3-O-(2-O-[beta]-xylopyranosyl-6-O-acetyl)-[beta]-galactopyranoside (5), and cyanidin 3-O-(2-O-[beta]-xylopyranosyl-6-O-acetyl)-[beta]-glucopyranoside (6), together with the known cyanidin 3-O-(2-O-[beta]-xylopyranosyl)-[beta]-galactopyranoside (1), were isolated from red flowers of Camellia cultivar `Dalicha' (Camellia reticulata) by chromatography using open columns. Their structures were subsequently determined on the basis of spectroscopic analyses, i.e., 1H NMR, 13C NMR, HMQC, HMBC, HR ESI-MS and UV-vis.
Keywords: Acylated anthocyanin; Camellia reticulata; Dalicha; Queen of Dali; Theaceae; Tali camellia; Yunnan camellia

Yann Guedon, Jean Michel Legave, Analyzing the time-course variation of apple and pear tree dates of flowering stages in the global warming context, Ecological Modelling, Volume 219, Issues 1-2, 24 November 2008, Pages 189-199, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2008.08.010.
(http://www.sciencedirect.com/science/article/B6VBS-4TPS79Y-1/2/481a2a3070cebfff6d2bbbfab1f3e2de)
Abstract:
Over the last 40 years, perceptible advances in dates of flowering stages have been observed in apple and pear trees growing in three cropping areas in France and one in Switzerland. The time-course variation of dates of flowering stages was established for eight chronological sequences. Our aim was to propose a statistical modelling framework for such sequences with the objective of characterizing the relationship between flowering advances in fruit trees and global warming. After an exploratory analysis, change-point models were applied to multivariate and univariate sequences. The results clearly support the occurrence of a significant abrupt change in the time-course variation of flowering dates at the end of the 1980s toward more frequent early dates, the

most probable change instant being between 1988 and 1989. The coincidence between this abrupt change in phenological variations and marked increases in temperature recorded particularly in France at the end of the 1980s led us to consider the flowering advances in apple and pear trees as impacts of global warming. The suddenness in the response to global warming could be explained by changes in rates for completion of chilling and heat requirements, successively essential to the development of floral primordia within buds. In all cropping areas, annual mean temperatures had suddenly increased since 1988 (1.1-1.3 [degree sign]C), but including noticeable monthly differences. Particularly, warming was clearly more pronounced in February and March (mean temperature increases of 1.6 [degree sign]C) corresponding to the main period of heat requirements, than in November and December (0.8 [degree sign]C) corresponding to the main period of chilling requirements. So marked temperature increases during the heat phase would have suddenly resulted in more frequent years with relatively short duration for completion of the heat requirements and consequently more frequent early flowering years, despite some years with relatively long duration of chilling requirements.
Keywords: Change-point detection; Chilling requirement; Climate change; Fruit tree; Heat requirement; Phenology

M. Matloobi, A. Baille, M.M. Gonzalez-Real, R.P. Gutierrez Colomer, Effects of sink removal on leaf photosynthetic attributes of rose flower shoots (Rosa hybrida L., cv. Dallas), Scientia Horticulturae, Volume 118, Issue 4, 4 November 2008, Pages 321-327, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.06.021.
(http://www.sciencedirect.com/science/article/B6TC3-4T29WNR-2/2/ffa7416262a5ccc8b50b4e73fa9eb628)
Abstract:
Two experiments were conducted under greenhouse conditions to evaluate the effects of sink removal (flower shoot harvest and debudding) on the gas-exchange capacity (i) of leaves left on the parent shoot after flower shoot harvest and (ii) of flower shoot leaves after flower-bud removal. In the first experiment, gas-exchange measurements were performed on three 5-foliate leaves (leaf 1: uppermost parent shoot leaf, and two leaves inserted just below: leaves 2-3). It was found that, after bud sprouting, the leaf nearest to the young growing shoot (leaf 1) experienced a significant reduction in leaf maximum net CO2 assimilation rate, Alm, stomatal conductance, gs, and transpiration rate, El, over time in comparison to the corresponding values observed for leaves 2-3. Leaf water use efficiency, WUE, significantly changed over time, while the ratio of leaf internal to ambient CO2 concentration, Ci/Ca, was rather conservative throughout the entire shoot growing period. In the second experiment, leaf gas-exchange measurements were performed for adult flower shoots that were either debudded or left intact. Both types of shoots exhibited a similar along-shoot distribution pattern of physiological fluxes, gs, and WUE. Bud removal did not significantly affect the magnitude of gas-exchange, with the exception of El. One week after bud removal, only slight differences were observed for Alm, gs and El between the two types of shoots. These results suggest (i) that the contribution of the uppermost parent shoot leaf to the assimilates demand of newly growing shoot significantly affects its photosynthetic capacity; and (ii) that flower-bud removal does not change the overall photosynthetic capacity of the flower shoot leaves, which divert the surplus of produced assimilates towards alternative sink organs and plant reserve pools.
Keywords: Source-sink relationship; Shoot harvest; Bud removal; Gas exchange; Water use efficiency

AN Li-jun, JIN Liang, YANG Chun-qin, LI Tian-hong, Effect and Functional Mechanism of the Action of Exogenous Gibberellin on Flowering of Peach, Agricultural Sciences in China, Volume 7, Issue 11, November 2008, Pages 1324-1332, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60181-9.

(http://www.sciencedirect.com/science/article/B82XG-4V0M7MN-6/2/9bbd384fea106f8b21b1204df04de502)
Abstract:
This study was conducted to assess the effect of gibberellin and its possible mechanism of action on peach flower formation. At flower induction, 100 mg L-1 of gibberellic acid 3 (GA3) was sprayed on the leaves of peach [Prunus persica (L.) Batsch.] cv. Bayuecui. Using anatomy, immunohistochemistry, and semi-quantitation, the in situ distribution of GAs and the expression of the key genes involved in peach flower formation in the apical meristem were studied during flowering differentiation. The results showed that induction of flowering in the Bayuecui peach occurred prior to 10 July in Beijing, China. Flower induction and further differentiation of the peach flower organs were significantly inhibited by leaf-spraying of GA3 at a concentration of 100 mg L-1 during the induction stage. The flowering rate was only 11.67% after treatment. The distribution of GA1 in the apical meristem varied during the process of flower bud differentiation. From 13 June to 25 July, the GA1 signal from control plants was detected mainly in the vascular bundles at the base of the flower buds. No GA1 signal was detected in the apical meristem. After treatment with GA3, the distribution was similar to that of the control from 13 June to 3 July. On 13 July, a GA1 signal was detected in the apical meristem accompanied by an increase in the GA1 signal in the vascular bundles at the base of the flower buds. The GA1 signal weakened significantly in both the vascular bundles and the apical meristem on 25 July. The expression of the genes PpLEAFY and MADS6 in flower buds could be detected only on 10 October in the GA3-treated plants. The critical period for flower induction of Bayuecui peach in Beijing was in early July, during which time, leaf-spraying with 100 mg L-1 GA3 could effectively inhibit flower induction and further differentiation of the flower buds. GA1 in the gibberellin family was the suppressor for flower induction in peach. Its action was affected by the stage of flower bud differentiation. Expression of the key genes PpLEAFY and MADS6 involved in flower formation was inhibited by GA3 treatment.
Keywords: peach [Prunus persica (L.) Batsch.]; gibberellin; flowering induction; anatomy; immunohistochemistry; semi- quantitation RT-PCR

R. Fernandez-Escobar, A. Ortiz-Urquiza, M. Prado, H.F. Rapoport, Nitrogen status influence on olive tree flower quality and ovule longevity, Environmental and Experimental Botany, Volume 64, Issue 2, November 2008, Pages 113-119, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.04.007.
(http://www.sciencedirect.com/science/article/B6T66-4SF3053-1/2/47358f1663146dd619c8c58b05fc8cee)
Abstract:
In the course of a long-term experiment we investigated the influence of olive tree nitrogen status on flower development and quality in two different years. Three N status levels were compared, based on leaf nitrogen status in July: low (0.98-1.32%), adequate (1.43-1.57%) or high (1.69-1.93%) leaf nitrogen concentration of July samples. With few exceptions, the inflorescence parameters generally showed no significant differences among years or treatments. For 2002, values were significantly higher for the adequate N level as compared to high N for number of nodes, for high N as compared to low N for percent perfect flowers, and high and adequate N as compared to low N for percent fertile inflorescences. However decreased water availability during the pre-flowering period also could have reduced the number and percent of perfect flowers during that year. For perfect flowers, N level had no affect on either ovule differentiation or ovary, mesocarp and endocarp size. Ovule viability decreased, though, both in the low N trees, as has been shown previously in other tree fruits, and also in the high N trees, as compared to those with adequate N level. These results suggest that nitrogen excess could reduce ovule longevity to the same extent as nitrogen deficiency, and indicate the importance of maintaining an adequate nitrogen status for potential fertilization and fruit set.
Keywords: Olea europaea L.; Pistil abortion; Perfect flower; Ovary; Ovule viability

Lisa Chanbusarakum, Diane Ullman, Characterization of bacterial symbionts in Frankliniella occidentalis (Pergande), Western flower thrips, Journal of Invertebrate Pathology, Volume 99, Issue 3, November 2008, Pages 318-325, ISSN 0022-2011, DOI: 10.1016/j.jip.2008.09.001.
(http://www.sciencedirect.com/science/article/B6WJV-4TDC0KM-1/2/61a2d01675ca7c01ecc9fcb48ccccfa1)
Abstract:
Many insects have associations with bacteria, although it is often difficult to determine the intricacies of the relationships. In one such case, facultative bacteria have been discovered in a major crop pest and virus vector, the Western flower thrips (WFT), Frankliniella occidentalis (Pergande) (Thysanoptera: Thripidae). Several bacterial isolates have been studied in Netherlands greenhouse thrips populations, with molecular data indicating that these bacteria were similar to Escherichia coli, although biochemical properties suggested these microbes might actually be most similar to plant pathogenic bacteria in the genus Erwinia. We focused on the bacterial flora of the Hawaiian Islands thrips population where these gut bacteria were first reported in 1989. We also analyzed a German population and a 1965 California population preserved in ethanol. Culture and culture-independent techniques revealed a consistent microflora that was similar to the Netherlands isolates studied. The similarity among thrips microbes from multiple populations and environments suggested these bacteria and their hosts share a widespread association. Molecular phylogeny based on the 16S rRNA gene and biochemical analysis of thrips bacteria suggested two distinctive groups of microbes are present in thrips. Phylogenetic analysis also revealed support for one thrips bacterial group having a shared ancestry with Erwinia, whereas the second group of thrips bacteria fell out with E. coli, but without support. Although species-specific relationships were indeterminable due to the conservative nature of 16S, there is strong indication that thrips symbionts belong to two different genera and originated from environmental microbes.
Keywords: Frankliniella occidentalis; Bacteria; Symbiosis; 16S RNA; Erwinia; Escherichia; Phylogenetic analysis

Zeng Youwei, Zhao Jinlian, Peng Yonghong, A comparative study on the free radical scavenging activities of some fresh flowers in southern China, LWT - Food Science and Technology, Volume 41, Issue 9, November 2008, Pages 1586-1591, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.10.010.
(http://www.sciencedirect.com/science/article/B6WMV-4RDR1KM-D/2/1eed944c6d9d1d336a4259df23ec0e29)
Abstract:
The scavenging activities of the crude aqueous extracts from 69 kinds of fresh flowers in southern China on DPPH, superoxide and hydroxyl free radicals, and their polyphenolic contents, were investigated and evaluated in the paper. The results showed that the extracts of red rose flowers had obviously stronger antioxidant activity when compared to other flowers. Polyphenolic content had significant relationships with the 1,1-diphenyl-2-picrylhydrazyl (DPPH) ($r = 0.983$, $P < 0.01$) and superoxide free radical scavenging activity (FRSA) ($r = 0.588$, $P < 0.01$), but no significant relationship with hydroxyl FRSA ($r = 0.184$, $P > 0.05$) in tested open flowers. However, in tested flower buds, polyphenolic content was correlated well with the DPPH FRSA ($r = 0.993$, $P < 0.01$), superoxide FRSA ($r = 0.738$, $P < 0.01$), and hydroxyl FRSA ($r = 0.737$, $P < 0.01$), respectively. Rose was found to be a promising resource of antioxidant polyphenolics that might contribute to the development of functional food.
Keywords: Fresh flower; Extract; Free radical scavenging activity; Polyphenolic content

Andrew J. Macnish, Ria T. Leonard, Terril A. Nell, Treatment with chlorine dioxide extends the vase life of selected cut flowers, Postharvest Biology and Technology, Volume 50, Issues 2-3, November 2008, Pages 197-207, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.04.008.

(http://www.sciencedirect.com/science/article/B6TBJ-4ST45TJ-2/2/08c4f6d3886c96aa030edf1247d6854e)
Abstract:
The accumulation of bacteria in vase water is often associated with premature senescence in many cut flower species. In the present study, we tested the efficacy of aqueous chlorine dioxide (ClO2) to extend flower display life by preventing the build-up of bacteria in vase solutions. The addition of 2 or 10 [mu]L L-1 ClO2 to clean deionized water extended the vase life of Alstroemeria peruviana `Senna', Antirrhinum majus `Potomic Pink', Dianthus caryophyllus `Pasha', Gerbera jamesonii `Monarch', Gypsophila paniculata `Crystal' and `Perfecta', Lilium asiaticum `Vermeer', Matthiola incana `Ruby Red' and Rosa hybrida `Charlotte' flowers by 0.9-13.4 d (7-77%) relative to control (i.e. 0 [mu]L L-1 ClO2) stems. The beneficial effects of ClO2 treatment were associated with a reduction in the accumulation of aerobic bacteria in vase water and on cut surfaces of flower stems. ClO2 treatment was also effective in maintaining or extending the vase life of A. majus `Potomic Pink', Dendrathema x grandiflorum `Albatron', G. paniculata `Perfecta' and M. incana `Ruby Red' flowers even when stems were placed into water containing 1011 CFU L-1 bacteria. The efficacy of 10 [mu]L L-1 ClO2 in vase water containing 0.2 g L-1 citric acid and 10 g L-1 sucrose to extend the display life of G. jamesonii `Lorca' and `Vilassar' flowers was equal to or greater than other tested biocides (i.e. aluminum sulfate, dichloroisocyanuric acid, 8-hydroxyquinoline sulfate, Physan 20(TM), sodium hypochlorite). Taken collectively, the results of the present study highlight the potential of aqueous ClO2 for use as an alternative antibacterial agent in flower vase solutions.
Keywords: Bacteria; Chlorine dioxide (ClO2); Cut flowers; 8-Hydroxyquinoline sulfate (8-HQS); Vase life; Vase solution

G.D. Ascough, L.J. Rice, J. Van Staden, Considerations for evaluating flower abscission in potted plants with multiple inflorescences--Plectranthus as a case study, South African Journal of Botany, Volume 74, Issue 4, November 2008, Pages 753-756, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.05.004.
(http://www.sciencedirect.com/science/article/B7XN9-4SXRYJW-1/2/a93e31a0211c4c448d19909f9e32ff20)
Abstract:
The ability to protect plants and flowers from the adverse affects of ethylene and sub-optimal transport conditions relies on a thorough understanding of the environmental triggers and subsequent downstream physiological and molecular processes that result in senescence or abscission. Characterising abscission is the essential starting point in this process. In this study we explore additional measures of abscission that provide insight into differential abscission patterns where open flowers or unopened buds are preferentially shed. We examine equations relating to the proportion of open or unopened flowers shed, as well as those that are available for abscission using simulated data. To test these equations, two varieties of potted Plectranthus were subjected to continuous darkness or placed under fluorescent lights. After 96 h, abscission data was calculated using equations. Cultivar P000603 was found to preferentially shed open flowers in both conditions, as indicated by differences in the number of open flowers abscised as a proportion of the total available for abscission. Cultivar P010509 shed open and unopened flowers at similar proportions. These additional measures of abscission enlarge our understanding of this intricate process by providing a more comprehensive and thorough approach to evaluate abscission.
Keywords: Ethylene; Flower abscission; 1-MCP; Plectranthus; Post-harvest

Brian C.W. Crawford, Martin F. Yanofsky, The Formation and Function of the Female Reproductive Tract in Flowering Plants, Current Biology, Volume 18, Issue 20, 28 October 2008, Pages R972-R978, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.08.010.

(http://www.sciencedirect.com/science/article/B6VRT-4TSMC9G-S/2/16382fc12e7313d2482629a23ff9c14b)
Abstract: Summary
In angiosperms, sexual reproduction requires a sperm cell, contained within a pollen tube, to fertilize the egg cell. The pollen tubes are capable of growth but have a difficult journey, as egg cells are buried within the ovary of the carpel. Several tissues, known collectively as the reproductive tract, develop within the carpel to facilitate the journey of the pollen tube. The genes involved in the formation and function of the reproductive tract have largely remained a mystery but are crucial for successful fertilization. This review summarizes recent advances in our understanding of the genetic control of reproductive tract development.

Amy D. Atchison, Paul W. Sammarco, Daniel A. Brazeau, Genetic Connectivity in Corals on the Flower Garden Banks and Surrounding Oil/Gas Platforms, Gulf of Mexico, Journal of Experimental Marine Biology and Ecology, Volume 365, Issue 1, 20 October 2008, Pages 1-12, ISSN 0022-0981, DOI: 10.1016/j.jembe.2008.07.002.
(http://www.sciencedirect.com/science/article/B6T8F-4TC2S3F-1/2/797b81f474efc34fb5cdfd42bb532551)
Abstract:
The northern Gulf of Mexico (GOM) currently possesses ~ 3,600 offshore oil and gas production platforms. These platforms serve as artificial reefs on the continental shelf, where, until their introduction, shallow hard substrata were rare. This newly available substrate has helped to expand scleractinian coral populations in the GOM. Here, we conduct molecular genetic analyses on adult scleractinian corals on the Flower Garden Banks (FGB) coral reefs (~ 180 km SE of Galveston, TX) and on surrounding oil and gas platforms. We have attempted to determine the degree of genetic affinity among the natural populations and those on the surrounding platforms. The three most abundant hermatypic scleractinian species were sampled: Madracis decactis, Diploria strigosa, and Montastraea cavernosa. Tissue samples were collected from the East (E-) and West (W-) FGB, and seven platforms within a 65 km radius of the FGB, at a depth range of 5-37 m. Genetic variation was assessed using Amplified Fragment Length Polymorphisms (AFLPs). The large number of polymorphic markers generated by AFLPs allowed for the use of standard genetic analysis tools (AMOVA) as well as population allocation techniques (AFLPOP). AMOVA analyses indicated that the E- and W-FGB were genetically homogeneous for populations of Madracis decactis and Diploria strigosa; Montastraea cavernosa populations, however, were significantly different there. In all species, genetic distance (FST) increased significantly with geographic distance between populations. In the brooding species Madracis decactis, this pattern was even stronger when one considered distance between the platforms and the perimeters of the FGB, particularly the nearest FGB, suggesting that the FGB may be a source of larvae for platform populations. AFLPOP analyses showed that the degree of self-allocation to home sites also increased with inter-site distance. Cross allocations between sites dropped significantly and exponentially in all species within only one to several kms of the FGB. Madracis decactis, a brooder with extended larval release periods and near-immediate settlement competence, showed greater affinity to the FGB with distance than Diploria strigosa, a broadcaster. This brooder appears to be more effective at colonizing small, nearby target sites and expanding its geographic range at the meso-scale. The low degree of genetic affinity exhibited by all species on the platforms may be attributed to genetic drift/founder effect or relatively small samples sizes, although total populations were sampled. In general, genetic affinity decreased with inter-site distance. Young coral populations are highly differentiated at the meso-scale during early stages of community succession, implying that much time and repeated colonization of patchy habitats around larger potential larval sources will be required before genetic equilibrium or homogeneity is reached.

Keywords: AFLP; Broadcaster; Brooder; Coral, genetic affinity; Connectivity; Diploria strigosa; Flower Garden Banks; Madracis decactis; Meso-scale; Molecular genetics; Montastraea cavernosa

Todd J. Barkman, Mika Bendiksby, Seok-Hong Lim, Kamarudin Mat Salleh, Jamili Nais, Domingo Madulid, Trond Schumacher, Accelerated Rates of Floral Evolution at the Upper Size Limit for Flowers, Current Biology, Volume 18, Issue 19, 14 October 2008, Pages 1508-1513, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.08.046.
(http://www.sciencedirect.com/science/article/B6VRT-4TMSSGR-3/2/986f38ab3b2c255a2b13b61a9de60e48)
Abstract: Summary
Evolutionary theory explains phenotypic change as the result of natural selection, with constraint limiting the direction, magnitude, and rate of response [1]. Constraint is particularly likely to govern evolutionary change when a trait is at perceived upper or lower limits. Macroevolutionary rates of floral-size change are unknown for any angiosperm family, but it is predicted that rates should be diminished near the upper size limit of flowers, as has been shown for mammal body mass [2]. Our molecular results show that rates of floral-size evolution have been extremely rapid in the endoholoparasite Rafflesia, which contains the world's largest flowers [3]. These data provide the first estimates of macroevolutionary rates of floral-size change and indicate that in this lineage, floral diameter increased by an average of 20 cm (and up to 90 cm)/million years. In contrast to our expectations, it appears that the magnitude and rate of floral-size increase is greater for lineages with larger flowered ancestors. This study suggests that constraints on rates of floral-size evolution may not be limiting in Rafflesia, reinforcing results of artificial- and natural-selection studies in other plants that demonstrated the potential for rapid size changes [4], [5] and [6].
Keywords: EVO_ECOL

Jan Kolar, Jana Senkova, Reduction of mineral nutrient availability accelerates flowering of Arabidopsis thaliana, Journal of Plant Physiology, Volume 165, Issue 15, 9 October 2008, Pages 1601-1609, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.11.010.
(http://www.sciencedirect.com/science/article/B7GJ7-4S02YVY-1/2/633a1cd36d2751a9d1181a58d76d5b8e)
Abstract: Summary
The time of flowering is regulated by various environmental cues, and in some plant species, it is known to be affected by abiotic stresses. We investigated the effect of nutrient stress caused by an abrupt reduction of mineral nutrition on flowering of Arabidopsis thaliana. We used a hydroponic culture system that enabled us to precisely control nutrient levels. When plants were grown in full-strength nutrient solution for several weeks and then transferred to a diluted medium, the time from sowing to bud appearance was significantly shortened. This acceleration of flowering was more pronounced in short days than in long days, and stronger in the ecotype Landsberg erecta than in Columbia and San Feliu-2. The response was also affected by the age of plants at the beginning of nutrient stress and by the concentration of the diluted medium: earlier treatment and more diluted solutions strengthened the effect. Flowering was affected by nutrient stress, not by a change in the osmotic potential of the medium: addition of mannitol to a 1000-fold diluted solution had no effect on the promotion of flowering. When 3-week-old Landsberg erecta plants were exposed to 1000-fold diluted nutrient solution in an 8-h day length, flower bud appearance was strongly and reproducibly advanced by 10.8-12.8 d compared with control plants (which developed buds 41.1-46.2 d after sowing). This treatment can serve as an optimized protocol for future studies concerning physiological, molecular and ecological aspects of flower induction by nutrient stress in A. thaliana.
Keywords: Arabidopsis thaliana; Flowering; Landsberg erecta; Nutrient deficiency; Stress

Anagnostis Argiriou, Georgios Michailidis, Athanasios S. Tsaftaris, Characterization and expression analysis of TERMINAL FLOWER1 homologs from cultivated alloteraploid cotton (Gossypium hirsutum) and its diploid progenitors, Journal of Plant Physiology, Volume 165, Issue 15, 9 October 2008, Pages 1636-1646, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.10.013.
(http://www.sciencedirect.com/science/article/B7GJ7-4RGVWFC-4/2/8c8867f995f197ff4553eb93c33eca96)
Abstract: Summary
The seasonal cycle and persistence of a plant is governed by a combination of the determinate or indeterminate status of shoot and root apical meristems. A perennial plant is one in which the apical meristem of at least one of its shoot axes remains indeterminate beyond the first growth season.
TERMINAL FLOWER1 (TFL1) genes play important roles in regulating flowering time, the fate of inflorescence meristem and perenniality. To investigate the role of TFL1-like genes in the determination of the apical meristems in an industrially important crop cultivated for its fibers, we isolated and characterized two TFL1 homologs (TFL1a and TFL1b) from tetraploid cultivated cotton (Gossypium hirsutum) and its diploid progenitors (Gossypium arboreum and Gossypium raimondii). All isolated genes maintain the same exon-intron organization. Their phylogenetic analysis at the amino acid level confirmed that the isolated sequences are TFL1-like genes and collocate in the TFL1 clade of the PEBP protein family. Expression analysis revealed that the genes TFL1a and TFL1b have slightly different expression patterns, suggesting different functional roles in the determination of the meristems. Additionally, promoter analysis by computational methods revealed the presence of common binding motifs in TFL1-like promoters. These are the first reported TFL1-like genes isolated from cotton, the most important crop for the textile industry.
Keywords: Cotton; Gossypium; Flowering; Perenniality; TERMINAL FLOWER1

Patrik Kehrli, Sven Bacher, Differential effects of flower feeding in an insect host-parasitoid system, Basic and Applied Ecology, Volume 9, Issue 6, 6 October 2008, Pages 709-717, ISSN 1439-1791, DOI: 10.1016/j.baae.2007.07.001.
(http://www.sciencedirect.com/science/article/B7GVS-4PVY32B-2/2/51a502843c02e0938e118851cf240762)
Abstract:
In many insect host-parasitoid systems, both the host and its parasitoids forage on shared floral resources. As a result of insect behaviour, morphology and physiology, flower species may act selectively at different levels of such systems, e.g., between the trophic levels of hosts and parasitoids, between species within a guild, between sexes or individuals within a species or between life history traits within an individual. We asked if effects of selectivity are consistent across levels in the horse chestnut leafminer, Cameraria ohridella, and its parasitoid complex. Insects were exposed singly in no-choice feeding trials to twelve common flower species and their survival and reproduction were recorded. Only one of twelve flower species (Ranunculus acris) tended to selectively favour the longevity of leafminers, but not of parasitoids. No flower species were found to favour parasitoids only. Both trophic levels profited from feeding on Anthriscus sylvestris, however, parasitoids benefited up to eight times more than their hosts. No differences were found among the species of the parasitoid guild, but females lived significantly longer than males, and single individuals within species were able to exploit generally unfavourable flower species. Out of the seven flower species that increased the longevity of leafminer females, only Chaerophyllum hirsutum significantly enhanced the number of eggs laid. Fecundity was generally positively correlated with longevity of leafminer females, but two flower species (C. hirsutum, Taraxacum officinale) had an additional positive effect on fecundity. In conclusion, we demonstrated that flowers act differently on life history traits in a host-parasitoid system at a multitude of biological levels and that these effects are not always consistent across levels.

Selective plant-derived resources can therefore modify herbivore-natural enemy interactions in ways that are more complex than currently appreciated.
Keywords: Selectivity; Floral resources; Trophic interactions; Conservation biological control

Hiroshi S. Ishii, Taku Kadoya, Reina Kikuchi, Shin-Ichi Suda, Izumi Washitani, Habitat and flower resource partitioning by an exotic and three native bumble bees in central Hokkaido, Japan, Biological Conservation, Volume 141, Issue 10, October 2008, Pages 2597-2607, ISSN 0006-3207, DOI: 10.1016/j.biocon.2008.07.029.
(http://www.sciencedirect.com/science/article/B6V5X-4TDBMDN-2/2/2c7e252f6be8b4078348161f0d6707eb)
Abstract:
Studies of the interspecific relationships between alien and native pollinator species can help forecast the success of alien species as well as assess the extent of disturbance to native plant-pollinator interactions. We examined the habitat and flower resource occupancy by the invasive introduced bumble bee Bombus terrestris and three dominant native bumble bees in central Hokkaido, northern Japan, in relation to a landscape factor (forest cover ratio) and flower morphology with respect to the proboscis length of bees. Three years of monitoring the invasive boundary of B. terrestris indicated that this species, which dominates open agricultural areas, probably will not invade the forests in which the native species dominate. This habitat partitioning likely followed the displacement of the natives by the invader in open agricultural lands. In forested areas, the native species partitioned flower resources on the basis of the relationship between proboscis length and the lengths of the corolla tubes of flowers. However, in open agricultural areas, both the long- and short-tubed flowers were primarily visited by the exotic short-tongued B. terrestris, which foraged illegitimately (by nectar robbing) on long-tubed flowers (Trifolium pratense L.) and legitimately on short-tubed flowers (T. repens L. and Lavandula angustifolia Mill.). The invasion of B. terrestris into open natural vegetation, in addition to open agricultural areas, has recently been reported in Hokkaido. Even though the exotic and dominant native bumble bees partition their habitat according to landscape factors, the invasive bee has the potential to alter the overall interactions within plant-pollinator systems in the regions of open vegetation on Hokkaido Island.
Keywords: Bombus terrestris; Niche partitioning; Plant-pollinator interactions; Species invasion

Anastasia Karioti, Christine K. Kitsaki, Stella Zygouraki, Marouska Ziobora, Samah Djeddi, Helen Skaltsa, Georgios Liakopoulos, Occurrence of flavonoids in Ophrys (Orchidaceae) flower parts, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 203, Issue 7, 1 October 2008, Pages 602-609, ISSN 0367-2530, DOI: 10.1016/j.flora.2007.09.009.
(http://www.sciencedirect.com/science/article/B7GX0-4SNPPY1-3/2/466b9885f677b05ef757180b3b43e11a)
Abstract:
The flower parts (i.e. sepals, labellum, gynostemium and isolated pollinia) of four Ophrys species (Ophrys argolica, Ophrys apifera, Ophrys cornuta, and Ophrys delfinensis [O. argolicaxO. cornuta]), native in Greece, were examined for the presence of polyphenolic compounds. The chemical composition was studied by chromatographic and spectroscopic techniques (UV-vis and 1D and 2D NMR), whereas the localization of the phenolic compounds was depicted by epifluorescence microscopy. The chemical composition was highly variable among the different flower parts. Pollinia and sepals contained the highest concentrations of flavonoids, while the labellum contained the lowest. Among species, O. apifera showed the highest (up to 6-fold) concentration of flavonoid compounds compared with the other three species. Microscopic observations showed that flavonoids are localized in the protoplast, especially in proximity of the nucleus. They are concentrated on cuticle and cell walls of epidermal cells and in parenchyma cells of the sepals. The pollinia contained high concentrations of flavonols which were deposited in

the pollen grains. Three kaempferol (Km) glycosides, Km 3-O-[beta]-d-glucoside, Km 3-O-[beta]-d-rutinoside and Km 3-O-[beta]-d-rhamnoside, were the dominant compounds in the pollinia. The above results suggest a UV-protective role for flavonoids in the flower parts of these plants. Additionally, the pollen-specific flavonols could also be related to the flavonol-depended male fertility known from other plant species.
Keywords: Flavonoids; Flower; Ophrys sp.; Orchidaceae; Pollen fertility; Ultraviolet radiation

Raghav Kumar Mishra, Shio Kumar Singh, Safety assessment of Syzygium aromaticum flower bud (clove) extract with respect to testicular function in mice, Food and Chemical Toxicology, Volume 46, Issue 10, October 2008, Pages 3333-3338, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.08.006.
(http://www.sciencedirect.com/science/article/B6T6P-4T72X13-4/2/73bb2af4f6c01c921c2ad7a362f93afb)
Abstract:
The flower buds of Syzygium aromaticum (clove), a common food flavor, have been used as indigenous medicine for the treatment of male sexual disorders in Asian countries. However, the possible mechanism(s) by which it acts at testicular level remain obscure. Therefore, to investigate its effect on testicular function, chronic oral exposure of hexane extract of flower buds of Syzygium aromaticum in three doses (15 mg, 30 mg, and 60 mg/kg BW) were evaluated for a single spermatogenic cycle (35 days) in Parkes (P) strain mice. The treatment did not induce systemic toxicity at the doses tested. Lower dose (15 mg) of the extract increased the activities of [Delta]5 3 [beta]-HSD and 17 [beta]-HSD, and serum level of testosterone. The higher doses (30 and 60 mg) of extract inhibited these parameters and induced non-uniform degenerative changes in the seminiferous tubules associated with decrease in daily sperm production and depletion of 1C (round and elongated spermatids) population. Taken together these results suggest biphasic action of hexane extract of Syzygium aromaticum flower bud on testicular function, thereby advocating a cautious use of the flower bud as an aphrodisiac in indigenous systems of medicine in Asian countries.
Keywords: Syzygium aromaticum; Testis; Flowcytometry; Spermatogenesis

M. Anupama, S.S. Murgan, P. Balakrishna Murthy, Broccoli flower head extract reduces mitomycin-C induced sister chromatid exchange in cultured human lymphocytes, Food and Chemical Toxicology, Volume 46, Issue 10, October 2008, Pages 3351-3353, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.08.009.
(http://www.sciencedirect.com/science/article/B6T6P-4T7XGVR-1/2/5cba7c70af912a334771456be61978f7)
Abstract:
This study is a continuation of our previous work [Murugan, S.S., Balakrishnamurthy, P., Mathew, Y.J., 2007. Antimutagenic effect of broccoli flower head by the Ames Salmonella reverse mutation assay. Phytother. Res. 21, 545-547], in search of possible antimutagenic properties in broccoli flower head extracts. In the present investigation, the effect of addition of ethanol extract of broccoli flower head on mitomycin-C (MMC) induced sister chromatid exchange (SCE) in cultured human peripheral blood lymphocytes was investigated.
Broccoli flower head was extracted in ethanol using either acetone or ethanol as solvents. The extract was tested at final concentrations of 200 and 400 [mu]g/ml culture and set for SCE assay. MMC at a concentration of 1 [mu]g/ml and the test concentrations of broccoli flower head were added to the culture following 48 h from the initiation of culture. Enumeration of SCE in second division mitotic cells indicated that broccoli flower head extract significantly reduced MMC induced SCEs at both the concentrations tested. This observation is in line with our earlier finding and confirms to the presence of antimutagenic principles in broccoli flower head extract.

Keywords: Broccoli flower head; Sister chromatid exchange; Human lymphocytes; Antimutagenic; Antigenotoxic; Mitomycin-C

Kati Hanhineva, Ilana Rogachev, Harri Kokko, Shira Mintz-Oron, Ilya Venger, Sirpa Karenlampi, Asaph Aharoni, Non-targeted analysis of spatial metabolite composition in strawberry (Fragaria x ananassa) flowers, Phytochemistry, Volume 69, Issue 13, October 2008, Pages 2463-2481, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2008.07.009.
(http://www.sciencedirect.com/science/article/B6TH7-4TCCHT6-1/2/4c5d9fa027bd20fc88f22a04bf68ab8e)
Abstract:
Formation of flower organs and the subsequent pollination process require a coordinated spatial and temporal regulation of particular metabolic pathways. In this study a comparison has been made between the metabolite composition of individual flower organs of strawberry (Fragaria x ananassa) including the petal, sepal, stamen, pistil and the receptacle that gives rise to the strawberry fruit. Non-targeted metabolomics analysis of the semi-polar secondary metabolites by the use of UPLC-qTOF-MS was utilized in order to localize metabolites belonging to various chemical classes (e.g. ellagitannins, proanthocyanidins, flavonols, terpenoids, and spermidine derivatives) to the different flower organs. The vast majority of the tentatively identified metabolites were ellagitannins that accumulated in all five parts of the flower. Several metabolite classes were detected predominantly in certain flower organs, as for example spermidine derivatives were present uniquely in the stamen and pistil, and the proanthocyanidins were almost exclusively detected in the receptacle and sepals. The latter organ was also rich in terpenoids (i.e. triterpenoid and sesquiterpenoid derivatives) whereas phenolic acids and flavonols were the predominant classes of compounds detected in the petals. Furthermore, we observed extensive variation in the accumulation of metabolites from the same class in a single organ, particularly in the case of ellagitannins, and the flavonols quercetin, kaempferol and isorhamnetin. These results allude to spatially-restricted production of secondary metabolite classes and specialized derivatives in flowers that take part in implementing the unique program of individual organs in the floral life cycle.
Keywords: Strawberry (Fragaria x ananassa); Rosaceae; Secondary metabolite profiling; Floral metabolites; UPLC-qTOF-MS; Ellagitannin; Proanthocyanidin; Flavonol; Terpenoid; Spermidine

R.W. King, R. Worrall, I.A. Dawson, Diversity in environmental controls of flowering in Australian plants, Scientia Horticulturae, Volume 118, Issue 2, 16 September 2008, Pages 161-167, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.05.032.
(http://www.sciencedirect.com/science/article/B6TC3-4SXS3FF-4/2/c38ec8e77b322c109514d8e262894912)
Abstract:
In adapting their flowering to a particular season of the year, plants utilize a number of environmental inputs. Knowledge of these environmental controls of flowering is important for production in commercial horticulture. Such information is also relevant for assessing whether or not a species is threatened by global warming. Here, for five Australian plant species, we document ways in which the environment regulates their flowering. Spring flowering of Crowea exalata `Bindelong Compact' reflects a response to increased daily light integral, these plants showing no hint of a true long day photoperiodic response. Higher temperatures not only cause earlier flowering of this Crowea cultivar but also depress flower production (5% loss per 1 [degree sign]C increase). By contrast, another Crowea, `White Star', flowers only if exposed to cool temperatures (15 [degree sign]C) at the time of the increase in daily light integral. Thus, in commercial horticulture, synchronous and rapid flowering of Crowea will be possible by shifting plants from shade to high light conditions. In nature, light intensity will also have a major impact on flowering. By contrast, best flowering of Lechenaultia formosa in spring is a response to short

photoperiods at high temperature while L. biloba prefers long days and has potentially spring to summer flowering. Whereas rising summer temperatures could have a deleterious effect on flowering of C. exalata, global warming may have little impact on L. formosa and L. biloba which flower more profusely in warmer conditions. Another spring flowering species, Verticordia chrysantha, responds both to short days and to exposure to cool temperatures so its survival could be threatened by global warming. For Calytrix fraseri its late summer flowering in nature is explained by its requirement for an exposure to long days. When combined with information previously published for Australian plants, it is clear that there are no simple generalizations to explain why a plant species flowers when it does.
Keywords: Flowering; Environment; Temperature; Australian plants; Global warming

Jean-Claude Chalchat, Mehmet Musa Ozcan, Comparative essential oil composition of flowers, leavesand stems of basil (Ocimum basilicum L.) used as herb, Food Chemistry, Volume 110, Issue 2, 15 September 2008, Pages 501-503, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.02.018.
(http://www.sciencedirect.com/science/article/B6T6R-4RVG3S9-2/2/f905c1526cd019de9e969974246d3f1c)
Abstract:
The chemical composition of flower, leaves and stems from basil (Ocimum basilicum L.) have been examined by GC and GC-MS. The identified components constituting 99.03%, 95.04% and 97.66% of the flower, leaves and stem oils, respectively. The main constituents of the essential oil of flower, leaves and stem oils, respectively, were estragole (58.26%, 52.60% and 15.91%) and limonene (19.41%, 13.64% and 2.40%) and p-cymene (0.38%, 2.32% and 2.40%). Dill apiole (50.07%) was identified as the highest main constituent for stem. Estragole (15.91%), apiole (9.48) and exo-fenchyle acetate (6.14%) followed in order to decreasing them. Minor qualitative and major quantitative variations for some compounds of essential oils were determined with respect to different parts of O. basilicum. It was reported that the chemical composition of different parts oils of basil are very variable. It is known that specific estragole chemotypes are also known.
Keywords: Basil; O. basilicum; Lamiaceae; Essential oil; Estragol; Dillapiole

Cristina Castillejo, Soraya Pelaz, The Balance between CONSTANS and TEMPRANILLO Activities Determines FT Expression to Trigger Flowering, Current Biology, Volume 18, Issue 17, 9 September 2008, Pages 1338-1343, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.07.075.
(http://www.sciencedirect.com/science/article/B6VRT-4T8B9VK-3/2/db507a013d0bed386701cc8258e7917b)
Abstract: Summary
Seasonal changes in day length influence flowering time in many plant species. In Arabidopsis, flowering is accelerated by exposure to long day (LD). Those inductive photoperiods are perceived in leaves [1] and initiate a long-distance signaling mediated by CO and FT. CO is expressed in the phloem according to a circadian rhythm [2], [3] and [4]. Only under LD does CO induce FT expression as high levels of CO in the evening coincide with the external light that stabilizes CO protein [4] and [5]. Subsequently, FT protein travels through the phloem to the shoot apex where, together with FD, it initiates flowering [6], [7], [8], [9], [10], [11] and [12]. Despite the photoperiodic induction, a mechanism of floral repression is needed to avoid precocious flowering. We show that TEMPRANILLO genes (TEM1 and TEM2) act as novel direct FT repressors. Molecular and genetic analyses suggest that a quantitative balance between the activator CO and the repressor TEM determines FT levels. Moreover, developmental TEM downregulation marks the timing of flowering, as it shifts the CO/TEM balance in favor of CO activity, allowing FT transcript to reach the threshold level required to trigger flowering. We envision that this might be a general mechanism between long-day plants to ensure a tight regulation of flowering time.
Keywords: DNA

Felix J.J.A. Bianchi, Felix L. Wackers, Effects of flower attractiveness and nectar availability in field margins on biological control by parasitoids, Biological Control, Volume 46, Issue 3, September 2008, Pages 400-408, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.04.010.
(http://www.sciencedirect.com/science/article/B6WBP-4S9P5PV-3/2/880ecc397c0818c581e305aba174dddc)
Abstract:
Flowering plants have been shown to differ with regard to their attractiveness to parasitoids and nectar accessibility. These floral traits are likely to affect the foraging performance of parasitoids in agricultural landscapes. Using a spatially explicit simulation model we explore how the attractiveness and nectar availability of flowering field margins affects their impact on parasitoids and ultimately on pest populations in crops. The model simulates the movement, nectar feeding and parasitism of parasitoids in an agroecosystem composed of a crop and adjacent flower margin. The perception of olfactory cues emitted by flowers and host-infested plants drives the movement of the parasitoid. Its preference for floral nectar or hosts is described as a function of its internal energy status. Model validation reveals that simulations and measurements of the spatial distribution and energy status of parasitoids are generally in good agreement. Model simulations suggest that aggregation of parasitoids at flower strips are caused by a prolonged longevity of parasitoids feeding on floral nectar as well as by attraction of parasitoids from the surrounding area. We found no indication for depletion of parasitoids in the field interior as a result of migration towards flower strips. Simulations further suggest that the attractiveness of flowers is an important characteristic that should be taken into account for the selection of flowering plants. This study implies that tailoring nectar supply to the requirements of parasitoids holds potential to increase their effectiveness as biological control agents.
Keywords: Conservation biological control; Parasitism; Spatial dynamics; Modeling; Flower strips; Food ecology; Habitat management

Bishwo Prasad Mainali, Un Taek Lim, Evaluation of chrysanthemum flower model trap to attract two Frankliniella thrips (Thysanoptera: Thripidae), Journal of Asia-Pacific Entomology, Volume 11, Issue 3, September 2008, Pages 171-174, ISSN 1226-8615, DOI: 10.1016/j.aspen.2008.07.003.
(http://www.sciencedirect.com/science/article/B8JJN-4T0MMS7-1/2/7a061c759ae09c16334aacd4968054fa)
Abstract:
Frankliniella occidentalis Pergande and F. intonsa Trybom (Thysanoptera: Thripidae) are anthophilous insect pests of many crops worldwide. We evaluated a flower model trap mimicking the chrysanthemum flower as a new method to attract the thrips in the laboratory and a strawberry greenhouse. Both choice and no-choice tests in the laboratory showed that the chrysanthemum flower model trap attracted significantly more adult F. occidentalis and F. intonsa compared to yellow sticky trap. Up to 4.1 times more of F. occidentalis and 5.4 times more of F. intonsa were caught in the flower model trap in the strawberry greenhouse. The flower model trap would be a good addition to the integrated thrips management, although at present it is more expensive than the yellow sticky trap.
Keywords: Frankliniella occidentalis; Frankliniella intonsa; Artificial flower; Visual attraction; Yellow sticky trap

J.C.L. Brown, M.M. De Decker, M.A. Fieldes, A comparative analysis of developmental profiles for DNA methylation in 5-azacytidine-induced early-flowering flax lines and their control, Plant Science, Volume 175, Issue 3, September 2008, Pages 217-225, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.03.023.
(http://www.sciencedirect.com/science/article/B6TBH-4SHMCB4-1/2/d696733a071169c67e8e34e6facabed7)

Abstract:
Earlier experiments demonstrated that DNA from young plants of 5-azacytidine-induced flax (Linum usitatissimum) lines that flower earlier-than-normal is hypomethylated relative to DNA from their control lines and detected differences in methylation level between plants sampled at different ages, which suggested that the methylation level in flax changes during development. To investigate this possibility, and its potential impact on the difference in methylation level between early-flowering and control lines, developmental profiles were established for the cytosine methylation levels in DNA from post-germination seedlings and from the shoot tips of main stems and the cotyledons sampled throughout vegetative phase. The methylation profiles for two early-flowering lines and their control lines were compared. The methylation profiles were then compared to profiles for DNA content, tissue weight and chlorophyll content (green tissues); these additional parameters provided information on tissue status in terms of cell division, tissue expansion and/or photosynthetic maturity. With one exception, methylation levels were either static or increased with plant age and/or tissue maturity; the highest methylation levels were seen in senescent cotyledons. Although DNA from immature plants or tissues of the early-flowering lines was usually hypomethylated, the hypomethylation was not always apparent in tissues from older plants.
Keywords: Epigenetics; Cytosine methylation; Vegetative phase; Flowering time; Post-germination; Cotyledon senescence

Tsai-Wei Hsu, Wen-Chieh Tsai, Dan-Ping Wang, Sandy Lin, Yu-Yun Hsiao, Wen-Huei Chen, Hong-Hwa Chen, Differential gene expression analysis by cDNA-AFLP between flower buds of Phalaenopsis Hsiang Fei cv. H. F. and its somaclonal variant, Plant Science, Volume 175, Issue 3, September 2008, Pages 415-422, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.06.010.
(http://www.sciencedirect.com/science/article/B6TBH-4SWFNMD-1/2/1f480bde1433947ae788ba3c69d151e5)
Abstract:
Somaclonal variation occurs during plant tissue culture and introduces changes that can result in the development of desirable traits. Using cDNA-amplified restriction fragment length polymorphism (cDNA-AFLP) analysis, we compared gene expression patterns between flower buds from wild type (donor) plants of Phalaenopsis Hsiang Fei cv. H. F., whose flowers are bronze in color, and from its somaclonal variants, whose flowers have a mosaic yellowish color, and sometimes an aberrant shape. Using 128 fluorescently labeled primer sets, a total of 2269 transcript-derived fragments (TDFs) were analyzed. Among them, 25 TDFs were differentially expressed between the wild type plant and its variant. After cloning and sequencing these differentially expressed TDFs, we found that they contained 27 distinct sequences. Further confirmation of the differential expression of these sequences was carried out by using semi-quantitative RT-PCR. We found that five sequences showed higher expression levels in the wild type plant compared to those in the variant plant. These corresponded to sequences that encoded casein kinase, isocitrate dehydrogenase, cytochrome P450, EMF2, and a no hits found protein. In contrast, two other sequences, whose roles were unknown, were expressed to a higher level in the variant plant compared to those in the wild type plant. The differential expression of these genes may lead to the mosaic color patterns as well as the aberrant flower shapes in the somaclonal variants of Phalaenopsis Hsiang Fei cv. H. F.
Keywords: cDNA-AFLP; Phalaenopsis orchid; Semi-quantitative RT-PCR; Somaclonal variant; Transcript-derived fragment (TDF)

Guan-fu FU, Long-xing TAO, Jian SONG, Xi WANG, Li-yong CAO, Shi-hua CHENG, Responses of Yield Characteristics to High Temperature During Flowering Stage in Hybrid Rice Guodao 6, Rice Science, Volume 15, Issue 3, September 2008, Pages 215-222, ISSN 1672-6308, DOI: 10.1016/S1672-6308(08)60045-1.

(http://www.sciencedirect.com/science/article/B8JG8-4TSKFYD-9/2/d0b1a9e3abb53a1425970c51b0c58b8f)
Abstract:
By sowing at different dates during 2005 and 2006 both in paddy fields and greenhouse, a super hybrid rice combination Guodao 6 and a conventional hybrid rice combination Xieyou 46 (as control) were used to analyze the differences in heat injury index, seed setting rate, grain yield and its components. Guodao 6 showed more stable yield and spikelet fertility, and lower heat injury index than Xieyou 46. Further studies indicated that the spikelet sterility is positively correlated with the average daily temperature and the maximum daily temperature, with the coefficients of 0.8604 and 0.9850 ($P<0.05$) respectively in Guodao 6. The effect of high temperature injury on seed setting caused by maximum daily temperature was lower than that by average daily temperature during the grain filling stage.
Keywords: hybrid rice; high temperature stress; high temperature injury; spikelet fertility; seed setting

Briana C. Lindh, Flowering of understory herbs following thinning in the western Cascades, Oregon, Forest Ecology and Management, Volume 256, Issue 5, 20 August 2008, Pages 929-936, ISSN 0378-1127, DOI: 10.1016/j.foreco.2008.05.055.
(http://www.sciencedirect.com/science/article/B6T6X-4T2RYV0-1/2/924486c1dd3773ee917c1f548fecf1be)
Abstract:
Thinning of young forest stands encourages development of the understory layer by increasing the levels of light and belowground resources. High-intensity thinning, with associated ground disturbance and high light levels, can lead to dominance by early seral species or by a few species of shrubs, while low-intensity thinning may not increase resource levels enough to encourage forest herbs. Changes in herb-layer abundance can be hard to detect because forest-floor herbs are often slow growing, but flowering increases rapidly in response to high resource levels. This study examined flowering of the understory herb community before and 5 years after low-intensity thinning. Flowering of 10 herb species was sampled in 62 nine-meter radius plots in six treatment units within the H.J. Andrews Experimental Forest. Thinning proved to be the most important determinant of the composition of the flowering assemblage (that is of which plants were flowering in a given plot). Old-growth species and release species (those specializing in large forest openings) showed higher numbers of flowering ramets following thinning. Release species also showed significant positive linear relationships with the plot-level degree of reduction in Douglas-fir (Pseudotsuga menziesii) basal area (BA), while old-growth species showed no significant relationships and forest generalist species showed significant negative linear relationships with reduction in BA. Plot-level reduction in BA explained little of the variation in numbers of flowering ramets per plot for most species except for the release species Hieracium albiflorum and the forest generalist Trillium ovatum. The overall lack of strong linear relationships between herb flowering and reduction in BA makes it difficult to predict optimal thinning intensities for these species. However, the results of this study suggest that even when low-intensity thinning does not significantly change herb abundance it could still influence the ecology of the understory herb community by increasing carbon allocation to sexual reproduction.
Keywords: Thinning; Understory; Herb; Flowering; Forest; Pseudotsuga menziesii

Hanne Skovgaard Mortensen, Yoko Luise Dupont, Jens M. Olesen, A snake in paradise: Disturbance of plant reproduction following extirpation of bird flower-visitors on Guam, Biological Conservation, Volume 141, Issue 8, August 2008, Pages 2146-2154, ISSN 0006-3207, DOI: 10.1016/j.biocon.2008.06.014.
(http://www.sciencedirect.com/science/article/B6V5X-4T3TR05-1/2/b20892deed0c959a8bf0740bd3d3e3a8)

Abstract:
The introduction of an alien top predator, the brown treesnake (Boiga irregularis), has resulted in severe losses of native vertebrate populations in Guam. Among these are important pollinators and seed dispersers. This study is a first attempt to document cascading effects on vertebrate-pollinated native plant species in Guam. We investigated flower visitation, seed set and germination in two native plants, the mangrove tree Bruguiera gymnorrhiza and the forest tree Erythrina variegata var. orientalis. Both species are bird-pollinated. Studies were conducted on two Mariana islands, Guam (with high density of snakes) and Saipan (with nearly no snakes). Visitation rates by birds were high on Saipan, but zero on Guam. Insects and lizards visited flowers to a low extent on both islands. Only lizards were potential effective pollinators. Seed set of both species were significantly higher on Saipan compared to Guam, and for B. gymnorrhiza, seedling recruitment was significantly higher on Saipan. Hence, these bird-pollinated species appear highly dependent on bird visitors for reproduction. The eradication of flower-visiting birds by the invasive treesnake thus secondarily results in broken mutualistic interactions, which may, in turn, result in a lower recruitment of native plants. Thus, the treesnake affects not only potential prey species, but its effects cascade through the entire ecosystem on Guam. Conservation actions should be directed towards an improved recruitment (artificial pollination, planting) of the affected plant species.
Keywords: Boiga irregularis; Brown tree snake; Cascade extinction; Indirect effects; Pacific; Mariana Islands

Nikolaos Makrodimos, George J. Blionis, Nikolaos Krigas, Despoina Vokou, Flower morphology, phenology and visitor patterns in an alpine community on Mt Olympos, Greece, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 203, Issue 6, 1 August 2008, Pages 449-468, ISSN 0367-2530, DOI: 10.1016/j.flora.2007.07.003.
(http://www.sciencedirect.com/science/article/B7GX0-4SNPPY1-1/2/13fd519d2a233e9cb9fca7fed5112108)
Abstract:
Alpine vegetation, restricted to the top of high mountains, is among the vegetation types most endangered by global warming, currently predicted to raise temperatures from 1.1 to 6.4 [degree sign]C, by the end of the century. Nevertheless, background information allowing evaluation of impacts is rather scarce for some geographic zones. Our study of an alpine community on the Plateau of Muses (2600-2750 m a.s.l.) of Mt Olympos, the highest mountain of Greece, conducted in 1993-1994, can provide such background information for the Mediterranean region. We studied features relating to phenology of flowering, floral morphology, distribution and abundance, and flower visitors of plant species that exhibit a biotic pollination syndrome. We identified dominant patterns and we further (i) explored the relative contribution of the plant features and abiotic factors studied in explaining the activity patterns of flower visitors, (ii) examined if flower and visitor traits of the alpine community match each other according to the classical pollination syndromes, and (iii) investigated whether the responses of individual plant species to the yearly climatic variability result into phenological patterns that characterize the whole community. The common strategy of the alpine community was for early flowering and long flower life span; consistently early flowering species were twice as many as late flowering ones, whereas floral longevity (estimated for 36 species) averaged 5.2 days. Duration of flowering (estimated for 57 species) averaged 18.2 days. Climatic variability affected onset of flowering; all late flowering species delayed their flowering during the year characterized by a humid and cold summer. Duration of flowering and floral longevity did not change in a consistent way. Hymenoptera (Aculeates) were the dominant flower visitors. They accounted for 43.3% of the visits recorded, with bumblebees making a little less than half. Diptera followed making 37.5% of the visits (most made by syrphid flies). There was a mismatch between flower-morphology and flower visitor traits; the alpine community had predominantly non-specialized, pale-colour flowers, which are traits assumed to

correspond to Diptera dominance and absence of social bees. Visitation was influenced by flower abundance and duration of flowering; proportionately more Diptera, and proportionately less Hymenoptera visited species with short flowering periods and few flowers present in the field. In a number of cases, the phenological and flower visitor patterns of the community of Mt Olympos deviated from those observed in other alpine environments suggesting a mediterranean influence even at high altitudes.
Keywords: Flowering; Insects; Mediterranean; Mountain; Pollination; Strategy

Suli Zhang, Anyan Yao, Huilei Bai, Jie Ren, Wensou Jia, Lusheng Zhang, Jianfang Hu, The VAP1 gene expression in relation to GAs effect on tendrils, buds and flowers development in 'Xiangfei' grapevine, Scientia Horticulturae, Volume 117, Issue 3, 23 July 2008, Pages 225-230, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.04.007.
(http://www.sciencedirect.com/science/article/B6TC3-4SP4B3S-1/2/18054d3f18f4a8b353b1e279c8e8c27e)
Abstract:
The VAP1 expression and its relationship to GAs in tendrils, inflorescences and different buds of 'Xiangfei' grapevine (Vitis vinifera L.) were investigated. Transcripts of VAP1 could be clearly detected in floral meristem primordia, ovule primordia, bracts of the apical buds and corolla of latent buds, but not in grown tendrils. These results suggested that VAP1 gene might affect the floral determination and the floral organ formation during development and growth of inflorescence and different buds. Applying GAs to shoot tips, tendrils, and inflorescence prolonged the length of tendrils, inflorescence and pedicels, which was due to the high immunohistochemical signals in these tissues. In addition, the expression of VAP1 could not be detected in the apical buds, latent buds, and inflorescences treated with exogenous GAs, suggesting that GAs might be one of the important plant hormones that regulated the transcripts of VAP1 during the development of latent or apical buds and floral induction in grapevine.
Keywords: Grapevine; VAP1; Tendrils; Buds; Flowers; GAs

Anita Sonsteby, Ola M. Heide, Environmental control of growth and flowering of Rubus idaeus L. cv. Glen Ample, Scientia Horticulturae, Volume 117, Issue 3, 23 July 2008, Pages 249-256, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.05.003.
(http://www.sciencedirect.com/science/article/B6TC3-4SV6PM2-1/2/ec311e141fd0930575cd03434f8fb82a)
Abstract:
Environmental control of the annual growth cycle of `Glen Ample' raspberry has been studied in order to facilitate crop manipulation for out-of-season production. Plants propagated from root buds were raised in long days (LD) at 21 [degree sign]C and then exposed to different temperature and daylength conditions at varying ages. Shoot growth was monitored by weekly measurements and floral initiation by regular sampling and examination of axillary bud #5. Under natural summer daylight conditions at 60[degree sign]N shoot growth was nearly doubled at 21 [degree sign]C compared with 15 [degree sign]C, while at 9 [degree sign]C one half of the plants ceased growing and formed flower buds at midsummer. Developing shoots have a juvenile phase and could not be induced to flower before the 15-leaf stage. No significant reduction in induction requirements was found in larger plants. Plants exposed to natural light conditions from 10th August, had an immediate growth suppression at 9 and 12 [degree sign]C with complete cessation after 4 weeks (by September 7). This coincided with the first appearance of floral primordia. At 15 [degree sign]C both growth cessation and floral initiation occurred 2 weeks later (by September 21), while at 18 [degree sign]C continuous growth with no floral initiation was maintained until early November when the photoperiod had fallen below 9 h. The critical photoperiod for growth cessation and floral initiation at 15 [degree sign]C was 15 h. Plants exposed to 10-h photoperiods at 9 [degree sign]C for 2-4 weeks had a transient growth suppression followed by resumed growth under subsequent

high temperature and LD conditions, while exposure for 5 or 6 weeks resulted in complete growth cessation and dormancy induction. The critical induction period for floral initiation was 3 weeks although no transitional changes were visible in the bud before week 4. When exposed to inductive conditions for marginal periods of 3 or 4 weeks, an increasing proportion of the plants (20% and 67%, respectively), behaved as primocane flowering cultivars with recurrent growth and terminal flowering. It is concluded that growth cessation and floral initiation in raspberry are jointly controlled by low temperature and short day conditions and coincide in time as parallel outputs from the same internal induction mechanism.
Keywords: Dormancy; Growth cessation; Flowering; Photoperiod; Raspberry; Rubus; Temperature

Marc Thery, Douglass H. Morse, Predator upon a Flower. Life History and Fitness in a Crab Spider , Harvard University Press, Cambridge, Massachusetts (2007) Pp. x+377. Price [pound sign]32.95 hardback., Animal Behaviour, Volume 76, Issue 1, July 2008, Pages 257-258, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2008.03.005.
(http://www.sciencedirect.com/science/article/B6W9W-4S8TRBF-4/2/4166f90ba85bb8841736463df13d6a38)

Vijai K. Agnihotri, Hala N. ElSohly, Shabana I. Khan, Troy J. Smillie, Ikhlas A. Khan, Larry A. Walker, Antioxidant constituents of Nymphaea caerulea flowers, Phytochemistry, Volume 69, Issue 10, July 2008, Pages 2061-2066, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2008.04.009.
(http://www.sciencedirect.com/science/article/B6TH7-4SNJ73J-2/2/ea0ffece8e178d2f2e9647dd579a2b72)
Abstract:
As part of an ongoing search for antioxidants from medicinal plants, 20 constituents were isolated from the Nymphaea caerulea flowers, including two 2S,3S,4S-trihydroxypentanoic acid (1), and myricetin 3-O-(3''-O-acetyl)-[alpha]-l-rhamnoside (2), along with the known myricetin 3-O-[alpha]-l-rhamnoside (3), myricetin 3-O-[beta]-d-glucoside (4), quercetin 3-O-(3''-O-acetyl)-[alpha]-l-rhamnoside (5), quercetin 3-O-[alpha]-l-rhamnoside (6), quercetin 3-O-[beta]-d-glucoside (7), kaempferol 3-O-(3''-O-acetyl)-[alpha]-l-rhamnoside (8), kaempferol 3-O-[beta]-d-glucoside (9), naringenin (10), (S)-naringenin 5-O-[beta]-d-glucoside (11), isosalipurposide (12), [beta]-sitosterol (13), [beta]-sitosterol palmitate (14), 24-methylenecholesterol palmitate (15), 4[alpha]-methyl-5[alpha]-ergosta-7,24(28)-diene-3[beta],4[beta]-diol (16), ethyl gallate (17), gallic acid (18), p-coumaric acid (19), and 4-methoxybenzoic acid (20). The structures were determined by spectroscopic means. Compounds were tested for antioxidant activity and nine compounds 2-7, 11, 12 and 18 were considered active with IC50 of 1.16, 4.1, 0.75, 1.7, 1.0, 0.34, 11.0, 1.7 and 0.95 [mu]g/ml, respectively, while 1 was marginally active (IC50 > 31.25 [mu]g/ml). The most promising activity was found in the EtOAc fraction (IC50 0.2 [mu]g/ml). This can be attributed to the synergistic effect of the compounds present in it.
Keywords: Nymphaea caerulea; Nymphaeaceae; Antioxidant activity; 2S 3S,4S-trihydroxypentanoic acid; Myricetin 3-O-(3''-O-acetyl)-[alpha]-l-rhamnoside

Yong-Biao Liu, Ultralow oxygen treatment for postharvest control of western flower thrips, Frankliniella occidentalis (Thysanoptera: Thripidae), on iceberg lettuce: I. Effects of temperature, time, and oxygen level on insect mortality and lettuce quality, Postharvest Biology and Technology, Volume 49, Issue 1, July 2008, Pages 129-134, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.12.009.
(http://www.sciencedirect.com/science/article/B6TBJ-4S0RC2V-1/2/25e48e9c54ac7ceb2e4eb46484c2d3e6)
Abstract:
Ultralow oxygen (ULO) treatments with different oxygen levels, treatment times, and temperatures were studied to determine effects on western flower thrips mortality and postharvest quality of

iceberg lettuce. Thrips mortality increased with reduced oxygen level and increased treatment time and temperature. At 0.003% oxygen, over 99.6% mortality rates of thrips were achieved in three ULO treatments of 2, 3, and 4 d at 10, 5, and 1 [degree sign]C, respectively. No treatments caused injury to lettuce surface leaves and there was no reduction in visual quality for treated lettuce. However, about 9-33% of lettuce heads sustained injury to heartleaves. The 2 d ULO treatment with 0.003% oxygen had the lowest injury rate to heartleaves and the injury increased with increased treatment duration. The amount of injured leaves was small (<2 g per head). There were also some variations among the lettuce cultivars in susceptibility to heartleaf injury by ULO treatments. Four out of eight cultivars tested tolerated the 2 d ULO treatment at 10 [degree sign]C without any injury. Therefore, ULO treatment has potential to be developed as an alternative postharvest treatment for western flower thrips on iceberg lettuce.
Keywords: Controlled atmosphere; Ultralow oxygen; Phytosanitary treatment; Lettuce; Western flower thrips; Postharvest quality

Yong-Biao Liu, Ultralow oxygen treatment for postharvest control of western flower thrips, Frankliniella occidentalis (Thysanoptera: Thripidae), on iceberg lettuce: II. Effects of pre-treatment storage on lettuce quality, Postharvest Biology and Technology, Volume 49, Issue 1, July 2008, Pages 135-139, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.01.007.
(http://www.sciencedirect.com/science/article/B6TBJ-4S0357F-C/2/b6514ce5ba76f8be0db4b6b2e83f05f5)
Abstract:
Iceberg lettuce stored under normal atmosphere and controlled atmosphere (CA) with about 3% oxygen at low temperature for 1 week was compared with fresh lettuce for their response to 2 d ultralow oxygen (ULO) treatment with 0.003% oxygen at 10 [degree sign]C for control of western flower thrips. Lettuce which had been stored for 1 week under normal or CA tolerated ULO treatment while over 30% of fresh lettuce sustained minor injury to heartleaves. Therefore, pre-treatment storage at low temperature enhanced tolerance of lettuce to the subsequent insecticidal ULO treatment. A sequential combination of CA storage and ULO treatment was demonstrated to be effective against western flower thrips and lettuce aphid and safe to all seven lettuce cultivars tested. The study indicated that ULO treatment can be made safer to lettuce through pre-treatment storage to increase lettuce tolerance.
Keywords: Controlled atmosphere; Ultralow oxygen; Thrips; Aphid; Phytosanitary treatment; Lettuce; Storage; Postharvest quality

Shogo Matsumoto, Takahiro Eguchi, Tsutomu Maejima, Hiromitsu Komatsu, Effect of distance from early flowering pollinizers `Maypole' and `Dolgo' on `Fiji' fruit set, Scientia Horticulturae, Volume 117, Issue 2, 26 June 2008, Pages 151-159, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.03.025.
(http://www.sciencedirect.com/science/article/B6TC3-4SH1J2R-2/2/d2dd565e15884f09ecb167f1b809135f)
Abstract:
An apple orchard consisting of a single cultivar under the condition of natural pollination must have suitable pollinizers such as Crab apples to ensure stable fruit production. We selected `Maypole' and `Dolgo' as pollinizers for the cultivar `Fuji', and investigated the rate of fruit and seeds in `Fuji' fruits produced by pollen of the pollinizers. We developed a method for tracing pollen flow based on the leaf color of progeny and S-RNase allele of `Maypole', and on Simple Sequence Repeat (SSR) analyses of `Maypole' and `Dolgo'. These were powerful tools for determining the distance insects (mainly Osmia cornifrons) carry pollen from the pollinizers to `Fuji'. Although the fruit set of `Fuji' apples was not reduced with increasing distance between `Fuji' apple trees and pollinizers (probably due to pollen flow from other commercial cultivars planted outside the area), the rate of `Fuji' apple fruit produced by the pollen of the pollinizers decreased with increasing distance. The

rate of fruit produced by the pollinizers was 84% and 77% when `Fuji' was 2.5 m from `Maypole' and `Dolgo', respectively, and 71% and 64% when `Fuji' was 5 m from `Maypole' and `Dolgo', respectively, but was reduced to 47% and 39% when `Fuji' was 10 m from `Maypole' and `Dolgo', respectively. However, the spacing could cause reduced fruit size, and require extra fruit thinning for producing large fruits. It could also cause reduction of the yield for increasing the planting area of pollinizers. We recommend that pollinizers should be planted not more than 10 m from `Fuji'.
Keywords: Pollen flow; Apple pollinizers; S-RNase; SSR; `Fuji'

Xin-e WANG, Cheng-he ZHANG, Shu-xin XUAN, Hong MAN, Hai-he LIU, Shu-xing SHEN, Monosomic Addition Lines of Flowering Chinese Cabbage (B. campestris L. ssp. chinensis var. parachinensis L. H. Bailey)-Chinese Kale (B. oleracea L. var. alboglabra L. H. Bailey), Agricultural Sciences in China, Volume 7, Issue 6, June 2008, Pages 656-663, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60099-1.
(http://www.sciencedirect.com/science/article/B82XG-4SWFK1G-3/2/5fe4db57143e340c9a748fcb182cc117)
Abstract:
Interspecific alien addition lines have played significant roles in gene mapping, intergenomic gene transfer and chromosomal homoeological identification between closely related species. Selection of alien addition lines was conducted by karyotype analysis and morphological observation with the reference of parents. Triploid interspecies hybrid (AAC, 2n = 3x = 29) was obtained from Brassica campestris ssp. chinensis var. parachinensis Qinglu 9601 (tetraploid, AAAA, 2n = 4x = 40) x B. oleracea var. alboglabra Baihua 9705 (diploid, CC, 2n = 2x = 18) by immature hybrid embryo culture in vitro. Five different alien monosomic addition lines (AA + C2, AA + C3, AA + C4, AA + C6, AA + C7) were obtained from the backcross progenies of AAC x AA. Each alien monosomic addition line has some specific morphological characters. It is feasible to obtain alien addition lines from the progenies of AAC x AA by karyotype analysis and morphological observation based on the reference of parents.
Keywords: flowering Chinese cabbage; Chinese kale; allotriploid; alien addition lines

Bishwo Prasad Mainali, Un Taek Lim, Use of flower model trap to reduce the infestation of greenhouse whitefly on tomato, Journal of Asia-Pacific Entomology, Volume 11, Issue 2, June 2008, Pages 65-68, ISSN 1226-8615, DOI: 10.1016/j.aspen.2008.04.005.
(http://www.sciencedirect.com/science/article/B8JJN-4SH7D18-1/2/c5094ae486d5c891700b26b492cd0856)
Abstract:
Flower model trap (FMT) made from artificial yellow chrysanthemum flower coated with sticky material was originally developed to attract anthophilous Frankliniella thrips species. During evaluation of the FMT in a strawberry greenhouse, it was also found to attract higher number of greenhouse whitefly, Trialeurodes vaporariorum Westwood (Homoptera: Aleyrodidae), compared to the conventional yellow sticky trap. The color cue exhibited by the petals and/or geometrical pattern of the flower models might have tempted the whitefly to land on them. Therefore, we assessed the potential of the FMT as a novel pest management tactic for T. vaporariorum. In laboratory comparison test in an acryl cage, the FMT captured adult whiteflies 1.8 times more than did the yellow sticky trap. Installation of 80 FMTs in a 500 m2 commercial tomato greenhouse significantly reduced the adult population of T. vaporariorum. Sooty mold infestation was also reduced by 85% on the greenhouse fruits. Similarly less sooty mold infestation was found on the harvested tomato fruits from the trap-equipped greenhouse. Although no significant reduction in the nymphal population of T. vaporariorum was observed, the FMT employed with timely installation and replacement could be another useful greenhouse tomato pest management tactic for T. vaporariorum.

Keywords: Trialeurodes vaporariorum; Visual attraction; Yellow sticky trap; Color tropism; Anthophilous insects

Adriana Szmidt-Jaworska, Krzysztof Jaworski, Jan Kopcewicz, Involvement of cyclic GMP in phytochrome-controlled flowering of Pharbitis nil, Journal of Plant Physiology, Volume 165, Issue 8, 26 May 2008, Pages 858-867, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.02.010.
(http://www.sciencedirect.com/science/article/B7GJ7-4PTF972-1/2/dff19c9873fa2ffa8a86667c4bc2b450)
Abstract: Summary
Light is one of the most important environmental factors influencing the induction of flowering in plants. Light is absorbed by specific photoreceptors - the phytochromes and cryptochromes system - which fulfil a sensory and a regulatory function in the process. The absorption of light by phytochromes initiates a cascade of related biochemical events in responsive cells, and subsequently changes plant growth and development.
Induction of flowering is controlled by several paths. One is triggered by the guanosine-3':5'-cyclic monophosphate (cGMP) level. Thus, the aim of our study was to investigate the role of cGMP in phytochrome-controlled flowering.
It is best to conduct such research on short-day plants because the photoperiodic reactions of only these plants are totally unequivocal. The most commonly used plant is the model short-day plant Pharbitis nil.
The seedlings of P. nil were cultivated under special photoperiodic conditions: 72-h-long darkness, 24-h-long white light with low intensity and 24-h-long inductive night. Such light conditions cause a degradation of the light-labile phytochrome. Far red (FR) treatment before night causes inactivation of the remaining light-stable phytochrome. During the 24-h-long inductive darkness period, the total amount of cGMP in cotyledons underwent fluctuations, with maxima at the 4th, 8th and 14th hours. When plants were treated with FR before the long night, fluctuations were not observed. A red light pulse given after FR treatment could reverse the effect induced by FR, and the oscillation in the cGMP level was observed again.
Because the intracellular level of cGMP is controlled by the opposite action of guanylyl cyclases (GCs) and phosphodiesterases (PDEs), we first tested whether accumulation of the nucleotide in P. nil tissue may be changed after treatment with a GC stimulator or PDE inhibitor.
Accumulation of the nucleotide in P. nil cotyledons treated with a stimulator of cGMP synthesis (sodium nitroprusside) was markedly (approximately 80%) higher. It was highest in the presence of dipyridamole, whereas 3-isobutyl-1-methylxanthine did not significantly affect cGMP level.
These results show that the analysed compounds were able to penetrate the cotyledons' tissue, and that they influenced enzyme activity and cGMP accumulation.
FR light applied at the end of the 24-h-long white light period inhibited flowering. Exogenous cGMP added on cotyledons could reverse the effect of FR, especially when the compound was applied in the first half of the long night. Flowering was also promoted by exogenous application of guanylyl cyclase activator and phosphodiesterase inhibitors, and in particular dipyridamole.
The results obtained suggest that an endogenous cGMP system could participate in the mechanism of a phytochrome-controlled flowering in P. nil.
Keywords: cGMP; Flowering; Pharbitis nil; Photoperiodic induction; Phytochrome

Ling-Tao Peng, Zhen-Ying Shi, Lin Li, Ge-Zhi Shen, Jing-Liu Zhang, Overexpression of transcription factor OsLFL1 delays flowering time in Oryza sativa, Journal of Plant Physiology, Volume 165, Issue 8, 26 May 2008, Pages 876-885, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.07.010.
(http://www.sciencedirect.com/science/article/B7GJ7-4R0CVKG-6/2/5adf6fa9e8ebe53e547aadffc4d4bb82)
Abstract: Summary

Flowering time is regulated by genetic programs and environment signals in plants. Genetic analysis of flowering time mutants is instrumental in dissecting the regulatory pathways of flower induction. Genotype W378 is a rice (Oryza sativa) late-flowering mutant selected from our collections of T-DNA insertion line. The T-DNA flanking gene in mutant W378 codes OsLFL1 (O. sativa LEC2 and FUSCA3 Like 1), a putative B3 DNA-binding domain-containing transcription factor. In wild-type rice OsLFL1 is expressed exclusively in spikes and young embryos, while in mutant W378 it is ectopically expressed. Introduction of OsLFL1-RNAi into mutant W378 successfully down-regulated OsLFL1 expression and restored flowering to almost normal time, indicating that overexpression of OsLFL1 confers late flowering for mutant W378. The flowering-promoting gene Ehd1 and its downstream genes are all down-regulated in W378. Thus, overexpression of OsLFL1 might delay the flowering of W378 by repressing the expression of Ehd1.
Keywords: Late flowering; B3 DNA-binding domain; Overexpression; OsLFL1; Oryza sativa

Nigel Williams, Flower show, Current Biology, Volume 18, Issue 10, 20 May 2008, Page R400, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.04.067.
(http://www.sciencedirect.com/science/article/B6VRT-4SJ91G8-5/2/8296579ec58f935b107a1480d8526bd0)

Nobuhito Mitani, Ryoji Matsumoto, Terutaka Yoshioka, Takeshi Kuniga, Citrus hybrid seedlings reduce initial time to flower when grafted onto shiikuwasha rootstock, Scientia Horticulturae, Volume 116, Issue 4, 20 May 2008, Pages 452-455, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.03.003.
(http://www.sciencedirect.com/science/article/B6TC3-4S92XSX-2/2/3e5d53b2f7b7dda71215e8e7ab702c84)
Abstract:
The long juvenile period of citrus seedlings before flowering is one of the major obstacles in citrus breeding. Under the citrus breeding program of National Institute of Fruit Tree Science in Japan, 299 citrus hybrid seedlings were grafted onto shiikuwasha (Citrus depressa HAYATA) and cultivated. Approximately one-third of the plants flowered two and a half years after grafting. The average length of the main stems of flowering plants was 308 cm, while that of non-flowering plants was 264 cm. Half of the plants having main stem length >=300 cm formed flowers, while most of the plants having main stem length <210 cm formed no flower. These results indicate that plant vigor influences the flowering and that grafting effectively accelerated flowering. The proportion of flowering plants varied among cross combinations, ranging from 71.4% to 8.0% among the 10 cross combinations used.
Keywords: Citrus; Citrus depressa; Breeding; Grafting; Rootstock

Norman Q. Arancon, Clive A. Edwards, Andrei Babenko, John Cannon, Paola Galvis, James D. Metzger, Influences of vermicomposts, produced by earthworms and microorganisms from cattle manure, food waste and paper waste, on the germination, growth and flowering of petunias in the greenhouse, Applied Soil Ecology, Volume 39, Issue 1, May 2008, Pages 91-99, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.11.010.
(http://www.sciencedirect.com/science/article/B6T4B-4RM896G-1/2/b45542ce5a42ebaadcc983d6e102db33)
Abstract:
Vermicomposts have been shown to promote the germination, growth, and yields of plants. This paper aims to demonstrate the effects of vermicomposts produced from three types of wastes on growth and flowering of petunias which are an important U.S. flowering crop.
Vermicomposts, produced commercially from cattle manure, food wastes and paper wastes, were substituted at a range of different concentrations into with a soilless commercial bedding plant

container medium, Metro-Mix 360 (MM360), to evaluate their effects on the growth and flowering of petunias (Petunia sp.) in the greenhouse. Seeds of petunia (var. Dreams Neon Rose F1) were sown into 100, 90, 80, 70, 60, 50, 40, 30, 20 or 10% MM360 substituted with 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 or 100% cattle manure, food waste or paper waste vermicompost. Each type of vermicompost constituted a separate sub-experiment. All plants were watered three times weekly with 200 ppm Peter's nutrient solution, containing all nutrients required, from sowing up to 79 days. Substitutions with all of the vermicomposts into MM360 increased germination significantly on almost all sampling dates. Shoot dry weights increased significantly after substituting MM360 with 10-60% cattle manure vermicompost, and 10-100% of both food waste and paper waste vermicomposts. Numbers of flowers increased significantly after MM360 substitutions with 20-40% of both cattle manure and food waste vermicomposts, and by only 40% of paper waste vermicompost. There were no positive correlations between the increases in numbers of flowers, and the amounts of mineral-N and microbial biomass-N in the potting mixtures, or the concentrations of N in the shoot tissues of petunias. Factors such as improvement of the physical structure of the potting medium, increases in populations of beneficial microorganisms, and most probably, the availability of plant growth-influencing-substances such as hormones and humates produced by microorganisms during vermicomposting, probably contributed to the increased petunia germination, growth and flowering.
Keywords: Vermicomposts; Petunias; Plant growth; Flowering; Plant growth regulators

Neila Rassaa, Halim Ben Haj Salah, Kaouther Latiri, Thermal responses of Durum wheat Triticum durum to early water stress. Consequence on leaf and flower development, Comptes Rendus Biologies, Volume 331, Issue 5, May 2008, Pages 363-371, ISSN 1631-0691, DOI: 10.1016/j.crvi.2008.02.005.
(http://www.sciencedirect.com/science/article/B6X1F-4S97JDS-1/2/a6073de8167c1631feed01efcf57658a)
Abstract:
Drought can alter stem apex temperature and plant phenological development and it can then have an effect on the duration of the durum wheat stages. Thermal responses of plants to water stress are tentatively analysed as regards microclimate conditions by applying three different water treatments. Apex temperature measurements showed that they are related to radiation and that acceleration of apex development could be related to their increase. To cite this article: N. Rassaa et al., C. R. Biologies 331 (2008).
Keywords: Apex temperature; Water stress; Durum wheat; Temperature apicale; Stress hydrique; Ble dur

Siegfried E. Drewes, Sandy F. van Vuuren, Antimicrobial acylphloroglucinols and dibenzyloxy flavonoids from flowers of Helichrysum gymnocomum, Phytochemistry, Volume 69, Issue 8, May 2008, Pages 1745-1749, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2008.02.022.
(http://www.sciencedirect.com/science/article/B6TH7-4S848G6-2/2/658129ecbdad0feb39a67cf4e4dd9ab5)
Abstract:
From the dichloromethane extract of the flowers of Helichrysum gymnocomum (Asteraceae) two known flavonoids, 4 and 5, and a known acylphloroglucinol, 3B, were isolated. In addition to 1 and 2, the 4',6'-dibenzyloxy-2'-hydroxy derivative of 2',4',6'-trihydroxychalcone and 5,7-dibenzyloxy derivative of pinocembrin, respectively, are reported in Nature for the first time. A compound 3A, related to 3B has the structure 2-methyl-1-[2,4,6-trihydroxy-3-(2-hydroxy-3-methyl-3-butenyl)phenyl]-1-propanone. Compounds 1, 2, 3A, 3B, 4 and 5 have MIC values below 64 [mu]g/ml against a selection of pathogens, with 3B having the highest sensitivity (6.3-45 [mu]g/ml) for eight of the ten pathogens tested, including Staphylococcus aureus (6.3 [mu]g/ml) and

methicillin and gentamycin resistant strain of S. aureus (7.8 [mu]g/ml). With the exception of 2, the other compounds had notable activity (45-63 [mu]g/ml) towards Pseudomonas aeruginosa.
Keywords: Helichrysum gymnocomum; Acylphloroglucinols; Flowers; Antimicrobial

Annalisa Tassoni, Marina Franceschetti, Nello Bagni, Polyamines and salt stress response and tolerance in Arabidopsis thaliana flowers, Plant Physiology and Biochemistry, Volume 46, Issues 5-6, May-June 2008, Pages 607-613, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.02.005.
(http://www.sciencedirect.com/science/article/B6VRD-4S0203Y-1/2/18f1ba3c594821f2e3e11f0c0af1ca4b)
Abstract:
In the present study we analysed polyamine metabolism in Arabidopsis thaliana (ecotype Columbia) flowers and stalks collected from plants germinated and grown under increasing salt-stress conditions (0-75 mM NaCl). The expression level of the different isoforms of polyamine biosynthetic enzymes was analysed by reverse transcriptase-polymerase chain reaction (RT-PCR). Spermidine synthase enzyme activity determined both in supernatant and pellet fractions, together with RT-PCR results, led us to hypothesize a different intracellular compartmentation of the isoforms of these enzymes. Free and conjugated polyamines (perchloric acid-soluble and -insoluble) were measured. Free spermidine was the most abundant polyamine and its levels, such as those of free spermine, increased with salt concentration, supporting the hypothesis for a specific role of those polyamines in the response and tolerance to salt stress of Arabidopsis thaliana flowers.
Keywords: Arabidopsis thaliana; Polyamines; Putrescine; Salt stress; Spermidine; Spermine

Peerapong Sangwanangkul, Parson Saradhuldhat, Robert E. Paull, Survey of tropical cut flower and foliage responses to irradiation, Postharvest Biology and Technology, Volume 48, Issue 2, May 2008, Pages 264-271, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.12.002.
(http://www.sciencedirect.com/science/article/B6TBJ-4RPVJ1W-3/2/1d1428a4a01391a6a497e3836d9fffcb)
Abstract:
The sensitivity of cut flowers and foliage to irradiation used for insect disinfestation varies from species to species and to a lesser extent variety to variety. Flowers with low sensitivity to 250 Gy of electron-beam irradiation were Red ginger (Alpinia purpurata) and Bird-of-Paradise (Strelitzia reginae) inflorescences, and Oncidium (Oncidium spp.-Gower Ramsey) sprays. Medium sensitive flowers were Dendrobium (Dendrobium spp.) `Royal Purples', Protea hybrid `Pink Ice' and heliconia `Red Stricta' (Heliconia stricta). Flowers that showed high sensitivity to 250 Gy were Heliconia `Keanae', `Beehive' ginger (Zingiber spectabilis), `Barbatus' ginger (Costus barbatus), and `Indian head' ginger (Costus woodsonii) inflorescences. White (UH 306) dendrobium was more sensitive than the Pink (UH 232) to irradiation (150 Gy). Pretreatment of UH 306 with 1-methylcyclopropene (1-MCP: 50 [mu]g L-1, 3 h) extended the vase life of dendrobium sprays and mitigated the effects of irradiation (250 Gy) on dendrobium vase life. Hot water at 40 [degree sign]C for 30 min or up to 47.5 [degree sign]C for 20-30 min reduced the minimal irradiation injury to Bird-of-Paradise inflorescences. For the heliconia `Keanae' inflorescences, a hot water treatment at 45-47.5 [degree sign]C for 40 min effectively reduced irradiation injury. Red ginger infloresences were able to withstand 500 Gy if pretreated with benzyladenine (BA) before irradiation. Green Ti (Cordyline terminalis) was not sensitive to irradiation doses from 0 to 500 Gy. Leather-leaf fern (Dryopteris erythrosora) and baby eucalyptus (Eucalyptus pulverulenta) foliage showed little or no sensitivity to irradiation. Lycopodium (Lycopodium taxifolium) and Bracken fern (Pteridium aquilinum) were sensitive. Ruscus leaves (Ruscus aeulectus L.) showed chlorosis after irradiation and leaves treated with BA had less chlorosis compared to the non-irradiated foliage. `Pink Ice' protea foliage withstood up to 500 Gy, if first pulsed with 2% glucose solution for 12 h.

Keywords: Electron-beam irradiation; Heat treatments; Pretreatments; Simulated shipping; Ornamentals; Insect disinfestation; Injury

V. Burggraaf, G. Waghorn, S. Woodward, E. Thom, Effects of condensed tannins in white clover flowers on their digestion in vitro, Animal Feed Science and Technology, Volume 142, Issues 1-2, 15 April 2008, Pages 44-58, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.07.001.
(http://www.sciencedirect.com/science/article/B6T42-4PG2KV2-1/2/36c95ad350259e52aba9e4b077146a42)
Abstract:
Protein in white clover (Trifolium repens L.) is poorly utilised by ruminants because of its extensive degradation to ammonia in the rumen. However, white clover produces condensed tannins (CT) in its flowers, which can reduce rumen proteolysis. Effects of increasing proportions of clover dry matter (DM) as flowers (and therefore floral CT) on soluble protein, ammonia and volatile fatty acid (VFA) concentrations were determined with in vitro incubations. Minced mixtures of 0, 250, 500, 750 and 1000 g/kg of DM as white clover flower (F) with the remainder as white clover leaf, were incubated in vitro and sampled after 0, 2, 4, 8, 12 and 24 h. Treatments contained 0, 13, 26, 39 and 52 g CT/kg DM, respectively. A further treatment with 500 g/kg DM as flower and 500 g/kg DM as leaf had polyethylene glycol added to remove effects of CT. Increasing the proportion of white clover as flowers from 0 to 1000 g/kg DM reduced net conversion of plant N to ammonia N from 290 to 120 mM/M at least partly due to reduced solubility of the protein. Treatments with 750 g/kg DM or more as clover flowers reduced ammonia concentrations to levels likely to limit microbial growth. Total VFA production was not affected by flower content, although the proportion of acetate to propionate increased. The contribution of CT to treatment effects was small compared to effects attributed to difference in chemical composition between flowers and leaves.
Keywords: In vitro digestion; Nutritive value; Rumen; Trifolium repens

H.C. Passam, A.C. Koutri, I.C. Karapanos, The effect of chlormequat chloride (CCC) application at the bolting stage on the flowering and seed production of lettuce plants previously treated with water or gibberellic acid (GA3), Scientia Horticulturae, Volume 116, Issue 2, 4 April 2008, Pages 117-121, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.11.004.
(http://www.sciencedirect.com/science/article/B6TC3-4RFKKPN-2/2/22dd6fe0e270110adc07ecc4c1e1fbc1)
Abstract:
Lettuce plants were sprayed with gibberellin (GA3) or water at the rosette (8-leaf) stage and subsequently with water or CCC (500 or 1500 ppm) at the onset of bolting. GA3 induced rapid bolting and increased seed yield, but seed stalks were longer and thinner than those that had been sprayed with water at the same stage. Treatment with CCC (500 ppm) at bolting decreased the flower stalk height of plants that had been sprayed with water at the rosette stage, but not that of GA3 treated plants. CCC (500 ppm) increased the number of inflorescence branches per plant as well as seed yield in the autumn sown crop, but had no effect on the winter sown crop. When a higher concentration of CCC (1500 ppm) was applied at bolting, flower stalk height decreased, irrespective of whether the plants had been previously treated with GA3 or not, and seed stalk diameter increased. However, 1500 ppm CCC reduced the number of inflorescence branches per plant and mean seed yield. It is concluded therefore that although the application of 500 ppm CCC at the onset of bolting may increase seed yield in the autumn sown crop, this treatment does not improve the seed stalk strength (e.g. increasing diameter or reducing height) of GA3 treated plants. On the other hand, whereas a higher concentration of CCC (1500 ppm) improves seed stalk characteristics, it reduces seed yield.
Keywords: Lettuce; Seed production; Bolting; Lodging

Cyd Celeste Cagas, O New Lee, Keisuke Nemoto, Nobuo Sugiyama, Quantitative trait loci controlling flowering time and related traits in a Solanum lycopersicum x S. pimpinellifolium cross, Scientia Horticulturae, Volume 116, Issue 2, 4 April 2008, Pages 144-151, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.12.003.
(http://www.sciencedirect.com/science/article/B6TC3-4RR86VK-3/2/4483608de1d1ca608eea7e274a4a27fd)
Abstract:
Flowering time is an important factor determining early yield in tomato. However, the quantitative trait loci (QTLs) controlling flowering time and their relation to other QTLs for morphological and physiological traits have not been well studied. The aim of this study was to map the chromosomal regions controlling days to flowering (DTF) concurrently with other traits, such as the number of leaves preceding the first inflorescence (LN), length of the largest leaf (LL), number of lateral shoots (LS), fresh weight (FRW) and plant height (PH). This was undertaken using an inbred backcross population derived from a cross between the commercial cultivar Solanum lycopersicum cv. `M570018' and its close wild relative S. pimpinellifolium (PI124039). S. pimpinellifolium flowers earlier than the cultivated tomato. Plants were grown in spring and summer. Composite interval mapping detected 16 QTLs for the six traits evaluated. These QTLs explained 10-42% of the individual phenotypic variation. QTLs detected in spring generally did not differ from those detected in summer. In chromosome 1, the DTF QTL was co-located with the QTLs for LL, LS and FRW, while in chromosome 3 it was co-located with the QTLs for LN, FRW (summer) and PH. One DTF QTL that was detected in chromosome 3 and conferred by the S. pimpinellifolium allele hastens flowering. The co-location of the DTF QTL with the LN QTL suggested that the DTF QTL in chromosome 3 controls the period from the vegetative to reproductive phase. Co-locations of DTF QTLs with the other traits might be pleiotropic effects of a single gene or cluster of genes via physiological relationships among traits because they were found to be highly significantly correlated.
Keywords: First inflorescence; Lateral shoot development; Number of leaves; Tomato

Yipeng Zhao, Yan Zhou, Brian W.W. Grout, Alterations in flower and seed morphologies and meiotic chromosome behaviors of micropropagated rhubarb (Rheum rhaponticum L.) `PC49', Scientia Horticulturae, Volume 116, Issue 2, 4 April 2008, Pages 162-168, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.11.007.
(http://www.sciencedirect.com/science/article/B6TC3-4RS9STF-1/2/5631dc76ddcbe4ceba5b3a1c68e9ba8b)
Abstract:
Variations in flower and seed and meiotic chromosome behaviors were investigated in micropropagated rhubarb (Rheum rhaponticum L.) `PC49'. The results showed that micropropagated plants had significantly higher variations in flower and seed morphologies and chromosome behaviors than plants derived from crown division. The results demonstrated that micropropagated plants grew 2-5 stamens, 8-13 stigmas, and 2-7 seed-wing, compared to 3 stamens, 9 stigmas and 3 (rarely 4) seed-wing in crown-derived plants. Additionally, alteration in chromosome behaviors (i.e. lagging and bridging) was observed only in micropropagated plants. All the results suggest that somaclonal variation may have been involved in micropropagated rhubarb `PC49'.
Keywords: Flower and seed morphologies; Micropropagation; Chromosome behavior; Rhubarb `PC49'; Somaclonal variations

Long-Xing TAO, Hui-Juan TAN, Xi WANG, Li-Yong CAO, Jian SONG, Shi-Hua CHENG, Effects of High-Temperature Stress on Flowering and Grain-Setting Characteristics of Guodao 6, Acta Agronomica Sinica, Volume 34, Issue 4, April 2008, Pages 609-674, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60027-9.

(http://www.sciencedirect.com/science/article/B94TW-4T5JDPJ-5/2/be08be00a53d8b5e1ba81d603eeec104)
Abstract:
Eight leading rice (Oryza sativa L.) hybrids were used to study the physiological and morphological adaptability to 40-42[degree sign]C air temperature stress. Plants were treated for 6 h each day from initial heading to the 15th day. Guodao 6 and Xieyou 46, which had significant differences in heat injury index under high-temperature stress, were selected for investigating flowering and grain-setting characteristics response to high-temperature stress. Guodao 6 showed a relative stability in grain setting probably because of its adaptability to heat avoidance by changing characteristics of flowing. It had a shortened flowering period and weakened 'apical grain superiority' under high-temperature stress. Within a day, although the peak flowering hour (11:00) was the same as control (normal temperature), the glume-opening rate decreased from 40.0% (control) to 23.6% (high-temperature treatment). In addition, the daily number of spikelet flowering increased compared with the control, and the flowering clock was delayed for 2 h during initial heading period. High temperature reduced the grain-setting rate of Guodao 6 by increasing the sterile spikelets.
Keywords: high-temperature stress; heat tolerance; hybrid rice; flowering clock; glumes opening rate

Giovanni Della Porta, Davide Ederle, Luca Bucchini, Matteo Prandi, Alberto Verderio, Carlo Pozzi, Maize pollen mediated gene flow in the Po valley (Italy): Source-recipient distance and effect of flowering time, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 255-265, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.07.009.
(http://www.sciencedirect.com/science/article/B6T67-4PMT5XN-2/2/67e3393d2a55786a46014e6063957efd)
Abstract:
Gene flow in maize can be monitored by measuring the cross-fertilization rate from a pollen source to a pollen recipient plot. According to European Commission Recommendation 2003/556, co-existence measures should allow non-GM crops to be grown and marketed so that the adventitious presence of GM material does not exceed the labelling threshold of 0.9% set by EC Regulation 1829/2003. Using dominant phenotypic markers we have investigated in farm scale fields in the Po Valley (Italy) the effect of: distance between the pollen source and recipient plants, with and without pollen competition; wind; synchrony in flowering times, in determining cross-fertilization. To this purpose, three types of experimental fields were designed: in type 1, a block of pollen source was planted in the middle of a recipient field; in fields of type 2, the source was separated from the recipient maize by fallow soil and/or maize buffer zones of variable shape and dimension; in type 3 experiments, the pollen source was planted within a recipient field of maize hybrids having different growing cycle lengths (and, hence, differing flowering synchrony). The following conclusions could be drawn: (1) the 0.9% cross-fertilization threshold was reached within, on average, 10 m in type 1 experiments (but exceptionally at 25 m); 17.5 m in type 2a experiments; 1.5 m for areas contiguous to pollen source or to recipient in type 2b experiments; (2) the influence of wind was minor compared to distance between pollen source and recipient; (3) buffer maize plants that shed non source pollen, rather than fallow land, were the most efficient barrier against cross-fertilization. Type 3 experiments allowed to conclude that: (1) little or no reduction in pollen flow was observed if there were only up to 3 days of difference in flowering time between pollen source and recipient; (2) when the time interval was 4-5 days a 25% reduction of pollen flow was recorded; (3) when the time interval was 6 days, the reduction was 50%, reaching levels close to 0% when the off-set was higher than 7 days.
Keywords: Coexistence; Maize; Pollen flow

Terry J. Rose, Zed Rengel, Qifu Ma, John W. Bowden, Post-flowering supply of P, but not K, is required for maximum canola seed yields, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 371-379, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.003.
(http://www.sciencedirect.com/science/article/B6T67-4RWHXH4-1/2/c186c1c3862da094e0c8016f4fa245e8)
Abstract:
The effect of limited P or K supply during and after flowering on canola (Brassica napus L.) seed yields is not known. To determine the growth stage at which canola had accumulated sufficient P or K for maximum yields, we conducted two sand culture experiments in which external P (Experiment 1) or K (Experiment 2) supply was removed at four growth stages (GS 4.7; GS 4.9-5.5; GS 6.2 and maturity). Two levels of P/K supply (adequate or high) were included in each experiment. Plants had accumulated enough K by early flowering (GS 4.7) for maximum seed yields at both adequate and high K supply. Under high P supply, canola plants had accumulated sufficient P by early flowering (GS 4.7) for maximum yields. Under adequate P supply, yield loss occurred when P was removed at early flowering (GS 4.7), predominantly due to a combination of fewer siliques and fewer seeds per silique on branches. Yield loss when P supply was removed at late flowering (GS 4.9-5.5) was due to fewer seeds per silique on branches. Early P removal caused more P remobilization from vegetative organs to the seed. When K was supplied until later growth stages, K concentration in the silique walls increased under both adequate and high K supply. Stem K concentrations also increased under high supply. The results suggest that when P supply is near-limiting, canola requires a continued supply of P post-flowering for maximum seed yields.
Keywords: Canola; Nutrient accumulation; Phosphorus; Potassium

Joao C.M. Barreira, Isabel C.F.R. Ferreira, M. Beatriz P.P. Oliveira, Jose Alberto Pereira, Antioxidant activities of the extracts from chestnut flower, leaf, skins and fruit, Food Chemistry, Volume 107, Issue 3, 1 April 2008, Pages 1106-1113, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.030.
(http://www.sciencedirect.com/science/article/B6T6R-4PPF6FG-6/2/9fec7881757fc926edb00b8a1f56c3fb)
Abstract:
In this study, the antioxidant properties of chestnut (flowers, leaves, skins and fruits) extracts were evaluated through several biochemical assays: DPPH (2,2-diphenyl-1-picrylhydrazyl) radical-scavenging activity, reducing power, inhibition of [beta]-carotene bleaching, inhibition of oxidative hemolysis in erythrocytes, induced by 2,2'-azobis(2-amidinopropane)dihydrochloride (AAPH), and inhibition of lipid peroxidation in pig brain tissue through the formation of thiobarbituric acid-reactive substances (TBARS). These assays have been extensively studied as models for the peroxidative damage in biomembranes. The EC50 values were calculated for all the methods in order to evaluate the antioxidant efficiency of each chestnut extract. The phenol and flavonoid contents were also obtained. Chestnut skins revealed the best antioxidant properties, presenting much lower EC50 values, particularly for lipid peroxidation inhibition in the TBARS assay. Furthermore, the highest antioxidant contents (polyphenols and flavonoids) were found for these extracts.
Keywords: Chestnut extracts; Antioxidants; Scavenging effects; Peroxidation and hemolysis inhibition

Deny Susanti, Hasnah M. Sirat, Farediah Ahmad, Rasadah Mat Ali, Norio Aimi, Mariko Kitajima, Erratum to 'Antioxidant and cytotoxic flavonoids from the flowers of Melastoma malabathricum L.' [Food Chem. 103(3) (2007) 710-716], Food Chemistry, Volume 107, Issue 3, 1 April 2008, Page 1275, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.009.

(http://www.sciencedirect.com/science/article/B6T6R-4PNFVBX-3/2/ae327ebb4b218c087cfe0d6c38215189)

M.S. Madruga, R.G. Costa, A.M. Silva, A.V.M.S. Marques, R.N. Cavalcanti, N. Narain, C.L.C. Albuquerque, G.E. Lira Filho, Effect of silk flower hay (Calotropis procera Sw) feeding on the physical and chemical quality of Longissimus dorsi muscle of Santa Inez lambs, Meat Science, Volume 78, Issue 4, April 2008, Pages 469-474, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2007.07.016.
(http://www.sciencedirect.com/science/article/B6T9G-4P7R8D5-1/2/91ac8e4a996cfcec433161469b86846e)
Abstract:
The effect of different levels of silk flower hay (Calotropis procera Sw) in the diet of confined lambs by the substitution of the commonly used foraging broom corn hay (Sorghum bicolor L) was investigated to evaluate its possible effects on the growth and quality of the lamb meat. Twenty-four male Santa Inez lambs were divided in equal numbers into four treatment groups and fed diets containing 0%, 16.7%, 33.3% and 50% of silk flower hay (SFH). Growth rate, feed intake and meat quality were investigated. Mean daily gains of lambs were 170 g for control, 180.5 g for 16.7% SFH, 96.8 g for 33.3% SFH and 22.9 g for 50% SFH. The use of silk flower hay in the diet of Santa Inez lambs affected health of the animals and meat pH when the substitution of the forage was high, up to 50%; however, the general meat quality was not affected. Meat from animals fed with levels up to 50% SFH had physical (Aw, a*, b* and L*) and chemical (moisture, ash, lipid, phosphorus, iron, phospholipid and fatty-acid profile) parameters comparable to the control group (0% SFH). Among the various levels of substitution (16.7%, 33.3% and 50%) of silk flower hay in the diet tried in this work, the use of 16.7% was found to be an attractive and technically viable option for the Northeast region of Brazil.
Keywords: Silk flower hay; Lamb; Meat quality

K.L. Mandiwana, S.J. Siebert, N. Panichev, M. Kataeva, A.E. Van Wyk, Solubility of Cr(III) and Cr(VI) compounds in ultramafic soil and their availability to perennial flowering plants, South African Journal of Botany, Volume 74, Issue 2, April 2008, Page 388, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.01.149.
(http://www.sciencedirect.com/science/article/B7XN9-4S807WN-4X/2/274e9ad139d4e403fc2acccd6c15812f)

Richard Sibout, Stephanie Plantegenet, Christian S. Hardtke, Flowering as a Condition for Xylem Expansion in Arabidopsis Hypocotyl and Root, Current Biology, Volume 18, Issue 6, 25 March 2008, Pages 458-463, ISSN 0960-9822, DOI: 10.1016/j.cub.2008.02.070.
(http://www.sciencedirect.com/science/article/B6VRT-4S3GVPJ-9/2/f27eb3c3a540fd68320778eff72d6e34)
Abstract: Summary
In dicotyledons, biomass predominantly represents cell-wall material of xylem, which is formed during the genetically poorly characterized secondary growth of the vasculature. In Arabidopsis hypocotyls, initially proportional secondary growth of all tissues is followed by a phase of xylem expansion and fiber differentiation. The factors that control this transition are unknown. We observed natural variation in Arabidopsis hypocotyl secondary growth and its coordination with root secondary growth. Quantitative trait loci (QTL) analyses of a recombinant inbred line (RIL) population demonstrated separate genetic control of developmentally synchronized secondary-growth parameters. However, major QTL for xylem expansion and fiber differentiation correlated tightly and coincided with major flowering time QTL. Correlation between xylem expansion and flowering was confirmed in another RIL population and also found across Arabidopsis accessions. Gene-expression analyses suggest that xylem expansion is initiated after flowering induction but

before inflorescence emergence. Consistent with this idea, transient activation of an inducer of flowering at the rosette stage promoted xylem expansion. Although the shoot was needed to trigger xylem expansion and can control it in a graft-transmissible fashion, the inflorescence stem was not required to sustain it. Collectively, our results suggest that flowering induction is the condition for xylem expansion in hypocotyl and root secondary growth.
Keywords: CELLBIO; SIGNALING

A.B. Locatelli, L.C. Federizzi, S.C.K. Milach, A.R. McElroy, Flowering time in oat: Genotype characterization for photoperiod and vernalization response, Field Crops Research, Volume 106, Issue 3, 20 March 2008, Pages 242-247, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.12.006.
(http://www.sciencedirect.com/science/article/B6T6M-4RR211F-1/2/a5d32c8d84f046a039c1da8d45fb1c76)
Abstract:
Flowering time is an important component in the adaptation of oat to sub-tropical environments. Genotypes differ in their response to photoperiod and to vernalization. The objectives of this study were to identify photoperiod insensitive oat genotypes and then investigate the response of different oat genotypes to a period of vernalization (cold treatment), and to evaluate F6 recombinant inbred lines from two oat crosses in two different environments (day-length increases and day-length decreases). The genotypes used in the studies were from the UFRGS Oat Breeding Program: UFRGS 8, UFRGS 881971 and UFRGS 930605 and from the University of Minnesota, USA: Amagalon/*Ogle, Coker 492/Starter-1 and PC68/5*Starter, and F6 lines from the crosses UFRGS 8 x UFRGS 930605 and UFRGS 8 x PC68/5*Starter. UFRGS 8 showed no photoperiod sensitivity by flowering early regardless of the photoperiod length. Late flowering in the winter and early flowering in the summer characterize day-length-dependent genotypes like PC68/5*Starter. UFRGS 881971 responded to vernalization. Genotypes showed variability that can be used in the selection of lines/varieties that more effectively use the complete season.
Keywords: Avena sativa; Day-length; Adaptation; Growing season

Hanna Ranta, Tatu Hokkanen, Tapio Linkosalo, Liisa Laukkanen, Kristoffer Bondestam, Annukka Oksanen, Male flowering of birch: Spatial synchronization, year-to-year variation and relation of catkin numbers and airborne pollen counts, Forest Ecology and Management, Volume 255, Issues 3-4, 20 March 2008, Pages 643-650, ISSN 0378-1127, DOI: 10.1016/j.foreco.2007.09.040.
(http://www.sciencedirect.com/science/article/B6T6X-4R1189T-2/2/b86036f8c9073ee52dac7ef1d045d808)
Abstract:
The magnitude of flowering of many forest tree species varies intermittently and extensively from year to year. Besides its great consequences for the reproductive biology of plant species, the phenomenon has manifold implications for silviculture, ecological interactions and public health. In order to characterise the male flowering and pollen flow of birch (Betula), and to understand the proximal causes contributing to them, we studied the annual variability and spatial synchronization of male catkin numbers of silver birch (Betula pendula Roth.) and downy birch (Betula pubescens Ehrn.) stands, and the relation of catkin numbers to airborne pollen counts during 18 years in Finland in northern Europe. Years with either low or abundant catkin production of both species tended to occur at the same time over a large geographic area. The longest distance between two stands in our study was 500 km, and all correlations between annual catkin amounts were still positive at this distance. Years with abundant and low male catkin crops were correlated among stands of the same birch species as well as among stands of silver birch and downy birch. The association between annual airborne pollen sums and catkin numbers was positive, but interestingly, marked differences were also detected.
Keywords: Betula; Pollen; Male catkin; Flowering synchronization; Annual variation

Guido Flamini, Marianna Tebano, Pier Luigi Cioni, Composition of the essential oils from leafy parts of the shoots, flowers and fruits of Eryngium amethystinum from Amiata Mount (Tuscany, Italy), Food Chemistry, Volume 107, Issue 2, 15 March 2008, Pages 671-674, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.08.064.
(http://www.sciencedirect.com/science/article/B6T6R-4PJCYJM-5/2/74a2b5e44785f3f24190c627895df819)
Abstract:
The essential oils obtained from the leafy parts of the shoots, inflorescences and fruits of Eryngium amethystinum (Apiaceae) from Italy have been studied. The essential oil from the inflorescences was characterised by methyl-derivatives of benzaldehyde (26.4%) and by some phenylpropanoids (3.0%) such as eugenol and (E)-methyl isoeugenol. The essential oil of leafy parts of the shoots showed a higher percentage of sesquiterpenes (31.3%) than monoterpenes (20.2%). The main differences between the two essential oils can be referred to [alpha]-pinene and germacrene D: the essential oil of the inflorescences contained much more [alpha]-pinene than the other one (25.6% vs. 11.8%), while the contrary is true for germacrene D (14.5% vs. 31.3%).
Keywords: Eryngium amethystinum L.; Apiaceae; Essential oil; Flowering aerial parts; Benzaldehyde methyl-derivatives; [alpha]-Pinene; Germacrene D

Noriko Yoshihara, Masako Fukuchi-Mizutani, Hiroaki Okuhara, Yoshikazu Tanaka, Tsutomu Yabuya, Molecular cloning and characterization of O-methyltransferases from the flower buds of Iris hollandica, Journal of Plant Physiology, Volume 165, Issue 4, 13 March 2008, Pages 415-422, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.12.002.
(http://www.sciencedirect.com/science/article/B7GJ7-4NBRFK1-1/2/7b66be9c6392255328335cab7f6ecf98)
Abstract: Summary
In plants, O-methyltransferases (OMTs) play an important role in methylation of secondary metabolites, especially flavonoids and other phenylpropanoids, and two cDNA clones, IhOMT1 and IhOMT2 (Iris hollandica OMT), encoding OMTs were successfully isolated from a cDNA library of flower buds of I. hollandica. IhOMT1 encodes an open reading frame (ORF) of 365 amino acids with calculated molecular mass of 40,193 Da and isoelectric point (pI) of 5.54, while IhOMT2, which shares 31.5% amino acid sequence identity with IhOMT1, encodes 369 amino acids with calculated molecular mass of 40,385 Da and pI of 5.50. In addition, the molecular masses of both recombinant IhOMT1 and IhOMT2 proteins were estimated to be about 40 kDa by protein gel blot analysis. Characterization of the enzymatic properties using the recombinant IhOMT1 protein confirmed that IhOMT1 cDNA encodes a S-adenosyl-l-methionine (SAM)-dependent caffeic acid 3-OMT, which catalyzes the transfer of the methyl moiety from SAM to caffeic acid to form ferulic acid. Its optimum activity was observed at pH 7.5-8.0 and at 35 [degree sign]C. This is the first report of the isolation and characterization of a COMT cDNA clone involved in the phenylpropanoid biosynthesis of Iridaceae plants. In contrast, IhOMT2 showed no activity in SAM-dependent assays for various phenylpropanoids.
Keywords: cDNA cloning; Heterologous expression; Iris hollandica; O-methyltransferase; Phenylpropanoid biosynthesis

A. Iannucci, M.R. Terribile, P. Martiniello, Effects of temperature and photoperiod on flowering time of forage legumes in a Mediterranean environment, Field Crops Research, Volume 106, Issue 2, 5 March 2008, Pages 156-162, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.11.005.
(http://www.sciencedirect.com/science/article/B6T6M-4RGG2NH-1/2/694e4fa764b9feca061d4891674ee421)
Abstract:
Flowering time plasticity is a commonly occurring adaptive characteristic of fodder crops, including legumes, in arid and semiarid environments of the Mediterranean regions. Time of flowering is

mainly influenced by genotype, temperature and photoperiod. Field experiments were carried out at Foggia (southern Italy) during successive growing seasons (from 8 to 16 growing cycles according to species) to study the relation among air temperature, photoperiod and duration of the morphological development of flowering in eight forage legume species: sulla (Hedysarum coronarium L.), sainfoin (Onobrychis viciifolia Scop.), pea (Pisum sativun L.), berseem clover (Trifolium alexandrinum L.), Persian clover (Trifolium resupinatum L.), faba bean (Vicia faba L.), common vetch (Vicia sativa L.) and hairy vetch (Vicia villosa Roth). Time to reach 10% flowering (EF) and 100% flowering (FF) were recorded. Rate of progress to flowering, defined as the inverse of time from sowing to EF and FF, was related to mean daily temperature, or to both mean daily temperature and mean photoperiod. Using the linear equations, the thermal time requirements (Tt) and the base temperature (Tb) expressed as heat units were determined by the x-intercept method for both EF and FF stages. Evaluation of flowering time was also based on days after planting (DAP), day of year (DOY) and on a photothermal index (PTI). For all species, a significant negative correlation (P >= 0.01) was found between planting date (PD) and DAP whereas PTI showed a significant negative relationship (P >= 0.05) only for faba bean, pea, berseem clover and common vetch. In sainfoin, sulla and berseem clover, the rate of progress to flowering was affected significantly (P >= 0.05) by both mean temperature and photoperiod. The Tt requirements to reach the EF and the FF stage ranged from 871 to 1665 [degree sign]C day and from 1043 to 1616 [degree sign]C day, respectively, for the studied species. Both phenological stages considered depended upon accumulated thermal time above a species-specific base temperature. Furthermore, in all legumes the onset of flowering only occurred when dual thresholds of a minimum Tt and a minimum photoperiod were reached, which were specific to each species.
Keywords: Base temperature; Flowering stage; Legume species; Photoperiod; Temperature; Thermal time

Satu Ramula, Population dynamics of a monocarpic thistle: simulated effects of reproductive timing and grazing of flowering plants, Acta Oecologica, Volume 33, Issue 2, March-April 2008, Pages 231-239, ISSN 1146-609X, DOI: 10.1016/j.actao.2007.11.005.
(http://www.sciencedirect.com/science/article/B6VR3-4RV1JXS-2/2/e6e9f085a9e927406c92955caa3b5127)
Abstract:
In monocarpic plants, which die after flowering once, the timing of reproduction plays an important role. The optimal time for reproduction is when reproductive output and survival are maximized. This optimum may be altered by herbivores that consume reproductive plants of different sizes disproportionally. I examined plant survival, flowering probability, reproductive output and the probability of becoming grazed in relation to plant size in two populations of the short-lived monocarpic herb Cirsium palustre. Moreover, I simulated the consequences of changes in reproductive timing and grazing preference for population dynamics. Plant survival, flowering probability and reproductive output tended to increase with plant size, whereas the probability of becoming grazed was unaffected by plant size. According to the stochastic simulations, intense grazing would have been required to significantly reduce the stochastic population growth rate (log[lambda]s) and therefore, the observed levels of grazing had no impact on log[lambda]s in the study populations. Stochastic simulations conducted with selective grazing focusing on either early or late flowering plants and with different reproductive timings revealed that the grazing of early flowering plants had a constant effect on log[lambda]s despite the proportions of early and late flowering plants in the population, suggesting that there is no optimal time for reproduction. The grazing of late flowering plants reduced log[lambda]s with delayed reproduction, favouring reproduction early in the life cycle.
Keywords: Demography; Grazing; Herbivory; Matrix population model; Monocarpy; Population growth rate; Reproductive timing; Stochastic simulation

Ulf Toelch, Kai Petra Stich, Clifton Lee Gass, York Winter, Effect of local spatial cues in small-scale orientation of flower bats, Animal Behaviour, Volume 75, Issue 3, March 2008, Pages 913-920, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2007.07.011.
(http://www.sciencedirect.com/science/article/B6W9W-4PX16X5-6/2/6282ae6665f684acdd8a2a1e187392be)
Abstract:
It is crucial for nectar-feeding animals to re-locate profitable flowers. However, neither flower shape nor colour signal the nectar content of a single flower. Such information can emerge only by an animal remembering experienced foraging profitability. Furthermore, this requires the ability to spatially discriminate between individual flowers of similar appearance, which appears to be demanding especially when multiple flowers of the same species are aggregated. In a study of the foraging behaviour of nectar-feeding bats, Glossophaga soricina, we investigated the effect of local echo acoustic cues that were spatially separated by at least 40 cm from the goal in a multiple goal-finding task. Increasing density of local spatial cues improved accuracy in re-locating rewarding feeders by helping bats identify profitable flowers on a small scale.
Keywords: echo acoustic cues; foraging; Glossophaga soricina; Pallas' long-tongued bat; pollinator; spatial memory

Di Wu, Mian Zhang, Chaofeng Zhang, Zhengtao Wang, Chromones from the flower buds of Tussilago farfara, Biochemical Systematics and Ecology, Volume 36, Issue 3, March 2008, Pages 219-222, ISSN 0305-1978, DOI: 10.1016/j.bse.2007.07.003.
(http://www.sciencedirect.com/science/article/B6T4R-4PKX5WH-2/2/10ba8d4241ebf2cfa34c871918ccb9d5)
Keywords: Tussilago farfara; Compositae; Chromone; Chemotaxonomy

Khajanchi Lal, P.S. Minhas, Shipra, R.K. Chaturvedi, R.K. Yadav, Extraction of cadmium and tolerance of three annual cut flowers on Cd-contaminated soils, Bioresource Technology, Volume 99, Issue 5, March 2008, Pages 1006-1011, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.03.005.
(http://www.sciencedirect.com/science/article/B6V24-4NJP98P-2/2/21fe841f9a4c32792d8cbd6c42c6db3a)
Abstract:
To evaluate the production potential and Cd removal by three flower crops, viz.: marigold (Tagetes erecta), chrysanthemum (Chrysanthemum indicum) and gladiolus (Gladiolus grandiflorus), an experiment was conducted on differentially contaminated soils (DTPA-Cd 0.6-68.4 mg kg-1). Biotoxicity of Cd lead to reductions in growth and flower yield of marigold at DTPA-Cd [greater-or-equal, slanted] 7.9 mg kg-1 soil, while the productivity of chrysanthemum and gladiolus was sustained up to 21.2 mg kg-1. DTPA-Cd for 50% yield reduction (C50) was 85, 106 and 215 mg kg-1 soil for marigold, chrysanthemum and gladiolus, respectively, that indicates a better Cd-tolerance in gladiolus. The uptake of Cd increased with contents in soils and the maximum accumulation occurred in leaves. Among the economic parts, gladiolus spikes accumulated the highest Cd (7.2) followed by flowers of marigold (6.5) and chrysanthemum (4.0 mg kg-1). But, because of higher biomass, the total Cd removal was the maximum with chrysanthemum (8.3) followed by gladiolus (6.0) and the minimum (2.6 mg m-2) with marigold. Gladiolus with highest tolerance and Cd-content in saleable part holds potential to clean up the moderately contaminated soils.
Keywords: Cadmium toxicity; Phyto-remediation; Marigold; Chrysanthemum; Gladiolus

A. Ngakou, M. Tamo, I.A. Parh, D. Nwaga, N.N. Ntonifor, S. Korie, C.L.N. Nebane, Management of cowpea flower thrips, Megalurothrips sjostedti (Thysanoptera, Thripidae), in Cameroon, Crop

Protection, Volume 27, Issues 3-5, March-May 2008, Pages 481-488, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.08.002.
(http://www.sciencedirect.com/science/article/B6T5T-4PNF2GP-2/2/4b978677273e5cea908c2f7e72db0a81)
Abstract:
A series of experiments were conducted in Cameroon to investigate options for managing cowpea flower thrips, Megalurothrips sjostedti, via arbuscular mycorrhiza fungi, rhizobia and Metarhizium anisopliae. Six cowpea fields were established in three agroecological zones over a 3-year period. The abundance of both larvae and adults of M. sjostedti was assessed on plants grown from (1) seeds co-inoculated at sowing with arbuscular mycorrhiza fungi (AMF) and rhizobia (mycorrhiza/rhizobia); (2) non-inoculated seeds and plants sprayed three times with M. anisopliae (Metarhizium); (3) seeds co-inoculated at sowing with AMF and rhizobia and plants sprayed three times with M. anisopliae (mycorrhiza/rhizobia/Metarhizium); (4) non-inoculated seeds and plants sprayed three times with the synthetic insecticide deltamethrin; and compared with (5) a control consisting of non-inoculated seeds and unsprayed plants. Results indicate that thrips infestation was associated with the flowering cycle and was higher in the first than in the second cropping season in most agroecological zones. In general, M. sjostedti larval and adult counts were significantly higher ($P<0.01$) in the control than in other treatments. Compared with the control, treatment insecticide obtained the highest reduction of adults (range 52-95%) and larvae thrips population (64-97%), followed by mycorrhiza/rhizobia/Metarhizium (29-56%) and (29-49%), mycorrhiza/rhizobia (31-49%) and (24-52%), and Metarhizium (25-58%) and (5-52%), respectively. In all of the above treatments, the reduction of thrips led to a subsequent increase of seed yield, although it was not always significant. Apart from two cases (Ngaoundere 2000 and Nkolbisson 1999), biological treatments (Metarhizium, mycorrhiza/rhizobia and mycorrhiza/rhizobia/Metarhizium) consistently reduced grain yield loss in the trials compared with the control at Ngaoundere in 1999 and Maroua 2001. These results are discussed in the context of sustainable management of M. sjostedti populations on cowpea.
Keywords: Cowpea; Megalurothrips sjostedti; Arbuscular mycorrhizal fungi; Rhizobia; Metarhizium anisopliae

Gloria Rodriguez Banuelos, Ruby Argumedo, Komal Patel, Vicky Ng, Feimeng Zhou, Robert Luis Vellanoweth, The developmental transition to flowering in Arabidopsis is associated with an increase in leaf chloroplastic lipoxygenase activity, Plant Science, Volume 174, Issue 3, March 2008, Pages 366-373, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.12.009.
(http://www.sciencedirect.com/science/article/B6TBH-4RKTN6X-1/2/b918eda02fa2e3cb67dacfd4cb20f407)
Abstract:
The developmental transition from vegetative growth to flowering in Arabidopsis is associated with a precipitous decline in the activity of leaf ascorbate peroxidase (APx), an enzymatic scavenger of hydrogen peroxide, and an increase in specific lipid peroxidation leading to the accumulation of 13-hydroperoxy-9,11,15 (Z,E,Z) octadecatrienoic acid (13 HOO-FA). The appearance of this specific isomer suggests that it is of enzymatic origin and may represent the activation of an oxylipin signaling pathway. We thus hypothesized that leaf 13-lipoxygenase (LOX) activity increases at the floral transition and leads to the observed elevation of 13-HOO-FA levels. Leaf protein extracts were prepared from seven distinct life stages of Arabidopsis plants and used to assay for LOX activity. We report that leaf 13-LOX enzymatic activity increases two- to three-fold from the vegetative stage to the immediate post-floral transition stage. We found two forms of LOX activity in cell extracts and show that the higher pH optimum form is the isoenzyme activated. This increase is correlated with a small increase in H_2O_2, perhaps resulting from the previously reported decline in leaf APx activity. Very low levels of exogenous H_2O_2 activate the induced form in vegetative leaf extracts in vitro, suggesting that the floral transition-dependent APx decline and

subsequent H2O2 elevation are involved in activating plastid 13-LOX and thus a second messenger oxylipin pathway.
Keywords: Lipoxygenase; Ascorbate peroxidase; Oxylipin pathway; Floral transition

Hye-Ji Kim, William B. Miller, Effects of GA4+7 and benzyladenine application on postproduction quality of `Seadov' pot tulip flowers, Postharvest Biology and Technology, Volume 47, Issue 3, March 2008, Pages 416-421, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.08.004.
(http://www.sciencedirect.com/science/article/B6TBJ-4PTN8SG-2/2/deda6cc9000322b05a589f8ea75810bb)
Abstract:
We investigated the effect of gibberellin4+7 (GA4+7) plus benzyladenine (BA) on postproduction quality of potted tulips. Plants of Tulipa gesneriana `Seadov' were sprayed with GA4+7 plus BA, and placed in a simulated consumer environment (SCE) in order to determine effectiveness of the compound at each stage. Regardless of plant stage, treatment with GA4+7 plus BA improved individual flower longevity and postproduction longevity in the range of concentrations tested, with BA being the main active ingredient in the mixture. At bud stage application, postproduction quality was improved with higher doses of GA4+7 plus BA. GA4+7 plus BA had a strong effect on enhancing flower longevity when sprayed at the mature (fully colored) bud, and a lesser effect when applied to immature (green) buds. When applied at bloom stage, however, concentrations over 50 mg L-1 reduced individual flower and postproduction longevity relative to lower concentrations as a result of undesirable hyper-opening of older flowers and greatly stimulated gynoecium growth. For all flower ages, concentrations as low as 10 mg L-1 significantly increased tulip flower longevity.
Keywords: Postharvest; Benzyladenine; Cytokinin; Gibberellin; Senescence; Tulipa gesneriana

Maricruz Ramirez, Marco Vinicio Saenz, Alfonso Vargas, Mario Araya, Leaf pruning intensities at flowering of banana (Musa AAA, cv. Grande Naine) did not influence fruit green and yellow life and quality, Scientia Horticulturae, Volume 115, Issue 4, 21 February 2008, Pages 319-322, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.10.014.
(http://www.sciencedirect.com/science/article/B6TC3-4R8KTC3-1/2/755677173606eb330b640261b6cd87cb)
Abstract:
This study examined the effects of leaf pruning intensities at flowering on the green and yellow life and fruit quality of bananas (Musa AAA, cv. Grande Naine). The fruit from banana plants that retained 7, 9, 11 and 13 leaves after pruning were packed in carton boxes of 13.7 kg and stored in a cold room at 14 [degree sign]C for 21 days to simulate transportation conditions. During this period, eight visual evaluations of fruit peel colour were made. Next, fruits were induced to commercial ripening using ethylene at 100 [mu]l/ml. Four evaluations (every 2 days) on fruit firmness, soluble solids, titratable acidity, fruit weight and peel colour were made to assess fruit yellow life. No interaction between evaluations and number of leaves retained was found for pulp firmness, soluble solid percentage, fruit acidity, fruit weight and maturation grade. The fruit green life and peel colour was similar for plants retaining different number of leaves. After the application of ethylene, there were no differences in fruit firmness ($P > 0.62$), percentage of soluble solids ($P > 0.24$) nor in the percentage of acidity ($P > 0.32$). No difference in fruit weight ($P > 0.07$) and ripening grade ($P > 0.17$) were observed among plants retaining different number of leaves. The results suggest that in tropical commercial banana plantations, producing for international markets, it is possible to defoliate the banana plants to seven leaves at flowering without causing a reduction on the green and yellow life and quality of fruit.
Keywords: Defoliation; Leaf pruning; Post harvest

Sandra Vairo Cavalli, Sofia V. Silva, Cecilia Cimino, F. Xavier Malcata, Nora Priolo, Hydrolysis of caprine and ovine milk proteins, brought about by aspartic peptidases from Silybum marianum flowers, Food Chemistry, Volume 106, Issue 3, 1 February 2008, Pages 997-1003, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.07.015.
(http://www.sciencedirect.com/science/article/B6T6R-4P6M66K-2/2/72da432b236c5786d4e649f6db614db4)
Abstract:
The flowers of cardoon (Asteraceae) are a rich source of aspartic peptidases which possess milk clotting activity - and are thus used in traditional cheesemaking in the Iberian Peninsula. This study was aimed at characterizing the enzymatic action of the aspartic peptidases present in flowers of Silybum marianum (L.) Gaertn. (Asteraceae), specifically upon degradation of caseins. The proteolytic activities toward Na-caseinates previously prepared from caprine and ovine milks were studied, in a comparative fashion, using urea-PAGE, tricine-SDS-PAGE, densitometry, electroblotting and sequencing. Caprine [alpha]s1- and [beta]-caseins were degraded up to 68% and 40%, respectively, during 24 h of incubation. Only one important and well-defined band corresponding to a molecular weight of 14.4 kDa - i.e. a fragment of [beta]-casein, was observed by 12 h of hydrolysis. By 24 h of incubation, ovine [alpha]s- and [beta]-caseins were degraded up to 76% and 19%, respectively. In what concerns specificity, the major cleavage site in ovine caseinate was Leu99-Arg100 in [alpha]s1-casein.
Keywords: Rennet substitute; Proteolysis; Electrophoresis; Aspartic peptidase; Milk clotting

Hong Gao, Yi-Na Huang, Bo Gao, Pei-Yu Xu, Chika Inagaki, Jun Kawabata, [alpha]-Glucosidase inhibitory effect by the flower buds of Tussilago farfara L., Food Chemistry, Volume 106, Issue 3, 1 February 2008, Pages 1195-1201, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.07.064.
(http://www.sciencedirect.com/science/article/B6T6R-4PB0PW9-7/2/b8571fa8d7f4f20672070f983cb76681)
Abstract:
Methanolic extracts from the medicinal parts of 50 traditional Chinese herbs were tested in screening experiments for rat intestinal [alpha]-glucosidase. The methanolic extract from flower buds of Tussilago farfara L. (Compositae) showed the highest maltase inhibitory activity, with maltose as a substrate. Enzyme assay-guided fractionation of this extract afforded 3,4-dicaffeoylquinic acid (1), 3,5-dicaffeoylquinic acid (2), 4,5-dicaffeoylquinic acid (3) and rutin (4), and the structures of these compounds were elucidated on the basis of MS and NMR data analyses. Compounds 1, 2 and 3 showed comparative maltase inhibitory activities, and the IC50 values were 0.91 mM, 0.90 mM and 0.89 mM, respectively. Comparison of the activities of 1-3, chlorogenic acid (5), quinic acid (6) and caffeic acid (7) suggested that the number of caffeoyl groups attached to a quinic acid core were important for the potency. Rutin (4) showed moderate activity and inhibited 41% of maltase activity at a concentration of 1 mM. This is the first report on mammalian [alpha]-glucosidase inhibition of T. farfara and the isolation of 1, 2 and 3 from this herb species. These results suggest a use of the extract of T. farfara for antidiabetes.
Keywords: [alpha]-Glucosidase; Maltase inhibitor; Postprandial hyperglycemia; Tussilago farfara

Simona Dobrinas, Semaghiul Birghila, Valentina Coatu, Assessment of polycyclic aromatic hydrocarbons in honey and propolis produced from various flowering trees and plants in Romania, Journal of Food Composition and Analysis, Volume 21, Issue 1, February 2008, Pages 71-77, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.07.003.
(http://www.sciencedirect.com/science/article/B6WJH-4P96215-1/2/187047bff0eda35dfa2391d56c3e5880)
Abstract:
Honey and propolis samples from different flowering plants in 15 regions of Romania, collected from beekeepers and the local market during the period 2002-2005, were analyzed to detect 15

polycyclic aromatic hydrocarbons (PAHs). An analytical procedure based on previous liquid-liquid extraction (LLE) with hexane, after which the extract was cleaned up in a mixture of silica gel, aluminum oxide and anhydrous sodium sulfate column, has been developed. The fractions eluted from the columns were further analyzed by gas chromatography with mass spectrometric detection (GC-MS). The limits of detection ranged from 0.03 to 0.12 [mu]g/kg. Some PAHs were detected in honey and propolis samples within the range 0.6-665.0 ng/g, and some PAHs were not detected or were under the detection limit of the method. Thus, consumers should not be concerned about PAHs in Romanian honey and propolis.
Keywords: Polycyclic aromatic hydrocarbons; PAHs; Honey; Propolis; GC-MS

Fumi Tatsuzawa, Norio Saito, Kenjiro Toki, Koichi Shinoda, Atsushi Shigihara, Toshio Honda, Triacylated cyanidin 3-(3X-glucosylsambubioside)-5-glucosides from the flowers of Malcolmia maritima, Phytochemistry, Volume 69, Issue 4, February 2008, Pages 1029-1036, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.08.031.
(http://www.sciencedirect.com/science/article/B6TH7-4R003V0-1/2/705bb5abbf4227cb41942f05eaf2f688)
Abstract:
Three acylated cyanidin 3-(3X-glucosylsambubioside)-5-glucosides (1-3) and one non-acylated cyanidin 3-(3X-glucosylsambubioside)-5-glucoside (4) were isolated from the purple-violet or violet flowers and purple stems of Malcolmia maritima (L.) R. Br (the Cruciferae), and their structures were determined by chemical and spectroscopic methods. In the flowers of this plant, pigment 1 was determined to be cyanidin 3-O-[2-O-(2-O-(trans-sinapoyl)-3-O-([beta]-d-glucopyranosyl)-[beta]-d-xylopyranosyl)-6-O-(trans-p-coumaroyl)-[beta]-d-glucopyranoside]-5-O-[6-O-(malonyl)-([beta]-d-glucopyranoside) as a major pigment, and a minor pigment 2 was determined to be the cis-p-coumaroyl isomer of pigment 1. In the stems, pigment 3 was determined to be cyanidin 3-O-[2-O-(2-O-(trans-sinapoyl)-3-O-([beta]-d-glucopyranosyl)-[beta]-d-xylopyranosyl)-6-O-(trans-p-coumaroyl)-[beta]-d-glucopyranoside]-5-O-([beta]-d-glucopyranoside) as a major anthocyanin, and also a non-acylated anthocyanin, cyanidin 3-O-[2-O-(3-O-([beta]-d-glucopyranosyl)-[beta]-d-xylopyranosyl)-[beta]-d-glucopyranoside]-5-O-([beta]-d-glucopyranoside) was determined to be a minor pigment (pigment 4). In this study, it was established that the acylation-enzymes of malonic acid has important roles for the acylation of 5-glucose residues of these anthocyanins in the flower-tissues of M. maritima; however, the similar enzymatic reactions seemed to be inhibited or lacking in the stem-tissues.
Keywords: Malcolmia maritima (L.) R. Br; Cruciferae; Acylated anthocyanins; Cyanidin 3-(3X-glucosylsambubioside)-5-glucoside; p-Coumaric acid; Sinapic acid; Malonic acid; Flower color

Lijuan Xie, Daryl C. Joyce, Donald E. Irving, Joseph X. Eyre, Chlorine demand in cut flower vase solutions, Postharvest Biology and Technology, Volume 47, Issue 2, February 2008, Pages 267-270, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.06.019.
(http://www.sciencedirect.com/science/article/B6TBJ-4PK8B2G-1/2/83e3c80a5400af1ee6fb8b100b6c3a6f)
Abstract:
Chlorine is used in the cut flower industry to suppress the growth of bacteria in handling and vase solutions. On-farm observations suggested that chlorine was rapidly degraded in a flower handling solution that contained citric acid. Changes in free available chlorine (FAC) concentrations for a range of vase solutions and cut flower types were investigated. FAC levels were stable in deionised water. FAC decreased more rapidly when cut flowers with rough stems (bark or trichomes) were placed in solution as compared to flowers with smooth (waxy cuticle) stems. FAC also decreased more rapidly with increasing number of stems in vases. Inclusion of sucrose (2%, w/v) in the vase solution reduced FAC levels. In contrast, chlorine was lost almost immediately in solution that included citric acid.

Keywords: Cut flower; Electrical conductivity (EC); Free available chlorine (FAC); Handling solution; pH; Sucrose; Vase solution

Mariana Mondragon-Palomino, Gunter Thei[ss]en, MADS about the evolution of orchid flowers, Trends in Plant Science, Volume 13, Issue 2, February 2008, Pages 51-59, ISSN 1360-1385, DOI: 10.1016/j.tplants.2007.11.007.
(http://www.sciencedirect.com/science/article/B6TD1-4RTCPX5-2/2/c5a2b4bbd4d7113a716dccfe2dd37b42)
Abstract:
Orchids have unique flowers involving three types of perianth organs: outer tepals, lateral inner tepals, and a lip. Expression studies indicate that the identity of these organs is specified by the combinatorial interaction of four different DEFICIENS-like MADS-box genes. We suggest that clarifying the evolution of these genes provides a rational framework for reconstructing the enigmatic origin and unique diversification of the orchid flower. For example, two rounds of gene duplications during early orchid evolution might have generated the genes that were probably recruited to distinguish the different types of perianth organs. This hypothesis suggests intriguing, experimentally testable mechanisms by which gene duplications followed by sub- and neo-functionalization events might have contributed to the evolutionary origin of morphological novelties in orchids - and well beyond.

Daniela Ciccarelli, Fabio Garbari, Anna Maria Pagni, The flower of Myrtus communis (Myrtaceae): Secretory structures, unicellular papillae, and their ecological role, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 203, Issue 1, 15 January 2008, Pages 85-93, ISSN 0367-2530, DOI: 10.1016/j.flora.2007.01.002.
(http://www.sciencedirect.com/science/article/B7GX0-4RN488D-4/2/423b0060a69ff8601c3f69beb6a3fc64)
Abstract:
Secretory cavities, unicellular papillae and hair trichomes of the flower of Myrtus communis have been investigated morphologically, anatomically and histochemically. Secretory cavities located adjacent to the epidermis of sepals, petals, receptacle, stamens, ovary and style show both a schizolysigenous, a combination of schizogenous and lysigenous development. At maturity, the glands are made up of a sheath of flattened cells; secretory cells are completely degenerated. The presence of lipids, terpenes and phenolics identified in the secretory lumen may be linked to different ecological functions especially depending on the organ where glands are distributed.
Unicellular papillae are located on the upper surface of the ovary close to the base of the stamens. They do not seem to form a nectary, but phenolic production by parenchymal cells beneath them could be linked to the production of volatile secretions as attractants for pollinators.
Hair trichomes are generally made of a single-basal cell, one stem cell and a cap cell. They are present on the upper surface of the ovary among unicellular papillae. It could be assumed that these hairs have a generic protective role for the ovary.
Keywords: Myrtus; Flower anatomy; Secretory cavities; Papillae; Hair trichomes; Ontogeny

Doris Wolff, Ulrich Meve, Sigrid Liede-Schumann, Pollination ecology of Ecuadorian Asclepiadoideae (Apocynaceae): How generalized are morphologically specialized flowers?, Basic and Applied Ecology, Volume 9, Issue 1, Special feature: Facing a hotspot of tropical biodiversity, 2 January 2008, Pages 24-34, ISSN 1439-1791, DOI: 10.1016/j.baae.2007.06.013.
(http://www.sciencedirect.com/science/article/B7GVS-4R1NNPD-1/2/b225c90e2fc480b5f87ac8972ab7aee9)
Abstract:
This paper studies phenology and pollination ecology of an assemblage of nine small-flowered species of Asclepiadoideae-Asclepiadeae in a southern Ecuadorian mountain forest. These

observations were augmented by laboratory studies of floral traits including scanning electron microscopy. Supported by multidimensional scaling analysis, three distinct pollination systems were identified: (a) pollination by small flies (Orthosia, Scyphostelma), (b) pollination by small bees and flies (Ditassa), and (c) pollination unspecialized ('Cynanchum', Jobinia, Oxypetalum). Although numerous floral visitors were observed in the field, pollinaria were carried by only seven insect species. The average pollinaria removal rate of all species was low with 0.32+/-0.13%, and still lower for the pollinia insertion rate with 0.13+/-0.07%. The ratio of inserted pollinia to removed pollinaria was comparatively high with an average of 42.7+/-22.3%. If an insect achieved pollinia transfer, it did so very effectively. The complex floral morphology of the Asclepiadoideae has often been interpreted as a general trend toward specialization, but our observations indicate that the flowers are specialized functionally rather than ecologically.
Keywords: Asclepiadoideae; Ditassa; Generalization; Jobinia; Orthosia; Phenology; Pollination systems; Scyphostelma; Specialization

Osamu Nagasaki, Impact of the flower stalk-boring moth Neoschoenobia testacealis (Lepidoptera: Crambidae) and water-level fluctuations on the flower and fruit production of the yellow water lily Nuphar subintegerrima (Nymphaeaceae) in irrigation ponds of western Japan, Aquatic Botany, Volume 88, Issue 1, January 2008, Pages 27-31, ISSN 0304-3770, DOI: 10.1016/j.aquabot.2007.08.004.
(http://www.sciencedirect.com/science/article/B6T4F-4PJCYJ6-4/2/53a57c63a731920bfe26dd8a43c6a516)
Abstract:
The flower and fruit production of the yellow water lily Nuphar subintegerrima and the seasonal occurrence of the flower stalk-boring moth Neoschoenobia testacealis were surveyed in two irrigation ponds in western Japan. Water-level fluctuations at each pond were measured. Flowering was observed from late May to September, and fruiting from late May to October. The yellow water lily produced cumulative numbers of 189 and 181 flowers and 121 and 129 fruits in the two ponds' quadrats. The fruit setting rates at the two ponds were 0.64 and 0.71, and decreased in the summer. The percentage of bored flower stalks was 16 and 5%. Mature larvae bored flower stalks severely during the summer. Whenever the boring larvae attacked the flower stalks, the flower buds and flowers were aborted. There was a significant negative correlation between the fruit setting rate and the boring rate per month (number of bored flower stalks/number of all flower stalks). Whenever abruptly rising water levels (about 10 cm) submerged the flowers, the flowers were aborted too and could not set fruits. The percentages of non-setting fruit due to the rising water levels at the two ponds were 6 and 8%. Overall, our results indicated that flower stalk boring was a more important factor than water-level fluctuation in the sexual reproduction of N. subintegerrima and that N. subintegerrima was well suited to small irrigation ponds.
Keywords: Flower and fruit production; Flower stalk borer; Irrigation pond; Nuphar subintegerrima; Water-level fluctuation

A. de Goes, R.B.O. Garrido, R.F. Reis, R.B. Baldassari, M.A. Soares, Evaluation of fungicide applications to sweet orange at different flowering stages for control of postbloom fruit drop caused by Colletotrichum acutatum, Crop Protection, Volume 27, Issue 1, January 2008, Pages 71-76, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.04.007.
(http://www.sciencedirect.com/science/article/B6T5T-4NXGS5D-1/2/71287f1c986e78877f0749dbd3cde754)
Abstract:
Postbloom fruit drop (PFD), caused by Colletotrichum acutatum, produces blossom blight, fruit abscission and persistent calyces. In groves of Pera-Rio and Natal sweet orange located in Santa Cruz do Rio Pardo and Rincao, Sao Paulo, Brazil, four experiments were carried out to evaluate the effectiveness of fungicides sprayed alone or as mixtures, at different flowering stages for the

control of PFD of citrus. The number of symptomatic flowers, the percentage of fruit set (FS), and the relationship between persistent calyces and total fruit weight per plant were evaluated. The fungicides carbendazim and folpet were sprayed at 0.50 ml and 1.25 g a.i. l-1 of water, respectively, were superior by all the criteria to the other treatments. Carbendazim and folpet fungicides performed best when they were applied at the green bud through hollow ball stages. Difenoconazole, independent of application timing, was less effective by all criteria used. Application of mancozeb at 1.60 g a.i. l-1 at the green bud stage followed by application of mancozeb in a tank mix with carbendazim or folpet at 1.0 ml and 1.25 g a.i. l-1, respectively, during green bud bloom and hollow ball stages were effective for disease control. Carbendazim combined with 0.25% KNO3, reduced the number of persistent calyces and increased fruit production significantly. Applications must be made between green bud and hollow ball stages for best control. Applications only at hollow ball or open flower stages did not provide effective disease control.
Keywords: Citrus sinensis; Blossom blight; Flowers

Haya Friedman, Nirit Bernstein, Moshe Bruner, Ilona Rot, Zeev Ben-Noon, Atara Zuriel, Ron Zuriel, Sima Finkelstein, Nakdimon Umiel, Amir Hagiladi, Application of secondary-treated effluents for cultivation of sunflower (Helianthus annuus L.) and celosia (Celosia argentea L.) as cut flowers, Scientia Horticulturae, Volume 115, Issue 1, 10 December 2007, Pages 62-69, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.07.003.
(http://www.sciencedirect.com/science/article/B6TC3-4PG2M0R-1/2/ec413f884f8b4f0fc4104771b3846098)
Abstract:
In this study we have examined the effects of irrigation with municipal secondary-treated effluents on growth of sunflower (Helianthus annuus L.) and celosia (Celosia argentea var cristata L.) plants for cut flower production. The applied treated effluents contained higher levels of Na (~X6), Cl (~X4.5), N-NH4 (30-50 mg/l), B, HCO3, P, K, and Fe than the potable water. The effect of the two types of irrigation water on the chemical composition of soil and leaves, flower yield and postharvest performance was examined. Our results demonstrate higher accumulation of Cl, Na, B, and NO3 in soils irrigated with effluents as compared to potable water only in the 40-60 cm soil layer. Phosphorus accumulated to higher levels in the upper soil layer (0-20 below ground), as well as in the lower soil layer, irrigated with effluents. SAR levels as well, were higher under irrigation with the treated effluents in the soil until 40 cm below ground indicating higher Na absorption in comparison to Ca and Mg. In both sunflower and celosia, boron accumulated to higher levels in leaves of plants irrigated with effluents. In addition, under irrigation with effluents, celosia accumulated higher levels of N and Mn and sunflower higher levels of P and lower levels of Fe. Despite these differences in mineral contents, the quality of the irrigation water did not affect cut flower yield. In both species spike length, receptacle size, number of flowers and flower weight were not affected. However, flowers' quality, examined during vase life, was compromised by irrigation with the effluents. Celosia leaves appeared more yellow and sunflower petal edges became browner. Nevertheless, leaf yellowing in celosia occurred mainly on the lower leaves of the stem, which can be removed to maintain high commercial value. The reduction in sunflower quality as well, will most likely not pose any commercial problem since these negative symptoms appeared at a late stage of vase life. Overall, our results demonstrate that secondary-treated municipal effluents can be used for production of sunflower and celosia for cut flowers, in the northern-eastern part of the `Negev' desert in Israel. Due to the high SAR values of the water, and in order to avoid damage to the soil structure, dilution of this water should be considered for commercial growth.
Keywords: Celosia; Effluents; Postharvest; Sunflower

Yan-yan LI, Zhen FENG, Lan-yong ZHAO, Zhen-hua MO, Bao ZHANG, The Grey Analysis, Kriging and Selection Index of Flower Yield in Rugosa Rose, Agricultural Sciences in China, Volume 6, Issue 12, December 2007, Pages 1420-1425, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60003-6.
(http://www.sciencedirect.com/science/article/B82XG-4RJBPV7-3/2/3171515b1ac4940fe9ec347a50e68852)
Abstract:
The analysis of grey system, kriging interpolation, and integration selection index were employed to investigate the relationships between the flower yield/plant (FY) and 15 other quantitative traits of 20 rugosa rose cultivars. The result showed that: The grey relational grade (GRG) of the number of flowers/plant (NF), the number of branches/plant (NB), the width of floral bud (WB), and the weight/flower (WF) to the FY were larger (> 0.5); FY improved with the increase of NF and NB. Moreover, the indirect selection of either trait could not achieve improvement of FY. It is necessary to improve FY by multi-trait selection. The integration selection index (ISI) equation of FY was established with the characters NF, NB, WB, and WF: I=0.3187x1 - 318.6x2 + 670.1x4 + 6.3x8, index heritability=0.8014, selective response of the integration breeding value = 245.8811. This will provide a theoretic basis for the genetic breeding of rugosa rose.
Keywords: rugosa rose; grey relational grade; quantitative traits; kriging interpolation; index selection

David Ruiz, Jose Antonio Campoy, Jose Egea, Chilling and heat requirements of apricot cultivars for flowering, Environmental and Experimental Botany, Volume 61, Issue 3, December 2007, Pages 254-263, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.06.008.
(http://www.sciencedirect.com/science/article/B6T66-4P1P6WS-1/2/1285924276b3b7734ea8113abe3f8175)
Abstract:
Chilling requirements for breaking of dormancy and heat requirements for flowering were studied for 3 successive years in 10 apricot cultivars which spanned the range of flowering times in this species. Different methods for estimating chilling requirements were evaluated and compared, and correlations between chilling requirements, heat requirements and flowering date were established. The cultivars examined showed a range of chilling requirements (chill units, CU), between 596 CU (Currot) and 1266 CU (Orange Red), though most of them showed chilling requirements between 800 and 1200 CU. The results obtained in different years by the Utah and Dynamic models were more homogeneous with respect to the hours below 7 [degree sign]C model. The heat requirements for flowering ranged between 4078 and 5879 growing degree hours (GDH). The apricot cultivars showed important differences concerning flowering date, and the results indicate a high positive correlation between chilling requirements and flowering date, as well as a negative correlation between chilling requirements for breaking of dormancy and heat requirements for flowering.
Keywords: Dormancy; Environment; Prunus armeniaca L.; Chilling requirements; Heat requirements; Flowering date

Soledad Chazarra, Lara Sidrach, Dorotea Lopez-Molina, Jose Neptuno Rodriguez-Lopez, Characterization of the milk-clotting properties of extracts from artichoke (Cynara scolymus, L.) flowers, International Dairy Journal, Volume 17, Issue 12, December 2007, Pages 1393-1400, ISSN 0958-6946, DOI: 10.1016/j.idairyj.2007.04.010.
(http://www.sciencedirect.com/science/article/B6T7C-4NVH7RS-1/2/b69e83e8e0c00fde810b1372763bb55c)
Abstract:
Extract of artichoke (Cynara scolymus, L.) flowers have been investigated as a source of enzymes to be used in cheese making as an alternative or in addition to calf rennet. Coagulation activity

was highly dependent upon milk pH and temperature. The rennet strength (RS) of this extract increased hyperbolically with increasing concentrations of calcium, and the concentration was saturated at . However, the effect of sodium chloride on RS was not significant. Additionally, the properties of individual cynarases obtained from artichoke flowers were also studied. Purification led to a decrease in the specific coagulant activity relative to that of the crude extract in the case of cynarases A and C, whereas cynarase B increased its specific clotting activity. Moreover, whereas the cynarases A and C showed a slight increase in specific peptidase activity relative to the initial extract, the specific peptidase activity of cynarase B was much higher.
Keywords: Artichoke; Cynara scolymus L.; Plant rennet; Cynarases; Milk-clotting

Sverre Lundemo, Orjan Totland, Within-population spatial variation in pollinator visitation rates, pollen limitation on seed set, and flower longevity in an alpine species, Acta Oecologica, Volume 32, Issue 3, November-December 2007, Pages 262-268, ISSN 1146-609X, DOI: 10.1016/j.actao.2007.05.007.
(http://www.sciencedirect.com/science/article/B6VR3-4P5YK96-1/2/28a5c02febb4696516baee8886dc6200)
Abstract:
Pollen limitation through insufficient pollen deposition on stigmas caused by too infrequent pollinator visitation may influence the reproductive outcome of plants. In this study we investigated how pollinator visitation rate, the degree of pollen limitation, and flower longevity varied spatially among three sites at different altitudes within a population of the dwarf shrub Dryas octopetala L. in alpine southern Norway. Significant pollen limitation on seed set only occurred at the mid-elevation site, while seed set at the other sites appeared to be mainly resource limited, thus indicating a spatial variation in pollen limitation. There was no association between the spatial variation in the extent of pollen limitation and pollinator visitation rate to flowers. However, pollinator visitation rates were related to flower longevity of Dryas; sites with low visitation rates had long-lived flowers and vice versa. Thus, our results suggest within-population spatial co-variation between pollinator visitation rates, pollen limitation, and a developmental response to these factors, flower longevity.
Keywords: Alpine; Dryas octopetala; Flies; Flower longevity; Pollen limitation; Pollinator visitation rate; Resource limitation; Spatial variation

Katsuyoshi Shimamura, Takeshi Ishimizu, Kazuma Nishimura, Kiyoshi Matsubara, Hiroaki Kodama, Hitoshi Watanabe, Sumihiro Hase, Toshio Ando, Analysis of expressed sequence tags from Petunia flowers, Plant Science, Volume 173, Issue 5, November 2007, Pages 495-500, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.07.011.
(http://www.sciencedirect.com/science/article/B6TBH-4PCGRR2-1/2/043a601d8ba593af843b904f85720985)
Abstract:
Petunia cDNA libraries were prepared from whole flower parts (including buds), pollen, and pollen tubes to generate expressed sequence tags (ESTs). A total of 7001 random clones were subjected to unidirectional sequencing, resulting in identification of 611 groups of related sequences and 2410 singletons. Highly conserved 1098 ESTs were functionally assigned. ESTs encoding proteins involved in the calcium-dependent signal pathway and in cell wall metabolism such as pectin degradation and modification were frequently found in the pollen and pollen tube libraries. The 2976 cDNA clones from the bud/flower cDNA libraries were used for the construction of microarrays. The 112 functionally annotated genes were up-regulated in the buds just before opening, including the genes for anthocyanin pigmentation and protein degradation. These ESTs and microarrays will serve the analysis of floral traits of petunias.
Keywords: Anthocyanin; Calmodulin; Microarray; Pectin; Pollen; Pollen tube

Kelley Dunfield, Sanjeeva Srivastava, Salehuzzaman Shah, Nat N.V. Kav, Constitutive expression of ABR17 cDNA enhances germination and promotes early flowering in Brassica napus, Plant Science, Volume 173, Issue 5, November 2007, Pages 521-532, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.08.001.
(http://www.sciencedirect.com/science/article/B6TBH-4PD4X8S-1/2/83a1871885094d555b429c1a5c8f7558)
Abstract:
Pathogenesis-related 10 (PR 10) proteins are induced in a number of angiosperms and gymnosperms following exposure to abiotic or biotic stresses, but their biological function remains unknown. However, the constitutive expression of a PR 10 cDNA has been reported to enhance germination and abiotic stress tolerance in Arabidopsis thaliana. In the present study, we report the constitutive expression of Pisum sativum ABA-responsive 17 (ABR17/PR 10.4) cDNA in an important agricultural species, Brassica napus (canola,) to determine its effects on germination as well as other characteristics. We observed significantly greater germination in the transgenic line at 275 mM NaCl, 5 [degree sign]C, and 10 [degree sign]C + 75 mM NaCl when compared to the wild type. In addition, we observed a significantly greater rate of flowering, significantly earlier flowering and greater height in the transgenic line when compared to the wild type at 42 days after planting. Proteome analysis of our transgenic line revealed surprisingly few transgene-induced changes but identified carbonic anhydrase, which may be potentially responsible for some of the observed characteristics, as being elevated. Our study demonstrates that ABR17 promotes germination and early flowering in canola and possible applications are discussed.
Keywords: ABR17; Abiotic stress; Early flowering; Pathogenesis-related (PR) 10

Samuel Nyalala, Brian Grout, African spider flower (Cleome gynandra L./Gynandropsis gynandra (L.) Briq.) as a red spider mite (Tetranychus urticae Koch) repellent in cut-flower rose (Rosa hybrida L.) cultivation, Scientia Horticulturae, Volume 114, Issue 3, 1 November 2007, Pages 194-198, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.06.010.
(http://www.sciencedirect.com/science/article/B6TC3-4PCXXSR-1/2/53a3f136d17f4f1cf3b98845f926456c)
Abstract:
Companion planting of Cleome gynandra, of Kenyan origin, in beds of cut-flower roses reduces significantly red spider mite (Tetranychus urticae Koch) infestation without any detrimental effect on productivity or flower quality. The level of reduction is dependent upon the density of the C. gynandra plants with 15 plants in a 1.8 m2 bed (8.3 plants m2) being the most effective, planted either around the bed perimeter or within the rows of roses. The relatively high density of C. gynandra plants required may limit the direct application of this technology in export-focused, greenhouse rose production yet may be of significant value as a supplement to other mite-control strategies. The potential benefits of such companion planting for growers of field roses and those involved in some domestic markets are also evident. Research into the nature and extraction of the active, volatile mite-repellant components of C. gynandra is indicated.
Keywords: Cleome gynandra; Spider mite; Miticide; Rose; Flower quality

Glendon D. Ascough, A.K. Singh, Flower Crops: Cultivation and Management, New India Publishing Agency, New Delhi, New India (2006) ISBN 81-89422-35-9 Price: $150.00, 475 pages, E-mail: ., South African Journal of Botany, Volume 73, Issue 4, November 2007, Pages 672-673, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.07.004.
(http://www.sciencedirect.com/science/article/B7XN9-4PCXXX7-2/2/ab5c4489d5520d94e2fbef58f88dc6e7)

E.S. Dennis, W.J. Peacock, Epigenetic regulation of flowering, Current Opinion in Plant Biology, Volume 10, Issue 5, Cell Signalling and Gene Regulation - Edited by Jian-Kang Zhu and Ko Shimamoto, October 2007, Pages 520-527, ISSN 1369-5266, DOI: 10.1016/j.pbi.2007.06.009.
(http://www.sciencedirect.com/science/article/B6VS4-4PG2VH2-1/2/d029aa3a8993ae85d6a1a89008179a93)
Abstract:
The acceleration of flowering by prolonged low temperature treatment (vernalization) has unique properties including the floral transition occurring at a time separate from the vernalization treatment. This implies the vernalization condition is inherited through mitotic divisions, but this vernalized state is not inherited from one generation to the next. FLC, the key gene mediating this response in the Arabidopsis is repressed by histone modifications involving the VRN2 protein complex. Other protein complexes participate in activating the gene. While many plant species depend on vernalization for optimising flowering time, the genes involved differ between dicot and monocot plants in both Arabidopsis and cereals, vernalization regulates photoperiod control of flowering by preventing the induction of the floral promoter FT by long days in autumn but allowing induction of FT in spring and hence flowering occurs at an optimal time in the annual life cycle.

Todd A. Ugine, Stephen P. Wraight, John P. Sanderson, A tritrophic effect of host plant on susceptibility of western flower thrips to the entomopathogenic fungus Beauveria bassiana, Journal of Invertebrate Pathology, Volume 96, Issue 2, October 2007, Pages 162-172, ISSN 0022-2011, DOI: 10.1016/j.jip.2007.05.004.
(http://www.sciencedirect.com/science/article/B6WJV-4NS0M13-2/2/bdf627e0ef644ae19de3b6bf16881e63)
Abstract:
Adult female western flower thrips (Frankliniella occidentalis) were exposed 12-24 h to bean (Phaseolus vulgaris) and impatiens (Impatiens wallerana) leaf disks treated with Beauveria bassiana conidia and then transferred to clean bean or impatiens at various times post-treatment. Significantly greater levels of fungal infection were observed when thrips were treated on bean versus impatiens, but exposure to impatiens following treatment had no effect on fungal infection (percent mortality). This result, combined with observations of no inhibition of germination of conidia exposed to intact or macerated impatiens foliage, indicated that the negative effect of the impatiens host plant was not due to plant chemical compounds (antibiosis). Further observations revealed that insects acquired (picked-up) 75% more conidia from treated bean disks than from treated impatiens disks. This difference in dose acquisition was determined to account for the observed difference in percent mortality (15%) following treatment on the two host plants. Median lethal doses (LD50) of B. bassiana were not significantly different on the two host plants, but median lethal concentrations were nearly 7-fold greater on impatiens. This difference was explained by disproportionate rates of conidial acquisition at measured rates of conidial deposition (an inverse relationship was observed between application rate expressed as conidia/mm2 and the number of conidia acquired). The mechanism underlying the differential rates of conidial acquisition from bean versus impatiens was not determined.
Keywords: Western flower thrips; Frankliniella occidentalis; Beauveria bassiana; Tritrophic interactions; Host plant effects; Dose acquisition

Li-Chun Huang, U-Long Lai, Shang-Fa Yang, Mei-Ju Chu, Ching-I Kuo, Mei-Fong Tsai, Chih-Wen Sun, Delayed flower senescence of Petunia hybrida plants transformed with antisense broccoli ACC synthase and ACC oxidase genes, Postharvest Biology and Technology, Volume 46, Issue 1, October 2007, Pages 47-53, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.03.015.
(http://www.sciencedirect.com/science/article/B6TBJ-4P2S262-1/2/5b1764ce08b5ca90b661599e5d3d41f8)
Abstract:

Petunia (Petunia x hybrida Hort. Vilm.-Andr.) plants were transformed by Agrobacterium with antisense BoACS1 (broccoli ACC synthase) and antisense BoACO1 (broccoli ACC oxidase) coding sequences of enzymes involved in biosynthesis of ethylene in broccoli plants. The integration of these genes with an antisense orientation was verified by PCR analyses of kanamycin-resistant regenerants. The expression of transgenes and endogenous genes was further confirmed by RT-PCR analysis. Production of ethylene in shoot tissues was reduced among most transgenic plants. Flowers of transformants, especially excised flowers, generally remained fresh longer than those of untransformed controls. The delayed flower senescence was more pronounced with the antisense BoACO1 than the antisense BoACS1. Transgenic tissues were, nevertheless, still responsive to ethylene. We conclude that the antisense BoACO1gene from Brassica oleracea is able to reduce ethylene biosynthesis and delay flower senescence of Petunia hybrida more efficiently than the antisense BoACS1 gene.
Keywords: 1-Aminocyclopropane-1-carboxylic acid (ACC); ACC synthase (ACS); ACC oxidase (ACO); Antisense transgene; Flower senescence; Ethylene; Petunia

Doris Wolff, Sigrid Liede-Schumann, Evolution of flower morphology, pollen dimorphism, and nectar composition in Arcytophyllum, a distylous genus of Rubiaceae, Organisms Diversity & Evolution, Volume 7, Issue 2, 2 August 2007, Pages 106-123, ISSN 1439-6092, DOI: 10.1016/j.ode.2006.02.005.
(http://www.sciencedirect.com/science/article/B7GJ9-4P5KMCY-2/2/7a0aee6a59f256821d3281b971134866)
Abstract:
A phylogenetic study of Arcytophyllum based on ITS was conducted and compared with an earlier study based on cpDNA. The position of the widespread A. thymifolium as sister to all other species was confirmed and several well-supported clades could be retrieved. The Central American A. lavarum is well embedded between exclusively or predominantly South American species. To understand the expression of heterostyly in the genus, we analyzed inter- and intraspecific variation in floral morphology, nectar, pollen-ovule (P/O) ratio and seed set of ten species in 11 populations. Stigma and anther levels differed significantly between the morphs in the species/populations investigated, except for A. filiforme, in which anther levels did not differ significantly between the two morphs. Different expressions of heterostyly in Arcytophyllum seem independent of phylogenetic relationships. Nectar sugar composition was similar between the morphs. Nectar of most species presented a larger proportion of hexoses than of sucrose; only the most derived species, A. macbridei and A. vernicosum, have higher sucrose proportions. There is a significant positive correlation between corolla tube length and the proportion of sucrose. Pollen dimorphism, with regard to both number (long-styled>short-styled) and size (short-styled>long-styled), was observed in all taxa investigated except A. filiforme. According to the P/O ratios, the breeding systems range from facultative autogamy to facultative xenogamy. The lowest P/O ratios were found in A. filiforme, and the highest in A. rivetii. Hymenoptera, Diptera and Coleoptera were observed as flower visitors. Seed production did not differ significantly between the morphs in eight of the 11 species/populations investigated. There is, however, a tendency in all species/populations (except in A. macbridei Peru) for the short-styled morph to have a higher percentage of seeds per ovule, indicating that the short-styled morphs display higher female reproductive success.
Keywords: Heterostyly; ITS; P/O ratio; Pollination; Seed set; Spermacoceae

Anna D. Howell, Ruben Alarcon, Osmia bees (Hymenoptera: Megachilidae) can detect nectar-rewarding flowers using olfactory cues, Animal Behaviour, Volume 74, Issue 2, August 2007, Pages 199-205, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2006.11.012.
(http://www.sciencedirect.com/science/article/B6W9W-4P2S2BP-1/2/58a0e14bcd92b7076c40caf55cf95974)

Abstract:
Nectar-foraging bees frequently face the choice of which flowers to visit and which to avoid. One possible mechanism by which bees could discriminate between flowers before visiting them is by detecting nectar via its odours. To test this idea, we observed visits by solitary bees in the genus Osmia (Megachilidae) to flowers of Penstemon caesius (Scrophulariaceae) in the San Bernardino Mountains of southern California. We observed that free-foraging Osmia bees visited flowers containing nectar seven times more frequently than they visited nectar-depleted flowers. To test whether bees could detect the presence of nectar via odour cues, we compared floral preferences between trials where we blocked the olfactory capabilities of bees by coating their antennae with nontoxic silicone and where bees foraged with uncovered antennae. We randomly assigned the order of the silicone treatments and attempted to test 32 bees at P. caesius arrays containing nectar-depleted flowers, nectar-depleted flowers with added water and nectar-rewarding control flowers. Bees with uncovered antennae visited more than twice as many control flowers as they did either group of nectar-depleted flowers. In contrast, bees foraging with silicone-covered antennae visited all treatment flowers equally. Bees that completed both trials visited nectar-rewarding control flowers twice as frequently while foraging with uncovered antennae as they did while foraging with silicone-coated antennae. These results are consistent with the idea that solitary Osmia bees are capable of perceiving nectar volatiles to identify nectar-rewarding Penstemon flowers.
Keywords: direct detection; nectar; nectar foraging; nectar scent; olfactory cue; Osmia; Penstemon; solitary bee

Jelmer A. Elzinga, Anne Atlan, Arjen Biere, Luc Gigord, Arthur E. Weis, Giorgina Bernasconi, Time after time: flowering phenology and biotic interactions, Trends in Ecology & Evolution, Volume 22, Issue 8, August 2007, Pages 432-439, ISSN 0169-5347, DOI: 10.1016/j.tree.2007.05.006.
(http://www.sciencedirect.com/science/article/B6VJ1-4P00RTN-3/2/3e4f5c29af65e47f0736105f4e75b2b5)
Abstract:
The role of biotic interactions in shaping plant flowering phenology has long been controversial; plastic responses to the abiotic environment, limited precision of biological clocks and inconsistency of selection pressures have generally been emphasized to explain phenological variation. However, part of this variation is heritable and selection analyses show that biotic interactions can modulate selection on flowering phenology. Our review of the literature indicates that pollinators tend to favour peak or earlier flowering, whereas pre-dispersal seed predators tend to favour off-peak or later flowering. However, effects strongly vary among study systems. To understand such variation, future studies should address the impact of mutualist and antagonist dispersal ability, ecological specialization, and habitat and plant population characteristics. Here, we outline future directions to study how such interactions shape flowering phenology.

Ben Trevaskis, Megan N. Hemming, Elizabeth S. Dennis, W. James Peacock, The molecular basis of vernalization-induced flowering in cereals, Trends in Plant Science, Volume 12, Issue 8, August 2007, Pages 352-357, ISSN 1360-1385, DOI: 10.1016/j.tplants.2007.06.010.
(http://www.sciencedirect.com/science/article/B6TD1-4P5RW3J-2/2/d6e95ab5492fb76830a7446a11fff56e)
Abstract:
Genetic analyses have identified three genes that control the vernalization requirement in wheat and barley; VRN1, VRN2 and FT (VRN3). These genes have now been isolated and shown to regulate not only the vernalization response but also the promotion of flowering by long days. VRN1 is induced by vernalization and accelerates the transition to reproductive development at the shoot apex. FT is induced by long days and further accelerates reproductive apex development. VRN2, a floral repressor, integrates vernalization and day-length responses by

repressing FT until plants are vernalized. A comparison of flowering time pathways in cereals and Arabidopsis shows that the vernalization response is controlled by different MADS box genes, but integration of vernalization and long-day responses occurs through similar mechanisms.

Saeid Eshghi, Enayatollah Tafazoli, Shahram Dokhani, Majid Rahemi, Yahya Emam, Changes in carbohydrate contents in shoot tips, leaves and roots of strawberry (Fragaria x ananassa Duch.) during flower-bud differentiation, Scientia Horticulturae, Volume 113, Issue 3, 20 July 2007, Pages 255-260, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.03.014.
(http://www.sciencedirect.com/science/article/B6TC3-4NK47DC-4/2/616491afb4aedb3246360daafa6fce61)
Abstract:
Flowering is an important step in crop production. Under flower-inducing conditions, biochemical or physiological changes can be recognized. Changes in carbohydrates have an important role in flower development in plants; however, carbohydrate changes during flower bud differentiation in strawberry have not been thoroughly investigated. In this study, runner plants potted in 18 cm diameter pots and grown under non-inducing conditions (28 +/- 3/22 +/- 3 [degree sign]C day/night; 16 h day length). When the plants were established, half of the plants then were put under inducing conditions (23 +/- 3/13 +/- 3 [degree sign]C day/night; 8 h day length). After the induction period of 21 short-day cycles, plants were brought to non-inductive conditions again. In order to evaluate the carbohydrate changes during flower differentiation, shoot tips, leaves and roots were sampled from four replicated plants collected weekly for the period of 7 weeks. Sucrose, glucose and fructose contents were determined by HPLC, and starch by the anthrone method. The results obtained indicated that the most abundant soluble sugar in all organs tested was sucrose. Sucrose in the shoot tips of induced plants at 42, 56 and 70 days after the start of the short-day treatment were significantly higher than corresponding time in non-induced plants. However, the glucose, fructose and starch contents in shoot tips, leaves and roots of non-induced plants in most sampling dates were greater than those of induced plants. In other words, the shoot tips (bud) of induced plants acted as strong `utilizing sink' and preferentially metabolized carbohydrates rather than storing them. It seems that non-structural carbohydrate contents in shoot tips, leaves and roots of strawberry may have an important role in flower-bud differentiation.
Keywords: Strawberry; Flower differentiation; Sucrose; Glucose; Fructose; Starch

Victor Parra-Tabla, Carlos F. Vargas, Flowering synchrony and floral display size affect pollination success in a deceit-pollinated tropical orchid, Acta Oecologica, Volume 32, Issue 1, July-August 2007, Pages 26-35, ISSN 1146-609X, DOI: 10.1016/j.actao.2007.02.002.
(http://www.sciencedirect.com/science/article/B6VR3-4NF2HS2-1/2/f4fd6e013300da817ab7882ee6471ac0)
Abstract: ABSTRACT
Due to frequency-dependent negative selection, a strong relationship between reproductive phenology traits and pollination success is expected in deceit-pollinated species. This paper assesses the effects of floral display size on both female (fruit production) and male (pollen removal) pollination success in a population of the deceit-pollinated tropical orchid Myrmecophila christinae during two consecutive years (1998-1999). Low pollen removal (~9% of total flowers) and fruit production values (~3% of total flowers) were recorded during both years. As expected, binary logistic regressions showed a significant negative effect of floral synchrony, and a positive effect of floral display size on both male and female success, although these effects varied across years. Pollination rates in the field and in hand pollinations suggest a doubling in pollinator abundance between years. Results suggest that floral display size and flowering synchrony are of adaptive value for M. christinae. However, between-year fluctuations might indicate that reproductive phenology traits in deceit-pollinated species undergo fluctuating selection regimes

among years and are probably linked to short-term changes in environmental (abiotic and biotic) conditions.
Keywords: Binary logistic regression; Deceit-pollination; Female success; Fluctuating natural selection; Frequency-dependent selection; Male success; Multilevel selection; Pollen limitation

A.J. Matich, B.J. Bunn, D.J. Comeskey, M.B. Hunt, D.D. Rowan, Chirality and biosynthesis of lilac compounds in Actinidia arguta flowers, Phytochemistry, Volume 68, Issue 13, Reports on Structure Elucidation, July 2007, Pages 1746-1751, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.03.023.
(http://www.sciencedirect.com/science/article/B6TH7-4NKB1YK-8/2/bc949d284ec8523f5c4c316a83f6ed6e)
Abstract:
Biosynthesis of lilac compounds in `Hortgem Tahi' kiwifruit (Actinidia arguta) flowers was investigated by treating inflorescences with d5-linalool. The incorporation of the deuterium label into 8-hydroxylinalool, 8-oxolinalool, the lilac aldehydes, alcohols, and alcohol epoxides was followed by GC-MS and enantioselective GC-MS. Both (R)- and (S)-linalool were produced naturally by the flowers, but 8-hydroxylinalool, 8-oxolinalool, and the lilac aldehydes and alcohols occurred predominantly as the (S) and 5'(S)-diastereoisomers, respectively. The enantioselective step in the biosynthesis of the lilac aldehydes and alcohols was concluded to be the oxidation of linalool to (S)-8-hydroxylinalool. In contrast, the lilac alcohol epoxides had a 5'(R):(S) ratio, the same as for linalool, which suggests that either these compounds are not synthesised from the 5'(S)-configured lilac aldehydes and alcohols, or that if indeed they are, then it is by an enantioselective step that favours utilisation of the 5'(R)-configured compounds.
Keywords: Actinidia arguta; Monoterpenes; Linalool; 8-Hydroxylinalool; 8-Oxolinalool; Lilac aldehydes; Lilac alcohols; Lilac alcohol epoxides; Deuterium labelling; Enantioselective GC-MS

A.J. Hall, J.L. Catley, E.F. Walton, The effect of forcing temperature on peony shoot and flower development, Scientia Horticulturae, Volume 113, Issue 2, 26 June 2007, Pages 188-195, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.03.001.
(http://www.sciencedirect.com/science/article/B6TC3-4NHM71Y-1/2/c4e7148ff55f42f251dff816afa7f765)
Abstract:
Pre-chilled potted plants of Paeonia `Coral Sunset', `Monsieur Jules Elie', `Sarah Bernhardt', and `Karl Rosenfeld' were placed in a range of controlled temperature regimes to ascertain the effect of temperature on the timing of shoot emergence and floral development. For all cultivars, warmer temperatures up to 25 [degree sign]C lead to more rapid shoot emergence and flower development. Linear temperature responses adequately described the rate of development from shoot emergence to flower bud appearance, and from bud appearance to flower opening, but a curvilinear response was required to describe the time taken for shoots to emerge. There were significant differences between cultivars in the number of heat units required for shoot emergence, with the shoots of the slowest-developing cultivar, `Monsieur Jules Elie', taking 50% longer to emerge than those of the most rapid, `Coral Sunset'. No significant differences were found among cultivars in the time taken from shoot emergence to flower opening, although the `split' stage (when the bud opens sufficiently for petal colour to be observed) was slightly earlier in `Karl Rosenfeld'.
Keywords: Paeonia lactiflora Pall.; Development rate; Shoot emergence; Heat units

E. Pagano, S. Cela, G.A. Maddonni, M.E. Otegui, Intra-specific competition in maize: Ear development, flowering dynamics and kernel set of early-established plant hierarchies, Field Crops Research, Volume 102, Issue 3, 20 June 2007, Pages 198-209, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.013.

(http://www.sciencedirect.com/science/article/B6T6M-4NRVTT4-1/2/8ec0436ae796d21c3cab0df638c3f986)

Abstract:
Maize canopies with a synchronous seedling emergence and a uniform plant spatial distribution exhibit early-established plant hierarchies (at the 4-leaf stage; V4). The dominant and dominated individuals of the stand differ in plant growth rate during both the pre-silking period (i.e. from V7 to V13; PGRPS) and the period around silking (i.e. a 30 d period centered in silking; PGRS), and in the ear growth rate around silking (EGRS). Based on the depleted availability of assimilates of the dominated plants, we tested the hypotheses that (i) the low PGRPS of dominated individuals affects the morphogenesis of the apical ear leading to a low number of completely developed flowers per ear, and (ii) the low EGRS of dominated individuals results in a pronounced asynchrony of flowering dynamics and uneven silk exsertion from the husks. Two hybrids with contrasting tolerance to crowding stress (DK752 and DK765 as the tolerant and the intolerant hybrid, respectively) were cropped under different intensities of interplant competition (6, 12, 12 plants m-2 thinned to 6 plants m-2 at V9 and 6 plants m-2 shaded from V9 onwards) during 2004/2005 and at 12 plants m-2 during 2005/2006 at Pergamino (34[degree sign]56'S 60[degree sign]34'W), Argentina. Dominant plants were the individuals of the stands with the highest PGRPS (ca. 1.72 and 2.56 g d-1 for dominated and dominant plants, respectively), PGRS (ca. 3.05 and 3.94 g d-1 for dominated and dominant plants, respectively) and EGRS (ca. 1.06 and 1.55 g d-1 for dominated and dominant plants, respectively). This plant type also exhibited the most synchronous flowering dynamics (anthesis-silking interval ca. 1.49 and 1.15 days for dominated and dominant plants, respectively) and the highest kernel set (ca. 401 and 572 kernels plant-1 for dominated and dominant plants, respectively). Apical ears of dominated plants exhibited a delayed in the rate of progress to successive floral stages, but the final number of completely developed flowers per ear did not differ between extreme plant types (ca. 967 and 803 completely developed flowers per ear for DK752 and DK765, respectively). Hence, kernel number per plant was not limited by the number of completely developed flowers per ear, but flowering dynamics were a decisive factor in kernel set of both plant types. Asynchronous silking within the ear of dominated plants determined a greater proportion of flowers per ear with non-exposed silks on silking + 5 d and a larger asynchrony in silk extrusion within the ear. These responses increased kernel abortion rate respect to figures obtained for dominant individuals.
Keywords: Maize; Intra-specific competition; Plant hierarchies; Ear development; Flowering dynamics

Maria T. Amela Garcia, Beatriz G. Galati, Patricia S. Hoc, Ultrastructure of the corona of scented and scentless flowers of Passiflora spp. (Passifloraceae), Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 202, Issue 4, 11 June 2007, Pages 302-315, ISSN 0367-2530, DOI: 10.1016/j.flora.2006.08.003.
(http://www.sciencedirect.com/science/article/B7GX0-4NP9K9P-1/2/6d3ee78f6d525666cef4c3ef09caa8b1)

Abstract:
To know thoroughly the structure and function of the corona of Passiflora, the anatomy and ultrastructure of two species were analysed in relation to the emission of odour perceivable by humans: a scented one, P. caerulea L., and a scentless one, P. suberosa L.
Both species exhibited secretory tissue, whose cells were characterised by dense cytoplasm, numerous mitochondria and vacuoles. Evidence of granulocrine secretion was detected. Nevertheless, there were differences concerning some cytological structures: P. suberosa lacked smooth endoplasmic reticulum (sER) and starch but had large and many lipidic globules, while P. caerulea had few dictyosomes, scarce lipidic content, a greater proportion of sER/rough endoplasmic reticulum (rER) and amyloplasts. The cellular features of P. caerulea correspond with those of fragrance tissues. The secretion appearance and quantity were also different between

both species: P. caerulea exhibited sparse drops on the cuticle in contrast to P. suberosa, which secrets a wax-like material. If this is the final product of the secretory process or just a vehicle that contributes to the emission of volatile compounds, as occurs in certain osmophores, needs further confirmation with chemical analysis.
Results are discussed in the context of the pollination syndromes of each species and their florivores.
Keywords: Osmophores; Submicroscopic structure; TEM; Passiflora; Scent guides; Wax

Mark S. Roh, Dae-Ki Hong, Inflorescence development and flowering of Ornithogalum thyrsoides hybrid as affected by temperature manipulation during bulb storage, Scientia Horticulturae, Volume 113, Issue 1, 5 June 2007, Pages 60-69, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.01.009.
(http://www.sciencedirect.com/science/article/B6TC3-4N3H14M-1/2/b336c075de76eb096ab818582d3ed530)
Abstract:
The growth and flowering responses of Ornithogalum thyrsoides, `Chesapeake Starlight' as influenced by bulb size and storage temperature were investigated. Development of inflorescences and florets as influenced by bulb storage temperature was studied using scanning electron microscopy (SEM). Three experiments were carried out: bulbs of 5.2 cm circumference (circum.) were treated at either 10, 16, 22, or 28 [degree sign]C for a 6-week period, followed by other temperatures for a total of 18 weeks (Experiment 1); bulbs of two sizes, 8.1 and 12.8 cm in circum. received 6 weeks of 30 [degree sign]C, followed by 3 and 6 weeks of 7, 10, 13, 16, 19, 22, 25 and 30 [degree sign]C (Experiment 2); bulbs of two sizes, 5.7 and 6.5 cm in circum. were dried at 20 [degree sign]C for a week and were potted after storing for 6 weeks at 30 [degree sign]C (30 [degree sign]C/6W) followed by either storage at 20 [degree sign]C for 4 or 8 weeks (20 [degree sign]C/4W or 20 [degree sign]C/8W) and finally at 10 [degree sign]C/4W or 20 [degree sign]C/8W (Experiment 3). Development of inflorescences and florets were studied using SEM (Experiment 1). Bulb sizes of `Chesapeake Starlight' (Experiments 2 and 3) did not affect flowering. The shoot apex of the bulb is vegetative at harvest and bulbs should be stored dry at 28-30 [degree sign]C for 6 weeks for rapid inflorescence development. When root primordia were clearly visible at the end of the 20 [degree sign]C treatment, the scape of the first inflorescence is clearly formed, and bulbs are then treated at 10 [degree sign]C. When bulbs were treated at 28 [degree sign]C during the first 6 weeks (week 0-6), flowering accelerated. Flowering was also accelerated and only one inflorescence was produced from the center when bulbs were stored at 10 [degree sign]C/6W during the second and third 6 weeks (weeks 7-12 and weeks 13-18). A sequential treatment of 30 [degree sign]C/6W-10 [degree sign]C/6W-10 [degree sign]C/6W ensured a longer flower stem and accelerated flowering of the first inflorescence, and this was verified by SEM. Flower stem length increased significantly and only one inflorescence was produced from the center when bulbs received 30 [degree sign]C/6W-20 [degree sign]C/4W-10 [degree sign]C/8W as compared to bulbs that received 30 [degree sign]C/6W-20 [degree sign]C/4W-10 [degree sign]C/4W. To produce two or more inflorescences per bulb, we recommend treating bulbs at 10 [degree sign]C/3-4W or 13 [degree sign]C/3W. Descriptions of the development of the first and second inflorescence and of a single flower using SEM will be useful to document the development of inflorescence and flowers during bulb storage and to further develop precise treatment temperatures and durations to shorten the pre-treatment period of bulbs after harvest.
Keywords: Optimum temperature; Flower bud initiation and development; Inflorescence development; Scanning electron microscopy

Jeong-Mi Park, Jean-Francois Manen, Gerald M. Schneeweiss, Horizontal gene transfer of a plastid gene in the non-photosynthetic flowering plants Orobanche and Phelipanche

(Orobanchaceae), Molecular Phylogenetics and Evolution, Volume 43, Issue 3, June 2007, Pages 974-985, ISSN 1055-7903, DOI: 10.1016/j.ympev.2006.10.011.
(http://www.sciencedirect.com/science/article/B6WNH-4M4KDKT-6/2/45643a07a0e65f1f16c10a8aaf498d1c)
Abstract:
Plastid sequences are among the most widely used in phylogenetic and phylogeographic studies in flowering plants, where they are usually assumed to evolve like non-recombining, uniparentally transmitted, single-copy genes. Among others, this assumption can be violated by intracellular gene transfer (IGT) within cells or by the exchange of genes across mating barriers (horizontal gene transfer, HGT). We report on HGT of a plastid region including rps2, trnL-F, and rbcL in a group of non-photosynthetic flowering plants. Species of the parasitic broomrape genus Phelipanche harbor two copies of rps2, a plastid ribosomal gene, one corresponding to the phylogenetic position of the respective species, the other being horizontally acquired from the related broomrape genus Orobanche. While the vertically transmitted copies probably reside within the plastid genome, the localization of the horizontally acquired copies is not known. With both donor and recipient being parasitic plants, a possible pathway for the exchange of genetic material is via a commonly attacked host.
Keywords: Horizontal gene transfer; Orobanche; Parasitic flowering plant; Phelipanche; Plastid genes

Andrea Quintana, Jana Albrechtova, Robert J. Griesbach, Rosanna Freyre, Anatomical and biochemical studies of anthocyanidins in flowers of Anagallis monelli L. (Primulaceae) hybrids, Scientia Horticulturae, Volume 112, Issue 4, 14 May 2007, Pages 413-421, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.01.024.
(http://www.sciencedirect.com/science/article/B6TC3-4N6FP0W-1/2/1c5fd95fb72b518dfd7ec32c30ba02d0)
Abstract:
Violet, lilac and red flower colors segregated in an F3 population obtained from hybridizing blue and orange breeding lines of Anagallis monelli at UNH. One individual per color was studied, as well as 'true-blue' cultivar `Skylover Blue'. Anatomical examination revealed typical petal layout with upper epidermis, loose mesophyll and lower epidermis. Cells in upper and lower epidermis were categorized by their vacuole color. Blue and red individuals had mostly blue and red cells, respectively. Lilac and violet individuals had blue and bicolored (red and blue) cells on both surfaces, and red cells on the lower epidermis only. Violet individuals had more blue cells on the upper epidermis than lilac individuals. Anthocyanidins were determined by HPLC for each petal epidermis. Blue flowers had only malvidin in both petal surfaces, red flowers had mostly delphinidin with traces of malvidin. Lilac and violet flowers had more malvidin than delphinidin. For violet and lilac flowers respectively, 2 and 3% delphinidin in upper petal surfaces result in a reddish tone while in the lower surface 33 and 25% delphinidin result in a red color. pH in upper and lower petal surfaces were significantly different for each individual, which may affect final flower color.
Keywords: Anthocyanidin; Anthocyanin; Flower color; Petal epidermis; Primulaceae

E.I. Ile, P.Q. Craufurd, R. Asiedu, N.H. Battey, Duration from vine emergence to flowering suggests a long-day or rate of change of photoperiod response in white yam (Dioscorea rotundata Poir.), Environmental and Experimental Botany, Volume 60, Issue 1, May 2007, Pages 86-94, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2006.06.009.
(http://www.sciencedirect.com/science/article/B6T66-4KPN9XT-1/2/a68d972efc5e4d1d749841a86caacf15)
Abstract:

The objective of this study was to quantify the effect of photoperiod on the duration from vine (shoot) emergence to flowering in white or Guinea yam (Dioscorea rotundata). The duration from vine emergence to flowering in two clonal varieties of yam (TDr 131 and TDr 99-9) was recorded at 10 different sowing dates/locations in Nigeria. Durations to flowering varied from 40 to >88 days. Mean daily temperature and photoperiod between vine emergence and flowering varied from 25 to 27 [degree sign]C and 13.1 to 13.4 h day-1, respectively. Both clones had similar responses to temperature, with base and optimum temperatures of 12 and 25-27 [degree sign]C, respectively. Thermal durations to flowering were strongly related (r2 > 0.75-0.83) to absolute photoperiod (h) at vine emergence as well as to rate of change of photoperiod (s day-1) at vine emergence. The response to absolute photoperiod suggests that white yams are quantitative LDPs, flowering sooner in long than short days. Yams also flowered earlier when the rate of change of photoperiod was positive but small, or was negative. It is suggested that yams may use a combination of photoperiod and rate of change in order to fine tune flowering time.
Keywords: Dioscorea rotundata; Flowering; Photoperiod; Rate of change of photoperiod; Yam

Wei-Fen Huang, Pung-Ling Huang, Yi-Yin Do, Ethylene receptor transcript accumulation patterns during flower senescence in Oncidium `Gower Ramsey' as affected by exogenous ethylene and pollinia cap dislodgment, Postharvest Biology and Technology, Volume 44, Issue 2, May 2007, Pages 87-94, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.12.012.
(http://www.sciencedirect.com/science/article/B6TBJ-4MWXT7X-7/2/43e1063fa442848e13913e8b466ea9e2)
Abstract:
The cDNA encoding a putative ethylene response sensor (ERS) type ethylene receptor OgERS1 of Oncidium was cloned and the deduced amino acid sequence of OgERS1 was structurally characterized. Phylogenetic analysis of amino acid sequences of ethylene receptor homologues indicated that OgERS1 was closely related to other members of ethylene receptors from monocotyledonous plants. OgERS1 was expressed abundantly in roots and flower buds, and a lesser extent in pseudobulbs, leaves, and fully opened flowers. OgERS1 mRNA levels in fully opened flowers during the natural senescence increased with days after cutting and reached the maximum in the fifth day of bloom. The accumulation of OgERS1 mRNA began to decrease at the day when ethylene raised abruptly and the flowers started to wilt. The expression of OgERS1 mRNA in pollinia de-capped Oncidium flowers showed an increasing and then decreasing trend toward the late stage of flower senescence as in un-dislodged fully opened flowers, and the overall expression level was decreased throughout the senescence period referred to un-dislodged flowers. Our results concluded that the expression of ethylene receptor OgERS1 is differentially expressed in different organs and the pollinia cap dislodgment alleviated the mRNA levels of ethylene receptor initiated by exogenous ethylene treatments.
Keywords: Histidine kinase; Petal senescence; Pollinia cap dislodgment

Yadeta Anbessa, Tom Warkentin, Rosalind Bueckert, Albert Vandenberg, Short internode, double podding and early flowering effects on maturity and other agronomic characters in chickpea, Field Crops Research, Volume 102, Issue 1, 30 April 2007, Pages 43-50, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.01.004.
(http://www.sciencedirect.com/science/article/B6T6M-4N5172C-1/2/8b2b7a1f7d6c2ef4616dd61e469e1f75)
Abstract:
Chickpea is an indeterminate species, which continues to flower and set new pods over a long period under wet and cool growing conditions, resulting in excessive canopy development and delayed maturity. We hypothesized that the chickpea's long season requirement could be reduced through introgression of short internode, double podding and early flowering. Four populations E100Ym/CDC Anna, 272-2/CDC Anna, 298T-9/CDC Anna, and 298T-9/CDC Frontier were

developed to test this hypothesis with the first parents of each cross being the donor of the short internode, double podding and early flowering traits, respectively. Also, the donor parents E100Ym, 272-2 and 298T-9 were intercrossed. Segregating populations of F2 to F3:6 generations were then evaluated under greenhouse and field conditions. When expressed well, double podding significantly reduced time to maturity as compared to the single podding counterparts. The best double podding lines were about 1 week earlier maturing than the early parent and standard checks. Days to flowering (DF) was positively associated with days to maturity (DM) ($r = 0.44$, $P < 0.001$), and partial path analysis revealed that DF contributed to DM mainly via days to first pod maturity (DFPM). In the two early flowering populations 298T-9/CDC Anna and 298T-9/CDC Frontier, DF determined about 32% of the variation in DFPM. Conversely, the short internode trait had an undesirable effect, in that all the short internode segregants were too late to mature. In conclusion, the alleles for double podding and early flowering may be used to improve early maturity in chickpea and subsequently minimize the risks associated with the production of this crop in environments where the growing conditions allow excessive crop canopy development, as in the Canadian prairies.
Keywords: Chickpea; Days to maturity; Short internode; Double podding; Early flowering

Nigel Williams, Flowers now but nowhere to go, Current Biology, Volume 17, Issue 8, 17 April 2007, Pages R262-R263, ISSN 0960-9822, DOI: 10.1016/j.cub.2007.03.054.
(http://www.sciencedirect.com/science/article/B6VRT-4NH6WNX-4/2/2c1b34d45bb8dddfe2323b5ac8eb9147)
Abstract:
Climate change studies suggest ecosystems will be forced to move towards the poles but some may be unable to move. Nigel Williams reports.

Pingli Mo, Yongsheng Zhu, Xin Liu, Aimin Zhang, Chongling Yan, Daowen Wang, Identification of two phosphatidylinositol/phosphatidylcholine transfer protein genes that are predominately transcribed in the flowers of Arabidopsis thaliana, Journal of Plant Physiology, Volume 164, Issue 4, 5 April 2007, Pages 478-486, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.03.014.
(http://www.sciencedirect.com/science/article/B7GJ7-4JXPS07-7/2/540be27f95fafeb48af0bef4b7b08a1f)
Abstract: Summary
The Sec14 protein (Sec14p) and its homologs are involved in the transfer of phosphatidylinositol/phosphatidylcholine phospholipids in eukaryotic cells. In the completely sequenced genome of Arabidopsis thaliana, multiple genes encoding putative Sec14p homologs have been predicted based on bioinformatic analysis. Here we report the identification of two yeast Sec14-like genes (designated as AtSFH3 and AtSFH12, respectively) that are predominately transcribed in Arabidopsis flowers. The deduced amino acid sequences of AtSfh3p and AtSfh12p exhibited high similarity to that of Sec14p. Ectopic expression of AtSfh3p or AtSfh12p corrected the high temperature sensitive phenotype caused by Sec14p functional deficiency in Saccharomyces cerevisiae, indicating that the two plant homologs are functional in the intracellular environment. AtSFH3 transcripts were detected in flowers, stems and immature siliques but not roots and leaves, with a relatively higher transcript level in the flowers. In contrast, AtSFH12 transcripts were only detectable in the flowers. Based on histochemical staining of [beta]-glucuronidase (GUS) activities in the transgenic Arabidopsis plants harboring promoter::GUS constructs, AtSFH3 transcription was first detected in the stigma papillae of the flowers at stage 11, and then in the pollen grains before and after fertilization. On the other hand, AtSFH12 transcription was only found in the mature and germinating pollen grains. The information from this study may provide useful clue for further analysis of the function of plant Sec14p homologs in the development of the male gametic cells and/or the fertilization process in higher plants.
Keywords: Arabidopsis thaliana; AtSFH3; AtSFH12; Flower; Sec14p

K.V. Saritha, C.V. Naidu, In vitro flowering of Withania somnifera Dunal.--An important antitumor medicinal plant, Plant Science, Volume 172, Issue 4, April 2007, Pages 847-851, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.12.016.
(http://www.sciencedirect.com/science/article/B6TBH-4MT5JVP-1/2/b2e51910e485b7ef6b2c39d782f02e02)
Abstract:
In vitro flowering, in vitro fruiting and effective micropropagation protocol were studied in Withania somnifera, an antitumor medicinal plant using axillary bud explants. The Murashige and Skoog's medium (MS) supplemented with N6-benzyl adenine (BA) 2.0 mg l-1 and [alpha]-naphthalene acetic acid 0.1 mg l-1 was found optimum for production of multiple shoots. The regenerated plantlets were found to form tiny green floral buds after 4-6 weeks of culture in MS medium supplemented with Kinetin (0.5-4.0 mg l-1) and indole-3-acetic acid (0.1 mg l-1). In vitro fruiting was observed in the presence of Kn (2.0 mg l-1) and IAA (0.1 mg l-1). This paper describes in vitro flowering system to overcome problems associated with flower growth and development as well as fruit and seed production in vitro.
Keywords: In vitro flowering; In vitro fruiting; Seed set; Withania somnifera

B. Anderson, S.D. Johnson, Coevolution between well endowed flies and deep throated flowers, South African Journal of Botany, Volume 73, Issue 2, April 2007, Page 277, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.012.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-8/2/8399b7776fb042ac0d457063e46aa608)

G.D. Ascough, J. Van Staden, Preventing flower abscission in potted Plectranthus plants and discovery of differential regulation of dark-induced abscission, South African Journal of Botany, Volume 73, Issue 2, April 2007, Pages 277-278, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.014.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-B/2/5678a897f37b99cbe11a51f33df72a74)

E.W. Hoffman, G. Jacobs, Can developing inflorescences of Protea cv. Carnival reduce the responsiveness of non-flowering shoots to benzyladenine induction of flowers `out of season'?, South African Journal of Botany, Volume 73, Issue 2, April 2007, Page 291, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.055.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-1T/2/1979a0589cb9e5f64fe45de7d5818eea)

M.E. Light, M.G. Kulkarni, G.D. Ascough, J. Van Staden, Improved flowering of a South African Watsonia with smoke treatments, South African Journal of Botany, Volume 73, Issue 2, April 2007, Page 298, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.074.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-2G/2/1a30276dc76910b6f1c31e5b3502741a)

Michel J. Verheul, Anita Sonsteby, Svein O. Grimstad, Influences of day and night temperatures on flowering of Fragaria x ananassa Duch., cvs. Korona and Elsanta, at different photoperiods, Scientia Horticulturae, Volume 112, Issue 2, 26 March 2007, Pages 200-206, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.12.022.
(http://www.sciencedirect.com/science/article/B6TC3-4MV1H70-2/2/9d6394a57bb07b7371c35e0358c71a1b)
Abstract:

The effects of photoperiod (12, 13, 14, 15 or 16 h), day temperature (12, 15, 18, 24 or 27 [degree sign]C) and night temperature (6, 9 or 12 [degree sign]C) and their interactions on flower and inflorescence emergence were investigated by exposing 4 week old runner plants of strawberry cvs. Korona and Elsanta during a period of 3 weeks. A daily photoperiod of 12 or 13 h resulted in the highest number of plants with emerged flowers. A photoperiod of 14 h or more strongly reduced this number, while no flowers emerged at a photoperiod of 16 h. Plants exposed to photoperiods of 12 or 13 h flowered earlier and had longer flower trusses. A day temperature of 18 [degree sign]C and/or a night temperature of 12 [degree sign]C were optimal for plants to emerge flowers and resulted in the shortest time to flowering. A night temperature of 6 [degree sign]C strongly reduced the number of plants that emerged flowers, especially when combined with lower day temperatures. Photoperiod and temperature had no effect on the number of inflorescences, all flowering plants produced on average one inflorescence. The number of flowers on the inflorescence increased with decreasing day temperature and when photoperiod was raised from 12 to 15 h. In general, `Korona' was more sensitive to photoperiod and temperature as `Elsanta', and had a lower optimal day temperature for flower emergence. Results of this experiment may be used to produce high quality plant material or to define optimal conditions when combining flower induction and fruit production.
Keywords: Day temperature; Flowering; Fragaria x ananassa; Greenhouse production; Night temperature; Photoperiod

Adriana G. Kantolic, Jorge L. Mercau, Gustavo A. Slafer, Victor O. Sadras, Simulated yield advantages of extending post-flowering development at the expense of a shorter pre-flowering development in soybean, Field Crops Research, Volume 101, Issue 3, 15 March 2007, Pages 321-330, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.12.008.
(http://www.sciencedirect.com/science/article/B6T6M-4MWGYKN-1/2/bd79e93f619e0eb9d8e349cfbe064fe7)
Abstract:
Field experiments with soybean demonstrated that the extension of photoperiod after flowering increases both the duration of the post-flowering phase and the production of seeds. These results suggest that cultivars with increased duration of the post-flowering phase could be selected to improve soybean yields. The aims of this paper were to: (a) evaluate the ability of the CROPGRO-soybean model to reproduce the experimental relationships between seed number and duration of the critical phase between first and last pod, and (b) assess the putative benefits and trade-offs of variable durations of the critical phase in a south-north transect in the Pampas of Argentina.
We varied the genetic coefficients accounting for photothermal requirements and photoperiod sensitivity of soybean A5409-RG (maturity group V), reducing pre-flowering phase while maintaining time to maturity. The model produced sound estimates of crop phenology and reproduced the positive relationship between seed production and the duration of the critical period between first and last pod found in field studies. Linking the model with long-term climate records for six locations between 31 and 37[degree sign]S, indicated that substantial yield gains could result from increasing the relative duration of post-flowering phases. A hypothetical cultivar with flowering time typical of cultivars of maturity group III and total cycle typical of cultivars of group V, outyielded the traditional cultivar of group V in most cases. For well-watered crops, extension of the critical period had a positive effect in yield in all seasons and locations, whereas for rainfed crops, the extension of the critical period increased yield in 95% of the simulated scenarios. The magnitude of the effect was strongly asymmetric: yield gains were up to 1 Mg ha-1 whereas losses were below 0.2 Mg ha-1. The modelled results in this paper indicate that shortening pre-flowering period without changing the duration of the whole cycle should increase yields in a broad range of latitudes and environmental conditions.
Keywords: Soybean; Glycine max; Simulation; Phenology; Post-flowering duration; Yield

De Li Liu, Incorporating vernalization response functions into an additive phenological model for reanalysis of the flowering data of annual pasture legumes, Field Crops Research, Volume 101, Issue 3, 15 March 2007, Pages 331-342, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.12.010.
(http://www.sciencedirect.com/science/article/B6T6M-4MVDVJ3-1/2/223fc3979a6ef647dc70072875fc5eb8)
Abstract:
Vernalization is a physiological process by which plants acquire competence to flower by prolonged exposure to cooling temperatures. A non-linear vernalization module was incorporated into the thermal and photothermal additive models for modelling the time to flowering. The model was applied to published data of time to flowering for annual pasture legumes. Fourteen out of 15 cultivars were detected as vernalization-requiring genotypes. All vernalization-requiring cultivars fitted to the thermal model had R2 of below 0.51. After incorporating a vernalization module, the model (vernalizing-thermal model) fitted to nine cultivars with R2 of over 0.9. All cultivars were well fitted to the photothermal model with an average R2 of 0.94. However, the accountability of variance in observed time to flowering dropped from 94% when the model was tested without cross validation to 68% when the model was tested with cross validation, indicating a poor predictability of the model. Further, the values of parameters for the photothermal model, such as base temperature and coefficients associated with the effect of temperature on the rate of development are unrealistic. The vernalizing-photothermal model not only provided a good fit to the data (averaged R2 = 0.98), but it also was able to account for 94% of the variance in the observed data when the model was tested by cross validation. The vernalizing-photothermal model produced meaningful base temperature and the coefficients for the effects of temperature and photoperiod were positive, which are consistent with the suboptimum temperature promotion of flowering and quantitative long day plant behaviour. The vernalizing-thermal model and vernalizing-photothermal model gave an averaged root mean squared error (RMSE) of 3.6 and 2.3 days, compared with the averaged RMSE of 32.4 and 5.9 days for the two respective additive models without the vernalization component. It was concluded that if the vernalization occurs, the additive models without the vernalization module can confound the effects of vernalization that hastens flowering at low temperature with the effects of temperature that promotes flowering at a suboptimum temperature regime. The confounded effects may be forced to be expressed as the unrealistic effects of temperature and base temperature in the model parameters and the model overall has low predictability. The modified additive model that incorporating the vernalization module can be used to quantitatively measure the length of vernalization and is a more valid approach to modelling the time to flowering.
Keywords: Vernalization; Photoperiod; Temperature; Annual pasture legumes; Modelling; Cross validation

Khalid Mahmud Khokhar, P. Hadley, S. Pearson, Effect of photoperiod and temperature on inflorescence appearance and subsequent development towards flowering in onion raised from sets, Scientia Horticulturae, Volume 112, Issue 1, 12 March 2007, Pages 9-15, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.12.009.
(http://www.sciencedirect.com/science/article/B6TC3-4MW90FM-1/2/c4eff683eaa0989a5fa3e9065296129d)
Abstract:
The plants of two onion cultivars Sturon and Stuttgarter were raised from sets and placed in a growth room at 12 [degree sign]C, a light flux density of 120 [mu]mol m-2 s-1 and a 16 h photoperiod. Cultivar Stuttgarter took 195 days to initiate, whereas time for initiation in cv. Sturon was 201 days. After initiation the plants were transferred to wide range of photo-thermal regimes consisting of six set point temperatures (6, 10, 14, 18, 22 and 26 [degree sign]C) and four photoperiods (8, 11, 14 and 17 h day-1). An overall mean temperature for all developmental stages under each photo thermal combination was 12.2, 12.4, 15.9, 17.8, 23 and 24.4 [degree

sign]C. Time to inflorescence appearance, spathe opening and floret opening decreased linearly as temperature and photoperiod increased. At low to mild temperatures (12.2-17.8 [degree sign]C), longer photoperiod enhanced florets per umbel, whereas at higher temperatures (23-24.4 [degree sign]C), the floret number declined with lengthening photoperiods. As the photoperiod extension in each temperature advanced inflorescence appearance, spathe opening and floret opening and this would be beneficial in a programme to accelerate seed production in onion.
Keywords: Inflorescence initiation; Flowering; Onion; Photoperiod; Temperature; Seed production

M. Ouk, J. Basnayake, M. Tsubo, S. Fukai, K.S. Fischer, S. Kang, S. Men, V. Thun, M. Cooper, Genotype-by-environment interactions for grain yield associated with water availability at flowering in rainfed lowland rice, Field Crops Research, Volume 101, Issue 2, 5 March 2007, Pages 145-154, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.10.003.
(http://www.sciencedirect.com/science/article/B6T6M-4MG6P80-3/2/209bb4983e3540c9f738b4996d4f3b01)
Abstract:
While a large genotype-by-environment (G x E) interaction component of variance for grain yield (GY) has been widely reported for rainfed lowland rice, the reasons for such large interactions are not well known. A random reference population of 34 genotypes taken from the Cambodian rice improvement program was used to examine the magnitude and nature of G x E interactions for GY in Cambodia. These genotypes were evaluated in a multi-environment trial (MET) conducted across 3 years (2000-2002) and eight locations in the rainfed lowlands. The G x E interaction was partitioned into components attributed to genotype-by-location (G x L), genotype-by-year (G x Y) and genotype-by-location-by-year (G x L x Y) interactions. The G x L x Y interaction was the largest component of variance for GY. The G x L interaction was also significant and comparable in size to the genotypic component (G). The significant G component was partly explained by a group of four genotypes that were broadly adapted to different environmental conditions represented by three environmental groups. The three environmental groups were identified from a pattern analysis, and the grouping was partly related to the time of sowing, and hence water availability at flowering. A major factor contributing to the large G x L x Y interactions for GY was late maturing genotypes being affected greatly when soil water availability at flowering was reduced greatly, compared to earlier maturing genotype groups. While the differential genotypic responses to the water availability environment explained part of a large G x E interaction for GY, other non-water related environmental conditions also appeared to have contributed to the interaction. Three target environments were identified for focusing efforts of the breeding programs in Cambodia, and four putative genotypes were selected for their high yield and wide adaptation in the rainfed lowlands.
Keywords: Drought adaptation; G x E interactions; Pattern analysis; Phenology; Yield

M.A. Ansari, F.A. Shah, M. Whittaker, M. Prasad, T.M. Butt, Control of western flower thrips (Frankliniella occidentalis) pupae with Metarhizium anisopliae in peat and peat alternative growing media, Biological Control, Volume 40, Issue 3, March 2007, Pages 293-297, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.12.007.
(http://www.sciencedirect.com/science/article/B6WBP-4MKCGYB-1/2/544e6f6459f50093cb5ac9a4f342c943)
Abstract:
The entomogenous fungus Metarhizium anisopliae V275 was more efficacious than chemical insecticides (imidacloprid, fipronil) in killing pupae of the western flower thrips (70-90% versus 20-50%) in a range of horticultural growing media (peat, coir, bark and peat blends with 10% and 20% composted green waste). Premixing inoculum of M. anisopliae into the growing media gave better control than drench applications in coir and peat blended with 20% composted green waste. Use of M. anisopliae with sublethal dose of the insecticides gives slightly better control than the

individual control agents but no clear cut additive or synergistic effects. Overall our study shows that M. anisopliae is efficacious in all growing media and compatible with conventional insecticides and offers much promise for the control of thrips as part of an integrated pest management program.
Keywords: Metarhizium anisopliae; Frankliniella occidentalis; Thrips pupae; Composts; Fipronil; Imidacloprid

Jane Barton, Simon V. Fowler, Alison F. Gianotti, Chris J. Winks, Maarten de Beurs, Greg C. Arnold, Guy Forrester, Successful biological control of mist flower (Ageratina riparia) in New Zealand: Agent establishment, impact and benefits to the native flora, Biological Control, Volume 40, Issue 3, March 2007, Pages 370-385, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.09.010.
(http://www.sciencedirect.com/science/article/B6WBP-4M0575J-2/2/87e0cd194ac7e56587cd6797fdff5134)
Abstract:
The white smut fungus (Entyloma ageratinae) and the gall fly (Procecidochares alani) were released in New Zealand in 1998 and 2001 respectively to suppress mist flower (Ageratina riparia). The fungus established and spread rapidly, crossing 80 km of sea to Great Barrier Island within 2 years. The mean number of P. alani galls increased exponentially to 1.96/stem at release sites, but dispersal was slow. The impact of the biocontrol agents was monitored once annually from 1998/99 to 2003/04, at up to 51 sites in the North Island. The mean percentage of live leaves infected with fungus rapidly reached nearly 60%. Maximum plant height declined significantly. In heavy infestations, mean percentage cover of mist flower declined from 81 to 1.5%. Galls were only recorded towards the end of the impact study, and at low mean numbers. As mist flower declined, the species richness and mean percentage cover of native plants increased. In contrast, the species richness and mean percentage cover of exotic plants (excluding mist flower) did not change significantly. Many plant species colonizing the plots were important native mid- or late-successional shrubs or trees. With few exceptions, the exotic plant species common in the plots were not weeds that appeared to threaten native forest habitats. There was only a weak 'replacement weed effect' from the potentially serious invader African club moss (Selaginella kraussiana). These data, together with reports of reduced threats to rare endemic plants from mist flower, suggest this rapid, well-monitored weed biocontrol program was very successful.
Keywords: Mist flower; Ageratina riparia; Entyloma ageratinae; Procecidochares alani; Biological control of weeds; Replacement weeds; Native regeneration

Hong-Hyun Park, Joon-Ho Lee, Ki-Baik Uhm, Economic Thresholds of Western Flower Thrips (Thysanoptera: Thripidae) for Unripe Red Pepper in Greenhouse, Journal of Asia-Pacific Entomology, Volume 10, Issue 1, March 2007, Pages 45-53, ISSN 1226-8615, DOI: 10.1016/S1226-8615(08)60330-1.
(http://www.sciencedirect.com/science/article/B8JJN-4V6TFFF-9/2/e1060b9b869722f67dcb0aa67d402fcf)
Abstract:
This study was conducted to develop economic thresholds of western flower thrips (Frankliniella occidentalis Pergande) for unripe red pepper in greenhouses. To investigate the relationship between the density of thrips and resulting damages, experimental plots with five treatments (0, 4, 16, 48, 96 adults per plot) as initial release densities were established at the National Institute of Agricultural Science and Technology, Suwon, Korea, in 2004. Western flower thrips density was monitored using flower samplings and yellow sticky trap (8x13 cm) counts. Western flower thrips density was directly related to increased numbers of damaged fruits and reduced fruit yield. The number of marketable fruits produced decreased as the thrips densities increased. The major damage to pepper fruits caused by thrips was cosmetic scars that resulted from immature feeding.

When flower samples or yellow trap caches were used to determine the density of thrips, which were collected on a previous sampling date, thrips densities were determined to be related to the percentage of fruits that were damaged, and a significant relationship was found for the flower samples (y = 0.3219x + 1.0792, r2 = 0.8640 and for trap catches (y = 11.9209 log(x) -2.158, r2 = 0.8306). The economically-tolerable ratio of damaged fruits based on control cost and market values under current greenhouse cultivation was estimated as 3.4 to 8.0%. Economic thresholds of western flower thrips ranged from 0.7 to 2.1 adults or nymphs per flower, and 2.3 to 5.7 adults per four-day sticky card count.
Keywords: Economic thresholds; Frankliniella occidentalis; Unripe red pepper; Greenhouse

Jiau-Ching Ho, Chiu-Ming Chen, Lie-Ching Row, Oleanane-type triterpenes from the flowers, pith, leaves, and fruit of Tetrapanax papyriferus, Phytochemistry, Volume 68, Issue 5, Reports on Structure Elucidation, March 2007, Pages 631-635, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.10.007.
(http://www.sciencedirect.com/science/article/B6TH7-4N0PFXY-1/2/7e3feaae397eb449adbca73d1c8854fc)
Abstract:
Four oleanane-type triterpenes, 3[alpha],21[beta],22[alpha]-trihydroxy-11,13(18)-oleanadien-28-oic acid (1), 3-epi-papyriogenin C (2), 21-O-acetyl-21-hydroxy-3-oxo-11,13(18)-oleanadien-28-oic acid (3) and 3[beta]-hydroxy-21-oxo-11,13(18)-oleanadien-28-oic acid methyl ester (4), together with four known triterpenes, were isolated from Tetrapanax papyriferus (Hook) K. Koch. Papyriogenin A (8) exhibited anti-HIV activity and low cytotoxicity in acutely infected H9 lymphocytes. Their structures were determined by analysis of spectroscopic data, including by 1D and 2D NMR.
Keywords: Tetrapanax papyriferus; Araliaceae; Oleanane-type triterpene

Cassie J. Majetic, Robert A. Raguso, Stephen J. Tonsor, Tia-Lynn Ashman, Flower color-flower scent associations in polymorphic Hesperis matronalis (Brassicaceae), Phytochemistry, Volume 68, Issue 6, March 2007, Pages 865-874, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.12.009.
(http://www.sciencedirect.com/science/article/B6TH7-4MX4VXW-6/2/f8917653bf0a2bcc9d039c6bdadaf963)
Abstract:
Floral scent emission rate and composition of purple and white flower color morphs of Hesperis matronalis (Brassicaceae) were determined for two populations and, for each, at two times of day using dynamic headspace collection and GC-MS. The floral volatile compounds identified for this species fell into two main categories, terpenoids and aromatics. Principal component analysis of 30 compounds demonstrated that both color morphs emitted more scent at dusk than at dawn. Color morphs varied in chemical composition of scent, but this differed between populations. The white morphs exhibited significant differences between populations, while the purple morphs did not. In the white morphs, one population contains color-scent associations that match expectations from classical pollination syndrome theory, where the flowers have aromatic scents, which are expected to maximize night-flying moth pollinator attraction; in the second population, white morphs were strongly associated with terpenoid compounds. The potential impact that pollinators, conserved biosynthetic pathways, and the genetics of small colonizing populations may have in determining population-specific associations between floral color and floral scent are discussed.
Keywords: Hesperis matronalis; Brassicaceae; GC-MS; Terpenoids; Aromatics; Flower color polymorphism

Norio Saito, Fumi Tatsuzawa, Yoshikazu Yazaki, Atsushi Shigihara, Toshio Honda, 7-Polyacylated delphinidin 3,7-diglucosides from the blue flowers of Leschenaultia cv. Violet Lena,

Phytochemistry, Volume 68, Issue 5, Reports on Structure Elucidation, March 2007, Pages 673-679, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.11.012.
(http://www.sciencedirect.com/science/article/B6TH7-4MKTXXK-3/2/54e0740f07fec5d48dc8e35241c706c9)
Abstract:
The triacyl anthocyanins, Leschenaultia blue anthocyanins 1 and 2 (LBAs 1 and 2) were isolated from the blue flowers of Leschenaultia R. Br. cv. Violet Lena (Goodeniaceae), in which LBA 1 was present as a dominant pigment. The structure of LBA 1 was elucidated to be delphinidin 3-O-[6-O-(malonyl)-[beta]-d-glucopyranoside]-7-O-[6-O-(4-O-(6-O-(4-O-([beta]-d-glucopyranosyl)-trans-caffeoyl)-[beta]-d-glucopyranosyl)-trans-caffeoyl)-[beta]-d-glucopyranoside] by application of chemical and spectroscopic methods. Since LAB 2 was isolated in small amount, its structure was tentatively assigned as either delphinidin 3-(malonylglucoside)-7-[(glucosyl-p-coumaroyl)-(glucosylcaffeoyl)-glucoside] or delphinidin 3-(malonyl-glucoside)-7-[(glucosyl-caffeoyl)(glucosyl-p-coumaroyl)-glucoside]. This is the first report of the occurrence of 7-polyacylated anthocyanins in the family of Goodeniaceae, although others have been found in the families of the Ranunculaceae, Campanulaceae, and Compositae. Moreover, delphinidin 3-glycoside-7-di-(glucosylcaffeoyl)-glucoside has been reported only in the flowers of Platycodon grandiflorum (Campanulaceae). From a chemotaxonomical viewpoint, the Goodeniaceae may be closely related to the Campanulaceae.
Keywords: Leschenaultia R. Br. cv. Violet Lena; Goodeniaceae; Blue flower color; Acylated anthocyanins; Delphinidin 3-malonylglucoside-7-di-(glucosylcaffeoyl)-glucoside

Narisa Uthaichay, Saichol Ketsa, Wouter G. van Doorn, 1-MCP pretreatment prevents bud and flower abscission in Dendrobium orchids, Postharvest Biology and Technology, Volume 43, Issue 3, March 2007, Pages 374-380, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.09.015.
(http://www.sciencedirect.com/science/article/B6TBJ-4MR1K3P-1/2/d614b302bbcaa3298b7442272021896b)
Abstract:
Dendrobium orchid inflorescences were treated for 4 h at 25 [degree sign]C with or without 100-500 nl/l 1-MCP and were then placed in water at 25 [degree sign]C to follow abscission. In controls, depending on the experiment, 20-80% of the floral buds and 0-20% of the open flowers abscised within 1 week. The 1-MCP pretreatment largely prevented this abscission. If flowers were exposed to 1.0 [mu]l/l ethylene for 3 days, all floral buds and all open flowers abscised within the 3 days of treatment. 1-MCP treatment just prior to ethylene treatment largely prevented the ethylene effect. Treatment with STS was as effective as treatment with 1-MCP. Dendrobium inflorescences are usually shipped by air in cardboard boxes lined with plastic film. The stem ends are placed in plastic tubes filled with water. After shipment and placement in water, a considerable percentage of the buds, and some flowers, abscise. This is probably due to elevated ethylene concentrations inside the boxes. Treatment of the inflorescences with 100-500 nl/l 1-MCP prior to simulated air transport largely prevented abscission during vase life. 1-MCP treatment inhibited ethylene production of the inflorescences by lowering both ACC synthase in open flowers and ACC oxidase activity in floral buds.
Keywords: Dendrobium; Abscission; ACC content; ACC synthase activity; ACC to ethylene conversion; 1-MCP; Orchid; Vase life

Wen-zhong ZHANG, Ya-dong HAN, Hong-juan DU, Relationship Between Canopy Temperature at Flowering Stage and Soil Water Content, Yield Components in Rice, Rice Science, Volume 14, Issue 1, March 2007, Pages 67-70, ISSN 1672-6308, DOI: 10.1016/S1672-6308(07)60010-9.
(http://www.sciencedirect.com/science/article/B8JG8-4PPX8F6-B/2/56b7934f1f57148b1820ad7fc980fb12)
Abstract:

The canopy temperature of rice at the flowering stage and the soil water content were investigated under different soil water treatments (the soil water contents were 24%, 55%, 90% and 175% at the flowering stage). The canopy temperature was lower than air temperature, and the soil water content significantly influenced the canopy temperature. The lower the soil water content, the higher the canopy temperature, the less the accumulative absolute value of canopy-air temperature difference. Moreover, the maximum difference between treatments and CK in the accumulative absolute value of canopy-air temperature difference appeared at 13:00 p.m. in a day, thus, it could be considered as a suitable measuring time. Under the lowest water content treatment, the peak flowering occurred in the first three days (about 70% of panicles flowered), resulting in shortened and lightened panicle of rice. As to the CK and the high water content treatments, the peak flowering appeared in the middle of flowering duration, with longer panicle length and higher panicle weight. Results indicated the lower the soil water content, the less the filled grain number and grain yield.
Keywords: rice; canopy temperature; soil water content; yield components

Mathieu Ngouajio, Guangyao Wang, Ronald Goldy, Withholding of drip irrigation between transplanting and flowering increases the yield of field-grown tomato under plastic mulch, Agricultural Water Management, Volume 87, Issue 3, 16 February 2007, Pages 285-291, ISSN 0378-3774, DOI: 10.1016/j.agwat.2006.07.007.
(http://www.sciencedirect.com/science/article/B6T3X-4KVXHMF-1/2/dbf42ed3ba79042b61543e86e2d21a8f)
Abstract:
Experiments were conducted in summer of 2003 and 2004 to study the effect of withholding irrigation on tomato growth and yield in a drip irrigated, plasticulture system. Irrigation treatments were initiated at tomato planting (S0), after transplant establishment (S1), at first flower (S2), at first fruit (S3), or at fruit ripening (S4). An additional treatment received only enough water to apply fertigation (FT). Withholding drip irrigation for a short period (S2-S3) increased tomato marketable yield by 8-15%, fruit number by 12-14% while reducing amount of irrigation water by 20% compared to the S0 treatment. Withholding drip irrigation also increased irrigation water use efficiency (IWUE). Similar trends were observed in 2003 and 2004 despite large differences in rainfall, heat units, and tomato yield between years. This suggests that if soil moisture is adequate at transplanting, subsequent withholding of irrigation for 1-2 weeks after tomato transplanting may increase yield while reducing the amount of irrigation water.
Keywords: Withholding drip irrigation; Irrigation water use efficiency; Tomato; Plasticulture

D. Gonzalez-Rossia, C. Reig, M. Juan, M. Agusti, Horticultural factors regulating effectiveness of GA3 inhibiting flowering in peaches and nectarines (Prunus persica L. Batsch), Scientia Horticulturae, Volume 111, Issue 4, 16 February 2007, Pages 352-357, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.11.001.
(http://www.sciencedirect.com/science/article/B6TC3-4MMP626-1/2/468282fae3c9b74af983aca2a45de626)
Abstract:
The application of gibberellic acid during the flower bud induction period significantly reduced flowering in peaches and nectarines. The magnitude of the response significantly depended on the total amount of active material applied per tree. Results show, for cultivars tested, a higher sensitivity of peach to GA3 in comparison with nectarine. Concentrations of 0.5 or 1.0 g tree-1 of gibberellic acid reduce flowering by about 50% in both, peaches and nectarines, respectively, and it gives rise to a reduction of costs of hand thinning by 50%, approximately, without affecting the yield. Fruit colour advanced, total soluble solids concentration increased and fruit firmness increased as a consequence of treatments. The effect was higher in the basal part of the shoots and reduced from the base to the apical part.

Keywords: Gibberellic acid concentration; Hand thinning cost; Fruit characteristics; Spraying procedure

G.M.G. Zilahi-Balogh, J.L. Shipp, C. Cloutier, J. Brodeur, Predation by Neoseiulus cucumeris on western flower thrips, and its oviposition on greenhouse cucumber under winter vs. summer conditions in a temperate climate, Biological Control, Volume 40, Issue 2, February 2007, Pages 160-167, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.10.011.
(http://www.sciencedirect.com/science/article/B6WBP-4M93KPT-3/2/c8c7f27b05980d46f038257bd52f837f)
Abstract:
In short-term controlled chamber experiments, the influence of light intensity, photoperiod, temperature, and light vs. dark conditions within the diel cycle were investigated on the predation and oviposition rates of Neoseiulus cucumeris (Oudemans) (Acari: Phytoseiidae), a biological control agent commonly used in greenhouse crops worldwide. In a 2 x 2 factorial experiment, neither light intensity nor photoperiod had an effect on the number of thrips killed by N. cucumeris at 24 [degree sign]C. Light intensity, but not photoperiod, had an effect on the number of eggs laid, with more eggs laid at high (83.0 +/- 1 Wm-2) than low (11.1 +/- 0.5 Wm-2) light intensity at 24 [degree sign]C. When simulated seasonal light regimes were compared (summer: high light intensity, long daylength vs. winter: low light intensity, short daylength) at the 2 constant temperatures 20 [degree sign]C vs. 24 [degree sign]C, only temperature had an effect. Significantly more thrips were killed at 24 [degree sign]C than 20 [degree sign]C irrespective of light regime, which is consistent with light having had no effect in the light intensity x photoperiod assay. There was no significant difference in the predation rate on first instar WFT by starved female N. cucumeris during scotophase vs. photophase when raised either under long L16:D8 h or short L8:D16 h diel cycle. However, N. cucumeris females only laid eggs during the photophase, regardless diel cycle in which they were reared. In the winter season, reduced predation by N. cucumeris appears to be influenced more by cooler temperature, than low light intensity and/or short days alone. However, our results also indicate that poor or delayed establishment and numerical response of N. cucumeris in the winter in northern temperate zones in greenhouses under natural light may result from reduced reproductive rate under low light intensity and short daylight conditions.
Keywords: Predation; Light intensity; Temperature; Diel cycle; Photoperiod; Biological control; Neoseiulus cucumeris; Frankliniella occidentalis

Long Yang, Hua Jun Miao, Guo Qing Li, Li Mei Yin, Hung-Chang Huang, Survival of the mycoparasite Coniothyrium minitans on flower petals of oilseed rape under field conditions in central China, Biological Control, Volume 40, Issue 2, February 2007, Pages 179-186, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.10.002.
(http://www.sciencedirect.com/science/article/B6WBP-4M62KCD-1/2/2ed60e550721e449787a32de51b8028f)
Abstract:
The mycoparasite Coniothyrium minitans is an effective biocontrol agent of stem rot of oilseed rape (Brassica napus) caused by Sclerotinia sclerotiorum. This study was to investigate survival of C. minitans on flower petals of oilseed rape under field conditions in central China using the mutant strain SV-5-2 which is tolerant to the fungicide vinclozolin, and the two bactericides benzylpenicillin sodium (BPS) and streptomycin sulfate (SS). Results showed that potato dextrose agar (PDA) amended with vinclozolin (500 [mu]g ml-1), BPS (500 [mu]g ml-1), and SS (500 [mu]g ml-1) was suitable for detection of conidial germination and mycelial growth of C. minitans strain SV-5-2. Results of the five field experiments (A-E) conducted in 2004 and 2005 showed that C. minitans strain SV-5-2 applied to flower racemes of oilseed rape could be detected for five days in four experiments and three days in one experiment. The rate of survival of C. minitans decreased

with time and at the last sampling date, the survival rate was 17.3, 14.3, 35.0, 62.6, and 1.9% for experiments A, B, C, D, and E, respectively. Moreover, survival of C. minitans was affected by weather conditions. Relatively, high rates of survival of C. minitans were observed under sunny weather in the experiments C and D, implying that conidia of C. minitans are tolerant to sunlight irradiation for a period of at least five days in the experiment C and three days in the experiment D. Low survival rates of C. minitans were observed under light rain weather in the experiment A, and heavy rain weather in the experiments B and E. The low recovery rate of C. minitans under rainy conditions suggests a possibility of rain wash of the inoculum applied to the florets. Methods for improving efficacy of C. minitans in the field are discussed.
Keywords: Coniothyrium minitans; Vinclozolin; Survival; Oilseed rape; Biological control

Tao ZHANG, Studies on In Vitro Flowering and Fruiting of Perilla frutescens, Agricultural Sciences in China, Volume 6, Issue 1, January 2007, Pages 33-37, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60014-5.
(http://www.sciencedirect.com/science/article/B82XG-4MX6G4F-5/2/dbd076d16dbf2cdd3d0c42cd7c2d3a01)
Abstract:
Influences of PGR, sucrose, and ammonium nitrate on in vitro flowering and fruiting from cotyledon explants of P. frutescens were studied. The regenerated shoots at 2-4 cm from cotyledon explants on MS medium supplemented with 0.5 mg L-1 BA and 1.0 mg L-1IAA were excised and transferred to MS medium containing 30 g L-1 sucrose, 8.25 g L-1 ammonium nitrate, and 1.0 mg L-1 BA. Following 40 d of culture, 86.2% of them flowered and set seeds. These seeds were germinable and developed into flowering plants in the fields. This study provides a simple system for rapid breeding of P. frutescens and studying the physiological mechanism of flowering of plants.
Keywords: Perilla frutescens; in vitro flowering; fruiting

Enrico Prenesti, Silvia Berto, Pier G. Daniele, Simona Toso, Antioxidant power quantification of decoction and cold infusions of Hibiscus sabdariffa flowers, Food Chemistry, Volume 100, Issue 2, 2007, Pages 433-438, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.09.063.
(http://www.sciencedirect.com/science/article/B6T6R-4HNYMT1-4/2/c66a08ff67aef540c24ce686f91f8130)
Abstract:
In this paper the overall antioxidant power, expressed as Briggs-Rauscher antioxidant index, of decoction or cold infusions of dried Hibiscus sabdariffa flowers was determined at 25 and 37 [degree sign]C, to compare the scavenger ability of the beverages at either room or physiological temperature. Total polyphenol contents and the absorbance of anthocyanin pigments were also determined, and the trend with the overall antioxidant capability is considered. Combined photometric and pH-metric titrations were acquired to obtain information on the colour-total acidity relationship of the product. The results show that the decoction preparation protocol provides karkade with the highest nutritional value and that the polyphenol content can account for the antioxidant capability of H. sabdariffa-based beverages. Moreover, a quantitative relationship between acid-base and redox chemistry was found. The H. sabdariffa-based drinks can be considered as protective beverages and a regular consumption of karkade might be proposed to ensure protection against free radicals.
Keywords: Anthocyanidins; Antioxidant power; Free radicals; Hibiscus sabdariffa; Karkade; Redox chemistry

Deny Susanti, Hasnah M. Sirat, Farediah Ahmad, Rasadah Mat Ali, Norio Aimi, Mariko Kitajima, Antioxidant and cytotoxic flavonoids from the flowers of Melastoma malabathricum L., Food

Chemistry, Volume 103, Issue 3, 2007, Pages 710-716, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.09.011.
(http://www.sciencedirect.com/science/article/B6T6R-4M7VFR0-2/2/810e7be61492f70a44ddc835abe1b9e0)
Abstract:
Phytochemical and bioactivity studies of the flowers of Melastoma malabathricum L. (Melastomataceae) have been carried out. The ethyl acetate extract yielded three compounds, identified as naringenin, kaempferol and kaempferol-3-O-d-glucoside, and methanol extract gave kaempferol-3-O-(2'',6''-di-O-p-trans-coumaroyl)glucoside and kaempferol-3-O-d-glucoside. The crude extracts and isolated compounds were screened for their antioxidant and cytotoxic activities. The antioxidant assay was carried out by the DPPH radical-scavenging electron spin resonance (ESR) spectroscopic method. The cytotoxicity was measured by the MTT assay against a MCF7 cell line. Naringenin, kaempferol, kaempferol-3-O-d-glucoside, kaempferol-3-O-(2'',6''-di-O-p-trans-coumaroyl) glucoside, ethyl acetate and methanol extracts were found to be active as radical-scavengers with IC50 values of 0.52 mM, 81.5 [mu]M, 1.07 mM, 35.8 [mu]M, 7.21 [mu]g/ml and 6.59 [mu]g/ml, respectively. Naringenin and kaempferol-3-O-(2'',6''-di-O-p-trans-coumaroyl)glucoside were also found to be active in inhibiting cell proliferation of MCF7 with IC50 values of 0.28 [mu]M and 1.3 [mu]M, respectively.
Keywords: Melastoma malabathricum; Melastomataceae; Flavonoids; Antioxidant; Cytotoxic

Yasemen Yanar, Hakan Buyukcapar, Mahmut Yanar, Mustafa Gocer, Effect of carotenoids from red pepper and marigold flower on pigmentation, sensory properties and fatty acid composition of rainbow trout, Food Chemistry, Volume 100, Issue 1, 2007, Pages 326-330, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.09.056.
(http://www.sciencedirect.com/science/article/B6T6R-4HNYMT1-2/2/0f79236b84be99b3eee4dd4b2d7f51ad)
Abstract:
Effects of carotenoid sources on pigmentation, sensory properties and fatty acid composition of rainbow trout (Onchorhynchus mykiss) were investigated. The fish (120.51 +/- 0.75 g) were fed with diets containing 1.8% marigold flower, 5% red pepper, 70 mg kg-1 commercial astaxanthin and compared with a control group for 60 days. Commercial astaxanthin provided the highest carotenoid accumulation in the fish, and this was followed by red pepper and marigold flower ($p < 0.05$). Dietary carotenoid sources did not significantly affect fatty acid composition of the fish fillets. Trout muscle coloured with commercial astaxanthin was more preferred than the others by the sensory panellists.
Keywords: Rainbow trout; Pigmentation; Sensory property; Fatty acid composition; Red pepper; Marigold flower

Abdelnaser A. Elzaawely, Tran D. Xuan, Haruo Koyamaand, Shinkichi Tawata, Antioxidant activity and contents of essential oil and phenolic compounds in flowers and seeds of Alpinia zerumbet (Pers.) B.L. Burtt. & R.M. Sm, Food Chemistry, Volume 104, Issue 4, 2007, Pages 1648-1653, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.03.016.
(http://www.sciencedirect.com/science/article/B6T6R-4N8M8CP-6/2/a47f9e666e22b545f126cae405ec8f1d)
Abstract:
Alpinia zerumbet leaves and rhizomes have been extensively studied for their chemical compositions and biological activities. However, less attention has been given to its flowers and seeds. In our study, essential oil, total phenolics and antioxidant capacities assayed by 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging and [beta]-carotene bleaching methods were evaluated in flowers and seeds of A. zerumbet. In addition, their phenolic composition was determined by GC-MS and HPLC. 1,8-Cineol, camphor, methyl cinnamate and borneol were the

major constituents in flower oils, whereas the main components in seeds oil were [alpha]-cadinol, T-muurolol, [alpha]-terpineol, [delta]-cadinene and terpinene-4-ol. The results showed that the hexane extract of flowers contained a significantly higher quantity of dihydro-5,6-dehydrokawain (DDK) than that of seeds. Total phenolic contents of flower and seed extracts were measured as 56.7 and 13.7 mg gallic acid equivalent per gram extract, respectively. The ethyl acetate extract of flowers and seeds possessed a high antiradical activity and prevented the bleaching of [beta]-carotene. The HPLC analysis indicated that p-hydroxybenzoic acid, ferulic acid and syringic acid were the predominant phenolics in the ethyl acetate extract of flowers, whilst p-hydroxybenzoic acid, syringic acid and vanillin were the major phenolics in seeds.
Keywords: Alpinia zerumbet; Essential oil; Total phenolics; Dihydro-5,6-dehydrokawain; Antioxidant activity; Phenolic acids

Ping Lou, Jungen Kang, Guoyu Zhang, Guusje Bonnema, Zhiyuan Fang, Xiaowu Wang, Transcript profiling of a dominant male sterile mutant (Ms-cd1) in cabbage during flower bud development, Plant Science, Volume 172, Issue 1, January 2007, Pages 111-119, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.07.015.
(http://www.sciencedirect.com/science/article/B6TBH-4KNM927-1/2/e786bc1694e70633ca059899280c8889)
Abstract:
A spontaneous male-sterile mutation affecting anther development has been identified in cabbage line 79-399-3. The male sterility was associated with abnormal callose degeneration and failure of microspore separation during anther development. Three pairs near-isogenic lines (NILs) with or without the dominant male sterility allele (MS-cd1) were profiled by cDNA-AFLP to detect differentially expressed genes during flower bud development. Out of 6500 transcript derived fragments (TDFs) inspected, 27 were differentially expressed between fertile and male sterile plants in all three sets of NILs. All 27 TDFs were sequenced and BLAST searching revealed that 14 out of 27 fragments were highly homologous to genes with known or predicted function in Arabidopsis. Moreover, three of these TDFs were homologous to genes involved in cell wall formation and degradation, including plant invertase/pectin methylesterase inhibitor (PMEI) and polysaccharide lyase. RT-PCR experiments revealed that PMEI was expressed strongly in the anther and filament. Analysis of a set of NILs with different male sterility types showed that PMEI was also not expressed in a Nigra CMS NIL, a recessive male sterile NIL and an Ogura CMS NIL compared to their corresponding fertile NILs. Based on both cytological and transcriptional data we suggest that the dominant MS-cd1 mutant gene may disrupts proper separation of pollens from tetrads, which leads to the suppressed expression of a number of genes including BoPMEI1, a gene likely involved in the degradation of pectin.
Keywords: Brassica oleracea; Dominant genetic male sterility; Near isogenic lines (NILs); Expression profiling; Transcript derived fragment (TDF); Pectin methylesterase inhibitor (PMEI)

Mohamed A. Awad, Water spray as a potential thinning agent for date palm flowers (Phoenix dactylifera L.) c.v. `Lulu', Scientia Horticulturae, Volume 111, Issue 1, 4 December 2006, Pages 44-48, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.09.005.
(http://www.sciencedirect.com/science/article/B6TC3-4M3RPD1-1/2/5edf67821762014e59741ad2eb9f014b)
Abstract:
Flower or fruit thinning is a critical cultural practice in the date palm production chain that affects fruit development, quality and yield and regulates tree yearly bearing. Development of a save and economic thinning agent for date palm is critically required especially under harsh conditions. During 2004 and 2005 seasons, water spray for 3 min was applied at different times following mechanical pollination on `Lulu' date palm cultivar growing under Al-Ain oasis conditions. The results showed that water spray following pollination generally decreased fruit set percentage to

different extent depending of the time of application. In this respect, the most effective treatment was water spray after 4 h following pollination. This treatment significantly decreased fruit set percentage (48%) compared to the control (79%), as the mean of both seasons. However, the other treatments including water spray 1 h before pollination also decreased fruit set percentage but to a lesser extent. Fruit quality characteristics especially fruit and flesh weight, length and diameter were significantly increased by water spray treatments during the 2004 season, in contrast to the 2005 season. Thinning with water significantly decreased both bunch weight and total yield per tree at the Tamr stage especially when applied after 4 h following pollination. To the best of our knowledge, this is a pioneer study investigating the role of water as a potential thinning agent for date palm flowers. The use of water spray as a save and economic thinner needs, however, more research work to justify the time following pollination and duration of application which may vary upon cultivar, method of pollination and district.
Keywords: Thinning; Pollination; Fertilization; Fruit quality; Yield; Phoenix dactylifera L.; Date palm

Seiichi Fukai, Rie Kanechika, Atsushi Hasegawa, Effect of low temperature on breaking dormancy and flowering of Arisaema sikokianum (Araceae), Scientia Horticulturae, Volume 111, Issue 1, 4 December 2006, Pages 97-100, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.08.005.
(http://www.sciencedirect.com/science/article/B6TC3-4M340GC-2/2/e54ef08f9131400229c763b7d0db91f3)
Abstract:
Arisaema sikokianum (Araceae) native to Japan is classified as a vulnerable species in the Red Data Book of Japan. Control of dormancy is essential for efficient corm production and forcing culture. Sprouting of both vegetative and reproductive corms was enhanced by exposure to low temperature. Vegetative corms exposed to low temperatures at 5 [degree sign]C longer sprouted faster when grown at 20 [degree sign]C. Effective temperatures for breaking dormancy was 5 [degree sign]C. Reproductive corms treated at 5 [degree sign]C longer showed shorter days to flower. Successful forcing culture was achieved; corms treated at 5 [degree sign]C from November for 30 days flowered on 5th February.
Keywords: Corm; Forcing

Jolene Scoble, Michael F. Clarke, Nectar availability and flower choice by eastern spinebills foraging on mountain correa, Animal Behaviour, Volume 72, Issue 6, December 2006, Pages 1387-1394, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2006.03.024.
(http://www.sciencedirect.com/science/article/B6W9W-4M4TNVT-2/2/bc0f31976092479a71ebd51d1e1f16d6)
Abstract:
Nectarivorous birds are known to make choices at the landscape, plant species and individual plant levels when selecting foraging sites. However, little attention has been given to the fine-scale foraging choices that nectarivorous honeyeaters (Meliphagidae) make, such as those between individual flowers. We examined the variability in nectar availability between individual flowers of mountain correa, Correa lawrenciana, and used this information to predict the foraging behaviour of the eastern spinebill, Acanthorhynchus tenuirostris, a small (10-15 g) member of the Meliphagidae. Eastern spinebills preferentially foraged upon mountain correa flowers that were at the developmental stage offering the greatest volume of nectar. They did not discriminate between the flowers on the basis of corolla length (size), but this was not unexpected as nectar production was not correlated with flower size. Eastern spinebills were significantly less likely to forage at flowers with visual evidence of having been robbed of nectar by vertebrate and invertebrate competitors. They did not discriminate against flowers containing the flower mite, Hattena floricola, even though the flowers produced significantly less nectar when mites were present. This is the first study to show that a member of the Meliphagidae is capable of discriminating between individual flowers, favouring those most likely to contain most nectar.

, Erratum: Photoperiodic control of flowering: not only by coincidence: Trends in Plant Science (2006) 11, 550-558, Trends in Plant Science, Volume 11, Issue 12, December 2006, Page 567, ISSN 1360-1385, DOI: 10.1016/j.tplants.2006.10.008.
(http://www.sciencedirect.com/science/article/B6TD1-4M94159-6/2/28a61d4329db47fbce374058282a66d9)

D. Gonzalez-Rossia, M. Juan, C. Reig, M. Agusti, The inhibition of flowering by means of gibberellic acid application reduces the cost of hand thinning in Japanese plums (Prunus salicina Lindl.), Scientia Horticulturae, Volume 110, Issue 4, 27 November 2006, Pages 319-323, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.07.022.
(http://www.sciencedirect.com/science/article/B6TC3-4KYXJ25-1/2/26f2afba8a2ff442073ad43be2c0952b)
Abstract:
The application of gibberellic acid during flower bud induction significantly reduced flowering of `Black Diamond' and `Black Gold' Japanese plums. The response depended on the concentration applied and on the type of shoot. Mixed shoots had a similar response in both varieties, flowering being reduced by 40% for GA3 50 mg l-1 and by 75-90% for GA3 75 mg l-1 or higher concentration. With regard to spurs, GA3 50 mg l-1 reduced flowering intensity by 40% and 25% in `Black Gold' and `Black Diamond', respectively, and GA3 75 mg l-1 or higher concentration reduced flowering by 70% and 50%, respectively. This partial inhibition of flowering significantly reduced the cost of manual thinning. The best GA3 concentration was found to be 50 mg l-1, since it reduced the cost of thinning by 45-47% and increased final fruit weight by 7-33% for `Black Diamond' and `Black Gold', respectively. Not significant differences in yield and in mature fruit characteristics of treated trees were found compared to untreated trees.
Keywords: Flower intensity; Fruit size; Fruit quality; Shoot development

Anna Pobudkiewicz, Jadwiga Treder, Effects of flurprimidol and daminozide on growth and flowering of oriental lily `Mona Lisa', Scientia Horticulturae, Volume 110, Issue 4, 27 November 2006, Pages 328-333, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.07.019.
(http://www.sciencedirect.com/science/article/B6TC3-4KWTFMN-1/2/0d1edd5478dbd810d01d9af3e16320e5)
Abstract:
Two separate experiments were conducted to evaluate the effectiveness of growth retardants in controlling height of oriental lily `Mona Lisa'. In first experiment flurprimidol was applied as a single foliar spray (0, 10, 20, 30 and 40 mg l-1) or a soil drench (0, 0.1125, 0.225, 0.3375 and 0.45 mg/pot) at two plant growth stages (7 and 15 cm). In second experiment flurprimidol (0, 10, 20, 30 and 40 mg l-1) and daminozide (0, 2500, 3500 and 4500 mg l-1) were applied once or twice as a foliar spray. Daminozide applied once or twice at concentrations of 2500-4500 mg l-1 was ineffective in `Mona Lisa' growth retardation. Flurprimidol was effective growth retardant in reducing stem extension without adverse side-effects. The maximum reduction in plant height obtained was 45% compared to controls. Flowering time was not affected by lower rates of flurprimidol, but it was slightly delayed when retardant was applied at higher doses. The tepal size, leaf size and pedicel length were smaller than those of the control plants. Intensified leaf colour was observed on flurprimidol treated `Mona Lisa'. The effect of flurprimidol persisted in the year after treatment.
Keywords: Daminozide; Flurprimidol; Growth retardation; Growth retardants; Oriental lilies; Pot lilies

G.S. Li, J. Duan, Z.L. Chen, S.J. Zeng, Y.M. Jiang, D.C. Joyce, KClO3 applications affect Phalaenopsis orchid flowering, Scientia Horticulturae, Volume 110, Issue 4, 27 November 2006, Pages 362-365, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.07.024.
(http://www.sciencedirect.com/science/article/B6TC3-4KSVGB5-2/2/0adef3e6caee86363e2a5f3d1b107671)
Abstract:
Potassium chlorate (KClO3) treatments are known to promote flowering in longan plants. Potential effects of KClO3 on Phalaenopsis orchid flowering were investigated in the present study. However, increasing application concentrations of 2, 4, 8 and 16 mmol/L KClO3 delayed spike emergence by 5, 6, 18 and 26 days, respectively. Moreover, they reduced final spike length by 2.1%, 4.0%, 16.2% and 46.1%, respectively. Nonetheless, application of KClO3 at 4 and 8 mmol/L advanced the time to appearance of the first open flower by 13 and 24 days, respectively. Use of 8 mmol/L KClO3 also increased the number of floral buds by 16%. Treatments with KClO3 tended to reduce flower size. Overall, the data suggest that application of KClO3 at an appropriate concentration (e.g. 8 mmol/L) can increase the number of floral buds and advance the time to Phalaenopsis orchid flowering, but may reduce flower size.
Keywords: Phalaenopsis; Potassium chlorate; Flowering

H.D. Vattala, S.D. Wratten, C.B. Phillips, F.L. Wackers, The influence of flower morphology and nectar quality on the longevity of a parasitoid biological control agent, Biological Control, Volume 39, Issue 2, November 2006, Pages 179-185, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.06.003.
(http://www.sciencedirect.com/science/article/B6WBP-4K544M3-2/2/d64f98001d9a5bb0eab6ec7fca0b229d)
Abstract:
Conservation biological control aims to enhance the efficacy of arthropod biological control agents, such as parasitoids, partly by providing them with access to floral nectar. However, the suitability of a flower species for providing nectar to a parasitoid is dependent on the morphologies of the parasitoid and the flower, as well as on the quality of the nectar. The effects of seven flower species on the longevity of Microctonus hyperodae (Hymenoptera Braconidae), a parasitoid of the Argentine stem weevil, Listronotus bonariensis (Coleoptera: Curculionidae), were measured in the laboratory. The flowers were phacelia (Phacelia tanacetifolia), buckwheat (Fagopyrum esculentum), alyssum (Lobularia maritima), coriander (Coriandrum sativum), white clover (Trifolium repens), red clover (Trifolium pratense) and white mustard (Sinapis alba). The results suggested M. hyperodae was unable to reach nectar of red clover, white clover, alyssum and phacelia, but was able to gain access to the nectar of the other three species. However, only buckwheat and coriander increased its longevity. Flower corolla aperture and depth probably determined the parasitoid's access to nectar. Accessible nectars were analyzed for sugar composition and the effect of the sucrose/(glucose + fructose) ratio on nectar suitability was assessed. The relevance of these results to other hymenopteran parasitoid species is discussed in terms of selecting the most appropriate floral diversity in agricultural extensification programmes.
Keywords: Conservation biological control; Floral nectar; Flower morphology; Listronotus bonariensis; Microctonus hyperodae; Sucrose/(glucose + fructose) ratio

Heike Wanner, Hainan Gu, Detlef Gunther, Silke Hein, Silvia Dorn, Tracing spatial distribution of parasitism in fields with flowering plant strips using stable isotope marking, Biological Control, Volume 39, Issue 2, November 2006, Pages 240-247, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.06.001.
(http://www.sciencedirect.com/science/article/B6WBP-4K544M3-1/2/32b48aa81c1ca1e5296b745b47c9123f)
Abstract:

Flowering plant strips providing nectar food sources at field edges might influence habitat exploitation by parasitoids, and are therefore of great interest for biological control. The present field study examines the host-foraging movement of the parasitoid, Cotesia glomerata (L.) (Hymenoptera: Braconidae), and the resulting distribution pattern of parasitism in Pieris brassicae (L.) (Lepidoptera: Pieridae) larvae in cabbage fields in the presence of floral nectar plants. Parasitoids were released in the center of 35 x 35 m field patches with flowering dill plants, Anethum graveolens L. (Apiaceae), arranged at two diagonally opposing corners, and non-flowering dill plants at the other two corners. The movement of released parasitoids marked with the stable isotope 44Ca was assessed based on parasitized host larvae on trap cabbage plants. This isotope marker is transferred from the parasitoid to host caterpillars through oviposition, and tracking of the marked wasps in the field was feasible in the presence of a native population by analyzing the sedentary host caterpillars. Data from two field trials with two trial areas each consistently showed that the parasitoid females dispersed over the entire cabbage field patches within 3 days and that the caterpillars parasitized by the released wasps were randomly distributed in space. Parasitism rates in sectors with and without flowering dill plants at the edges were not significantly different. In conclusion, C. glomerata females are able to cover the cabbage field patches of 1225 m2 within 3 days, foraging for hosts, while food sources at field edges remain within their reach.
Keywords: Adult feeding; Anethum graveolens; Brassica oleracea; 44Ca; Cotesia glomerata; Habitat management; Mark-release-recapture; Movement; Parasitoid; Pieris brassicae

Wagner de Melo Ferreira, Gilberto Barbante Kerbauy, Jane Elizabeth Kraus, Rosete Pescador, Rogerio Mamoru Suzuki, Thidiazuron influences the endogenous levels of cytokinins and IAA during the flowering of isolated shoots of Dendrobium, Journal of Plant Physiology, Volume 163, Issue 11, 1 November 2006, Pages 1126-1134, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.07.012.
(http://www.sciencedirect.com/science/article/B7GJ7-4HDG93S-5/2/7b248ecc70b7cf66b4e98967e4f06e8d)
Abstract: Summary
This study reports the effects of thidiazuron (TDZ) on the endogenous levels of indoleacetic acid (IAA), zeatin, zeatin riboside ([9R]Z), isopentenyladenine and isopentenyladenosine ([9R]iP) as well as structural changes in the apical meristem of Dendrobium Second Love shoots during flower induction and initial development in vitro. The results revealed that the presence of 1.8 [mu]M TDZ had a profound effect on the endogenous cytokinins (CKs) and IAA levels of the explants, when compared to those grown on a TDZ-free medium. A significant increase in CKs (especially [9R]iP and [9R]Z) and IAA in the first samples (taken at day 5) grown on TDZ-enriched medium was associated with flower induction, while a second increase in the level of these hormones after 25 d of culture was related to flower development. The histological changes detected in the shoot apical meristem of explants grown in the presence of 1.8 [mu]M TDZ during 30 d of culture are also described. Based on these findings, it is suggested that both auxin and CKs seem to be involved with the floral transition of Dendrobium Second Love in vitro. However, a possible direct effect of TDZ on flower formation is not discarded.
Keywords: Auxin; Cytokinins; Dendrobium; Flowering; Orchid

Koji Tanase, Kazuo Ichimura, Expression of ethylene receptors Dl-ERS1-3 and Dl-ERS2, and ethylene response during flower senescence in Delphinium, Journal of Plant Physiology, Volume 163, Issue 11, 1 November 2006, Pages 1159-1166, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.12.003.
(http://www.sciencedirect.com/science/article/B7GJ7-4JCBKDT-1/2/ee06acf08054090ca7f5162440117459)
Abstract: Summary

To clarify the relationships of flower senescence, especially sepal abscission, and ethylene receptor gene expression in different flower parts, we isolated two cDNAs encoding ethylene receptors Dl-ERS1-3 and Dl-ERS2 from Delphinium flowers. Deduced polypeptides possessed no response regulator domain, indicating that they belong to a family of ethylene response sensor (ERS) ethylene receptors. Dl-ERS1-3 and Dl-ERS2 exhibited constitutive levels during flower senescence. Exogenous ethylene increased transcript levels in sepals, which are influenced by ethylene but not in gynoecia and receptacles, which produce ethylene. It was suggested that expression of ethylene receptor genes under ethylene exposure was differentially regulated in each organ of the flower.
Keywords: Delphinium; Ethylene; Ethylene receptor; Flower; Gene expression

Mehbuba Begam, Sushil Kumar, Sribash Roy, James J. Campanella, H.C. Kapoor, Molecular cloning and functional identification of a ribosome inactivating/antiviral protein from leaves of post-flowering stage of Celosia cristata and its expression in E. coli, Phytochemistry, Volume 67, Issue 22, November 2006, Pages 2441-2449, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.08.015.
(http://www.sciencedirect.com/science/article/B6TH7-4KYXHXR-1/2/9f0f13a933b94b644906850f88526c9e)
Abstract:
A full-length cDNA clone, encoding a ribosome inactivating/antiviral protein (RIP/AVP) was isolated from the cDNA library of post-flowering stage of Celosia cristata leaves. The full-length cDNA consisted of 1015 nucleotides, with an open reading frame encoding 283 amino acids. The deduced amino acid sequence had a putative active site domain conserved in other ribosome inactivating/antiviral proteins (RIPs/AVPs). The coding region of the cDNA was amplified by polymerase chain reaction (PCR), cloned and expressed in Escherichia coli as recombinant protein of 72 kDa. The expressed fusion product was confirmed by Western analysis and purification by affinity chromatography. Both the recombinant protein (reCCP-27) and purified expressed protein (eCCP-27) inhibited translation in rabbit reticulocytes showing IC50 values at 95 ng and 45 ng, respectively. The native purified nCCP-27 has IC50 at 25 ng. The purified product also showed N-glycosidase activity towards tobacco ribosomes and antiviral activity towards tobacco mosaic virus (TMV) and sunnhemp rosette virus (SRV).
Keywords: Antiviral; cDNA; Celosia cristata; Expression; Ribosome inactivating

Takato Imaizumi, Steve A. Kay, Photoperiodic control of flowering: not only by coincidence, Trends in Plant Science, Volume 11, Issue 11, November 2006, Pages 550-558, ISSN 1360-1385, DOI: 10.1016/j.tplants.2006.09.004.
(http://www.sciencedirect.com/science/article/B6TD1-4M340JF-1/2/13baf08d2b4d3cb92dfbd2a8f8fdc0ed)
Abstract:
The timing of floral transition has a direct impact on reproductive success. One of the most important environmental factors that affect the transition is the change in day length (photoperiod). Classical experiments imply that plants monitor photoperiods in the leaf, and transmit that information coded within an elusive signal dubbed florigen to the apex to reprogram development. Recent advances in Arabidopsis research indicate that the core of the day-length measurement mechanism lies in the circadian regulation of CONSTANS (CO) expression and the subsequent photoperiodic induction of the expression of FLOWERING LOCUS T (FT) gene, which might encode a major component of florigen. In this review, we introduce current perspectives on how, when and where the floral signal is generated.

Victor O. Sadras, Juan P. Monzon, Modelled wheat phenology captures rising temperature trends: Shortened time to flowering and maturity in Australia and Argentina, Field Crops Research,

Volume 99, Issues 2-3, 30 October 2006, Pages 136-146, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.04.003.
(http://www.sciencedirect.com/science/article/B6T6M-4K18VS5-1/2/ddb1963386044cc5273b451f517fe11c)
Abstract:
Phenological development is the most important attribute of crop adaptation and long-term changes in phenology provide strong evidence of the biological impact of warmer climates. This paper takes the documented increase in temperature during the last decades as a starting point, and quantifies the changes in wheat phenology in (a) 53 locations in eastern Australia between 1957 and 2000 using the APSIM model, and (b) 17 locations in the Pampas between 1971 and 2000, using CERES-Wheat. The expectation is shortened season length associated with warmer climate; the aim is to quantify the actual magnitude of phenological changes, the relative changes in the duration of pre- and post-flowering phases, and the interaction between changing temperature and sowing date.
Modelled time from sowing to maturity was reduced up to ~0.3 d y-1; time to flowering accounted for most of the variation in time to maturity. The rate of change in the duration of modelled wheat phenophases was more marked with early sowing. Owing to the cumulative effect of temperature on crop development assumed in the models, significant changes in rate of development were detected in some cases when change in temperature was statistically undetected. A minimum rate of mean temperature increase ~0.02 [degree sign]C y-1 was required for significant shortening of time to flowering and season length. In agreement with rates derived from field experiments, the rate of change in modelled time to flowering and maturity was [approximate]7 d [degree sign]C-1. The duration of the post-flowering phase was largely unchanged. This was associated with lack of change in temperature, or where temperature increased, earlier flowering that shifted post-flowering development to relatively cooler conditions, thus neutralising the trend of increasing temperature.
Keywords: Anthesis; Post-anthesis; Thermal time; Frost; Photoperiod; Breeding; Modelling; Wheat; Phenology

Lemma Ebssa, Christian Borgemeister, Hans-Michael Poehling, Simultaneous application of entomopathogenic nematodes and predatory mites to control western flower thrips Frankliniella occidentalis, Biological Control, Volume 39, Issue 1, October 2006, Pages 66-74, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.02.005.
(http://www.sciencedirect.com/science/article/B6WBP-4JKRTPV-2/2/1ca85a6b017357e26c3e047fe2b84074)
Abstract:
Effects of entomopathogenic nematodes alone (Heterorhabditis bacteriophora Poinar or H. indica Poinar, Karunakar, and David), a predatory mite species alone [Amblyseius cucumeris (Oudemans) (Acarina: Phytoseiidae)], or the combination of nematodes and mites for the control of the western flower thrips Frankliniella occidentalis (Pergande) (Thysanoptera: Thripidae) was investigated in a climate controlled growth chamber and greenhouse. Different densities and concentrations of mites and nematodes, respectively, were tested at different densities of thrips infesting beans (Phaseolus vulgaris L.). In the growth chamber experiment, the presence of mites on the plants resulted in a large number of second-instar larvae of thrips to fall off the plants and to pupate in the soil, thereby increasing the number of available host larvae for the nematodes to attack. Applications of mites or nematodes alone, or combined applications of both natural enemies always resulted in greater thrips reduction than control treatment. Introduction of 10 adult mites per plant and applications of 200 infective juveniles (IJs) cm-2 of nematodes resulted in up to 83% thrips control, which was significantly higher than individual applications of each natural enemy. Due to high summer temperatures and low relative humidity, weekly applications of nematodes at 50 IJs cm-2 failed to control thrips in the greenhouse experiment. Yet, weekly

applications of nematodes alone at 200 IJs cm-2, mites alone at three adults per plant, or the combined application of the natural enemies at these rates significantly reduced thrips populations. Thus, this study clearly shows a great potential of combined applications of the mites and the nematodes to control foliage-feeding and soil-dwelling life stages of thrips.
Keywords: Predatory mite; Western flower thrips; Entomopathogenic nematode; Greenhouse; Frankliniella occidentalis; Heterorhabditis bacteriophora; Heterorhabditis indica; Amblyseius cucumeris

Anita Sonsteby, Ola M. Heide, Dormancy relations and flowering of the strawberry cultivars Korona and Elsanta as influenced by photoperiod and temperature, Scientia Horticulturae, Volume 110, Issue 1, 11 September 2006, Pages 57-67, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.06.012.
(http://www.sciencedirect.com/science/article/B6TC3-4KGX8FS-1/2/f6530bf9714ee80d376605c281c01262)
Abstract:
Dormancy and flowering responses of the strawberry cultivars Korona and Elsanta have been studied in controlled environments. After short day (SD) floral induction for 5 weeks at temperatures ranging from 9 to 27 [degree sign]C, long photoperiods only were required for optimal leaf and inflorescence growth and development at 18 [degree sign]C, with no additional effect of chilling. However, with extended SD treatment for 10 or 15 weeks at 15 [degree sign]C the plants entered the usual semi-dormant state typical for strawberry plants in late autumn, and subsequent long day (LD) conditions could not fully reverse the restrained growth habit. Extended SD treatment at 6 [degree sign]C did not bring about this dormant state, indicating that the dormancy-inducing effect of SD is continuously nullified by such low temperature. When SD induced plants were forced under continued SD conditions, leaf and inflorescence growth were strongly restrained even in plants that had been chilled for up to 6 weeks. The restrained plant growth habit attained in SD, proved not to be a reliable indicator of the dormant state of the plants as it occurred also at low temperature. Floral induction in `Korona' and `Elsanta' was shown to have an obligatory SD requirement at temperatures ranging from 9 to 21 [degree sign]C, while SD floral induction was marginal at 27 [degree sign]C. The floral inducing effect of SD was also strongly reduced at temperatures below 9 [degree sign]C. Application of these findings for multiple cropping of inherently single-cropping strawberry cultivars in winter season greenhouse production systems is discussed.
Keywords: Dormancy; Flowering; Fragaria; Photoperiod; Strawberry; Temperature

Danijela Dukovski, Robert Bernatzky, Susan Han, Flowering induction of Guzmania by ethylene, Scientia Horticulturae, Volume 110, Issue 1, 11 September 2006, Pages 104-108, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.05.004.
(http://www.sciencedirect.com/science/article/B6TC3-4KKNJ72-1/2/8354b1e16322b580dc4511dcb4ea843f)
Abstract:
Ethylene exposure time required to induce flowering of Guzmania lingulata Mez. `Anita' was investigated by exposing plants to ethylene at 100 [mu]l l-1 for 4, 6, 8, 10, 12, 16, or 24 h. Plants were also exposed to ethylene-free air for the same lengths of time. Plants exposed to ethylene for 4 h did not flower, but exposure for 6 h or longer resulted in 100% flowering. Suppression of endogenous ethylene synthesis by aminoethoxyvinylglycine (AVG) resulted in a longer exposure time of 20 h being required to obtain 100% flowering. This result suggests that endogenous ethylene production contributes substantially to floral induction. Ethylene treatment on a single young leaf induced flowering as well. Application of a protein synthesis inhibitor, cycloheximide, prevented flowering induced by ethylene, indicating that activation of ethylene responsive genes is followed by synthesis of new proteins involved in flowering.

Keywords: Bromeliad; Guzmania lingulata Mez. `Anita'; Aminoethoxyvinylglycine; Cycloheximide

Kazuhiko Masaka, Takenori Takada, Corrigendum to 'Floral sex ratio strategy in wind-pollinated monoecious species subject to wind-pollination efficiency and competitive sharing among male flowers as a game': [J. Theor. Biol. 240 (2006) 114-125], Journal of Theoretical Biology, Volume 242, Issue 1, 7 September 2006, Page 264, ISSN 0022-5193, DOI: 10.1016/j.jtbi.2006.05.019.
(http://www.sciencedirect.com/science/article/B6WMD-4K3KCH4-1/2/b40dd990b685dd94c60ffcdb085d6c32)

Y.L. Dupont, B. Overgaard Nielsen, Species composition, feeding specificity and larval trophic level of flower-visiting insects in fragmented versus continuous heathlands in Denmark, Biological Conservation, Volume 131, Issue 4, September 2006, Pages 475-485, ISSN 0006-3207, DOI: 10.1016/j.biocon.2005.12.020.
(http://www.sciencedirect.com/science/article/B6V5X-4K4PST6-2/2/cd7b18d7e0e644ca90da86891d4a0ea0)
Abstract:
Heathlands of Northwest Europe, which once covered extensive areas, are now reduced to small and large fragments in an agricultural landscape. In this study, we investigate the effect of fragmentation on the flower-visiting insect fauna in relation to species composition, level of specialization/generalization at the adult and larval stages, and larval trophic level. Two study sites were used: a large continuous tract of heathland, and a fragmented mosaic area. The assemblages of entomophilous plants at the two sites were similar. However, of a total of 256 species of flower-visiting insects observed, only 108 were shared between the two sites. The fragmented heath supported a taxonomically and ecologically more diverse assemblage of flower-visitors, compared to the extensive heath. At both sites, the majority of adult flower-visiting insect species were generalists, consuming floral resources from a variety of flowers. Larval types encompassed both specialists and generalists, represented by a spectrum of trophic groups, feeding classes and substrates. Species presence was dependent on the availability of larval resources and habitats rather than the requirements of imagines. No difference in level of specialization of adults or larvae was found between sites. Fragmentation affected trophic-level structure among larval specialists, significantly more high trophic-level species being found at the continuous heath tract, compared to the fragmented area. In contrast, no effect was observed among larval generalists, supporting the trophic-level hypothesis of island biogeography. Thus, although species richness is not negatively affected, composition and trophic structure is markedly changed by fragmentation of heathlands.
Keywords: Edge effects; Fragmentation; Pollination; Specialization/generalization; Trophic-level hypothesis of island biogeography

Mingchen Wang, Rong Tsao, Shanfeng Zhang, Ziming Dong, Raymond Yang, Jianhua Gong, Yingxin Pei, Antioxidant activity, mutagenicity/anti-mutagenicity, and clastogenicity/anti-clastogenicity of lutein from marigold flowers, Food and Chemical Toxicology, Volume 44, Issue 9, September 2006, Pages 1522-1529, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.04.005.
(http://www.sciencedirect.com/science/article/B6T6P-4JT8DM5-4/2/c1b10ad98bcaf7dd8816afef0ed22edc)
Abstract:
High dietary intake of lutein has been associated with risk reduction of many chronic diseases, including age-related macular degeneration (AMD), cancer, and cardiovascular diseases. Lutein in food is generally regarded as safe. However, information on the toxicological and beneficial effect of lutein at higher doses is limited. In this study, large amount of lutein was extracted and purified from marigold flower (Tagetes erecta L.). The antioxidant activity of lutein was examined by using the photochemiluminescence (PCL) assay and the [beta]-carotene-linoleic acid model system

([beta]-CLAMS). Lutein showed a greater antioxidant activity than the other two common carotenoids, [beta]-carotene and lycopene. The mutagenicity and anti-mutagenicity of lutein at 334, 668 and 1335 [mu]g/plate were examined using the standard Ames test in the presence and absence of S9 mix. Lutein was not only found to be non-mutagenic at all doses, but it showed an anti-mutagenic effect in a dose-dependent manner. Similar results were found in a chromosome aberration test using Chinese hamster ovary cells for the evaluation of clastogenicity and anti-clastogenicity of lutein at 66.8, 133.5 and 267.0 mg/L. Our findings provided scientific evidence for the safe use and health beneficial effects of lutein.
Keywords: Carotenoids; Lutein; Ames test; Chromosome aberration test; Mutagenicity; Anti-mutagenicity; Clastogenicity; Anti-clastogenicity

Lei Xu, Ashwani Kumar, Karen Lamb, Linda Layton, Recovery of isoflavones from red clover flowers by a membrane-based process, Innovative Food Science & Emerging Technologies, Volume 7, Issue 3, September 2006, Pages 251-256, ISSN 1466-8564, DOI: 10.1016/j.ifset.2005.12.001.
(http://www.sciencedirect.com/science/article/B6W6D-4J9N0WH-1/2/5f159df95a1ab3254dcb200857b9a5dc)
Abstract:
Isoflavones in red clover flowers were extracted and recovered using a new process that mainly comprised of ethanol extraction, membrane processing, micelle formation and drying. To obtain maximum isoflavone extraction an ethanol concentration between 40% and 50% in water was found to be optimal. The extracted isoflavones were processed by ultrafiltration for preliminary purification, and then concentrated by reverse osmosis. As ethanol was removed by evaporation, micelles were formed in the reverse osmosis retentate, which was dried to yield an isoflavone-enriched product. This product contained about 9% isoflavone highlighting its potential use as a direct nutraceutical supplement.Industrial relevance
Isoflavones present in agricultural biomass are utilized as source of functional food supplements. Extraction and refining of isoflavones involves several steps and the process is very energy intensive. This work reports an interesting approach for extraction and refining of isoflavones by developing a new process, which is energy efficient and gives a final product, which contains sufficiently high amounts of isoflavones for consumer applications.
Keywords: Isoflavones; Red clover flower; Extraction; Membrane and process

Peiling Lu, Qiang Yu, Jiandong Liu, Xuhui Lee, Advance of tree-flowering dates in response to urban climate change, Agricultural and Forest Meteorology, Volume 138, Issues 1-4, 29 August 2006, Pages 120-131, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2006.04.002.
(http://www.sciencedirect.com/science/article/B6V8W-4K0FFN3-2/2/7bf217471911821276bae62167a89acb)
Abstract:
An increase in temperature due to greenhouse effects is manifest in the changes in diurnal, annual and inter-annual patterns, which may alter phenological events in plants. Flowering dates of four tree species, Prunus davidina, Prunus armeniaca, Robinia pseudoacacia and Syringa oblata, were significantly advanced in response to temperature increase over the years 1950-2004 in Beijing, China, due to the impact of urban climate warming. Because both climate warming and the urban heat island effect in winter and early-spring were more rapid than in late-spring and early summer, the dates in early flowering species advanced more quickly than in late flowering species. The early flowering species, P. davidina, advanced by 2.9 days/decade, while the other species advanced by 1.5-2.0 days/decade during 1950-2004. Therefore, the intervals between flowering dates of different species were expanded. P. davidina, flowering in early-spring, was much more sensitive to minimum and average temperatures (2.88-2.96 days/[degree sign]C), but less sensitive to maximum temperature (2.46 days/[degree sign]C). R. pseudoacacia, flowering late in

the warmer season, was more sensitive to average and maximum temperatures (2.45-2.89 days/[degree sign]C), but less sensitive to minimum temperature (1.91 days/[degree sign]C). Statistical analysis showed that, in Beijing, plant flowering is most sensitive to average temperature over 30 days before average blossom date. On the basis of the temperature response curve, the goodness of fitting demonstrates that spring flowering dates can be predicted from the period when temperature is over 0 [degree sign]C.
Keywords: Tree phenology; Flowering date; Climate warming; Temperature; Urban heat island; Beijing

Christian Westerkamp, Arlete Aparecida Soares, Laercio P. do Amaral Neto, Male and female booths with separate entrances in the tiny flowers of Guazuma ulmifolia (Malvaceae-Byttnerioideae). I. Structural integration, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 201, Issue 5, 11 August 2006, Pages 389-395, ISSN 0367-2530, DOI: 10.1016/j.flora.2005.07.015.
(http://www.sciencedirect.com/science/article/B7GX0-4K0FFS8-2/2/002494281f5b24cfc0c391ea8a73589b)
Abstract:
In spite of their tiny dimensions (3x5 mm2), the strongly honey-scented flowers of Guazuma ulmifolia (Malvaceae-Byttnerioideae) provide six sexual chambers. A central female unit is surrounded by five interconnected male compartments. At the onset of anthesis the strap-shaped odoriferous petal appendages form an open star with the female chamber in the centre. Hereafter, they wilt, intermingle and finally lock access to the stigma. Meanwhile, wilting sepals liberate new entrances from the back between the petal claws. They give way to nectar-offering male chambers. In each of them a well-lit (but closed) window lures the visitor into a standard position for passive pollen uptake. Finally, the insects have to back out of one of the rear entrances. It remains unknown how the minute visitors (maximum height ca. 0.5 mm) - if ever - overcome the distance to another Guazuma tree.
Keywords: Herkogamy; Dichogamy; Myiophily; Deceptive phase; Nectar flower; Revolver flower

Heidrun Hochwallner, Anton Weber, Flower development and anatomy of Clusia valerioi, a Central American species of Clusiaceae offering floral resin, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 201, Issue 5, 11 August 2006, Pages 407-418, ISSN 0367-2530, DOI: 10.1016/j.flora.2005.07.017.
(http://www.sciencedirect.com/science/article/B7GX0-4JTR8XR-2/2/2b9fc81f1b713822bd9c668a5cb9c58b)
Abstract:
The present paper is part of a study dealing with various aspects of reproduction of two Costa Rican Clusia species offering resin as a floral reward. It provides data on the floral development and flower (especially stamen and staminode) anatomy of one of the species, Clusia valerioi. In the early stages, both male and female flowers develop in the same manner. The bracts are distinguished by a decussate arrangement from the five sepals and five petals, which emerge in a spiral manner. In the male flowers the apical meristem forms five meristematic mounds (common stamen primordia) that are pentagonally arranged around the apical meristem in epipetalous position. From these mounds, the primordia of the proper stamina emerge in 3-5 whorls. Direction is centrifugal. In the centre, five hemispherical bulges arise which develop into carpel primordia. These, however, cease growth, stay rudimentary and are hidden by the stamens in the mature male flower. The adult stamens consist mainly of a thick angular filament column, while the two anthers situated at the flattened top are very small. One anther is annular and surrounds a second, hemispherical one right in the centre. At the periphery, these two pollen sacs (provided with a distinct wall of customary anatomy) are surrounded by a ring-like protuberance of the filament. The resin canals are situated at the periphery of the filament. Their schizogenous development is

documented in cross sections. At anthesis, the resin is released from the ring-like filament protuberance by burst of the single-layered epidermis. In the female flower, the five meristematic mounds produce two whorls of staminode primordia. The development of the staminodes does not essentially differ from that of the fertile stamens, but some staminodes lack the central pollen sac and the other tissues do not develop into pollen grains. An attempt is made to derive the peculiar stamen morphology of Clusia valerioi and similar species from conventional stamens. Three hypotheses are proposed and discussed.
Keywords: Clusia; Clusiaceae; Flower development; Flower anatomy; Resin flowers; Stamen evolution

Lars Chittka and, Nigel E Raine, Recognition of flowers by pollinators, Current Opinion in Plant Biology, Volume 9, Issue 4, Biotic interactions / edited by Anne Osbourn and Sheng Yang He, August 2006, Pages 428-435, ISSN 1369-5266, DOI: 10.1016/j.pbi.2006.05.002.
(http://www.sciencedirect.com/science/article/B6VS4-4K0FJY9-4/2/68cebbfc3bdc92cf6c2cf2417d6fdf61)
Abstract:
The flowers of angiosperm plants present us with a staggering diversity of signal designs, but how did this diversity evolve? Answering this question requires us to understand how pollinators analyze these signals with their visual and olfactory sense organs, and how the sensory systems work together with post-receptor neural wiring to produce a coherent percept of the world around them. Recent research on the dynamics with which bees store, manage and retrieve memories all have fundamental implications for how pollinators choose between flowers, and in turn for floral evolution. New findings regarding how attention, peak-shift phenomena, and speed-accuracy tradeoffs affect pollinator choice between flower species show that analyzing the evolutionary ecology of signal-receiver relationships can substantially benefit from knowledge about the neural mechanisms of visual and olfactory information processing.

Peng Liu, Y.S. Yang, Gendi Xu, Chaoyun Hao, Physiological response of rare and endangered seven-son-flower (Heptacodium miconioides) to light stress under habitat fragmentation, Environmental and Experimental Botany, Volume 57, Issues 1-2, August 2006, Pages 32-40, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2005.04.003.
(http://www.sciencedirect.com/science/article/B6T66-4GFNG4N-1/2/dfb2af4e5a3a8811f2dd79c3870bfb33)
Abstract:
Seven-son flower (Heptacodium miconioide) is a prized, useful and well-accepted landscape plant in North America and some European countries but only grows in East China. Unfortunately, the distribution region, population size and individual numbers of seven-son flower rapidly decrease in the wild. It is a particular rare, highly severe endangered and protective plant. Here we investigated the physiological responses of seven-son flower at eight different sites under fragmental habitats in the Beishan mountains (Zhejiang, China), one of two only areas where the communities of seven-son flower currently are discovered. This was to determine the effect of light stress under fragmental habitat on the physiology and to explore the endangering mechanism of seven-son flower. The study shows that strong light brought by habitat fragmentation obviously inhibited the photosynthesis rates reduced antioxidant enzymes (superoxide dismutase (SOD), catalase (CAT), peroxidase (POD) and ascorbate peroxidase (APX)) activities and promoted electrical conductivity and MDA content of seven-son flower leaves. The characteristics of leaves were also affected by light intensity in fragmental habitat. Intense light in fragmental habitat is disadvantageous to photosynthesis and antioxidant enzymes of the flower. Our results suggest that biodiversity conservation of seven-son flower is timely needed and the light intensity should be considered carefully when biodiversity conservation of seven-son flower to be carried out, especially in the transplant conservation of seven-son flower from deteriorative area in the wild.

Keywords: Seven-son flower (Heptacodium miconioides); Photosynthesis rate; Antioxidant enzymes; Intensity light; Fragmental habitat; Ecological and physiological adaptation

Mi-Ran Kim, Jeong Yong Lee, Hyang-Hee Lee, Dipendra Kuma Aryal, Yoon Gyoon Kim, Sang Kyum Kim, Eun-Rhan Woo, Keon Wook Kang, Antioxidative effects of quercetin-glycosides isolated from the flower buds of Tussilago farfara L., Food and Chemical Toxicology, Volume 44, Issue 8, August 2006, Pages 1299-1307, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.02.007.
(http://www.sciencedirect.com/science/article/B6T6P-4JDN6HW-3/2/20ff90af953e54501b7c9923f954c28c)
Abstract:
A bioassay-guided fractionation of the ethylacetate soluble fraction from the flower buds of Tussilago farfara L. (Compositae) yielded two flavonoids, quercetin 3-O-[beta]-l-arabinopyranoside and quercetin 3-O-[beta]-d-glucopyranoside. These two sugar conjugates of quercetin exhibited higher antioxidative activity than their aglycone, quercetin by NBT superoxide scavenging assay. Moreover, treatment with quercetin 3-O-[beta]-l-arabinopyranoside significantly increased the total glutathione (GSH) contents and the protein level of [gamma]-glutamylcysteine ligase ([gamma]-GCL), a key enzyme required for glutathione (GSH) synthesis in a rat hepatocyte cell line. Subcellular fractionation and reporter gene analysis using antioxidant response element (ARE) construct revealed that quercetin 3-O-[beta]-l-arabinopyranoside increased the level of nuclear Nrf2 and reporter activity, and that these were associated with the induction of the [gamma]-GCL gene. After 24 h incubation of cells with quercetin 3-O-[beta]-l-arabinopyranoside, 23% of the glycoside was converted to its aglycone, quercetin, but [gamma]-GCL was not induced by 7 [mu]M (23%) quercetin. These results suggest that the two quercetin-glycosides isolated from T. farfara L. have direct antioxidative properties, and that quercetin 3-O-[beta]-l-arabinopyranoside increases the cellular GSH level by inducing the [gamma]-GCL gene. These novel effects of quercetin-glycosides are suggestive to underlie the potential putative chemopreventive effects of T. farfara L.
Keywords: Antioxidant; [gamma]-glutamylcysteine ligase; Glutathione; Glutathione S-transferase; Quercetin 3-O-[beta]-l-arabinopyranoside; Tussilago farfara L.

Fabrice Roux, Pascal Touzet, Joel Cuguen, Valerie Le Corre, How to be early flowering: an evolutionary perspective, Trends in Plant Science, Volume 11, Issue 8, August 2006, Pages 375-381, ISSN 1360-1385, DOI: 10.1016/j.tplants.2006.06.006.
(http://www.sciencedirect.com/science/article/B6TD1-4KD5C4H-3/2/0e481f6f0d2c8ad637e73d8d201ad4da)
Abstract:
In wild and cultivated annual plant species, flowering time is an important life-history trait that coordinates the life cycle with local environmental conditions. Extensive studies on the genetic basis of flowering time in the model species Arabidopsis thaliana have revealed a complex genetic network that can detect environmental and internal signals. Based on this knowledge and on known pleiotropic effects associated with flowering time genes, we suggest that a natural shift towards an early-flowering life cycle might involve only particular functional regions in a limited number of genes. Our predictions are supported by genetic theories of adaptation and by recent data about genes associated with natural variation. We analyse the extent to which these predictions can also apply to crop species.

Takaaki Nishijima, Koji Shima, Change in flower morphology of Torenia fournieri Lind. induced by forchlorfenuron application, Scientia Horticulturae, Volume 109, Issue 3, 21 July 2006, Pages 254-261, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.05.005.
(http://www.sciencedirect.com/science/article/B6TC3-4K4WN2B-1/2/d3b49b99822dccaf49362cf02b5928ed)
Abstract:

We induced various flower morphologies in torenia (Torenia fournieri Lind.) by the application of forchlorfenuron (CPPU). Those morphologies were the combination of four basic morphological changes, the development of serrate petals, incised petals, a paracorolla, and an increased number of floral organs. These morphological changes occurred systematically depending on the floral stage at the time of CPPU application. Serrate petals were induced when CPPU was applied during the stages of corolla development, whereas application at younger stages induced petal incision. The serrate petal margin resulted from preferential proliferation of cells around the vascular bundles, whereas petal incision likely resulted from the lateral outgrowths of petal. A paracorolla was induced at the adaxial petal face when CPPU was applied between the sepal development stage and early corolla development. The paracorolla appears to have arisen from the lateral outgrowths of the stamen. The numbers of stamens, petals, and sepals increased when CPPU was applied at and before the differentiation of sex organs and the corolla. Enlargement of the floral meristem probably caused this increase. Application of N6-benzylaminopurine and zeatin did not induce these morphological changes.
Keywords: Anatomy; CPPU; Cytokinins; Flower morphology; Forchlorfenuron; Torenia (Torenia fournieri Lind.)

Robert Byamukama, Monica Jordheim, Bernard Kiremire, Jane Namukobe, Oyvind M. Andersen, Anthocyanins from flowers of Hippeastrum cultivars, Scientia Horticulturae, Volume 109, Issue 3, 21 July 2006, Pages 262-266, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.05.007.
(http://www.sciencedirect.com/science/article/B6TC3-4K5HWRV-2/2/6f90d9974de3bac9df493f578bd58460)
Abstract:
The anthocyanins, cyanidin 3-O-(6''-O-[alpha]-rhamnopyranosyl-[beta]-glucopyranoside) (1) and pelargonidin 3-O-(6''-O-[alpha]-rhamnopyranosyl-[beta]-glucopyranoside) (2), were isolated from the ornamental flowers of a Ugandan Hippeastrum cultivar by a combination of chromatographic techniques, and their structures were elucidated mainly by the use of homo- and heteronuclear nuclear magnetic resonance spectroscopy and electrospray mass spectrometry. The same anthocyanins were found in six different Hippeastrum cultivars purchased in Norway. However, the absolute amount of the anthocyanins (0.08-1.79 mg/g, fresh weight) and the relative proportions of the individual anthocyanins varied from cultivar to cultivar (13.2-96.5% of 1). The colours of the fresh petals of the three cultivars `Red Lion', `Royal Velvet' and `Liberty' were described by the CIELab coordinates L* (lightness), C* (chroma) and hab (hue angles). All the cultivars showed hue angles corresponding to scarlet nuances (hab = 22-35[degree sign]), with the highest value in `Red Lion'. The most reddish petals (in `Royal Velvet') contained the highest relative proportion of 1. Thus, the in vivo colours of these cultivars seem to be correlated with the relative proportions of individual anthocyanin in the petals.
Keywords: Hippeastrum cultivars; Ornamental flowers; Anthocyanins; Cyanidin 3-O-(6''-O-[alpha]-rhamnopyranosyl-[beta]-glucopyranoside); Pelargonidin 3-O-(6''-O-[alpha]-rhamnopyranosyl-[beta]-glucopyranoside)

Mary E. Carrington, J. Jeffrey Mullahey, Effects of burning season and frequency on saw palmetto (Serenoa repens) flowering and fruiting, Forest Ecology and Management, Volume 230, Issues 1-3, 15 July 2006, Pages 69-78, ISSN 0378-1127, DOI: 10.1016/j.foreco.2006.04.020.
(http://www.sciencedirect.com/science/article/B6T6X-4K5JBPY-1/2/347ad62b59fe3d36dfecc139d57475e4)
Abstract:
Medicinal use of saw palmetto (Serenoa repens) fruits in treating benign prostatic hypertrophy has driven a recent sharp increase in fruit harvesting. At the same time, saw palmetto often is considered a keystone species, serving as habitat or a food source for several hundred mammal, bird, reptile, amphibian and insect species. Due to harvesting pressure on this ecologically

important, non-cultivated species, land management practices that produce environmentally sustainable harvests are needed. As part of research focusing on use of controlled burning as a management tool, we investigated effects of burning season and frequency on saw palmetto flowering and fruiting in 32 pine flatwoods sites in central and southwest Florida from 1997 to 1999. The study was conducted as two repeated measures experiments, each involving 16 sites. Each experiment included two among-subjects factors - burning season and past burning frequency - and one within-subjects factor - year - with four replications of each treatment combination. For both experiments, growing season (i.e., April-July) burns had high flowering levels the first year after burning (mean proportion of saw palmettos flowering = 0.49, n = 16 sites), but decreased the second year after burning (mean proportion flowering = 0.15, n = 16 sites), while winter (i.e., November-February) burns had intermediate levels of flowering during both the first and second years after burning (mean proportions flowering = 0.21 and 0.28 for first and second years after burning, n = 16 sites). Although most flowering occurred during April and May, flowering occurred 2-5 months after winter burns, but did not occur until 9-12 months after growing season burns. During the 1997-1998 experiment, fruit infection by the fungus Colletotrichum gloeosporioides caused a fruiting failure in all sites. During the 1998-1999 experiment, fruit yields were higher in growing season burns only in infrequently burned (i.e., burned less often than every 5 years) sites, and only in 1998 (mean fruit yields = 325 kg/ha and 0.25 kg/ha for growing season, infrequently burned sites and winter, infrequently burned sites; n = 4 sites in each group). Frequently burned (i.e., burned every 2-3 years) sites generally had low fruit yields (mean fruit yields = 163 kg/ha and 242 kg/ha for frequently burned sites in 1998 and 1999; n = 8 sites). Although controlled burning can be an effective management tool in producing economically sustainable saw palmetto fruit harvests, land managers also must consider ecological needs of other plant and animal species when planning environmentally sustainable burning regimes.
Keywords: Serenoa repens; Fire ecology; Flatwoods

Andreas Muller, Stefan Diener, Simone Schnyder, Katharina Stutz, Claudio Sedivy, Silvia Dorn, Quantitative pollen requirements of solitary bees: Implications for bee conservation and the evolution of bee-flower relationships, Biological Conservation, Volume 130, Issue 4, July 2006, Pages 604-615, ISSN 0006-3207, DOI: 10.1016/j.biocon.2006.01.023.
(http://www.sciencedirect.com/science/article/B6V5X-4JFHF93-3/2/02cf62ce991a6da5443d48813a6dc53c)
Abstract:
Knowledge about the quantitative pollen requirements of solitary bees is crucial for the preservation of endangered bee species and the understanding of the evolution of bee-flower relationships. We estimate the number of flowers required to rear a single larva for 41 European bee species (i) by comparing the pollen content of brood cells with the pollen quantity contained in the flowers of the bees' host plants and (ii) by deducing the pollen requirements from a regression model describing the relationship between the average bee dry body mass and the average brood cell pollen content. The flower requirements of the bee species examined vary by three orders of magnitude. Depending on both bee species and host plant, from seven to 1100 flowers or from 0.9 to 4.5 flower heads are needed to rear a single larva. As only about 40% of the pollen contained in a flower was found to be available to a single female bee, these minimal figures have to be multiplied by a factor of approximately 2.5 to obtain a realistic estimate of bee flower requirements. The amount of pollen lost from flowers for bee nutrition is surprisingly high. We hypothesize that the recent decline of many bee species may have its main cause in a food shortage provoked by a decrease in flower diversity and quantity following habitat destruction and modern agricultural practices. The substantial pollen losses to bees as documented in this study support earlier findings on floral adaptations against excessive pollen harvesting by bees.
Keywords: Apoidea; Bee reproduction; Pollen; Pollen harvesting; Pollination; Megachile parietina

Gurpreet Kaur, Zoobi Jabbar, Mohammad Athar, M. Sarwar Alam, Punica granatum (pomegranate) flower extract possesses potent antioxidant activity and abrogates Fe-NTA induced hepatotoxicity in mice, Food and Chemical Toxicology, Volume 44, Issue 7, July 2006, Pages 984-993, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.12.001.
(http://www.sciencedirect.com/science/article/B6T6P-4J2TVVX-3/2/4e1570b7bd9f953e818d2ba5139d2cea)
Abstract:
Most pomegranate (Punica granatum Linn., Punicaceae) fruit parts are known to possess enormous antioxidant activity. The present study evaluated antioxidant and hepatoprotective activity of pomegranate flowers. Alcoholic (ethanolic) extract of flowers was prepared and used in the present study. The extract was found to contain a large amount of polyphenols and exhibit enormous reducing ability, both indicative of potent antioxidant ability. The extract showed 81.6% antioxidant activity in DPPH model system. The ability of extract to scavenge reactive oxygen species (ROS) and reactive nitrogen species (RNS) was tested and it was found to significantly scavenge superoxide (by up to 53.3%), hydrogen peroxide (H2O2) (by up to 30%), hydroxyl radicals (OH) (by up to 37%) and nitric oxide (NO) (by up to 74.5%). The extract also inhibited OH induced oxidation of lipids and proteins in vitro. These results indicated pomegranate flower extract to exert a significant antioxidant activity in vitro. The efficacy of extract was tested in vivo and it was found to exhibit a potent protective activity in acute oxidative tissue injury animal model: ferric nitrilotriacetate (Fe-NTA) induced hepatotoxicity in mice. Intraperitoneal administration of 9 mg/kg body wt. Fe-NTA to mice induced oxidative stress and liver injury. Pretreatment with pomegranate flower extract at a dose regimen of 50-150 mg/kg body wt. for a week significantly and dose dependently protected against Fe-NTA induced oxidative stress as well as hepatic injury. The extract afforded up to 60% protection against hepatic lipid peroxidation and preserved glutathione (GSH) levels and activities of antioxidant enzymes viz., catalase (CAT), glutathione peroxidase (GPX) glutathione reductase (GR) and glutathione-S-transferase (GST) by up to 36%, 28.5%, 28.7%, 40.2% and 42.5% respectively. A protection against Fe-NTA induced liver injury was apparent as inhibition in the modulation of liver markers viz., aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), bilirubin and albumin in serum. The histopathological changes produced by Fe-NTA, such as ballooning degeneration, fatty changes, necrosis were also alleviated by the extract. These results indicate pomegranate flowers to possess potent antioxidant and hepatoprotective property, the former being probably responsible for the latter.
Keywords: Punica granatum; Pomegranate; Antioxidant; Hepatoprotective; Fe-NTA

A.D. Attolico, M.C. De Tullio, Increased ascorbate content delays flowering in long-day grown Arabidopsis thaliana (L.) Heynh, Plant Physiology and Biochemistry, Volume 44, Issues 7-9, July-September 2006, Pages 462-466, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2006.08.002.
(http://www.sciencedirect.com/science/article/B6VRD-4KPP2CT-2/2/d0f9af3ffdf6b1bc810da63fc919f715)
Abstract:
Flowering requires the integration of different inductive stimuli, including light, temperature and hormones. In an attempt to assess whether ascorbate (ASC) could contribute to the control of flowering time, we analyzed the effects of increased ASC content on the transition to the reproductive stage in the facultative long-day plant Arabidopsis thaliana. ASC content was increased by spraying leaves with the ASC precursor l-galactono-[gamma]-lactone. Our data show that increased ASC content did not affect vegetative growth, whereas a significant delay (5 days in average) in flower production occurred in ASC-overproducing plants. Higher ASC availability resulted in delayed expression of LEAFY (LFY), the gene encoding for a key transcription factor integrating different flowering-inductive pathways. On the contrary, spraying with gibberellin under

the same condition caused both early LFY expression and early flowering. The possible role of ASC in the transition to the reproductive stage is discussed.
Keywords: Ascorbate; Flowering time; LEAFY

Uulke van Meeteren, Lourdes Arevalo-Galarza, Wouter G. van Doorn, Inhibition of water uptake after dry storage of cut flowers: Role of aspired air and wound-induced processes in Chrysanthemum, Postharvest Biology and Technology, Volume 41, Issue 1, July 2006, Pages 70-77, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.03.005.
(http://www.sciencedirect.com/science/article/B6TBJ-4K1HDR9-3/2/4ab6373671a198e19e6fa9b7e635cf1b)
Abstract:
We investigated the relative role of aspired air and a plant-induced reaction in the vascular occlusion of dry-stored cv. Cassa chrysanthemum flowers (Chrysanthemum x morifolium Ramat). Measurements of hydraulic capacity showed that the air that is aspired directly after cutting (into the opened xylem conduits) was solely responsible for the blockage that developed during the first 1-2 h after cutting. The obstruction to water flow was not reversed when the flowering stems were placed in water, unless the water was degassed. Holding the cut stems or stem segments dry for a period longer than 2 h resulted in an additional decrease of hydraulic capacity, which was not reversed by placing the stems in degassed water. This blockage was still present in stem segments from which air was removed by vacuum infiltration. The second blockage became more serious upon increasing the length of the dry period. It was prevented by a pulse treatment of the cut stems with tropolone, shortly after harvest, suggesting that it was due to an enzymatic reaction in the stems. Taken together with previous data, it is concluded that the relative role of aspired air and a plant-induced process depends on the cultivar and on the pre-harvest growth conditions of the plants.
Keywords: Hydraulic resistance; Xylem occlusion; Water relations; Vase life; Cut flowers

Markus Woitke, Rainer Wolf, Wolfram Hartung, Hermann Heilmeier, Flower morphology of the resurrection plant Chamaegigas intrepidus Dinter and some of its potential pollinators, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 201, Issue 4, 16 June 2006, Pages 281-286, ISSN 0367-2530, DOI: 10.1016/j.flora.2005.07.008.
(http://www.sciencedirect.com/science/article/B7GX0-4J2KT8R-1/2/8d0e16c0a79f42db45a5b2c503e21157)
Abstract:
The resurrection plant Chamaegigas intrepidus Dinter (Scrophulariaceae) is a rare endemic species growing in ephemeral rock pools on isolated granite outcrops in Central Namibia. Previous studies suggested a high degree of gene flow within individual pools. Therefore, floral morphology, pollination and potential pollinators of the plant species were studied while the plants were at full flower set.
The zygomorphous, intensively scenting flowers carry dense layers of trichomes (400-1600 mm-2) on the lower lip, similar to well-known oil-flowers. Four species of potential pollinators could be found. Two of them the Hymenoptera, Apis mellifera and Liotrigona bottegoi, were found to be rare, whereas beetles of the genus Condylops spec. (Condylops erongoensis and a new species) showed up with numbers up to 50 individuals m-2 in some pools, visiting the flowers most frequently. Individuals of Liotrigona and Condylops were proven to carry pollen of Chamaegigas after their flower visits. The results are discussed in relation to the genetic variability of the plant and the phenomenon of pollen limitation in rare plant species.
Keywords: Endemic plant species; Pollen limitation; Trichomes; Liotrigona; Condylops; Malachidae

Dharam Pal Abrol, Foraging Behaviour of Bees as Influenced by Quality and Quantity of Rewards from Flowers, Journal of Asia-Pacific Entomology, Volume 9, Issue 2, June 2006, Pages 145-148, ISSN 1226-8615, DOI: 10.1016/S1226-8615(08)60285-X.
(http://www.sciencedirect.com/science/article/B8JJN-4V6TFDY-7/2/ad985d228dd31aadf92719f4314d5d9e)
Abstract:
Foraging behaviour of four honeybee species (Apis mellifera A. cerana, A. dorsata and A, florea) was studied in relation to energy production rates of Prunus persica and a simultaneously blooming weed, Lepidagathus incurva. Energy produced ranged from a minimum of 0.642+/-0.01 joules (L. /'cwrra)/flower/day to a maximum of 1.49+/-0.14 joules/day (P. persico). The weed having higher nectar sugar concentration and high flowering density attracted more number of bees as compared to peach. The foraging rates of bees were much higher on the weed and they could harvest more energy per unit time from the weed flowers. Evidently, food acquisition efficiency and quality of food determines the foraging decision of bees.
Keywords: Honeybees; Energetics; Foraging behaviour; Flower choice; Profitability; Pollination

Oksana Shavorskaya, Ulf Lagercrantz, Sequence divergence at the putative flowering time locus COL1 in Brassicaceae, Molecular Phylogenetics and Evolution, Volume 39, Issue 3, June 2006, Pages 846-854, ISSN 1055-7903, DOI: 10.1016/j.ympev.2006.01.013.
(http://www.sciencedirect.com/science/article/B6WNH-4J90W2X-5/2/bda96b482fc2a93b670430b962181b71)
Abstract:
An insertion/deletion polymorphism (Ind2) in the Brassica nigra CONSTANS LIKE 1 (Bni COL1) gene was previously found to be associated with variation in flowering time. In the present study we examine the inter-specific divergence of COL1 in the family Brassicaceae. Analysis of codon substitution models did not reveal evidence of positive Darwinian selection, but comparisons of the COL1 gene in different species revealed a surprising number of indels. A total of 24 indels were found in the 650 bp of the middle variable region of the gene. This high number of indels could reflect a lack of constraint on length of this region of the protein, or the effect of positive selection. The number of indels was close to that expected in non-coding DNA, but the indels were longer in COL1 than those observed in non-coding regions. Reconstruction of indel evolution indicated that most indels resulted from deletions rather than insertions. The Ind2 indel that has shown association with flowering time in Brassica nigra exhibited a remarkable distribution in the Brassicaceae family, indicating that the polymorphism may have persisted more than ten million years. Considering presumed historic populations sizes of Brassicaceae species, such a long persistence time seems unlikely for a neutral polymorphism.
Keywords: Brassica; COL1; Flowering time; Molecular evolution; Indel

Norberto Gariglio, Diego E. Gonzalez Rossia, Marisa Mendow, Carmina Reig, Manuel Agusti, Effect of artificial chilling on the depth of endodormancy and vegetative and flower budbreak of peach and nectarine cultivars using excised shoots, Scientia Horticulturae, Volume 108, Issue 4, 25 May 2006, Pages 371-377, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.02.015.
(http://www.sciencedirect.com/science/article/B6TC3-4JJGC6Y-2/2/725db2890dfca4d3e0ac7d1006fd4126)
Abstract:
Stem cuttings were obtained from 12 peach and nectarine cultivars during leaf fall, placed in plastic bags at 3.0 +/- 0.1 [degree sign]C to simulate 0-800 h of chilling and forced to budbreak at 20.0 +/- 1.0 [degree sign]C for a period of 6 weeks. Some cultivars showed high blooming and leafing without exposure to chilling; chilling enhances leafing and blooming but the percentage increment was higher in leaf buds. In general, maximum budbreak was reached with less chilling accumulation (<100-200 h) in flower buds compared with leaf buds; excessive chilling caused a

reduction of the percentage budbreak in flower but not in leaf buds. Additionally, chilling modified the proportion of blooming that occurred before leafing. In non-chilled shoots, blooming occurred earlier than leafing, except in cv. `San Pedro 16-33' but the proportion of blooming before leafing decreased significantly with chilling in most cases. By studying the mean time to budbreak, we conclude that the flower bud generally has a lower intensity of rest; the intensity of rest declines at a slower rate in flower than in leaf buds with chilling; flower buds had greater heat requirements than leaf buds when the chilling requirement had been covered, so that each peach cultivar had a point of critical chilling accumulation below which blooming tended to occur earlier, and above which leafing tends to occur first. Flower and leaf buds had different depths of endodormancy but similar chilling requirements in the majority of peach and nectarine cultivars studied. Finally, different varieties with similar chilling requirements showed different responses to chilling. Therefore, the cutting test measuring the response of vegetative and floral buds provides considerable information on the characterisation of the variety, compared with the sole and traditional data of chilling requirements.
Keywords: Stone fruit; Dormancy; Chilling accumulation; Mean time to budbreak; Chill hours

Shweta Sood, Dhiraj Vyas, Pramod Kumar Nagar, Physiological and biochemical studies during flower development in two rose species, Scientia Horticulturae, Volume 108, Issue 4, 25 May 2006, Pages 390-396, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.02.012.
(http://www.sciencedirect.com/science/article/B6TC3-4JK4PKT-1/2/edb69ceebb680ac4ad086b64616c0135)
Abstract:
The present investigation was aimed to study the changes in various physio-chemical attributes in petals of two different rose species, Rosa damascena Mill and Rosa bourboniana Desport differing in flowering behaviour from small bud (stage 1) till full bloom (stage 8). In both rose species fresh weight, dry weight and moisture content were maximum during full bloom. Electrical conductivity of the petal diffusates reached maximum at full bloom with significantly higher values in R. damascena. In both the species, starch content declined as the flower reached its full bloom stage with maximum reducing sugar content during this period. With progressive increase in petal growth, total protein and RNA declined. The results showed that in both the species peroxidase (POX) and catalase (CAT) activity were lower during full bloom with high activity of invertase and lipoxygenase (LOX) at this period. The present study indicates that lipid peroxidation induced membrane permeability could partly be the result of higher lipoxygenase activity during full bloom. The possible significance of these findings is discussed in relation to flower development in the two diverse rose species.
Keywords: Enzymes; Flower development; Rosa bourboniana; Rosa damascena

Ryan M. Warner, John E. Erwin, Prolonged high-temperature exposure differentially reduces growth and flowering of 12 Viola x wittrockiana Gams. cvs, Scientia Horticulturae, Volume 108, Issue 3, 8 May 2006, Pages 295-302, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.01.034.
(http://www.sciencedirect.com/science/article/B6TC3-4JKHMBM-1/2/8ce9fac79e6c5af55e3d0bd37ee55706)
Abstract:
Many cool season garden crops, including Viola x wittrockiana Gams. (pansy), exhibit reduced flowering outdoors during the warm summer months. Twelve pansy cultivars varying in summer garden performance were grown under either 20 +/- 1.5 or 30 +/- 1 [degree sign]C (air temperature) to determine growth and flowering responses to prolonged high-temperature exposure and to identify selection criteria to screen pansies for flowering heat tolerance. Increasing temperature from 20 to 30 [degree sign]C increased leaf number below the first flower on `Crystal Bowl Primrose' and `Skyline White' only. Flower bud number reduction at 30 [degree sign]C versus 20 [degree sign]C varied from 20% for `Crystal Bowl Purple' to 77% for `Majestic

Giants Red and Yellow'. Flower diameter reduction at 30 [degree sign]C versus 20 [degree sign]C ranged from 14% for `Skyline Beaconsfield' to 44% for `Super Majestic Giants Ocean'. The percentage reduction in total color (flower number x estimated flower area) ranged from 60% for `Crystal Bowl Primrose' to 88% for `Majestic Giants Rose Shades'. Based on a weighted base selection index, `Super Majestic Giants Canary' and `Delta Yellow' were identified as the most heat-tolerant cultivars, while `Super Majestic Giants Ocean' and `Majestic Giants Rose Shades' were identified as the most heat-sensitive. In a second experiment, root and shoot dry mass were determined after 10, 20, or 30 d when grown at 20 or 30 [degree sign]C. Relative growth rate and root:shoot ratio were also calculated. After 30 d, `Crystal Bowl Primrose', `Crystal Bowl Sky Blue' and `Skyline White' relative growth rates were lower at 30 [degree sign]C versus 20 [degree sign]C. Root:shoot ratio on day 30 was lower at 30 [degree sign]C compared to 20 [degree sign]C for six cultivars, but similar across temperature for five cultivars and higher for `Crystal Bowl Primrose'. Flower bud number at first flower was positively correlated with branch number, shoot dry mass at flowering, but not correlated with root dry mass at flowering, and negatively correlated with flower diameter and root:shoot ratio (either at flowering, or after 10, 20 or 30 d at 30 [degree sign]C), suggesting that these traits may be useful when screening pansies for flowering heat tolerance.
Keywords: Pansy; Flower initiation; Flower size; Flower number; Dry mass; Stress; High-temperature tolerance

Sei Kang, Kyoungwhan Back, Enriched production of N-hydroxycinnamic acid amides and biogenic amines in pepper (Capsicum annuum) flowers, Scientia Horticulturae, Volume 108, Issue 3, 8 May 2006, Pages 337-341, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.01.037.
(http://www.sciencedirect.com/science/article/B6TC3-4JFGFKT-1/2/33457329ec2d64d8d0dbe543779ade50)
Abstract:
The biosynthesis of N-hydroxycinnamic acid amides (HCAAs), such as feruloyltyramine, p-coumaroyltyramine, feruloylserotonin, and p-coumaroylserotonin, in pepper plants was investigated in view of the activity of their corresponding enzymes and substrate levels. Almost all HCAAs were found in flowers, whereas the enzyme activity essential for HCAA biosynthesis seemed to be expressed constitutively in all tissues tested. The highest levels of the biogenic amines tyramine and serotonin, the key amine substrates, were also found in flowers, indirectly suggesting that the amine substrates play an important regulatory role in the synthesis of HCAAs.
Keywords: p-Coumaroyltyramine; p-Coumaroylserotonin; Feruloyltyramine; Tryptophan decarboxylase; Serotonin; Tyramine

Kazuhiko Masaka, Takenori Takada, Floral sex ratio strategy in wind-pollinated monoecious species subject to wind-pollination efficiency and competitive sharing among male flowers as a game, Journal of Theoretical Biology, Volume 240, Issue 1, 7 May 2006, Pages 114-125, ISSN 0022-5193, DOI: 10.1016/j.jtbi.2005.09.001.
(http://www.sciencedirect.com/science/article/B6WMD-4HC77B4-2/2/f8b1e488fa91086fa0a24bc813fc0793)
Abstract:
To explain the floral sex ratio strategy in wind-pollinated monoecious species, we developed four models with special reference to wind-pollination efficiency (WPE) and competitive sharing among male flowers (CSM). WPE is a function that follows a Poisson distribution and explains the frequency of seeds fertilized by an individual via wind-pollination, whereas CSM is defined by the sharing of female flowers among male flowers within the local breeding population. We argued the applicability of the results to the actual tendencies observed in wind-pollinated monoecious species and found that a game model with WPE and CSM was the most applicable. The model predicted that individuals should change their gender expression in the following order: female

phase (female flowers only), male phase (male flowers only), and constant male phase (individuals constantly allocate reproductive resources to male flowers, and remaining resources to female flowers), with increasing reproductive resources. However, the trend is likely to be influenced by the variation in the reproductive investment among individuals and the degree of WPE. Thus, large variation and low pollination efficiency enable three phases to co-occur within a population. Actual trends in real populations correspond to our prediction.
Keywords: Competitive share; Floral sex ratio strategy; Game; Pollination efficiency; Wind-pollinated monoecious species

David Kleijn, Frank van Langevelde, Interacting effects of landscape context and habitat quality on flower visiting insects in agricultural landscapes, Basic and Applied Ecology, Volume 7, Issue 3, 2 May 2006, Pages 201-214, ISSN 1439-1791, DOI: 10.1016/j.baae.2005.07.011.
(http://www.sciencedirect.com/science/article/B7GVS-4J0WRP0-1/2/a70fb864af880f1235442d9b0151cd66)
Abstract: Summary
Landscape context and habitat quality may have pronounced effects on the diversity of flower visiting insects. We investigated whether the effects of landscape context and habitat quality on flower visiting insects interact in agricultural landscapes in the Netherlands. Landscape context was expressed as the area of semi-natural habitats or the density of linear landscape features, and was quantified at spatial scales ranging from 250 to 2000 m. Habitat quality was determined as flower abundance. Species richness and abundance of hoverflies and bees were determined along 16 stream banks experiencing similar environmental conditions but situated in areas with contrasting landscape context. Only flower abundance and the area of semi-natural habitats within 500-1000 m were significantly related to species richness of hoverflies and bees and these factors had interacting effects on both species groups. Our results suggest that the regional area of semi-natural habitats had a positive effect on hoverfly species richness when flower abundance was relatively high, but not when flower abundance was low. Moreover, flower abundance had positive effects on hoverfly species richness only in areas with relatively many semi-natural habitats. Contrastingly, flower abundance had a more positive effect on bee species richness in landscapes with few semi-natural habitats compared to landscapes with more semi-natural habitats. Our results suggest that the importance of landscape context for the species richness of flower visiting insects depends upon the quality of the habitat patches.
Keywords: Bumblebees; Flower abundance; Hoverflies; Linear landscape features; Spatial scale; Species richness

Cedric Bertrand, Gilles Comte, Florence Piola, Solid-phase microextraction of volatile compounds from flowers of two Brunfelsia species, Biochemical Systematics and Ecology, Volume 34, Issue 5, May 2006, Pages 371-375, ISSN 0305-1978, DOI: 10.1016/j.bse.2005.12.005.
(http://www.sciencedirect.com/science/article/B6T4R-4JB9W35-1/2/5c58ccbb570ba4ee2bae93f318634340)
Abstract:
Two plant species belonging to the genus Brunfelsia, commonly known as 'Yesterday-Today-and-Tomorrow', are closely related, however, differ by their flower fragrance. Flowers of Brunfelsia australis present a pleasant fragrance, whereas flowers of Brunfelsia pauciflora are scentless. SPME/GC/MS analysis on flower samples of both species of Brunfelsia indicated that flowers of B. australis emitted a fresh flowery fragrance, essentially comprising two monoterpenic compounds (linalool and (E)-ocimene). B. pauciflora, on the other hand, produced only a few sesquiterpenoids. These results are considered in an ecological and evolutionary context.
Keywords: Brunfelsia; Floral volatiles; SPME/GC/MS

Todd A. Ugine, Stephen P. Wraight, John P. Sanderson, Influences of impatiens pollen and exposure to Beauveria bassiana on bionomics of western flower thrips Frankliniella occidentalis, Biological Control, Volume 37, Issue 2, May 2006, Pages 186-195, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.09.020.
(http://www.sciencedirect.com/science/article/B6WBP-4HGM79M-4/2/6087cd1dba12e52259e5a488e5ba4239)
Abstract:
Adult female western flower thrips, Frankliniella occidentalis, were exposed for 24 h to impatiens leaf disks treated with Beauveria bassiana at low and high application rates (ca. 100 and 1000 viable conidia/mm2) and subsequently maintained on impatiens leaf disks supplemented or not supplemented with impatiens pollen. Offspring production and mortality of insects were monitored daily. Exposure to B. bassiana at the low and high rates significantly reduced thrips longevity by 3.9 and 4.0 days, reduced the ovipositional period by 3.4 and 3.0 days, and reduced lifetime fecundity by 22 and 46% at the low and high rates, respectively. Infection by B. bassiana resulted in a sublethal (pre-mortem) effect on offspring production, decreasing offspring production on the day before death by 1.2 offspring/female. Pollen supplements had no effect on adult female thrips longevity, yet did significantly increase both daily (2.3 and 3.8 times) and lifetime fecundity (2.1 and 3.6 times) compared to control insects in tests at the low and high rates, respectively. No significant Beauveria x pollen interactions were detected at the low rate; however, a marginally significant pollen x B. bassiana interaction was present in tests of both daily and lifetime fecundity. There was a significant effect of B. bassiana on lifetime offspring production in the presence of pollen, but the effect was not detectable in the no pollen treatment. The increase in both daily and lifetime offspring production in the presence of pollen and the slow action of B. bassiana suggest that if B. bassiana is to be used successfully as a thrips management tool in impatiens crops, it must be applied before pollen becomes present and targeted against thrips immature stages to kill the insects before they reach reproductive maturity.
Keywords: Western flower thrips; Frankliniella occidentalis; Bionomics; Pollen; Fecundity; Entomopathogenic fungus; Beauveria bassiana

R.C. Barbour, B.M. Potts, R.E. Vaillancourt, W.N. Tibbits, Gene flow between introduced and native Eucalyptus species: Flowering asynchrony as a barrier to F1 hybridisation between exotic E. nitens and native Tasmanian Symphyomyrtus species, Forest Ecology and Management, Volume 226, Issues 1-3, 1 May 2006, Pages 9-21, ISSN 0378-1127, DOI: 10.1016/j.foreco.2006.01.017.
(http://www.sciencedirect.com/science/article/B6T6X-4J84SRF-3/2/2755c7f4730c468970ce3f263450f8c6)
Abstract:
Eucalyptus nitens has recently been introduced to the island of Tasmania for use in commercial plantation forestry. The current area of the E. nitens plantation estate now stands at ca. 117,000 ha. E. nitens is potentially cross compatible with 16 of the island's 29 native eucalypt species. Interspecific flowering asynchrony was assessed as it is a potential barrier to pollen-mediated gene flow from E. nitens plantations in Tasmania. Flowering was assessed across 41 field sites containing these compatible native eucalypt species and/or E. nitens. Two years of field data from these sites, combined with previously published flowering data, showed that flowering phenology varied considerably with species, altitude and season. In addition, assessments of a field trial indicated that significant genetic variation at the provenance and family levels exists within E. nitens. This genetic variation was limited, however, and it is argued that the marked delay in flowering time with altitude observed in plantations of this exotic is mainly due to environmental effects such as the seasonal heat sum. Assessments of flowering synchrony between E. nitens and each native species found variation due to season and species. Of the 16 potentially cross-compatible species, six appear at low risk of pollen-mediated gene flow from E. nitens due to low

levels of flowering synchrony (proportion of flowering period synchronous with E. nitens <=0.18). Of the remaining species, E. archeri (0.50), E. ovata (0.58) and E. rodwayi (0.55) displayed the highest levels of flowering synchrony with E. nitens. The results demonstrate the importance of gaining greater empirical knowledge of factors affecting pollen-mediated gene flow from exotic species to precisely identify species and populations at greatest risk of exotic gene flow. When combined with studies of other potential reproductive barriers, such as spatial isolation, crossing incompatibilities and reduced hybrid fitness, further reductions in the number of native Tasmanian eucalypt species found to be at significant risk of exotic gene flow from E. nitens, are expected.
Keywords: Eucalyptus; Exotic species; Gene pool management; Genetic pollution; Plantation forestry; Pollen-mediated gene flow; F1 hybridisation

Kumi Yoshida, Sayoko Kitahara, Daisuke Ito, Tadao Kondo, Ferric ions involved in the flower color development of the Himalayan blue poppy, Meconopsis grandis, Phytochemistry, Volume 67, Issue 10, May 2006, Pages 992-998, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.03.013.
(http://www.sciencedirect.com/science/article/B6TH7-4JWMT8P-3/2/7ef09c5ccc893c1bbe560529b9fe420f)
Abstract:
The Himalayan blue poppy, Meconopsis grandis, has sky blue-colored petals, although the anthocyanidin nucleus of the petal pigment is cyanidin. The blue color development in this blue poppy involving ferric ions was therefore studied. We analyzed the vacuolar pH, and the organic and inorganic components of the colored cells. A direct measurement by a proton-selective microelectrode revealed that the vacuolar pH value was 4.8. The concentrations of the total anthocyanins in the colored cells were around 5 mM, and ca. three times more concentrated flavonols were detected. Fe was detected by atomic analysis of the colored cells, and the ratio of Fe to anthocyanins was ca. 0.8 eq. By mixing the anthocyanin, flavonol and metal ion components in a buffered aq. solution at pH 5.0, we were able to reproduce the same blue color; the visible absorption spectrum and CD were identical to those in the petals, with Fe3+, Mg2+ and flavonol being essential for the blue color. The blue pigment in Meconopsis should be a new type of metal complex pigment that is different from a stoichiometric supramolecular pigment such as commelinin or protocyanin.
Keywords: Meconopsis grandis; Papa veraceae; Blue flower color development; Metal complex anthocyanin; Circular dichroism; Vacuolar pH

P. Olsen, I. Lenk, C.S. Jensen, K. Petersen, C.H. Andersen, T. Didion, K.K. Nielsen, Analysis of two heterologous flowering genes in Brachypodium distachyon demonstrates its potential as a grass model plant, Plant Science, Volume 170, Issue 5, May 2006, Pages 1020-1025, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.01.012.
(http://www.sciencedirect.com/science/article/B6TBH-4J9VM3J-2/2/047f5f102df3a14d2da4d0c68f48944c)
Abstract:
Despite the great contribution of model organisms, such as Arabidopsis and rice to understand biological processes in plants, these models are less valuable for functional studies of particular genes from temperate grass crop species. Therefore a new model plant is required, displaying features including close phylogenetic relationship to the temperate grasses, vernalisation requirement, high transformation efficiency, small genome size and a rapid life cycle. These requirements are all fulfilled by the small annual grass Brachypodium distachyon. As a first step towards implementing this plant as our preferred test bed for ryegrass flowering genes we expressed two Terminal Flower 1 orthologs, LpTFL1 and TFL1 from perennial ryegrass and Arabidopsis, respectively, in two different B. distachyon accessions. Our results confirm that both LpTFL1 and TFL1 act as floral repressors, delaying heading date up to 10 weeks in plants of the T1 generation. Furthermore, a positive correlation between Terminal Flower 1 expression level

and delay in heading date was apparent for most of the lines. The short life cycle and fast transformation system of B. distachyon allowed heading date analyses in the T1 generation within the first year upon transformation.
Keywords: Brachypodium distachyon; Grass model plant; Terminal Flower 1; Floral transition

Hui Tan, Xiaohui Liu, Nan Ma, Jingqi Xue, Wangjin Lu, Jinghe Bai, Junping Gao, Ethylene-influenced flower opening and expression of genes encoding Etrs, Ctrs, and Ein3s in two cut rose cultivars, Postharvest Biology and Technology, Volume 40, Issue 2, May 2006, Pages 97-105, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.01.007.
(http://www.sciencedirect.com/science/article/B6TBJ-4JKHP7D-2/2/a9aa8260e78adb849a21f101edf7b35e)
Abstract:
Exogenous ethylene inhibits floral opening in cut rose (Rosa hybrida) cv. Kardinal and slightly promotes opening in cv. Samantha. We investigated ethylene production following short exposure to exogenous ethylene, and the expression of ethylene receptor genes (ETR) and genes in the ethylene signal transduction pathway (CTR and EIN3).
In cv. Kardinal the ethylene production rate was much higher than in cv. Samantha, following ethylene treatment. The expression of ETR fragments was not much affected by ethylene in cv. Kardinal but was up-regulated in cv. Samantha. Data from the literature suggest that ETR is a negative regulator. The up-regulation of ETR, after ethylene treatment, indicates that the sensitivity to ethylene is down-regulated in Samantha but not in Kardinal. No clear effect of ethylene was found on the expression of fragments of CTR and EIN3 genes. It is concluded that the inhibition of floral opening in cv. Kardinal, and its absence in cv. Samantha, can apparently be explained by a differential effect of ethylene on the expression of genes for the ethylene receptor.
Keywords: Cut rose (Rosa hybrida); Flower opening; Ethylene; Ethylene signal transduction; ETRs; CTRs; EIN3

Nehal Saleh, Kazuharu Ohashi, James D. Thomson, Lars Chittka, Facultative use of the repellent scent mark in foraging bumblebees: complex versus simple flowers, Animal Behaviour, Volume 71, Issue 4, April 2006, Pages 847-854, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2005.06.014.
(http://www.sciencedirect.com/science/article/B6W9W-4J90W5P-5/2/905ae298bd48572c33155a76947548b0)
Abstract:
Bumblebees leave scent marks on flowers, and use these marks to avoid recently depleted resources. We tested whether the response to such scent marks is fixed, or whether bees can adjust their responses flexibly, depending on floral complexity. Complex flowers require longer handling times and, when foraging on these flowers, bees show spatial foraging patterns that make revisits more likely. Therefore, we examined whether bees responded to scent marks more strongly if they were found on complex flowers, in order to reduce these revisits. To do this, we used two types of artificial flowers that differed in handling time. Bees preferred foraging on short flowers, but accepted both types. However, when they approached flowers, bees were more than twice as likely to reject scent-marked long flowers than short ones, and the effect of scent marks lingered for 60% longer in long flowers. Bees most often rejected long flowers in flight, without direct access to tactile cues indicating floral handling time. Therefore, they solved the task by using the current visual input to recall a memory of floral handling time, and they combined this information with a current olfactory cue, that is, the scent mark.

Ivan C. Nielsen, C.D.K. Cook, Aquatic and Wetland Plants of Southern Africa. Institut fur Systematische Botanik der Universitat Zurich. An identification manual for the stoneworts (charophytina), liverworts (Marchantiopsida), mosses (Bryopsida), quillworts (Lycopdiopsida), ferns (Polypodiopsida) and flowering plants (Magnoliopsida) which grow in water and wetlands of

Namibia, Botswana, Swaziland, Lesotho and Republic of South Africa, Backhuys Publishers, Leiden, The Netherlands, 2004 (281 pp., 290 figures, [euro] 86.00, hardback, ISBN 90-5782-142-7)., Aquatic Botany, Volume 84, Issue 3, April 2006, Page 283, ISSN 0304-3770, DOI: 10.1016/j.aquabot.2005.09.011.
(http://www.sciencedirect.com/science/article/B6T4F-4J6WR0B-1/2/b7a9d05ef57938f6747a3b4186a6df69)

Besrat Tesfagiorgis Demoz, Lise Korsten, Bacillus subtilis attachment, colonization, and survival on avocado flowers and its mode of action on stem-end rot pathogens, Biological Control, Volume 37, Issue 1, April 2006, Pages 68-74, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.11.010.
(http://www.sciencedirect.com/science/article/B6WBP-4J021RJ-2/2/43bc31c3a880e46efe4c95d83be84a4b)
Abstract:
Stem-end rot (SER) is an economically important postharvest disease of avocado. It is caused by several fungi, which infect fruit through inflorescences. Targeting the flowering stage in the disease cycle for dispersal of antagonists is believed to be an alternative application strategy for controlling SER. The aim of this study was therefore to determine the ability of Bacillus subtilis B246, commercially registered as Avogreen and used as a biocontrol agent against avocado pre- and postharvest diseases, to attach, colonize, and survive on avocado flowers and to study the interaction of the SER pathogens and the antagonist on avocado flowers. Avocado flowers inoculated with a liquid commercial formulation of the antagonist were observed at different time intervals under the scanning electron microscope (SEM). Population dynamics of the antagonist on the flowers were determined by means of total viable counts using reference cultures and background counts from the control. Flowers were also inoculated with antagonist-pathogen (Dothiorella aromatica and Phomopsis perseae) combinations to determine in vivo interactions. The SEM observations and population dynamics study confirmed that the antagonist could effectively attach, colonize, and survive on avocado flowers. It could also attach to conidia and hyphae of the pathogens and cause cell degradation. These modes of action can give new insights into the control of pathogens by B. subtilis.
Keywords: Bacillus subtilis; Mode of action; Stem-end rot; Avocado

Claire Domoney, Gerard Duc, TH Noel Ellis, Cristina Ferrandiz, Christian Firnhaber, Karine Gallardo, Julie Hofer, Joachim Kopka, Helge Kuster, Franciso Madueno, Nathalie G Munier-Jolain, Klaus Mayer, Richard Thompson, Michael Udvardi, Christophe Salon, Genetic and genomic analysis of legume flowers and seeds, Current Opinion in Plant Biology, Volume 9, Issue 2, Genome studies and molecular genetics: Part 1: Model legumes / edited by Nevin D Young and Randy C Shoemaker; Part 2: Maize genomics / edited by Susan R Wessler. Plant biotechnology / edited by John Salmeron and Luis R Herrera-Estrella, April 2006, Pages 133-141, ISSN 1369-5266, DOI: 10.1016/j.pbi.2006.01.014.
(http://www.sciencedirect.com/science/article/B6VS4-4J8KNR8-3/2/fb1fbec82b87194c3309529d81af1096)
Abstract:
New tools, such as ordered mutant libraries, microarrays and sequence based comparative maps, are available for genetic and genomic studies of legumes that are being used to shed light on seed production, the objective of most arable farming. The new information and understanding brought by these tools are revealing the biological processes that underpin and impact on seed production.

Chris CN van Schie, Michel A Haring, Robert C Schuurink, Regulation of terpenoid and benzenoid production in flowers, Current Opinion in Plant Biology, Volume 9, Issue 2, Genome studies and molecular genetics: Part 1: Model legumes / edited by Nevin D Young and Randy C Shoemaker; Part 2: Maize genomics / edited by Susan R Wessler. Plant biotechnology / edited by John

Salmeron and Luis R Herrera-Estrella, April 2006, Pages 203-208, ISSN 1369-5266, DOI: 10.1016/j.pbi.2006.01.001.
(http://www.sciencedirect.com/science/article/B6VS4-4J5T8D2-2/2/973c5acc82b454362aec1f568ba4fca0)
Abstract:
The production and emission of fragrant molecules by flowers are strictly regulated during the floral lifespan and often peak when pollinators are active. The best-studied classes of floral volatiles are benzenoids and terpenoids. The production of these molecules appears to be primarily regulated at the level of precursor biosynthesis. The genes from the petunia floral shikimate pathway, which provides the precursors for the formation of benzenoids, have recently been shown to be regulated by a MYB transcription factor. The floral terpenoids of snapdragon appear to be derived exclusively from the methyl-erythritol-phosphate pathway in plastids. This pathway controls precursor levels for geranyl diphosphate synthase, which in turn is transcriptionally regulated.

Adam J. Matich, Barry J. Bunn, Martin B. Hunt, Daryl D. Rowan, Lilac alcohol epoxide: A linalool derivative in Actinidia arguta flowers, Phytochemistry, Volume 67, Issue 8, Reports on Structure Elucidation, April 2006, Pages 759-763, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.12.021.
(http://www.sciencedirect.com/science/article/B6TH7-4J6W780-2/2/a31844e1bad64fab923a295e8328d4d1)
Abstract:
Lilac alcohol epoxide (2-(5-methyl-5-(oxiran-2-yl)-tetrahydrofuran-2-yl)propan-1-ol), a previously unreported monoterpene, was identified in the solvent extract of the flowers of seven Actinidia arguta genotypes. The diastereomeric lilac alcohol epoxides co-occurred with the lilac aldehydes and alcohols. Another compound, the lilac diol (2-(5-(1-hydroxyethyl)-5-methyl-tetrahydrofuran-2-yl)propan-1-ol) was synthesised as part of our efforts to identify the lilac alcohol epoxide.
Keywords: Actinidia arguta; Actinidiaceae; Flowers; Monoterpenes; Lilac alcohols; Lilac aldehydes; Lilac alcohol epoxide (2-(5-methyl-5-(oxiran-2-yl)-tetrahydrofuran-2-yl)propan-1-ol); Lilac diol (2-(5-(1-hydroxyethyl)-5-methyl-tetrahydrofuran-2-yl)propan-1-ol)

Elly Kesumawati, Takushi Kimata, Tatsuya Uemachi, Munetaka Hosokawa, Susumu Yazawa, Correlation of phytoplasma concentration in Hydrangea macrophylla with green-flowering stability, Scientia Horticulturae, Volume 108, Issue 1, 16 March 2006, Pages 74-78, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.01.003.
(http://www.sciencedirect.com/science/article/B6TC3-4J624VV-2/2/9eadd8fb98349a0870b6512f279e8c74)
Abstract:
The interaction between phytoplasma concentration and green-flowering stability was studied in hydrangea cultivars. Three green and 18 nongreen cultivars were subjected to polymerase chain reaction (PCR) analysis to determine Japanese hydrangea phyllody (JHP) phytoplasma infection. The results showed that JHP-phytoplasma was detected only in `Midori' plants, which have green sepals. `Midori' plants were propagated, and from 29 rooted cutting plants, they were grouped into three types on the basis of sepal color, that is, green (75.9%), blue-green (13.8%) and blue (10.3%) sepals. To clarify the variability in the sepal color of `Midori' plants, JHP-phytoplasma concentration in the sepals and leaves of green-, blue-green- and blue-flowering plants was determined by PCR analysis. The semiquantitative PCR comparisons of 370 bp DNA fragments showed that the JHP-phytoplasma concentrations in green sepals were 16 times higher than that in blue-green sepals. JHP-phytoplasma could not be identified by PCR analysis in blue sepals and leaves. These results showed that JHP-phytoplasma concentration correlated with green sepal stability in `Midori' plants. A histological observation of sepals showed that epidermal cells of blue

and blue-green sepals had a dome shape. Otherwise, green sepals were leaflike with flat epidermal cells, and palisade parenchyma cells with numerous chloroplasts.
Keywords: JHP-phytoplasma concentration; Stability; Green sepal; Polymerase chain reaction (PCR)

Ruhi Bastug, Osman Karaguzel, Koksal Aydinsakir, Dursun Buyuktas, The effects of drip irrigation on flowering and flower quality of glasshouse gladiolus plant, Agricultural Water Management, Volume 81, Issues 1-2, 10 March 2006, Pages 132-144, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.04.001.
(http://www.sciencedirect.com/science/article/B6T3X-4G7NF7B-3/2/e18ea6710ea17055d3414bfcc1bfcd71)
Abstract:
This study was carried out to determine the effects of irrigation on flowering, flower quality and water use efficiency (WUE) of gladiolus (Gladiolus grandiflorus L.) planted in glasshouse in the winter and irrigated by a drip irrigation system under Mediterranean conditions. Two gladiolus varieties, Peter Pears and Eurovision, were used. Three irrigation levels, I1 = 0.50 Epan, I2 = 0.75 Epan, and I3 = 1.00 Epan, were applied based on the evaporation measured by a Class A Pan (Epan, mm) located in the glasshouse. It was found that the irrigation levels affect the flowering (percentage) and flower quality characteristics of gladiolus and the two gladiolus varieties were not statistically different. The highest quality was obtained in the I3 irrigation treatment, followed by I2 and I1. Seasonal water use of I1, I2, and I3 irrigation treatments on the average were found to be 12.7, 15.4, and 18.1 mm week-1, respectively. A linear relation between water use (WU) and flowering percentage for Peter Pears and Eurovision varieties (R2 = 0.91 and 0.85, P <= 0.01, respectively) were obtained. It is determined that every mm of water is increasing flowering percentage of gladiolus about 0.3%.
Keywords: Gladiolus; Irrigation; Water use

F. Liu, Y. Cohen, M. Fuchs, Z. Plaut, A. Grava, The effect of vapor pressure deficit on leaf area and water transport in flower stems of soil-less culture rose, Agricultural Water Management, Volume 81, Issues 1-2, 10 March 2006, Pages 216-224, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.03.005.
(http://www.sciencedirect.com/science/article/B6T3X-4G0DF1K-1/2/4853088b09811e146c94679ca93abae1)
Abstract:
The effect of indoor air relative humidity on leaf area and water transport of flower stems in a greenhouse rose crop (Rosa X hybrida cv Mercedes) grown on a soil-less substrate was studied on 2-year-old plants, in a freely draining irrigated system ensuring a high leaching fraction. In one compartment of the greenhouse, the roof opened when the air temperature reached 28 [degree sign]C. In the other, an evaporative wet pad and fans were operated at 28 [degree sign]C.
The wet pad treatment decreased vapor pressure deficit (VPD). A maximum VPD difference of 1.45 kPa between the two compartments occurred during the noon-hours on a warm day with high atmospheric evaporative demand. On days with moderate evaporative demand, the wet pad was either not operated or when operated, produced VPD differences smaller than 1.45 kPa. Wet pad treatment decreased the transpiration rate per unit leaf area of the flower stem. On a typical summer day, with high evaporative demand, mean maximum water loss per unit leaf area was 2.63 +/- 0.13 and 1.79 +/- 0.09 kg m-2 day-1 for the high and low VPD compartments, respectively. However, low VPD decreased only slightly mean daily water flow per stem: 104.3 +/- 6.9 g at low VPD versus 112.4 +/- 8.7 g at high VPD (not significant at p > 0.05), despite the significant differences (p > 0.05) in VPD between the greenhouse compartments. The wet pad treatment mitigated leaf water potential drop at noon-time. The results suggest that rose flower stems adapt to high VPD by decreasing leaf area for maintaining high sap flow rate per unit area.

Keywords: Leaf area; Sap flow; VPD; Rosa X hybrida

A. Baille, R.P. Gutierrez Colomer, M.M. Gonzalez-Real, Analysis of intercepted radiation and dry matter accumulation in rose flower shoots, Agricultural and Forest Meteorology, Volume 137, Issues 1-2, 1 March 2006, Pages 68-80, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2006.02.010. (http://www.sciencedirect.com/science/article/B6V8W-4JRM01Y-1/2/ea970d85fd7bc9b2bfe8a20155319bad)
Abstract:
The relationship between intercepted photosynthetic active radiation, PAR and dry weight of single flower shoots of a rose (Rosa hybrida cv. Dallas) canopy managed with the arching technique was investigated through three growth cycles (summer, autumn and spring) under Mediterranean greenhouse conditions (Valencia, southern Spain). Non-destructive measurements were carried out at eight phenological growth stages and the evolution with thermal time of the in situ shoot dry weight, Ws, was estimated for each growth cycle. Intercepted PAR by the shoot, Rp,int, was estimated at a daily scale from a simplified single shoot interception model. The relationship between Ws and Rp,int was analysed using a radiation use efficiency (RUE)-based approach that considered three main periods throughout the shoot growth cycle: (i) from the stage the axillary bud had reached a length of about 1 cm (AB stage) till the visible bud (VB) stage, with a high apparent value of RUE due to the supply of assimilates from the plant reserves, (ii) from the VB stage to the stage of last leaf unfolded (LLF stage), when the shoot became self-supporting for assimilates, with the true value of RUE and (iii) from LLF stage till the stage of harvest (Y stage), when the shoots slowed down their growth and more assimilates were available for translocation to the basal part of the plant, with a low apparent value of RUE. This approach allowed the estimation of the imported and exported amounts of dry matter by the growing shoot. The reserves imported till the VB stage ranged from 5% (spring and summer shoots) to 25% (autumn shoots) of the shoot dry weight at harvest. The relative contribution of the shoot during the export phase was small (<5%) for the autumn and summer shoots, but reached up to 30% of its final dry weight for the spring shoots. A computational scheme was proposed to derive the dynamics of the import rate of assimilates from the plant reserves (roots, parent shoots, bent shoots and old foliage). It was found that the maximum translocation rate occurred near the 3LF stage (third unfolded leaf) and that the bud became self-supporting for assimilates at the VB stage.
Keywords: Growth; Dry biomass; Phenological stage; Thermal unit; Extinction coefficient; Intercepted radiation; Assimilates translocation

Liliana N. Gray, Norma G. Collavino, Graciela E. Simon, Jorge A. Mariotti, Diallelic analysis of genetic effects determining days to flowering in kenaf, Industrial Crops and Products, Volume 23, Issue 2, March 2006, Pages 194-200, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2005.06.001. (http://www.sciencedirect.com/science/article/B6T77-4GX0C84-1/2/b313a3b09bebfc738edb8c02bdadeb7d)
Abstract:
The genetic control determining the days to flowering, defined as the number of days from emergence to the beginning of flowering is considered an important characteristic for breeding purpose. We investigated this factor in kenaf (Hibiscus cannabinus L.), as part of an agroindustrial project in northwest Argentina. A diallelic cross approach was considered in this study. Six highly inbred photosensitive cultivars were used in the cross, namely, Endora, Pandora, Tainung 1, Line 42, Line 21, and Line 29. Significant differences among F1 family means as well as among general combining ability (GCA) and specific combining ability (SCA) components were found based on the Griffing genetic-statistical method IV, Model 1. A predominant additive effect was detected for the days to flowering, giving high heritability estimates (H = DGD = 0.96; h2 = 0.69), and suggests the possibility of effective selection for earliness in these cultivars. Early flowering in Line 29 was highly heritable, and therefore, is important for breeding purposes. Line 42, despite being the

earliest, did not transmit this characteristic to its progenies, possibly because of epistatic genetic effects. The regression of the covariances of F1 families on the non-recurrent parent (Wr) and the variance of the 'n' families (Vr) revealed that some dominance effects also occurred in the form of a partial dominance for early flowering. These results support the evidences revealed by the analysis of means of combinations between early and late flowering lines.
Keywords: Kenaf; Hibiscus cannabinus L.; Flowering; Gene action; Combining ability; Heritability

Xiquan Gao, Fanjiang Kong, Fang Wang, Hideyuki Matsuura, Teruhiko Yoshihara, Inhibitory role of gibberellins in theobroxide-induced flowering of Pharbitis nil, Journal of Plant Physiology, Volume 163, Issue 4, March 2006, Pages 398-404, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.04.028.
(http://www.sciencedirect.com/science/article/B7GJ7-4GP7NXS-1/2/223d2f605ec3208e8cf677effabd53cf)
Abstract: Summary
Theobroxide, a novel active compound isolated from a fungus, has been reported previously to induce potato tuberization and flower bud formation in Pharbitis nil under non-inductive long-day conditions. Up to date, the action mechanism of theobroxide on flower-bud induction of P. nil, however, is still unknown. In the present study, we observed a reduction of the stem length, along with the induction of flower buds, in theobroxide-treated and short-day-grown P. nil plants. Also, the results showed that flower bud formation was delayed markedly in P. nil seedlings with removal of cotyledons or exposure to night break. The suppression effect of night-break and cotyledon-removal, however, was abolished completely by spraying theobroxide. Endogenous gibberellin1/3 contents in P. nil plants treated with theobroxide or grown under short-day conditions were relatively lower, suggesting that gibberellins probably are negatively involved in theobroxide- and short-day-induced flower-bud formation of P. nil.
Keywords: Gibberellins; Night break; Pharbitis nil; Stem elongation; Theobroxide

Xizhi Guo, Zhong Zhao, Jianghua Chen, Xiaohe Hu, Da Luo, A putative CENTRORADIALIS/TERMINAL FLOWER 1-like gene, Ljcen1, plays a role in phase transition in Lotus japonicus, Journal of Plant Physiology, Volume 163, Issue 4, March 2006, Pages 436-444, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.04.037.
(http://www.sciencedirect.com/science/article/B7GJ7-4GYNXVW-1/2/48c8da9a9c4af22f0039f3d2fcce7caf)
Abstract: Summary
CENTRORADIALIS/TERMINAL FLOWER 1 (CEN/TFL1) genes play an important role in the phase transition of plant flowering. Here we characterized the expression pattern of a CEN/TFL1-like gene, Ljcen1, from Lotus japonicus. Sequence analysis revealed that Ljcen1 shared 67-76% identity to its homologs from a variety of plant species. Ljcen1 transcripts could be detected at the young root tip and reproductive shoot apical meristem of L. japonicus. RNA in situ hybridization analysis revealed that Ljcen1 was continuously expressed in the sub-domain of the primary inflorescence meristem and transiently expressed in the secondary inflorescence meristem. The ectopic expression of Ljcen1 in Arabidopsis driven by double CaMV 35S promoter delayed the flowering. These results suggested that Ljcen1 gene was involved in a conserved CEN/TFL1 pathway that functions in phase transition of shoot apical meristem in L. japonicus.
Keywords: Lotus japonicus; Shoot apical meristem; Phase transition; CEN/TFL1

S. Deachathai, W. Mahabusarakam, S. Phongpaichit, W.C. Taylor, Y.-J. Zhang, C.-R. Yang, Phenolic compounds from the flowers of Garcinia dulcis, Phytochemistry, Volume 67, Issue 5, Reports on Structure Elucidation, March 2006, Pages 464-469, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.10.016.

(http://www.sciencedirect.com/science/article/B6TH7-4HPD3W7-2/2/25f43419b856ef583333bd43b2c6d9b0)
Abstract:
Dulcisxanthones C-F (1-4) and dulcinone (5) together with 22 known compounds were isolated from the flowers of Garcinia dulcis. Their structures were determined by spectroscopic methods. The abilities of some of these compounds to act as radical scavengers and antibacterial agents were investigated.
Keywords: Garcinia dulcis; Guttiferae; Xanthones; Chromones; Radical scavenging; Antibacterial

Mihoko Mori, Tadao Kondo, Kenjiro Toki, Kumi Yoshida, Structure of anthocyanin from the blue petals of Phacelia campanularia and its blue flower color development, Phytochemistry, Volume 67, Issue 6, March 2006, Pages 622-629, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.12.024.
(http://www.sciencedirect.com/science/article/B6TH7-4J6X3SX-1/2/49466fb1f7849f0fa3a4223e8cc4d5c8)
Abstract:
The dicaffeoyl anthocyanin, phacelianin, was isolated from blue petals of Phacelia campanularia. Its structure was determined to be 3-O-(6-O-(4'-O-(6-O-(4'-O-[beta]-d-glucopyranosyl-(E)-caffeoyl)-[beta]-d-glucopyranosyl)-(E)-caffeoyl)-[beta]-d-glucopyranosyl)-5-O-(6-O-malonyl-[beta]-d-glucopyranosyl)delphinidin. The CD of the blue petals of the phacelia showed a strong negative Cotton effect and that of the suspension of the colored protoplasts was the same, indicating that the chromophores of phacelianin may stack intermolecularly in an anti-clockwise stacking manner in the blue-colored vacuoles. In a weakly acidic aqueous solution, phacelianin displayed the same blue color and negative Cotton effect in CD as those of the petals. However, blue-black colored precipitates gradually formed without metal ions. A very small amount of Al3+ or Fe3+ may be required to stabilize the blue solution. Phacelianin may take both an inter- and intramolecular stacking form and shows the blue petal color by molecular association and the co-existence of a small amount of metal ions. We also isolated a major anthocyanin from the blue petals of Evolvulus pilosus and revised the structure identical to phacelianin.
Keywords: Phacelia campanularia; Evolvulus pilosus; Hydrophyllaceae; Convolvulaceae; Phacelianin; Diacylated anthocyanin; Blue flower color development; Circular dichroism

Wen-Chieh Tsai, Yu-Yun Hsiao, Shu-Hua Lee, Chun-Wei Tung, Dan-Ping Wang, Hei-Chia Wang, Wen-Huei Chen, Hong-Hwa Chen, Expression analysis of the ESTs derived from the flower buds of Phalaenopsis equestris, Plant Science, Volume 170, Issue 3, March 2006, Pages 426-432, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.08.029.
(http://www.sciencedirect.com/science/article/B6TBH-4HG65JJ-1/2/c1d1c6e5a80ea7c15e1e43a30a07debc)
Abstract:
Orchids have profound diversity of specialized pollination and ecological strategies and provide a rich setting for studying evolutionary relationships and molecular biology. The sophisticated orchid flower morphology includes two whorls of perianth segments, three sepals and three petals, one of which is modified as labellum (or lip). In addition, the male and female reproductive organs are fused to form a gynostemium. In order to study gene expression in orchid reproductive organs, a cDNA library of mature flower buds of Phalaenopsis equestris, a native diploid species of Phalaenopsis in Taiwan, was constructed. A total of 5593 expressed sequence tags (ESTs) from randomly selected clones were identified and characterized. Cluster analysis allowed the identification of a unigene set of 3688 sequences. This abundance of transcripts with predicted cellular roles was functionally characterized by the BLASTX matches to known proteins. Comparison of the relative EST frequencies based on functional categories among floral tissues of five species including P. equestris, Acorus Americanus, Asparagus officinalis, Oryza sativa and

Arabidopsis thaliana was performed. The most highly transcribed genes in Phalaenopsis floral buds are those coding for RNA-dependent RNA polymerase of Cymbidium mosaic virus, followed by heat shock protein genes. A total 217 putative transcription factor related ESTs were identified. C3H and trihelix families occupied 25% of transcribed transcription factor genes, indicating that the profile of the transcription factors in orchid flower buds is polarized. The extensive analysis of the genes in floral organs adds to the growing repertoire of known plant genes and may also reveal unique features of the reproductive organs of orchids.
Keywords: Expressed sequence tags; Flower bud; Unigene; Gene expression; Phalaenopsis equestris; Transcription factor

Claudio A. Chimenti, Matias Marcantonio, A.J. Hall, Divergent selection for osmotic adjustment results in improved drought tolerance in maize (Zea mays L.) in both early growth and flowering phases, Field Crops Research, Volume 95, Issues 2-3, 15 February 2006, Pages 305-315, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.04.003.
(http://www.sciencedirect.com/science/article/B6T6M-4G3D857-1/2/4c1dcbce2a99a8ddf9c5ff4299e48e5b)
Abstract:
The value of the capacity for osmotic adjustment (OA) as a trait, which can contribute effectively to yield maintenance under drought, has not yet been established for maize (Zea mays L.) using cultivars of similar genetic background. Here we report results obtained using crops of two S4 populations derived from a cross between inbred lines exhibiting the highest and lowest capacities for osmotic adjustment in a screening applied to 20 inbred lines. The mean values of OA for the two S4 populations were 0.47 MPa for the high OA population (HOA) and 0.06 MPa for the low (LOA). Crops of these populations were grown under a rain-out shelter and subjected to 30-day droughts either before or during flowering. In both experiments, exposure to drought evoked a significant ($p < 0.05$) decrease in osmotic potential measured at full turgor in the HOA population, no change was found in the LOA population. This induced response became evident in plants of the HOA population in measurements effected 16-18 days after suspension of irrigation. Irrespective of the timing of drought, the HOA crops extracted significantly more water from deeper in the soil profile during the stress period, exhibited higher leaf area duration and attained greater grain yields and, in the crop droughted at flowering, greater harvest index than the LOA crops. The components of yield and their determinants (i.e., floret number per ear, grain set, grain number and weight per grain) exhibited differential responses with timing of the drought and in response to level of OA. Under irrigation, there were no differences between populations in either experiment in terms of yield and its components, or in harvest index, leaf area duration, or soil water extraction. We conclude that OA can contribute to drought tolerance in maize crops exposed to water deficit both before and during flowering, and that the trait carries no yield penalty under irrigation.
Keywords: Drought tolerance; Grain yield; Osmotic adjustment; Soil water extraction

S. Tangmitcharoen, T. Takaso, S. Siripatanadilox, W. Tasen, J.N. Owens, Insect biodiversity in flowering teak (Tectona grandis L.f.) canopies: Comparison of wild and plantation stands, Forest Ecology and Management, Volume 222, Issues 1-3, 15 February 2006, Pages 99-107, ISSN 0378-1127, DOI: 10.1016/j.foreco.2005.10.040.
(http://www.sciencedirect.com/science/article/B6T6X-4HJRRT7-3/2/7dca4abcbcb49efed1463c37c09fdfe0)
Abstract:
Insects were collected in the canopies of wild and plantation forests with Malaise traps and hand nets during the flowering season of teak (August-October 1998) in and near the Maegar Seed Orchard in Phayao province, Northern Thailand. A total of 10,404 individual insects were collected representing 693 morphospecies from 115 recognizable families and 11 orders. Of these 11

orders, Lepidoptera had the highest number of morphospecies (32%) followed by Hymenoptera (29%). Among 693 morphospecies, 620 (89.5%) were non-pollinators and 73 (10.5%) were potential pollinators. Canopies of wild teak had greater insect biodiversity than plantation; however, the number of potential insect pollinators in the plantation canopies was greater than the wild trees.
The total number of morphospecies was 552 in the canopies of wild trees, 340 in the plantation canopies and 199 appeared in both habitats. Mean numbers of morphospecies per individual tree for canopies of wild and plantation trees were 280 and 150, respectively. Total number of individuals collected in the canopies of wild trees was 6948 and 3456 in the plantation canopies. Mean numbers of individuals per individual tree in the canopies of wild and plantation trees were 2316 and 1152, respectively. The mean alpha diversity indices per individual tree in the canopies of wild and plantation trees were 84 and 49, respectively.
Keywords: Canopy; Insect diversity; Pollinator; Tectona grandis; Thailand

R.W. Cutler, R. Chundet, T. Handa, S. Anuntalabhochai, Development of sequence characterized DNA markers linked to a temperature dependence for flower induction in lychee (Litchi chinensis Sonn.) cultivars, Scientia Horticulturae, Volume 107, Issue 3, 6 February 2006, Pages 264-270, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.08.005.
(http://www.sciencedirect.com/science/article/B6TC3-4H3938W-1/2/daa988629b20e584d35ee1e84240c415)
Abstract:
In this paper, we present a method to find DNA markers for traits of interest in lychee cultivars (Litchi chinensis Sonn.) using high-annealing temperature random amplified polymorphic DNA (HAT-RAPD) as an initial screening method. Using 5 arbitrary random primers, a wide range of polymorphic bands ranging from 200 to 5200 bp were produced. Bands of interest were then selected for sequencing and conversion to the more reproducible and robust sequence characterized amplified region (SCAR) markers. Specifically, SCAR markers were found that distinguished lychee varieties requiring a sustained interval at low temperatures for flower induction versus those varieties that do not require such an environment, and another SCAR marker was found that amplified only the economically important Kom cultivar. These sequences shared similarity to known transposons suggesting a mechanism by which the temperature insensitivity may have initially developed.
Keywords: Litchee chinensis Sonn.; SCAR marker; Temperature dependence

R.P. Gutierrez Colomer, M.M. Gonzalez-Real, A. Baille, Dry matter production and partitioning in rose (Rosa hybrida) flower shoots, Scientia Horticulturae, Volume 107, Issue 3, 6 February 2006, Pages 284-291, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.08.003.
(http://www.sciencedirect.com/science/article/B6TC3-4H6XM7P-1/2/dabe0ca6fead73ecc7d3918c9effc313)
Abstract:
Dry matter production and allocation to the different organs of rose (Rosa hybrida, cv. Dallas) flower shoots were investigated during three growth cycles (spring, summer and late autumn). The crop was grown under greenhouse conditions in a Mediterranean climate (Valencia, Spain). Fresh and dry matter, leaf area, and thermal time were determined at eight phenological stages of the flower shoot, from cutting to harvest. The increase in the shoot dry matter followed an expolinear function quite closely, suggesting that the shoot growth rate was near its maximum value at the time of harvest. The appearance of the flower bud drastically changed the dry matter distribution between the organs (stem, leaves and flower bud). Leaves were the first organs to be affected by the bud demand, showing a strong decrease in growth rate just after bud appearance. Stem growth rate was also affected, but later, and to a lesser extent. Flower bud growth was exponential until harvest. When expressed as a function of thermal time, dry matter partitioning was rather

similar during the three growth cycles. Empirical functions are proposed that quantify dry matter partitioning in the organs of flower shoots as a function of thermal time. The overall results stressed the key role played by the flower bud in determining the dynamics of dry matter allocation in rose flower shoots.
Keywords: Growth; Development; Phenological stage; Growth function; Flower bud

Tamaki Mishio, Tamaki Honma, Tsukasa Iwashina, Yellow flavonoids in Centaurea ruthenica as flower pigments, Biochemical Systematics and Ecology, Volume 34, Issue 2, February 2006, Pages 180-184, ISSN 0305-1978, DOI: 10.1016/j.bse.2005.07.019.
(http://www.sciencedirect.com/science/article/B6T4R-4HMNGB5-3/2/d5bd9035a4a0cad6ea6a7488c4baf0ab)
Keywords: Centaurea ruthenica; Asteraceae; Flavonoids; Patuletin; Flower pigments

R.G. Van Driesche, S. Lyon, E.J. Stanek III, Bo Xu, C. Nunn, Evaluation of efficacy of Neoseiulus cucumeris for control of western flower thrips in spring bedding crops, Biological Control, Volume 36, Issue 2, February 2006, Pages 203-215, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.08.011.
(http://www.sciencedirect.com/science/article/B6WBP-4HDG9HK-1/2/a91f6d0c112b6fb4b946c87537261c69)
Abstract:
Western flower thrips, Frankliniella occidentalis (Pergande), is the principal insect pest of spring flower crops grown in the northeastern United States for use as bedding plants. Neoseiulus (=Amblyseius) cucumeris (Oudemans) is a predacious mite reared commercially that is recommended for control of western flower thrips in various vegetable and flower crops at a rate of ca 53 mites/m2/week. Efficacy on spring flower crops, however, is not well demonstrated, reports being either from other crops or extension demonstration trials. In two trials (each replicated), we compared suppression of western flower thrips in spring bedding plants provided by (1) N. cucumeris at the recommended rate, (2) spinosad (at the labeled rate), the most widely used thrips-control pesticide, and (3) both combined. Trial No. 1 was run in mixed bedding plants in commercial greenhouses and Trial No. 2 in impatiens monocultures in University greenhouses. We found that in commercial greenhouses, variation in species composition of crops and movement of plants during crop production made it difficult to detect any significant effects. In an impatiens monoculture (Trial No. 2), we found better evidence of partial suppression of thrips larvae and adults by treatments. Spinosad alone provided the best control, with mites alone usually providing control intermediate to that of spinosad alone and the untreated control. Control from spinosad plus mites was not significantly different from that of spinosad alone (all treatments evaluated as counts of thrips per plant, in flowers). In another University-based trial (Trial No. 3), we compared the commercially recommended rate of N. cucumeris (53 mites/m2/week) to a 3- to 4-fold higher rate (190 mites/m2/week) in impatiens monocultures. This trial was replicated twice in the fall of 2004 and once in spring of 2005 in Amherst, Massachusetts. We found that the higher release rate, while not resulting in statistically significantly more mites per plant (in flowers) than the standard rate, did suppress thrips larvae per plant (in flowers) by 50-75%, a higher level than that achieved by the recommended standard rate. No reductions, however, were found in counts of adult thrips, either as numbers per plant (in flowers) or as numbers caught per yellow sticky card, except for one replication in which thrips counts were lowered compared to controls by mites (at both release rates). We conclude that N. cucumeris, especially at the higher rate, provides partial control of western flower thrips in impatiens bedding plants, but that control from spinosad is better. Biological control of western flower thrips with this predator is not a complete thrips IPM program, but may be used together with spinosad or other materials to prevent development of pesticide resistance. This approach is most likely to be of value in crops grown as continuous relay plantings or a series of different, but thrips-susceptible, crop species.

Keywords: Frankliniella occidentalis; Impatiens; Bedding plant crops; Biological control; Greenhouses; Neoseiulus (=Amblyseius) cucumeris; Spinosad; Release rates

N. Katsoulas, C. Kittas, G. Dimokas, Ch. Lykas, Effect of Irrigation Frequency on Rose Flower Production and Quality, Biosystems Engineering, Volume 93, Issue 2, February 2006, Pages 237-244, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2005.11.006.
(http://www.sciencedirect.com/science/article/B6WXV-4HX47J9-1/2/c1d117c23a4addf8ff9396e8f5f58efb)
Abstract:
A better understanding of the effects of irrigation frequency on flower production and quality of rose plants can help to propose optimal irrigation scheduling. For this purpose, experiments were conducted on a soilless rose crop (Rosa hybrida, cv. First Red), with a closed hydroponic system, in a greenhouse located near Volos, on the continental area of eastern Greece. The plants were grown following the bending technique, on rockwool slabs. Irrigation scheduling was based on crop transpiration, and irrigation was performed whenever accumulative solar radiation outside the greenhouse reached 1600 kJ m-2 [high irrigation frequency (HIF)] and 3200 kJ m-2 (low irrigation frequency). The amount of water applied was 0[middle dot]2 and 0[middle dot]4 mm for high and low irrigation frequencies, respectively. Accordingly, the total water applied was equal for both cases. In order to study the effects of irrigation frequency on rose crop, measurements of fresh and dry weight of the cut flower shoots, number of harvested flowers and flowering stem's length, as well as measurements of microclimate variables were carried out. The total period of measurements ended 100 days after the last severe shoot bending (which was performed 60 days after planting). The results showed that irrigation frequency influenced cut flower fresh and dry weight, since the total fresh and dry weight of cut flower shoots measured at the end of the experimental period was about 33% higher in the HIF treatment. Statistical analysis revealed that there was no significant difference between the mean fresh or dry weight of cut flower shoots of the two treatments. As far as the number of shoots harvested is concerned, the results showed that the higher the irrigation frequency, the higher the production, as the total number of cut flowers measured at the end of the experimental period was 20[middle dot]7 and 16[middle dot]2 per greenhouse m-2 for high and low irrigation frequencies, respectively, namely about 28% higher in the HIF. Furthermore, the results showed that the length of rose flowering shoots was not affected by the irrigation frequency. In conclusion, it seems that the higher irrigation frequency improved the biomass production but did not affect the quality of harvested flowers.

M.J. Pascual-Villalobos, A. Lacasa, A. Gonzalez, P. Varo, M.J. Garcia, Effect of flowering plant strips on aphid and syrphid populations in lettuce, European Journal of Agronomy, Volume 24, Issue 2, February 2006, Pages 182-185, ISSN 1161-0301, DOI: 10.1016/j.eja.2005.07.003.
(http://www.sciencedirect.com/science/article/B6T67-4H9GRS1-1/2/401b2f751afeabcd9a94174d9e8ff529)
Abstract:
A two-year field experiment was carried out in Southeast Spain to study the effect of planting strips of Coriandrum sativum L. or Chrysanthemum coronarium L. with spring Iceberg lettuce on aphid and syrphid predator populations. Without chemical treatments, infestations by Nasonovia ribisnigri Mosley spread over the field in March and April. In 2001, the severity of infestations was greater (statistically significant) in lettuces from the plot with coriander margins in comparison with the monoculture. In 2002, predatory syrphid larvae were more abundant (tendency not statistically significant) on lettuces from the plot with flowering plant strips (1.9 larvae/head) than on lettuce monocultures (1.3 larvae/head). Adult syrphids were foraging on flowering strips from early winter to spring. Species identified being: Episyrphus balteatus De Geer, Eupeodes corollae Fabricius, Sphaerophoria rueppellii Wiedemann and Sphaerophoria scripta Linnaeus.

Keywords: Nasonovia ribisnigri; Coriandrum sativum; Chrysanthemum coronarium; Episyrphus balteatus; Eupeodes corollae; Sphaerophoria rueppelli; Sphaerophoria scripta; Floral resources

Renate Spitaler, P. Daniel Schlorhaufer, Ernst P. Ellmerer, Irmgard Merfort, Sigmar Bortenschlager, Hermann Stuppner, Christian Zidorn, Altitudinal variation of secondary metabolite profiles in flowering heads of Arnica montana cv. ARBO, Phytochemistry, Volume 67, Issue 4, February 2006, Pages 409-417, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.11.018.
(http://www.sciencedirect.com/science/article/B6TH7-4J021VY-2/2/1410f26fd79205a074f15b4057ed1a14)
Abstract:
The altitudinal variation on the contents of secondary metabolites in flowering heads of Arnica montana was assessed. Plants of A. montana cultivar ARBO were grown in nine experimental plots at altitudes between 590 and 2230 m at Mount Patscherkofel near Innsbruck/Austria. The total contents of sesquiterpene lactones and flavonoids were not positively correlated with the altitude of the growing site. However, the proportion of flavonoids with vicinal free hydroxy groups in ring B to flavonoids lacking this feature significantly increased with elevation. Additionally, the level of caffeic acid derivatives also positively correlated with the altitude of the growing site. In particular amounts of 1-methoxyoxaloyl-3,5-dicaffeoylquinic acid significantly increased in higher sites and samples from the summit region contained 85% more of this compound than samples from valley sites. These results are discussed with regards to chemosystematic studies comparing samples collected in different altitudes as well as in the light of a UV-B protective and radical scavenging function of phenolics and their significance for plant life in environments with elevated UV-B radiation.
Keywords: Arnica montana; Altitudinal effects; Chemical ecology; Phenolics; Caffeic acid esters; Sesquiterpene lactones; Natural products; UV radiation

L.L. Dreyer, K.J. Esler, J. Zietsman, Flowering phenology of South African Oxalis--possible indicator of climate change?, South African Journal of Botany, Volume 72, Issue 1, February 2006, Pages 150-156, ISSN 0254-6299, DOI: 10.1016/j.sajb.2005.06.009.
(http://www.sciencedirect.com/science/article/B7XN9-4J2M0W4-3/2/78f9aed087907d31a0ce3c20a8edf719)
Abstract:
Oxalis is a large geophytic genus that has diversified extensively in the winter rainfall region of the Cape Flora, South Africa. Patterns of flowering within Oxalis were investigated at both a regional scale (focusing on timing of flowering of Oxalis species in the Cape Region) and a local scale in a single habitat, the J.S. Marais Park, Stellenbosch, over 3 years (1999, 2003 and 2004). We found the active growth period of Oxalis to coincide with the peak rainfall period in the Cape Region, the start of flowering dependent on both the onset of the first significant rains and a drop in average daily temperatures. Both at a regional and local scale endospermous (dormant seed) species displayed an extended flowering season, while exendospermous (non-dormant seed) species displayed flowering peaks early in the rainy season. This correlates well with seedling strategies, in that dormant seeds of endospermous species are less affected by the dry summer months, while seeds of exendospermous species lack dormancy, and must thus germinate and establish seedlings well-before the onset of the dry summer months. Oxalis species in the local study displayed sequential replacement of flowering onset over the growing season, although there was an overlap in peak flowering times. The flowering sensitivity to alterations in temperature and delayed onset of winter rains suggests that specifically exendospermous species of Oxalis may indicate changes in climate. We hypothesize that global warming will influence the relative proportions of exendospermous vs. endospermous species flowering at local and regional scales in the Cape Region of South Africa.
Keywords: Oxalidaceae; Endospermy; Exendospermy; Phenophases

Michel J. Verheul, Anita Sonsteby, Svein O. Grimstad, Interactions of photoperiod, temperature, duration of short-day treatment and plant age on flowering of Fragaria x ananassa Duch. cv. Korona, Scientia Horticulturae, Volume 107, Issue 2, 10 January 2006, Pages 164-170, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.07.004.
(http://www.sciencedirect.com/science/article/B6TC3-4H4T12T-1/2/70229ce774cfba91204603a15b5aeb24)
Abstract:
The effects of photoperiod (10, 12, 16, 20 or 24 h), day-temperature (12, 15, 18, 24 or 30 [degree sign]C), the number of short days (14, 21 or 28 days), plant age (4, 8 or 12 weeks) and their interactions on flower and inflorescence emergence were investigated in strawberry cv. Korona. No flowers emerged in plants exposed to photoperiods of 16, 20 or 24 h or to a short-day treatment for 14 days. All plants exposed to short days at daily photoperiods of 10 or 12 h for 21 days or longer, emerged flowers at temperatures between 12 and 18 [degree sign]C. A further increase in temperature led to a drastic decrease in the total number of flowers per plant. A short-day treatment (10 or 12 h photoperiod) of 28 days resulted in highest numbers of inflorescences and flowers per plant, while a short-day treatment of 21 days resulted in the highest numbers of flowers per inflorescence. Complete flower induction was observed in only 4-week-old runner plants. The number of inflorescences and the number of flowers per inflorescence increased with plant age. However, the start of flowering was delayed with increasing plant age.
Results clearly demonstrate interactions between photoperiod, temperature, duration of short-day treatment and plant age on flowering. This knowledge may be used to produce flower-induced plants in a greenhouse or to develop a model for predicting flower behaviour in the field.
Keywords: Flowering; Fragaria x ananassa; Greenhouse production; Photoperiod; Plant age; Short-day treatment; Temperature

Nadia M. Al-Khassawneh, Nabila S. Karam, Rida A. Shibli, Growth and flowering of black iris (Iris nigricans Dinsm.) following treatment with plant growth regulators, Scientia Horticulturae, Volume 107, Issue 2, 10 January 2006, Pages 187-193, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.10.003.
(http://www.sciencedirect.com/science/article/B6TC3-4HPK8YR-1/2/62a19394c26184d26533b39093fc508c)
Abstract:
The effects of application method and concentration of gibberellic acid (GA3), paclobutrazol and chlormequat on black iris performance were assessed. Plants (10 cm high, 4 +/- 1 leaves) were sprayed with 125, 250, 375 or 500 mg L-1 or drenched with 0.25, 0.5, 1 or 2 mg L-1 GA3. In a second experiment, the plants were sprayed with 100, 250, 500 or 1000 mg L-1 or drenched with 0.25, 0.5, 1 or 2 mg L-1 paclobutrazol. Other plants were sprayed with 250, 500, 1000 or 1500 mg L-1 or drenched with 100, 250, 375 or 550 mg L-1 chlormequat. In each experiment, the control treatment consisted of untreated plants. Results indicated that the tallest plants (37.3 cm) in the GA3 experiment were those sprayed with 250 mg L-1. The most rapid flowering (160 days after planting) occurred when a 375 mg L-1 GA3 spray was used, whereas flowering was delayed to 200 days using 1 mg L-1 GA3 drench. Drenching with 1 mg L-1 GA3 increased height of the flower stalk by 7 cm compared to the control. Though relatively slow to flower, plants drenched with 1 mg L-1 GA3 had long and rigid stalks, which were suitable as cut flowers. Number and characteristics of the sprouts were not affected by GA3. All paclobutrazol sprays resulted in leaf falcation. A 500 or 1000 mg L-1 paclobutrazol spray resulted in severe and undesirable control of plant height, drastic reduction in stalk height and weight, and delayed flowering. Plants drenched with 0.25 or 1 mg L-1 paclobutrazol were suitable as pot plants. Chlormequat reduced plant height only at the highest drench concentration, which also reduced flowering to 70%. No leaf falcation was observed with GA3 or chlormequat. Chemical names: (+/-)-(R*,R*)-beta-((4-

chlorophenyl)methyl)-alpha-(1,1,-dimethylethyl)-1H-1,2,4,-triazol-1-ethanol (paclobutrazol); (2-chloroethyl) trimethylammonium chloride (chlormequat).
Keywords: Iridaceae; GA3; Paclobutrazol; Chlormequat

Pablo de Dios, Angel Jesus Matilla, Mercedes Gallardo, Flower fertilization and fruit development prompt changes in free polyamines and ethylene in damson plum (Prunus insititia L.), Journal of Plant Physiology, Volume 163, Issue 1, 4 January 2006, Pages 86-97, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.03.007.
(http://www.sciencedirect.com/science/article/B7GJ7-4G7DXTB-B/2/bbe4681ec7a0ef0105ffb3a9c9609094)
Abstract: Summary
The flower opening of damson plum (Prunus insititia L.) was accompanied by an increase in the content of free-polyamines (PA) in the sepals, petals and sex organs, the ovary being most active in accumulating spermine (Spm). The fertilization process and senescence brought on a decline in ovarian Spm, but stimulated putrescine (Put) and spermidine (Spd) content in the sepals. The endocarp of this climacteric fruit produced only ethylene at the end of the S1 phase and throughout S2, in which there was a great richness in ACC and MACC. The greatest amounts of ACC and MACC were observed in the ripening mesocarp and epicarp. The contribution of the endocarp and epicarp to the total ACC in the developing fruit was very similar. During flowering and S1 and S2 phases, Spd was the most abundant PA; in contrast, during S3 and S4 Put was most abundant. The mesocarp contributed the most to the total content in PA throughout the fruit development. The control of SAM distribution towards ethylene and/or PA appears to differ during the development of the endocarp, as the only peak of free-Put (detected in S2) coincided with the highest ACC accumulation and ethylene production. On the contrary, in S3 it is probable that SAM was transformed preferentially into PA, given that free-Spd and Spm, hardly detectable in S1 and S2, peaked in this phase in which there was no gas production.
Keywords: Damson plum; Endocarp (seed); Epicarp; Ethylene; Fertilization; Firmness; Flower; Mesocarp; Free polyamines; Ovary; Prunus insititia L. cv. Syriaca; Soluble solid content

Rolf Wisskirchen, An experimental study on the growth and flowering of riparian pioneer plants under long- and short-day conditions, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 201, Issue 1, 2 January 2006, Pages 3-23, ISSN 0367-2530, DOI: 10.1016/j.flora.2005.04.006.
(http://www.sciencedirect.com/science/article/B7GX0-4H9YC20-1/2/f0f6328489474a441be4ebde4f470d60)
Abstract:
Plants of 19 annual taxa from the hygro-nitrophilous vegetation of Central European river banks and dried ponds were exposed as seedlings for 42 days to either natural long days (LD=ca. 15.5 h) or artificial short days (SD=11 h). Phenological and morphological growth parameters such as first flowering, main stem length, leaf size and plant dry weight were measured and compared. Based on their day-length responses, the plants were classified as 11 short-day plants (SDP), 6 long-day plants (LDP) and 2+/-day neutral plants (DNP). Differences of morphological plant responses under SD (compared with those under LD) reached from none to almost negligible ones in Ranunculus sceleratus, Bidens cernua, Chenopodium ficifolium and Rumex palustris to an extreme reduction in all parameters, as in Chenopodium glaucumxrubrum, Ch. rubrum, Ch. glaucum, Ch. polyspermum, Bidens radiata, Persicaria lapathifolia subsp. brittingeri and subsp. lapathifolia. Growth inhibition was usually combined with neotenic flowering in SDP. Some LDP exhibited clear dormancy responses, like the formation of smaller (winter) rosettes. Erosulate therophytes were mostly SDP while (hemi)rosulate to caespitose winter annuals or short-lived hemicryptophytes were LDP. Plants of seven species that were exposed to natural SD in spring (increasing day length) showed rather different responses. While Bidens radiata flowered in late

spring soon after floral induction, other species showed increasing degrees of flowering delay (Chenopodium polyspermum-->Xanthium saccharatum-->Chenopodium rubrum). Only Atriplex prostrata did not exhibit any sign of floral induction until (decreasing) SD in late summer arrived. In the case of Chenopodium rubrum details of the divergent morphogenesis under SD and LD were studied. In this species SD lead to strong reduction of stem length, leaf number and leaf size, simplification of leaf outline and margins as well as an enhanced ramification in the axils of primary leaves (and cotyledons) instead of metaphylls. The study reveals that for the phytosociological vegetation group Chenopodion rubri, whose populations are mainly confined to river banks with moist but well-aerated sediments, erosulate, therophytic and often neotenic SDP are typical. For the species of the Bidention - that thrive preferentially at the margins of stagnant water on rather wet soils - (hemi)rosulate or caespitose winter annuals are frequent. They are often LDP and survive the cold season in a vegetative state, even under a shallow level of water. The SD response of therophytic pioneers together with an often strong neotenic plasticity is interpreted here as a reassurance for the plants to flower and set seed in riparian habitats that are available for colonization only for a short and insecure period of the year, which due to the asymmetric position of annual low water levels in larger rivers is often not before mid-summer.
Keywords: Plant ecology; Photoperiodism; Photomorphogenesis; Neoteny; Dormancy; Pioneer vegetation; Dwarfism; River banks; Chenopodium rubrum; Chenopodion rubri; Bidention

Zi-hong YE, Jun ZHU, Heterosis Study on Developmental Behavior of Flowering and Boll Setting in Upland Cotton, Agricultural Sciences in China, Volume 5, Issue 1, January 2006, Pages 23-32, ISSN 1671-2927, DOI: 10.1016/S1671-2927(06)60015-1.
(http://www.sciencedirect.com/science/article/B82XG-4JCC40Y-3/2/1f4eba35b68106fbb1fdb4b66148cdeb)
Abstract:
The developmental behavior was examined for flowering and boll setting in upland cotton (Gossypium hirsutum L.) at different boll-setting sites and blooming periods. Conventional and conditional methods were applied to analyze heterosis by an additive-dominance model with genotype by environment (GE) interaction effects. Positive general heterosis was significantly detected on middle-lower nodes at positions 1 and 2 for a number of flowers and bolls per plant. Deviation between HPBE1 and HPBE2 was relatively large for a number of flowers per plant at positions 3, 4, and 5, but much smaller for number of bolls per plant. There was increase of heterosis before the end of July, and the highest heterosis was observed at 22 DAF (22 days after flowering) for flowers and at 16 DAF for bolls, and then declined. There existed significant diversity of interaction heterosis for flowers as well as for bolls during blooming stages, but deviation between HPBE1 and HPBE2 was smaller for number of bolls per plant than that of flowers per plant. The cross of DP-15 (late-season variety)' HG-H-12 had positive general heterosis since 19 DAF, and negative HPB was observed for the cross of GL-5 (early-season variety)' HG-H-12 after 37 DAF. Interaction heterosis was mostly not significant for cross DP-15' HG-H-12, but the reverse was true for cross GL-5' HG-H-12. Positive conditional HPB was detected since 16 DAF until 43 DAF for cross DP-15' HG-H-12, and before 13 DAF for cross GL-5' HG-H-12.
Keywords: Gossypium hirsutum L.; heterosis; conditional analysis; number of flowers; number of bolls

Xuenong Xu, Christian Borgemeister, Hans-Michael Poehling, Interactions in the biological control of western flower thrips Frankliniella occidentalis (Pergande) and two-spotted spider mite Tetranychus urticae Koch by the predatory bug Orius insidiosus Say on beans, Biological Control, Volume 36, Issue 1, January 2006, Pages 57-64, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.07.019.
(http://www.sciencedirect.com/science/article/B6WBP-4H39324-1/2/007a654036862562d1583c15fa0a372e)

Abstract:
An omnivore shows preference to its preys and thus its control efficiency could be altered in different mix infestation system. The efficiency of Orius insidiosus for biocontrol of either Frankliniella occidentalis or Tetranychus urticae alone or for the two pests in combinations was studied on beans. When only mites or thrips were offered as prey, 1 or 2 O. insidiosus could considerably suppress pest populations at an initial density of 20, 40, and 80 adult female mites, and 100 and 160 thrips larvae, respectively. A single O. insidiosus was able to reduce mite populations by 52.9, 38.7, and 25.8% at initial densities of 20, 40, and 80 mites, respectively, two bugs achieved control levels of 60.6, 63.1, and 38.4%. Releases of 1 and 2 O. insidiosus resulted in corrected mortalities of 62.5 and 87.9%, and 46.3 and 71.9% in F. occidentalis at initial larval densities of 100 and 160, respectively. When two pests were simultaneously offered, the efficiency of O. insidiosus in controlling T. urticae markedly decreased. Furthermore, mite control decreased with increasing T. urticae densities and was also affected by the density of O. insidiosus. The presence of mites at initial densities of 20-80 females did not significantly influence thrips control by O. insidiosus. The presence of F. occidentalis resulted in higher oviposition by O. insidiosus females than the presence of mites, indicating that thrips are a more suitable resource than T. urticae for O. insidiosus. The implications for biocontrol of F. occidentalis and T. urticae are discussed.
Keywords: Thrips; Spider mites; Mix infestation; Predatory bug; Mutual relation; Biocontrol

N. Lamien, J.I. Boussim, R. Nygard, J.S. Ouedraogo, P.C. Oden, S. Guinko, Mistletoe impact on Shea tree (Vitellaria paradoxa C.F. Gaertn.) flowering and fruiting behaviour in savanna area from Burkina Faso, Environmental and Experimental Botany, Volume 55, Issues 1-2, January 2006, Pages 142-148, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2004.10.010.
(http://www.sciencedirect.com/science/article/B6T66-4F2V51M-1/2/d0f558d55cf0ce394de238e6aa5c0eba)
Abstract:
Vitellaria paradoxa C.F. Gaertn., Sapotaceae family, is a characteristic species of the woody flora in savanna woodland of Africa. The fresh pulp of its fruits and the butter extracted from the kernels play an important social and economic role in rural areas. However, about 95% of the trees in natural stands are infected with Mistletoes, which are plant parasites. The objective of this study was to assess the impact of this type of parasite on the flowering and fruiting behaviour of the infected branches. For the flowering and fruiting follow-up, 46 infected branches and 46 healthy ones selected on 30 trees located in cropping areas were tagged. The infected branch diameters before and after the attachment point of the parasite and the size of the stump of the parasite were measured. The number of reproductive organs of the on-year fruit bearing shoots was counted each week during the blossom period. Pearson's correlation coefficients were estimated to measure the association between the infected branch morphological parameters and the number of reproductive organs. General Linear Model ANOVA and Student's paired sample test were performed to compare the reproduction index of the infected to healthy branches. The data did not show sufficient evidence that indicate negative association between the infected branch morphological parameters and the reproduction index. No significant difference was observed between the flowering and fruiting behaviour of infected branches and that of healthy ones. The possible reasons of these results are discussed.
Keywords: Vitellaria paradoxa; Mistletoes; Impact; Fruit production; Burkina Faso

Robert C. Schuurink, Michel A. Haring, David G. Clark, Regulation of volatile benzenoid biosynthesis in petunia flowers, Trends in Plant Science, Volume 11, Issue 1, January 2006, Pages 20-25, ISSN 1360-1385, DOI: 10.1016/j.tplants.2005.09.009.
(http://www.sciencedirect.com/science/article/B6TD1-4H9PNC4-2/2/4b86022bd76b0b85720dc37a81081054)

Abstract:
The petunia flower has served as a model for the study of several physiological processes including floral development, self-incompatibility, anthocyanin biosynthesis and ethylene signalling during senescence. More recently, Petunia hybrida `Mitchell' has been used to understand the complex regulation of volatile benzenoid biosynthesis, which occurs predominantly in flower petal tissues. Benzenoid biosynthesis is temporally and circadian controlled and is tightly down-regulated by ethylene during floral senescence. Using targeted transcriptomics and gene knockouts, both biosynthetic genes and a transcription factor regulating benzenoid synthesis have been recently discovered and characterized. It appears that benzenoid production is regulated predominantly by transcriptional control of the shikimate pathway, benzenoid biosynthesis genes and S-adenosyl-methionine cycle genes.

Robert Frankl, Sarah Wanning, Ralf Braun, Quantitative floral phenology at the landscape scale: Is a comparative spatio-temporal description of ``flowering landscapes'' possible?, Journal for Nature Conservation, Volume 13, Issue 4, 6 December 2005, Pages 219-229, ISSN 1617-1381, DOI: 10.1016/j.jnc.2004.10.002.
(http://www.sciencedirect.com/science/article/B7GJ6-4GPW6K4-1/2/8f2b2d20c21b9e1da8c0d804397d6586)
Abstract: Summary
Entomophilous flowers form the food resources for insect pollinators. Many pollinator species forage at the landscape scale and depend on floral resources that are highly variable in space and time. We present a general model approach in which the floral resources of plant communities are estimated by the floral phenology and the cover of entomophilous plant species. We applied this landscape model in a case study for three landscape sections (1.5-2.2 km2) with strongly differing land-use patterns. The comparison between a conservation area and two agricultural landscapes shows extreme differences in the quantities and in the course of floral resources.
In a stepwise simplification of the landscape model we tested the effects of input data with lower spatio-temporal resolution. Even if input data for floral phenology and vegetation have a low resolution, the landscape model allows a ranking of landscape-specific floral resource potentials. The results of the case study encourage the use of landscape models to estimate floral resource potentials. The assessment of floral resource potentials may help to define this essential landscape quality for evaluation in practical nature conservation.
Keywords: Floral resources; Landscape analysis; Landscape quality; Pollinator habitat

Martin Roser, G. Tcherkez, Editor, Flowers - evolution of the floral architecture of angiosperms, Science Publishers, Enfield (NH), USA (2004) ISBN 1-57808-311-7 (194pp., price: USD 78.00)., Journal of Plant Physiology, Volume 162, Issue 12, 1 December 2005, Pages 1381-1382, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.07.002.
(http://www.sciencedirect.com/science/article/B7GJ7-4H0BSMY-2/2/64daeca2482b815e39176dac5d0e9e93)

Allan Holm Nielsen, Carl Erik Olsen, Birger Lindberg Moller, Flavonoids in flowers of 16 Kalanchoe blossfeldiana varieties, Phytochemistry, Volume 66, Issue 24, December 2005, Pages 2829-2835, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.09.041.
(http://www.sciencedirect.com/science/article/B6TH7-4HK5SV2-1/2/38f3772f6def54571166dd59864c23f8)
Abstract:
Kalanchoe blossfeldiana varieties with orange, pink, red and magenta flowers were found to contain 3,5-O-[beta]-d-diglucosides of pelargonidin, cyanidin, peonidin, delphinidin, petunidin and malvidin. Pink, red and magenta varieties contained relatively high amounts of quercetin based flavonols. Four distinct quercetin flavonols were identified, namely quercetin 3-O-[beta]-d-

glucoside and three that were quercetin 3-O-[alpha]-l-rhamnoside based, with either glucose, xylose or arabinose attached to position 2 of the rhamnose. In addition, the presence of at least three kaempferol based diglycosides was suggested from LC-MS analyses. Orange varieties contained very low amounts of flavonol co-pigments and of delphinidin derivatives. The flower extracts of the varieties `Diva' (magenta) and `Molly' (red) had identical anthocyanin ratios but differed significantly in flavonol content. The magenta variety contained four times as much quercetin relative to anthocyanidin as the red variety. This difference was mainly due to a larger content of quercetin 3-O-(2''-O-[beta]-d-glucopyranosyl-[alpha]-l-rhamnopyranoside). Based on pigment and co-pigment analyses, approaches for molecular breeding towards blue flower colour are discussed.
Keywords: Kalanchoe blossfeldiana; Crassulaceae; Flavonoids; Pelargonidin; Cyanidin; Peonidin; Delphinidin; Petunidin; Malvidin; Quercetin; Kaempferol; Rhamnose; Glucose; Arabinose; Xylose

Alfonso Vargas, Mario Araya, Sigifredo Rojas, Percy Roman, Effect of removing or leaving the suckers at flowering of plantain (Musa AAB, cv. `False Horn' type) on bunch weight and foliar nutrient content of the parent plant, Scientia Horticulturae, Volume 107, Issue 1, 1 December 2005, Pages 70-75, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.05.012.
(http://www.sciencedirect.com/science/article/B6TC3-4GWC28X-1/2/ebe99eb0be26e57123c7477bfb0602f6)
Abstract:
Three experiments were conducted on three commercial plantain (Musa AAB, cv. `False Horn' type) plantations during the plant crop or first production cycle in the Costa Rican Caribbean zone. The purpose was to verify the effect of removing or leaving suckers at flowering stage on yield and foliar nutrient content of the plantain parent plant. Treatments consisted of removing all suckers, leaving one single follower sucker or leaving all suckers present. Bunch weight, thickness and length of the central fruit of the outer row of the second hand did not differ between plants where suckers were completely removed and plants with a follower sucker in experiments I ($P > 0.22$), II ($P > 0.05$) and III $P > 0.05$). Leaving all the suckers in experiment III induced a mean reduction of 1.1 kg (8.5%) in bunch weight ($P = 0.0075$) and of 1.1 cm (5%) in finger length ($P = 0.0560$). In the three experiments no difference in the number of hands ($P > 0.3927$) per bunch or number of fruits ($P > 0.1350$) in the second hand was observed. In experiments II ($P = 0.0080$) and III ($P = 0.0001$) the follower sucker height at harvest was higher when only one follower was retained. With exception of the Ca ($P = 0.0249$) foliar content in experiment I, S ($P = 0.0238$) and B ($P = 0.0240$) in experiment II and K ($P = 0.0270$), Cu ($P = 0.0185$) and Mn ($P = 0.0476$) in experiment III, no differences ($P > 0.07$) in the foliar content of the other nutrients among parent plants with no suckers, holding one or all the suckers in the production unit were observed. With exception of the Mg foliar content in experiment II and Fe in experiment III, differences ($P < 0.01$) in the foliar nutrient content was observed between flowering and harvest. The foliar N, P, K, Mg, S, Cu and B concentration diminished ($P < 0.01$) and Ca and Mn increased ($P < 0.01$) from flowering to harvest in the three experiments.
Keywords: Cultural practices; Desuckering; Foliar nutrient content; Yield

Masahiro Nishihara, Takashi Nakatsuka, Saburo Yamamura, Flavonoid components and flower color change in transgenic tobacco plants by suppression of chalcone isomerase gene, FEBS Letters, Volume 579, Issue 27, 7 November 2005, Pages 6074-6078, ISSN 0014-5793, DOI: 10.1016/j.febslet.2005.09.073.
(http://www.sciencedirect.com/science/article/B6T36-4H8FTSY-6/2/4aa3aceaf5c9a4f5b7a75cc7013bf782)
Abstract:
A cDNA encoding chalcone isomerase (CHI) was isolated from the petals of Nicotiana tabacum and the effect of its suppression on flavonoid biosynthesis was analyzed in transgenic tobacco

plants. CHI-suppression by RNA interference (RNAi) showed reduced pigmentation and change of flavonoid components in flower petals. The plants also accumulated high levels of chalcone in pollen, showing a yellow coloration. Our results first demonstrated that suppression of CHI by genetic transformation is possible in higher plants. This suggests that CHI plays a major part in the cyclization reaction from chalcone to flavanone, and that spontaneous reactions are few, if any, in tobacco plants.
Keywords: Chalcone isomerase; Flavonoid biosynthesis; Flower color; RNAi; Nicotiana tabacum

Mrunal S. Damle, Ashok P. Giri, Mohini N. Sainani, Vidya S. Gupta, Higher accumulation of proteinase inhibitors in flowers than leaves and fruits as a possible basis for differential feeding preference of Helicoverpa armigera on tomato (Lycopersicon esculentum Mill, Cv. Dhanashree), Phytochemistry, Volume 66, Issue 22, November 2005, Pages 2659-2667, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.09.006.
(http://www.sciencedirect.com/science/article/B6TH7-4HDP78N-1/2/e8a4d26ddb408f64a11cf4f199724ac2)
Abstract:
Tomato (Lycopersicon esculentum, Mill; cultivar- Dhanashree) proteinase inhibitors (PIs) were tested for their trypsin inhibitory (TI) and Helicoverpa armigera gut proteinases inhibitory (HGPI) activity in different organs of the tomato plants. Analysis of TI and HGPI distribution in various parts of the plant showed that flowers accumulated about 300 and 1000 times higher levels of TI while 700 and 400 times higher levels of HGPI as compared to those in leaves and fruits, respectively. Field observation that H. armigera larvae infest leaves and fruits but not the flowers could be at least partially attributed to the protective role-played by the higher levels of PIs in the flower tissue. Tomato PIs inhibited about 50-80% HGP activity of H. armigera larvae feeding on various host plants including tomato, of larvae exposed to non-host plant PIs and of various larval instars. Tomato PIs were found to be highly stable to insect proteinases wherein incubation of inhibitor with HGP even for 3 h at optimum conditions did not affect inhibitory activity. Bioassay using H. armigera larvae fed on artificial diet containing tomato PIs revealed adverse effect on larval growth, pupae development, adult formation and fecundity.
Keywords: Lycopersicon esculentum; Helicoverpa armigera; Proteinase inhibitors; Midgut proteinases; Plant defense; Accumulation of PI

Takashi Nakatsuka, Masahiro Nishihara, Keiichiro Mishiba, Saburo Yamamura, Two different mutations are involved in the formation of white-flowered gentian plants, Plant Science, Volume 169, Issue 5, November 2005, Pages 949-958, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.06.013.
(http://www.sciencedirect.com/science/article/B6TBH-4GP271F-2/2/f25034cef6239bf11afdc6c766155644)
Abstract:
Japanese cultivated gentian plants have naturally blue flowers, but some white-flowered cultivars are being bred through the utilization of spontaneous mutants. To determine the molecular basis of white coloration in gentian flowers, we compared two white-flowered cultivars Homoi and Polano White to a blue-flowered cultivar Maciry using biochemical and molecular approaches. High performance liquid chromatography (HPLC) analyses showed that flavone levels in cv. Polano White were only about one-half the amounts measured in the other two cultivars, while anthocyanins were absent in the two white-flowered cultivars compared to cv. Maciry in which high levels accumulated. Northern blot analysis of 10 flavonoid biosynthetic structural genes, previously reported to be temporally regulated in cv. Maciry [1] showed that cv. Homoi lacked transcripts for the anthocyanidin synthase (ANS) gene while cv. Polano White had decreased expressions for ANS as well as for chalcone synthase (CHS), flavanone 3-hydroxylase (F3H), flavonoid 3',5'-hydroxylase (F3',5'H), dihydroflavonol 4-reductase (DFR), UDP-glucose:flavonoid 3-

glucosyltransferase (3GT) and anthocyanin 5-aromatic acyltransferase (5AT). Southern blot analysis confirmed the deficiency of one of two ANS loci in cv. Homoi. Transient expression of ANS in flower petals also strongly suggested that white flowers of cv. Homoi were derived from ANS mutation. Furthermore, analysis of stress-induced flower pigmentation suggested that rather than mutations in multiple structural genes being the cause, a defect in one or more regulatory factors controlling the later steps of flavonoid biosynthesis is responsible for white coloration in cv. Polano White.
Keywords: Anthocyanidin synthase; Flavonoid; Gene expression; Gentian; Mutation; White flower

Anastasios I. Darras, Leon A. Terry, Daryl C. Joyce, Methyl jasmonate vapour treatment suppresses specking caused by Botrytis cinerea on cut Freesia hybrida L. flowers, Postharvest Biology and Technology, Volume 38, Issue 2, November 2005, Pages 175-182, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2005.06.011.
(http://www.sciencedirect.com/science/article/B6TBJ-4H6XKWV-1/2/33562beda4e6b7a60dd5786a9d36be3b)
Abstract:
Treatment of cut freesia var. Cote d'Azur flowers with methyl jasmonate (MeJA, 0.1 [mu]l MeJA l-1) vapour suppressed petal specking caused by Botrytis cinerea infection. MeJA efficacy was concentration and incubation temperature dependent. Disease severity, lesion numbers and lesion diameters decreased with increasing MeJA concentration from 0.025 to 0.1 [mu]l MeJA l-1. However, there were no significant (P > 0.05) differences among MeJA concentrations examined. MeJA was more effective in reducing B. cinerea flower specking at 20 [degree sign]C than at 12 [degree sign]C. MeJA treatment was ineffective at 5 [degree sign]C. At 20 [degree sign]C, MeJA treatment at 0.1 [mu]l MeJA l-1 reduced disease severity, lesion numbers and lesion diameters by 58, 50 and 48%, respectively, as compared to untreated controls. In a repeat experiment, disease severity, lesion numbers and lesion diameters on MeJA vapour treated flowers after 12 h of incubation were reduced by 68, 56 and 50%, respectively. MeJA did not exert direct antifungal activity in-vitro, suggesting that treatment in-vivo reduced B. cinerea-induced flower specking by induction of host defence responses. MeJA at 0.1 [mu]l MeJA l-1 significantly (P < 0.05) increased vase life of cut freesia flowers and delayed senescence judged by lower wilt scores and higher fresh weights as compared to untreated controls.
Keywords: Cut flower; MeJA; Vase life

O. Zarrouk, Y. Gogorcena, J. Gomez-Aparisi, J.A. Betran, M.A. Moreno, Influence of almond x peach hybrids rootstocks on flower and leaf mineral concentration, yield and vigour of two peach cultivars, Scientia Horticulturae, Volume 106, Issue 4, 1 November 2005, Pages 502-514, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.04.011.
(http://www.sciencedirect.com/science/article/B6TC3-4GKWJ6W-2/2/eb8f3bc948136d86187a1fe257d85c46)
Abstract:
Flower and foliar nutrient content of `Queen Giant' and `Tebana' peach [Prunus persica (L.) Batsch] on six almond x peach hybrids rootstocks (`Adafuel', `Adarcias', `GF 677', `Cadaman', `Garnem' and `Felinem') were determined during one season. The mineral elements analysed were: N, P, K, Ca, Mg, Fe, Mn, Zn, Na and Cu. Leaf N concentration in `Queen Giant' was the highest on `Cadaman' and `GF 677' and the lowest on `Adarcias'. The P, Fe and Zn concentrations in flowers and leaves were significantly correlated. The leaf chlorophyll concentration at 120 DAFB was positively correlated with Fe floral concentration and with K, Zn and Na leaf concentration, in `Queen Giant', and with K and Mn leaf concentration, in `Tebana'. In `Queen Giant', the greatest trunk cross-sectional area was exhibited with `Felinem' and `Garnem' and the lowest with `Adarcias'. In contrast, the greater yield efficiency was found on `Adarcias'. In `Queen Giant', a negative correlation was found between yield efficiency and Ca in leaves and in

flowers. A positive correlation was observed between tree vigour and flower Fe, flower Ca and leaf Ca concentration. Correlation was also found between yield efficiency and Mg in `Tebana' flowers. In `Queen Giant', `Felinem' rootstock showed the weakest balanced nutritional values ([Sigma]DOP index) compared with other rootstocks.
Keywords: Peach; Rootstock; Flower mineral analysis; Foliar mineral analysis

B. Halbrecq, P. Romedenne, J.F. Ledent, Evolution of flowering, ripening and seed set in buckwheat (Fagopyrum esculentum Moench): quantitative analysis, European Journal of Agronomy, Volume 23, Issue 3, October 2005, Pages 209-224, ISSN 1161-0301, DOI: 10.1016/j.eja.2004.11.006.
(http://www.sciencedirect.com/science/article/B6T67-4F6MDKS-3/2/45d5c2ed8ad8ca954b7a4be9b0a2a8f8)
Abstract:
Buckwheat is characterised by a low grain yield despite an abundant formation of flowers through a long period of time. To understand the genesis of this low final yield (around 2000-2500 kg ha-1 in our weather conditions of Belgium), we studied, during 3 years in the field, the evolution of flowering and ripening of inflorescences or spikes located on the main stem of buckwheat plants of cultivar 'La Harpe'. We applied different treatments of defoliation (partial and complete) and partial removal of inflorescences of the main stem in order to modify the availability of photosynthates and to reduce the competition between kernels. In all cases, whatever the treatment, there was a drastic reduction of the grain number relative to the number of flowers formed, seed set being very low, around 20-30%. Cumulative curves of development stages of flowers and kernels show clearly that complete flower senescence occurring early after full display of the corolla accounted for most of the low grain set, whatever the treatments and the trials. The critical stage of grain is clearly just after flowering and is not influenced by change in sink-source relations due to defoliation or removal of inflorescences parts. In a given inflorescence, the extent of this early senescence increases progressively from the base (near the peduncle) to the top of the inflorescence.
A drastic reduction of competition between inflorescences and kernels (through partial removal of inflorescences) has only a negligible effect on final grain yield per plant, indicating a strong compensation by the remaining kernels. Thus, the limitation is associated to a strong sink restriction appearing only in some flowers and probably linked to internal flower structure and fertilization.
Keywords: Buckwheat; Defoliation; Removal inflorescences; Flowering; Seed set; Abortion rate

Adriana G. Kantolic, Gustavo A. Slafer, Reproductive development and yield components in indeterminate soybean as affected by post-flowering photoperiod, Field Crops Research, Volume 93, Issues 2-3, 14 September 2005, Pages 212-222, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.10.001.
(http://www.sciencedirect.com/science/article/B6T6M-4DS97NP-1/2/bbddbf2436089dda8ee56fa28e18abbe)
Abstract:
Pod and seed number are the most important yield components in soybean (Glycine max (L.) Merrill) crops. Crop growth rate during post-flowering and the duration of the period when pod and seeds are formed explain much of the variation of soybean yields across genotypes and environments. Exposing post-flowering stages to long photoperiod has been found to extend the period R3-R6 and to increase seed number in soybeans grown under field conditions. In this paper, post-flowering development and yield components responses to photoperiod were quantitatively analysed and the degree of coupling between both responses was investigated. Indeterminate soybean cultivars, A-5409 (maturity group V) and Dekalb CX-458 (maturity group IV), were grown under field conditions and exposed to natural photoperiod from sowing to the

beginning pod stage (R3). From then onwards, they were either kept under natural daylength or exposed to four photoperiod regimes that were artificially extended in relation to natural daylength by 1.5, 3.0, 4.5 or 6.0 h. All the extended photoperiod regimes increased the duration of R3-R6 period. Both cultivars showed a quantitative type of response through the whole range of explored photoperiods, though A-5409 exhibited a stronger sensitivity. Development responses during the R6-R8 phase were less noticeable and more variable. Exposing plants to extended photoperiod increased the number of nodes per plant and improved node fertility, thus increasing the number of pods and seeds produced per unit area. Average seed weight tended to be reduced in plants exposed to extended photoperiod and the magnitude of these effects depended both on cultivars and treatments. However, seed size was reduced in ca. 20% while seed number was increased by more than 75% due to the treatments. These results strengthen the hypothesis that manipulating photoperiod sensitivity during post-flowering in indeterminate soybean may actually be an avenue to increase seed number and yield.
Keywords: Soybean; Glycine max; Photoperiod; Development; Yield components

Christian Zidorn, Birthe Schubert, Hermann Stuppner, Altitudinal differences in the contents of phenolics in flowering heads of three members of the tribe Lactuceae (Asteraceae) occurring as introduced species in New Zealand, Biochemical Systematics and Ecology, Volume 33, Issue 9, September 2005, Pages 855-872, ISSN 0305-1978, DOI: 10.1016/j.bse.2004.12.027.
(http://www.sciencedirect.com/science/article/B6T4R-4G5BJVX-2/2/df4d7873817b7ab30b16a0701771c38b)
Abstract:
Crepis capillaris, Hieracium pilosella, and Hypochaeris radicata were investigated for the influence of the altitude of the collection site on the content of phenolics within the flowering heads. These three taxa from the Lactuceae tribe of the Asteraceae family originate from Europe and are now widespread within New Zealand. Flowering heads collected from different altitudes ranging from 180 m to 1060 m (C. capillaris), from 190 to 1290 m (H. pilosella), and from 20 m to 1290 m (H. radicata), respectively, were extracted and analysed by high performance liquid chromatography. Results showed a positive correlation between the altitude of the growing site and the contents of flavonoids and phenolic acids for all investigated taxa. The altitudinal effect was, however, partially concealed by geographic differences between coastal and inland collection sites, with the inland collections containing higher concentrations of flavonoids and phenolic acids than plants collected from the coast. The results are discussed in the light of a putative UV-B protective function of the quantified compounds and of the immigration histories of the three species at hand.
Keywords: Flavonoids; Phenolic acids; High performance liquid chromatography; Regression analysis; Altitude; UV-radiation; New Zealand; Chemosystematics; Crepis capillaris; Hieracium pilosella; Hypochaeris radicata

Elka Georgieva, Nedjalka Handjieva, Simeon Popov, Luba Evstatieva, Comparative analysis of the volatiles from flowers and leaves of three Gentiana species, Biochemical Systematics and Ecology, Volume 33, Issue 9, September 2005, Pages 938-947, ISSN 0305-1978, DOI: 10.1016/j.bse.2005.01.002.
(http://www.sciencedirect.com/science/article/B6T4R-4G54HX2-3/2/b51c3691b410e1c0797bd16017a7a1d6)
Abstract:
The volatiles from fresh flowers and leaves of Gentiana lutea L., Gentiana punctata L. (yellow Gentiana spp.) and Gentiana asclepiadea L. (Gentianaceae Juss.) were analyzed by GC/MS and 81 compounds identified. The samples studied showed differences in the volatile profiles of flowers and leaves among the species. In the flower-oils straight chain saturated aliphatic hydrocarbons were dominant along with low concentrations of branched saturated aliphatic hydrocarbons and alkylated benzenes. These compounds were not present in the flowers of G.

lutea and G. punctata and in the leaves of G. lutea. The branched saturated aliphatic hydrocarbons were the main constituents of the leaf-oil from G. ascleapidea. Terpenes were found in all flower-oils and in the leaf oil from G. punctata. Some of the identified compounds might have allelopathic activity. The results obtained confirm the accepted taxonomical scheme of the genus Gentiana and are also in agreement with the evolutionary less advanced position of the yellow species of Gentiana.
Keywords: Gentiana; Gentianaceae; Volatiles; Cluster analysis; Evolution

Jana C. Lee, George E. Heimpel, Impact of flowering buckwheat on Lepidopteran cabbage pests and their parasitoids at two spatial scales, Biological Control, Volume 34, Issue 3, Working at the interface of art and science: how best to select an agent for classical biological control?, September 2005, Pages 290-301, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.06.002.
(http://www.sciencedirect.com/science/article/B6WBP-4GNTFR9-2/2/5e36602bcfee7c4bb88e1843f883eac6)
Abstract:
We assessed the potential of annual buckwheat, Fagopyrum esculentum Moench, to lead to improved parasitism of lepidopteran cabbage pests over four years. Pest, parasitism, and hyperparasitism rates were monitored in replicated cabbage plots (12 x 20 m) with or without 3 m wide buckwheat borders from 2000 to 2003. Floral borders did not significantly increase egg, larval, or pupal densities of cabbage looper, Trichoplusia ni (Hubner), imported cabbageworm, Pieris rapae (L.), or diamondback moth, Plutella xylostella (L.). Buckwheat increased parasitism rates by Voria ruralis (Fallen) on T. ni larvae and Cotesia rubecula (Marshall) on P. rapaelarvae over four years. Parasitism by Diadegma insulare (Cresson) on P. xylostella larvae was higher in buckwheat than control plots in the first year, and parasitism by Euplectrus plathypenae (Howard) on T. ni larvae was lower in buckwheat than control plots in the second year. The hyperparasitoid Conura side (Walker) attacked D. insulare all four years, but buckwheat did not affect hyperparasitism rates. The effect of spatial scale on pest densities and parasitism in 2001 was evaluated by comparing plots separated at least 67 m (nearby) versus 800 m apart (isolated). T. ni pupae and P. rapae eggs and pupae were more abundant in plots in closer proximity, whereas P. xylostella densities did not vary by the spatial separation of plots. Tachinids and Pteromalus puparum (L.) attacked more P. rapae in nearby plots. E. plathypenae responded to the treatment x scale interaction, parasitizing more in control than buckwheat when plots were isolated but not when plots were nearby.
Keywords: Habitat diversification; Floral nectar; Hyperparasitism; Trichoplusia ni; Pieris rapae; Plutella xylostella; Voria ruralis; Euplectrus plathypenae; Copidosma floridanum; Pteromalus puparum; Cotesia rubecula; Cotesia glomerata; Diadegma insulare; Conura side

Todd A. Ugine, Stephen P. Wraight, John P. Sanderson, Acquisition of lethal doses of Beauveria bassiana conidia by western flower thrips, Frankliniella occidentalis, exposed to foliar spray residues of formulated and unformulated conidia, Journal of Invertebrate Pathology, Volume 90, Issue 1, September 2005, Pages 10-23, ISSN 0022-2011, DOI: 10.1016/j.jip.2005.07.003.
(http://www.sciencedirect.com/science/article/B6WJV-4H3JHJJ-1/2/32d33b1ff74fde87389973be04bd15bc)
Abstract:
Secondary acquisition of Beauveria bassiana conidia was recorded on the whole bodies and selected body parts of second-instar nymphs and adult female western flower thrips exposed to foliar spray residues of three differently formulated conidial preparations, for 24 h. Conidia were formulated in emulsifiable oil or with clay (wettable powder), or were essentially unformulated conidia (technical grade powder suspended in water with a surfactant). Formulation had no significant effect on dose acquisition and no effect on virulence of acquired conidia. The mean nymphal LC50/LD50 was 116 conidia/mm2 and 52 conidia/insect, respectively; the values for

adults were 19 conidia/mm2 and 5 conidia/insect. Greatest numbers of conidia were recorded on the legs and abdomens of nymphs and on the legs, wings, and thoraces of adults. As would be expected, numbers of conidia acquired increased with residue concentration (application rate). However, an inverse relationship was noted between acquisition rate (conidia acquired/total conidia applied) and residue concentration. The mechanism underlying this response was not determined. However, there was no indication that any body parts (e.g., tarsi) became saturated with spores, which suggests that either the thrips were repelled by the conidial residues or that as the concentrations of conidia on the substrate increased, conidia somehow became more difficult to acquire. Slopes of the LC probit regressions were lower than those of the LD regressions (mean 1.14 vs 1.78), suggesting that the low slopes often obtained in fungal pathogen assays could be partly an artifact of unequal rates of dose acquisition at low vs high application rates.
Keywords: Western flower thrips; Frankliniella occidentalis; Beauveria bassiana; Bioassay; Formulations; Foliar spray residues; Secondary pick-up

Ilias F. Ilias, Nihal Rajapakse, Prohexadione-calcium affects growth and flowering of petunia and impatiens grown under photoselective films, Scientia Horticulturae, Volume 106, Issue 2, 1 September 2005, Pages 190-202, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.02.023.
(http://www.sciencedirect.com/science/article/B6TC3-4FX23P8-1/2/293abb611903b2c36a501ce6617a5046)
Abstract:
The response of petunia (Petunia x hybrida Vilm.-Andr. `Countdown Burgundy') and impatiens (Impatiens wallerana Hook `Accent Orange Tempo') to Prohexadione-calcium was evaluated under a clear and a far-red light absorbing greenhouse (AFR) film to investigate the dosage effect of Prohexadione-Ca and to determine if it can overcome the flowering delay under FR deficient greenhouse environments. Prohexadione-Ca reduced stem elongation of petunia and impatiens under AFR and clear films when applied 3 weeks after germination. Late applications were less effective. In both crops, main stem length decreased in a quadratic pattern as the concentration of Prohexadione-Ca increased. Under both films, 50-100 mg l-1 Prohexadione-Ca resulted in [approximate]30% shorter petunia plants. Greater concentrations (500 and 1000 mg l-1) resulted in excessively short plants (over 70%). Prohexadione-Ca at 100 mg l-1 delayed anthesis of petunia by 8 and 3 days under the clear film and the AFR film, respectively during less inductive photoperiods but had no effect during inductive photoperiods. In impatiens, Prohexadione-Ca at 100 mg l-1 delayed anthesis over 10 days under clear or AFR film. Greater concentrations (200 and 300 mg l-1) inhibited flowering of impatiens. Prohexadione-Ca treatments significantly affected flower color development. Untreated petunia plants had dark burgundy flowers. Prohexadione-Ca treatment increased L*, a*, and C* values and decreased hue angle indicating that the flowers were faded. Flowers of untreated impatiens plants were bright orange color. Prohexadione-Ca at 100 mg l-1 increased L* value and decreased a*, b*, and C* values indicating that significant petal fading had occurred. Flowers of treated plants were nearly white under both films. Although effective in height control, loss of color would be a major limitation to the use of Prohexadione-Ca on flowering crops.
Keywords: Plant growth regulation; Spectral filters; Bedding plants

Jurg Schonenberger, Rise from the ashes - the reconstruction of charcoal fossil flowers, Trends in Plant Science, Volume 10, Issue 9, September 2005, Pages 436-443, ISSN 1360-1385, DOI: 10.1016/j.tplants.2005.07.006.
(http://www.sciencedirect.com/science/article/B6TD1-4GRHD4Y-2/2/80216a07604741a65010e79012e5baf3)
Abstract:
The fossil record provides a unique opportunity to study the evolutionary history and past diversity of life. Without making use of palaeontological data, a comprehensive understanding of the

phylogeny and present diversity of life would remain elusive. Angiosperms (flowering plants) are the largest and most diverse group of land plants. Our understanding of their evolution has in recent years profited immensely from the discovery and study of three-dimensionally preserved fossil flowers. Descriptions of such fossil flowers are in many respects equivalent to those of extant plants. Here, I provide background information about this type of angiosperm fossils and give special attention to the techniques used to reconstruct their three-dimensional shape and organization.

Kokkirala Venugopal Rao, Kasula Kiranmayee, Umate Pavan, Telakalapalli Jaya Sree, Alleni V. Rao, Abbagani Sadanandam, Induction of multiple shoots from leaf segments, in vitro-flowering and fruiting of a dwarf tomato (Lycopersicon esculentum), Journal of Plant Physiology, Volume 162, Issue 8, 23 August 2005, Pages 959-962, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.01.008.
(http://www.sciencedirect.com/science/article/B7GJ7-4FRHCYN-6/2/98c377a611686976de0b7c8d3d410735)
Abstract: Summary
Multiple shoots were induced from leaf explants of Lycopersicon esculentum cultivar MicroTom, within 20-25 d, on MS medium supplemented with 8.9 [mu]M benzylaminopurine (BAP)+1.14 [mu]M indole-3-acetic acid (IAA). For rooting, elongated microshoots were excised and transferred onto MS medium supplemented with 4.9 [mu]M indole-3-butyric acid (IBA). Well-developed roots and flower raceme were obtained on d 7 and 13, respectively, upon transfer of the microshoots onto rooting medium. The flowers self-fertilized in vitro and produced mature fruits in additional 15-17 d of culture.
Keywords: Auxin; In vitro flower induction; Microshoots; Tomato cv. MicroTom

Fumi Tatsuzawa, Yuki Mikanagi, Norio Saito, Koichi Shinoda, Atsushi Shigihara, Toshio Honda, Cyanidin glycosides in flowers of genus Corydalis (Fumariaceae), Biochemical Systematics and Ecology, Volume 33, Issue 8, August 2005, Pages 789-798, ISSN 0305-1978, DOI: 10.1016/j.bse.2004.12.021.
(http://www.sciencedirect.com/science/article/B6T4R-4G1WYD1-1/2/03938cf5c10a7a6acdff945ac1d98187)
Abstract:
Nine taxa of Corydalis were surveyed for their floral anthocyanins. Five cyanidin glycosides: cyanidin 3-glucoside, cyanidin 3-sambubioside, cyanidin 3-rutinoside, cyanidin 3-(2G-xylosylrutinoside) and cyanidin 3-(2G-xylosylrutinoside)-7-glucoside were isolated from these taxa and identified by chemical and spectroscopic techniques. A novel anthocyanin was found in the flowers of Corydalis elata and Corydalis flexuosa cultivars, and identified to be cyanidin 3-(2G-xylosylrutinoside)-7-glucoside. Two anthocyanins, cyanidin 3-sambubioside and cyanidin 3-(2G-xylosylrutinoside), were also found for the first time in Corydalis flowers. Furthermore, the major anthocyanin constituent of the flowers was cyanidin 3-sambubioside in the outer petals of Corydalis ambigua and Corydalis lineariloba, and cyanidin 3-rutinoside in those of Corydalis decumbens, Corydalis curvicalcarata and Corydalis speciosa. Similarly, Corydalis incisa contained cyanidin 3-(2G-xylosylrutinoside), and C. flexuosa `China Blue' and `Blue Panda', and C. elata contained the most complex structural pigment, cyanidin 3-(2G-xylosylrutinoside)-7-glucoside, as their dominant anthocyanin in their outer petals. According to the results of anthocyanin analyses, these nine plants were classified into four groups: groups A (three taxa), B (two taxa), C (one taxa) and D (three taxa). On the other hand, the anthocyanin constituent of their inner petals was composed of cyanidin 3-rutinoside as only one dominant anthocyanin.
Keywords: Corydalis species; Fumariaceae; Cyanidin 3-glucoside; Cyanidin 3-rutinoside; Cyanidin 3-sambubioside; Cyanidin 3-(2G-xylosylrutinoside); Cyanidin 3-(2G-xylosylrutinoside)-7-glucoside

Toshio Honda, Fumi Tatsuzawa, Nao Kobayashi, Hiroko Kasai, Seiji Nagumo, Atsushi Shigihara, Norio Saito, Acylated anthocyanins from the violet-blue flowers of Orychophragonus violaceus, Phytochemistry, Volume 66, Issue 15, August 2005, Pages 1844-1851, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.05.026.
(http://www.sciencedirect.com/science/article/B6TH7-4GMGWG0-1/2/297fcb24926c4f81c451561f81ed52b9)
Abstract:
Three acylated cyanidin 3-sambubioside-5-glucosides (1-3) were isolated from the violet-blue flowers of Orychophragonus violaceus, and their structures were determined by chemical and spectroscopic methods. Two of those acylated anthocyanins (1 and 3) were cyanidin 3-O-[2-O-(2-O-(4-O-(6-O-(4-O-([beta]-d-glucopyranosyl)-trans-caffeoyl)-[beta]-d-glucopyranosyl)-trans-caffeoyl)-[beta]-d-xylopyranosyl)-6-O-(4-O-([beta]-d-glucopyranosyl)-trans-acyl)-[beta]-d-glucopyranoside]-5-O-(6-O-malonyl-[beta]-d-glucopyranoside)s, in which the acyl groups were p-coumaric acid for 1, and sinapic acid for 3, respectively. The last anthocyanin 2 was cyanidin 3-O-[2-O-(2-O-(4-O-(6-O-(4-O-([beta]-d-glucopyranosyl)-trans-caffeoyl)-[beta]-d-glucopyranosyl)-trans-caffeoyl)-[beta]-d-xylopyranosyl)-6-O-(4-O-([beta]-d-glucopyranosyl)-trans-feruloyl)-[beta]-d-glucopyranoside]-5-O-[beta]-d-glucopyranoside. In these flowers, the anthocyanins 2 and 3 were present as dominant pigments, and 1 was obtained in rather small amounts.
Keywords: Orychophragonus violaceus; Cruciferae; Violet-blue flower color; Acylated cyanidin 3-sambubioside-5-glucoside; Caffeic acid; p-Coumaric acid; Ferulic acid; Sinapic acid; Malonic acid

Norio Saito, Kenjiro Toki, Yasumasa Morita, Atsushi Hoshino, Shigeru Iida, Atsushi Shigihara, Toshio Honda, Acylated peonidin glycosides from duskish mutant flowers of Ipomoea nil, Phytochemistry, Volume 66, Issue 15, August 2005, Pages 1852-1860, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.04.042.
(http://www.sciencedirect.com/science/article/B6TH7-4GNKRS3-1/2/91148336983ace2eba88a927b272eba5)
Abstract:
Five acylated peonidin glycosides were isolated from the pale gray-purple flowers of a duskish mutant in the Japanese morning glory (Ipomoea nil or Pharbitis nil) as major pigments, along with a known anthocyanin, Heavenly Blue Anthocyanin (HBA). Three of these were based on peonidin 3-sophoroside and two on peonidin 3-sophoroside-5-glucoside as their deacylanthocyanins; both deacylanthocyanins were acylated with caffeic acid and/or glucosylcaffeic acids. By spectroscopic and chemical methods, the structures of the former three pigments were determined to be 3-O-[2-O-(6-O-(trans-caffeoyl)-[beta]-D-glucopyranosyl)-[beta]-D-glucopyranoside], 3-O-[2-O-(6-O-(3-O-([beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-D-glucopyranosyl)-6-O-(4-O-(6-O-(3-O-([beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-glucopyranoside], and 3-O-[2-O-(6-O-(trans-caffeoyl)-[beta]-D-glucopyranosyl)-6-O-(4-O-(6-O-(3-O-([beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-D-glucopyranoside] of peonidin. The structures of the latter two pigments were also confirmed as 3-O-[2-O-(6-O-(trans-caffeoyl)-[beta]-D-glucopyranosyl)-[beta]-D-glucopyranoside]-5-O-[beta]-D-glucopyranoside, and 3-O-[2-O-(6-O-(trans-caffeoyl)-[beta]-D-glucopyranosyl)-6-O-(4-O-(6-O-(3-O-([beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-D-glucopyranosyl)-trans-caffeoyl)-[beta]-D-glucopyranoside]-5-O-[beta]-D-glucopyranoside of peonidin. The mutation affecting glycosylation and acylation in anthocyanin biosynthesis of Japanese morning glory was discussed.
Keywords: Ipomoea nil; Convolvulaceae; Japanese morning glory; Flower coloration; Acylated anthocyanins; Peonidin 3-sophoroside; Peonidin 3-sophoroside-5-glucoside; Caffeic acid; Glucosylcaffeic acid

O. Bethenod, M. Le Corre, L. Huber, I. Sache, Modelling the impact of brown rust on wheat crop photosynthesis after flowering, Agricultural and Forest Meteorology, Volume 131, Issues 1-2, 25 July 2005, Pages 41-53, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2005.05.001.
(http://www.sciencedirect.com/science/article/B6V8W-4GJM3D3-1/2/dcbb390258994bd11b97aacca8030bf3)
Abstract:
Rust infection on wheat leaves can induce a large decrease in crop yield. It is, therefore, important to understand the processes involved in order to forecast and manage disease impact. A model describing the effects of disease on whole crop photosynthesis is presented. The model is based on Bastiaans' approach, with net leaf CO2 assimilation under disease stress relative to healthy conditions described by a power law function of the healthy leaf area percentage. The model was tested using data from a wheat field experiment. The wheat crop was infected by Puccinia triticina, the causal agent of brown rust. Input data and parameters of the model (i.e. leaf CO2 assimilation, stomatal conductance, leaf area and internal and external CO2 concentrations) were measured in both a healthy and an infected crop. Model outputs were compared to crop transpiration and photosynthesis measured by eddy correlation and Bowen ratio systems, respectively. Crop photosynthesis was significantly reduced by brown rust in comparison to the photosynthesis in the healthy crop. The model successfully simulated this reduction under radiation conditions favourable to the high photosynthesis values of the healthy crop. The overall comparison between measurements and model outputs indicates that the impact of rust disease on canopy photosynthesis is almost proportional to the percentage of healthy leaf area. Based on the parameterisation of leaf response to disease stress, this biophysical approach provides a new way of quantifying disease effects on photosynthesis at the canopy scale with potential interest for generalisation to other foliar fungal pathogens.
Keywords: Canopy photosynthesis; Upscaling model; Winter wheat; Puccinia triticina

Hezhong Dong, Dongmei Zhang, Wei Tang, Weijiang Li, Zhenhuai Li, Effects of planting system, plant density and flower removal on yield and quality of hybrid seed in cotton, Field Crops Research, Volume 93, Issue 1, 14 July 2005, Pages 74-84, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.09.010.
(http://www.sciencedirect.com/science/article/B6T6M-4DM2CMY-3/2/b76d3fc6dc6bcac11da746d7c9a65d45)
Abstract:
Seedling transplanting and plastic mulching are widely adopted intensive planting systems in cotton production in China. Manual removal of early- or late-season flowers may improve seed quality without sacrificing yield through the compensatory growth of cotton plants. Two experiments were conducted, in Yellow River Valley in China from 2002 to 2003, to test if the intensive systems and flower removal can be used for enhancing hybrid seed production. Results in the first experiment show that yields of seed cotton and seed, and seed quality parameters averaged across three plant densities (2.25, 3.00 and 3.75 plants/m2), were significantly improved by either transplanting or plastic mulching relative to conventional planting. The improvements in yield and quality in two intensive planting systems were mainly attributed to longer and earlier flowering period. Transplanted plants did not differ significantly from mulched plants in seed yield, seed maturity and percentage germination, but transplanting decreased lint percentage and increased seed index relative to mulching. In terms of seed yield and quality, the optimum plant density for each planting system was 3.00 plants/m2. At the optimum plant density, seed yields averaged across two years for transplanting and mulching systems were 31.3% and 32.6% higher than for conventional planting system, respectively. Flower removal did not significantly affect seed yield, but removal of late-season or both early- and late-season flowers significantly improved seed quality. It was concluded that transplanting or plastic mulching, low plant density (3.00

plants/m2), and removal of late-season or both early- and late-season flowers can be integrated to enhance yield and quality of hybrid seed of cotton.
Keywords: Hybrid cotton; Seed yield; Seed quality; Transplanting; Mulching; Plant density; Flower removal

Anil P. Ranwala, William B. Miller, Effects of cold storage on postharvest leaf and flower quality of potted Oriental-, Asiatic- and LA-hybrid lily cultivars, Scientia Horticulturae, Volume 105, Issue 3, 4 July 2005, Pages 383-392, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.01.031.
(http://www.sciencedirect.com/science/article/B6TC3-4FR8PTX-1/2/b74addac7941b36e6bccf2311250ff7a)
Abstract:
The effects of cold storage of mature potted plants on postharvest leaf and flower quality were investigated in several cultivars of three major groups (Oriental, Asiatic and LA) of hybrid lilies (Lilium spp.). Mature plants were stored in darkness at 3 [degree sign]C for 2 weeks before placing them in a postharvest evaluation room (22 [degree sign]C) and were compared with plants moved directly to the evaluation room. The efficacy of GA4+7 plus benzyladenine (BA) treatments (applied just before cold storage) for preventing cold-induced postharvest disorders in each cultivar was also evaluated. In all cultivars, cold storage caused several adverse effects on postharvest quality, including accelerated leaf yellowing or browning, bud abortion and reduced flower or inflorescence longevity. Leaf abscission was observed only in Oriental-hybrids. Treatment with GA4+7 plus BA significantly reduced these disorders and improved the overall postharvest quality after cold storage. While different cultivars differed greatly in their sensitivity to cold storage, all the cultivars benefited from GA4+7 plus BA treatment. Experiments indicated that GA4+7 plus BA treatments could be applied as early as 2 weeks before the mature bud stage without compromising the positive effects.
Keywords: Benzyladenine; Cold storage; Gibberellin; Leaf abscission; Leaf yellowing; Leaf chlorosis; Lilium

Robert J. Gegear, Michael C. Otterstatter, James D. Thomson, Does parasitic infection impair the ability of bumblebees to learn flower-handling techniques?, Animal Behaviour, Volume 70, Issue 1, July 2005, Pages 209-215, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2004.09.025.
(http://www.sciencedirect.com/science/article/B6W9W-4G7DYC1-3/2/78b045e58364f79a539984530430fa54)
Abstract:
Although the capacity to learn how to manipulate flowers plays an integral role in the foraging of bumblebees, little is known about the effects of parasitic infection on the motor learning and memory of host bees. In the laboratory experiment reported here, we examined whether infection by the intestinal protozoan Crithidia bombi affected the ability of bumblebees, Bombus impatiens, to learn the specialized motor pattern required to handle a novel flower type. Using videotaped records of foraging behaviour, we related the motor performance of bees to the intensity of C. bombi infection. Low intensities of infection had no effect on the ability of bees to learn a novel flower-handling method; however, a high intensity of infection significantly reduced both motor-learning rate and maximum handling proficiency. In addition, highly infected bees showed a 200% increase in the amount of time and the number of visits required to learn how to manipulate flowers. These results indicate that C. bombi can influence the foraging behaviour of host bumblebees in subtle but ecologically significant ways.

J.A. Ellis, A.D. Walter, J.F. Tooker, M.D. Ginzel, P.F. Reagel, E.S. Lacey, A.B. Bennett, E.M. Grossman, L.M. Hanks, Conservation biological control in urban landscapes: Manipulating parasitoids of bagworm (Lepidoptera: Psychidae) with flowering forbs, Biological Control, Volume 34, Issue 1, July 2005, Pages 99-107, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.03.020.

(http://www.sciencedirect.com/science/article/B6WBP-4G0DF25-1/2/520127ef5544b8f096989965a77b2afe)

Abstract:
We conducted field experiments to test the hypothesis that regulation of herbivorous pests in urban landscapes can be enhanced with forbs that provide floral resources for adult natural enemies. The herbivore was bagworm, Thyridopteryx ephemeraeformis (Haworth) (Lepidoptera: Psychidae), which is attacked by a guild of hymenopterous parasitoids. We established host shrubs in common garden plantings, encircling some with flowering forbs, released bagworm larvae on shrubs, and assessed survivorship. The hypothesis was supported: parasitism rates of bagworm were 71% higher in shrubs that were surrounded by flowering forbs than in shrubs that lacked flowers. This study also suggested that white-footed mice and European sparrows were important predators of bagworms. The most abundant parasitoid species was the exotic ichneumonid Pimpla (=Coccygominus) disparis (Vierick), an introduced biological control agent of gypsy moth. In a second experiment, parasitism rates were at least three times higher in shrubs encircled by a high density of forbs compared to those having fewer or no forbs. In a third experiment, parasitism rates exceeded 70% in shrubs that were adjacent to a central bed of flowering forbs, but less than 40% in shrubs that were farther away. We conclude from these studies that flowering forbs have a localized effect on host-searching behavior of female parasitoids, encouraging them to parasitize bagworms in the immediate vicinity. This study provides further evidence that ecological methods of pest management can be integrated into the design of urban landscapes to improve regulation of herbivorous pests.
Keywords: Thyridopteryx ephemeraeformis; Natural enemy; Ichneumonidae; Torymidae; Itoplectis; Pimpla disparis; Coccygominus disparis; Gambrus; Monodontomerus; Gypsy moth; Peromyscus leucopus; Passer domesticus; Habitat manipulation

M. Walter, P. Harris-Virgin, C. Morgan, J. Stanley, K.S.H. Boyd-Wilson, G.I. Langford, M.S. Moore, Fungicides for control of flower and berry infections of Botrytis cinerea in boysenberry, Crop Protection, Volume 24, Issue 7, July 2005, Pages 625-631, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.11.005.
(http://www.sciencedirect.com/science/article/B6T5T-4F60WTX-1/2/d3760cb8ab4da6291969cb6240ef755d)

Abstract:
During 1998-2002 in New Zealand, fungicides were evaluated on boysenberry (Rubus spp. hybrid) for control of Botrytis cinerea in the laboratory (detached flowering lateral assay), and in the field (two small scale field evaluations and one large scale grower trial). Fungicides used were thiram (standard grower control), pyrimethanil, cyprodinil+fludioxonil, fenhexamid and three undisclosed plant extracts. Laboratory studies showed that fungicides, except for two plant extracts, reduced flower infections. Disease incidence was also affected by the timing of fungicide applications in response to artificial flower inoculations with B. cinerea conidia. In the field, all fungicides reduced B. cinerea berry infections, however some products (pyrimethanil, cyprodinil+fludioxonil, plant extract) affected plant growth and/or berry quality and their use was discontinued. Further grower trials of fenhexamid in comparison to standard fungicide applications (grower control) and an unsprayed control on four commercial properties showed that fenhexamid achieved similar reductions in disease levels as the grower control. The fenhexamid residue decay curve followed a first order kinetics with less than 0.05 mg/kg fenhexamid detected in fruit at harvest. The research contributed to the registration of fenhexamid for use in New Zealand boysenberry.
Keywords: Fenhexamid; Thiram; Boysenberry; Botrytis cinerea; Rubus

Todd A. Ugine, Stephen P. Wraight, Michael Brownbridge, John P. Sanderson, Development of a novel bioassay for estimation of median lethal concentrations (LC50) and doses (LD50) of the entomopathogenic fungus Beauveria bassiana, against western flower thrips, Frankliniella

occidentalis, Journal of Invertebrate Pathology, Volume 89, Issue 3, July 2005, Pages 210-218, ISSN 0022-2011, DOI: 10.1016/j.jip.2005.05.010.
(http://www.sciencedirect.com/science/article/B6WJV-4GP1VV9-1/2/8d69e56f90fad1cd942de8cd15c8d861)
Abstract:
To conduct laboratory experiments aimed at quantifying secondary acquisition of fungal conidia by western flower thrips (Frankliniella occidentalis), an efficient assay technique using Beauveria bassiana as the model fungus was developed. Various application protocols were tested and it was determined that the percent mortality did not vary among protocols. Peak mortality of second-instar nymphs, under constant exposure to conidia, occurred 5 days post-inoculation. Second-instar thrips that were exposed to conidia within 24 h of the molt to second instar were more susceptible to Beauveria bassiana than thrips exposed after times greater than 24 h post-molt. Conidia efficacy, which was monitored at 24 h intervals, did not differ significantly within 72 h. A test of the final bioassay system was conducted in a series of assays aimed at determining the LD50 of B. bassiana technical powder against second-instar western flower thrips. It was determined that B. bassiana (strain GHA) is highly effective at very low doses (LD50 of 33-66 conidia/insect).
Keywords: Frankliniella occidentalis; Bioassay; Beauveria bassiana; Entomopathogenic fungi; Microbial control; Secondary pick-up

Thomas A.W. van der Kooij, Karin Krupinska, Kirsten Krause, Tocochromanol content and composition in different species of the parasitic flowering plant genus Cuscuta, Journal of Plant Physiology, Volume 162, Issue 7, 1 July 2005, Pages 777-781, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.04.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4G4XBJ5-5/2/b5a0a86f968b92c0c58f2acfd6827ab7)
Abstract: Summary
The holoparasitic plant genus Cuscuta is comprised of species with various degrees of plastid functionality and significant differences in photosynthetic capacity, ranging from moderate to no photosynthetic carbon fixation. In the present study, several Cuscuta species were analyzed with respect to the overall contents of tocochromanols and plastoquinone and the levels of the individual tocochromanols. No correlations among photosynthetic capacity, the amount of carotenoids, of plastoquinone and of tocochromanols were observed. On the contrary, wide variation in the composition of the tocochromanol fraction was observed among different species, as well as in stems of the same species in response to starvation conditions. The implications of these findings are discussed.
Keywords: Cuscuta; Holoparasitic plants; Pigments; Plastoquinone; Tocopherol

Kosaku Takeda, Akiko Osakabe, Shinomi Saito, Daisuke Furuyama, Atsuko Tomita, Yumi Kojima, Mayumi Yamadera, Masaaki Sakuta, Components of protocyanin, a blue pigment from the blue flowers of Centaurea cyanus, Phytochemistry, Volume 66, Issue 13, July 2005, Pages 1607-1613, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.04.002.
(http://www.sciencedirect.com/science/article/B6TH7-4G3YDK7-1/2/f7d389fb832114c6dbc7cbf22882a39a)
Abstract: Graphical abstract
The components of protocyanin were shown to be cyanidin 3-O-(6-O-succinylglucoside)- 5-O-glucoside] 1, apigenin 7-O-glucuronide-4'-O-(6-O-malonylglucoside)] 2 and metals, Fe, Mg and Ca, by reconstruction experiments. Substitution of the metal components in protocyanin with other metals was also examined.
The components involved in the formation of protocyanin, a stable blue complex pigment from the blue cornflower, Centaurea cyanus, were investigated. Reconstruction experiments using highly

purified anthocyanin [centaurocyanin, cyanidin 3-O-(6-O-succinylglucoside)-5-O-glucoside], flavone glycoside [apigenin 7-O-glucuronide-4'-O-(6-O-malonylglucoside)] and metals, Fe and Mg, showed the presence of another factor essential for the formation of protocyanin. The unknown factor was revealed to be Ca. Reconstructed protocyanin using anthocyanin, flavone, Fe, Mg, and Ca was identical with protocyanin from nature in UV-Vis and CD spectra, and was isolated as crystals for the first time. In addition, substitution of the metal components in protocyanin with other metals was also examined.
Keywords: Centaurea cyanus; Compositae; Cornflower; Protocyanin; Blue pigment; Anthocyanin; Flavone glycoside

Nils Berding, Alan P. Hurney, Flowering and lodging, physiological-based traits affecting cane and sugar yield: What do we know of their control mechanisms and how do we manage them?, Field Crops Research, Volume 92, Issues 2-3, Sugarcane physiology:Integrating from cell to crop to advance sugarcane production, 14 June 2005, Pages 261-275, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.01.015.
(http://www.sciencedirect.com/science/article/B6T6M-4FP1J7W-1/2/489b3ee90bf6319baefd84a573a9157a)
Abstract:
Understanding flowering and lodging, or loss of crop erectness, in sugarcane is crucial for development of selection strategies to reduce their impact in commercial production systems and for flowering in breeding programs. Experiments conducted on Australia's tropical northeast coast, established the economic importance of flowering and lodging and provided insights into their control mechanisms. The effect of flowering on yield was determined using lit and unlit night regimes. Photoperiods at low and intermediate tropical latitudes (2[degree sign] versus 17[degree sign]) were contrasted for their effect on flowering. Losses for cane yield, sugar content, and sugar yield from flowering were 6.8, 3.0, and 9.4%, respectively. The latter equated to the penalty used in BSES Limited's tropical program for free, early season flowering. Sub-optimal photoperiod is largely responsible for poor and variable flowering in programs located close to the equator, and this may be confounded with high day temperature. The effect of six moisture regimes on panicle initiation and development was studied. Moisture regimes did not differ for flowering within crops, but differences between crops (29.4% versus 0.8% flowered stalks) coincided with an El Nino event and high temperatures in the ratoon crop, proving adequate soil moisture is not a sufficient condition for flowering. Seven early season phenotypic plant descriptors and two structural stalk traits were assessed as predictors of harvest erectness. Brix, commercial cane sugar (CCS), and fibre of erect and lodged stalks were determined to assess the impact of lodging prior to and within the harvest season. The interactions of the effects of cultivars with planting depth and mounding on erectness were examined. All phenotypic traits, except stalk height, and two structural stalk traits correlated poorly with plant erectness at harvest. Regression analyses revealed leaf width, plant top length, and stalk number were significant predictors of crop erectness at harvest, but their practical relevance is unclear. Pre-season loss of erectness and stalk condition (sound or unsound), resulted in a 12 and 8% loss of CCS, respectively, and a 24% loss combined. Erect- and lodged-stalk CCS increased during the season. The marked differential between classes in July (18 and 23% of erect stalks, in two crops) decreased by September (10 and 11%). The effect of increasing depth of anchorage approached significance suggesting crop erectness can be enhanced using appropriate cultural practices. Selection against flowering has been very successful and is justifiable economically. Poor flowering constrains achievable genetic recombination, but managed photoperiod regimes, combined with management of key environmental variables, alleviates this. Loss of CCS due to lodging is economically critical. Crop erectness via ideotype selection is achievable, but development of early season, aboveground traits as predictive variables has proven elusive.

Keywords: Sugarcane; Saccharum spp. hybrids; Physiological sub-systems; Crop quality; Crop condition

Hassan Salehi, Callista B. Ransom, Hesham F. Oraby, Zahra Seddighi, Mariam B. Sticklen, Delay in flowering and increase in biomass of transgenic tobacco expressing the Arabidopsis floral repressor gene FLOWERING LOCUS C, Journal of Plant Physiology, Volume 162, Issue 6, 14 June 2005, Pages 711-717, ISSN 0176-1617, DOI: 10.1016/j.jplph.2004.12.002.
(http://www.sciencedirect.com/science/article/B7GJ7-4FPX2FM-2/2/bfbb7bd12de4a4aa0b1d646c663829e8)
Abstract: Summary
FLOWERING LOCUS C (FLC), a gene from Arabidopsis thaliana (L.) Heynh. that acts as a flowering repressor, was expressed in tobacco (Nicotiana tabacum L. `Samsun'). Five putative transgenic lines were selected and examined for the presence of FLC. Genomic DNA and total RNA were isolated from the leaves and used for polymerase chain reaction (PCR) and RNA blot analysis, respectively. Both DNA and RNA tests confirmed the integration and transcription of FLC in all five lines and their T1 progenies. Transgenic plants in one line showed an average of 36 d delay in flowering time compared to control plants, and the overall mean for all lines was 14 d. Transgenic plants also displayed increased leaf size and biomass yield and reduced height at flowering time. It is important to note that the delay in flowering might have been caused by a slower rate of leaf initiation (i.e. nodes/day) rather than by a change in the flowering mechanism itself.
Keywords: Agrobacterium; FLOWERING LOCUS C; Genetic engineering; Leaf explant; pGreen

Elena Balestri, Flavia Vallerini, Claudio Lardicci, On the unusual flowering of plagiotropic shoots in the seagrass Posidonia oceanica, Aquatic Botany, Volume 82, Issue 2, June 2005, Pages 82-88, ISSN 0304-3770, DOI: 10.1016/j.aquabot.2005.03.001.
(http://www.sciencedirect.com/science/article/B6T4F-4G3CX2H-1/2/64e7626f2336a6c8e7c38e805d4a6059)
Abstract:
The seagrass Posidonia oceanica (L.) Delile can produce plagiotropic (horizontally oriented) and orthotropic (vertically oriented) axes. These axes differ in various morphological and growth characteristics and ecological functions. Only orthotropic shoots are likely to support flowering and seed production. To asses whether flowering may occur on plagiotropic shoots, we examined plagiotropic axes that grew at the edge of a meadow during the flowering of 2003. We identified and analysed 10 rhizome fragments that bore at least one reproductive plagiotropic shoot. We then investigated whether reproductive plagiotropic shoots differed from orthotropic ones in morphological characteristics and investment in flowering (i.e., number of hermaphroditic flowers per inflorescence). Multivariate analysis did not show any significant difference between plagiotropic and orthotropic shoots with regard to the characteristics examined and investment in flowering. Further studies are necessary to ascertain if the observed pattern of flowering is a common or an exceptional event in P. oceanica.
Keywords: Seagrass; Posidonia oceanica; Flowering; Clonal growth

Fumi Tatsuzawa, Tomohisa Yukawa, Koichi Shinoda, Norio Saito, Acylated anthocyanins in the flowers of genus Dendrobium section Phalaenanthe (Orchidaceae), Biochemical Systematics and Ecology, Volume 33, Issue 6, June 2005, Pages 625-629, ISSN 0305-1978, DOI: 10.1016/j.bse.2004.11.007.
(http://www.sciencedirect.com/science/article/B6T4R-4FC3RPY-8/2/05f54a241c215473750eee95ce5ca7eb)
Keywords: Dendrobium species; Section Phalaenanthe; Orchidaceae; Acylated cyanidin 3,7,3'-triglucoside; Malonic, p-Hydroxybenzoic and sinapic acids; Malonylglucoside

C. Rusterucci, Z. Zhao, K. Haines, D. Mellersh, M. Neumann, R.K. Cameron, Age-related resistance to Pseudomonas syringae pv. tomato is associated with the transition to flowering in Arabidopsis and is effective against Peronospora parasitica, Physiological and Molecular Plant Pathology, Volume 66, Issue 6, June 2005, Pages 222-231, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2005.08.004.
(http://www.sciencedirect.com/science/article/B6WPC-4HHP3HD-1/2/bec641d39c1ffdf9feaaa74d62341494)
Abstract:
As plants mature it has been observed that some become more resistant to normally virulent pathogens. The ability to manifest the Age-Related Resistance (ARR) response in Arabidopsis to Pseudomonas syringae pathovars tomato (Pst) coincided with the transition to flowering in plants both delayed and accelerated in the transition to flowering. ARR was also associated with a change in PR-1 gene expression, such that young plants expressed PR-1 abundantly at 3 days post inoculation (dpi) while mature plants expressed much less. The Arabidopsis ARR response requires SA accumulation via isochorismate synthase (ICS1) [24]. ICS1 was expressed one dpi with virulent and avirulent Pst in both young and mature plants. The ARR response was also effective versus avirulent Pst providing an additional 4-fold limitation in bacterial growth. Arabidopsis ARR was found to be ineffective against two necrotrophs, Erwinia carotovora subspecies carotovora (bacterium) and Botrytis cinerea (fungus) and one obligate biotroph, Erysiphe cichoracearum (fungus). However, mature wild type, SA-deficient sid2 and NahG plants supported little growth of the obligate biotrophic oomycete, Peronospora parasitica. Therefore ARR to P. parasitica appears to be SA-independent, however the level of ARR resistance was somewhat reduced in these mutants in some experiments. Thus, there may be numerous defence pathways that contribute to adult plant resistance in Arabidopsis.
Keywords: Arabidopsis thaliana; Pseudomonas syringae pv. tomato; Botrytis cinerea; Erysiphe cichoracearum; Erwinia carotovora subspecies carotovora; Peronospora parasitica; Age-related resistance; PR-1

P. Manochai, P. Sruamsiri, W. Wiriya-alongkorn, D. Naphrom, M. Hegele, F. Bangerth, Year around off season flower induction in longan (Dimocarpus longan, Lour.) trees by KClO3 applications: potentials and problems, Scientia Horticulturae, Volume 104, Issue 4, 15 May 2005, Pages 379-390, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.01.004.
(http://www.sciencedirect.com/science/article/B6TC3-4FG4BB8-1/2/c96fc0e8be9f7c4bfd26afcbe3665b23)
Abstract:
Off season induction of flowering and fruit production is a desirable economical and scientific goal with many subtropical fruit trees. Both objectives have been accomplished by the application of gibberellin biosynthesis inhibitors with mango and a few other fruit trees. Recently the same was achieved with longan trees (Dimocarpus longan, Lour.) after treatment with potassium chlorate. This treatment allows the efficient induction of flowering and fruit production all over the year in an obviously species-specific manner.
Experiments are described that investigated several aspects of this KClO3 treatments, such as methods of application, seasonal effects, reactiveness of different cvs. toward the chemical, influence of leaf age, etc. The results are discussed with respect to the practical application of KClO3 for off season fruit production, but also under the aspect of its use for more basic investigations into the endogenous regulation of the flowering induction process in perennial fruit trees.
Keywords: Flowering induction requirements; Potassium chlorate; Application method; Application time

F. J. Adamsen, T. A. Coffelt, Planting date effects on flowering, seed yield, and oil content of rape and crambe cultivars, Industrial Crops and Products, Volume 21, Issue 3, May 2005, Pages 293-307, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2004.04.012.
(http://www.sciencedirect.com/science/article/B6T77-4CJCY9X-1/2/490e7bb7fa062e59ec9239229ba12e4a)
Abstract:
Both crambe (Crambe abyssinicia, Hochst) and rape (Brassica napus L. and Brassica rapus L.) are cool season crops, thus they may have potential as irrigated, winter rotational crops in the low deserts of the southwestern United States and northern Mexico. Currently, no information is available on the effects of fall planting date on the production of these crops. The objectives of this study were (1) to determine the effects of fall planting date on flowering patterns, seed yield, and oil content of crambe and two species of rape, and (2) to determine the suitability of rape and crambe as rotational crops for the low deserts of the southwestern United States. Nine cultivars of rape and one cultivar of crambe were planted at the Maricopa Agricultural Center on three dates in November and December of 1995 and four dates from October through December of 1997 on a variable Mohall sandy loam soil (fine-loamy, mixed hyperthermic, Typic Haplargid). Five of the rape cultivars were B. napus types and the remaining four were B. rapus. One was an industrial rape (R-500) and the other eight were Canola types. Seed yield, oil concentration, and seed weight were determined. In 1996, the percent of plants flowering was observed visually on a periodic basis. In 1998, detailed imaging of flowering was done periodically using a digital camera. Planting date affected water application by controlling the length of the growing season. Our plants were taller, oil content was higher, seed weights were comparable, days to flowering were more than doubled, and seed yields were lower than plants from spring plantings in the Northern Great Plains. In both years of the study, the highest yields were obtained when rape and crambe were planted in November, which would fit well with cotton harvest dates. Lodging was a serious problem in rape. Crambe was sensitive to frost and could fail in some years. Only R-500 matured early enough to be used in rotation with current cotton cultivars. In addition to the onset of flowering, the automated method for estimating flowering was able to detect differences between Brassica species and cultivars and to measure the duration of flowering. Each species had a distinctive flowering pattern. Planting dates also affected the pattern and efficiency of flowering. Reproductive efficiency appeared to change with planting date and in general, October and November planting dates produced seed with higher oil content and seed weights than December planting dates.
Keywords: Oilseed; Brassica species; Digital image analysis; Canola

Jian-Hua Zou, Jun-Shan Yang, Yue-Sheng Dong, Liang Zhou, Geng Lin, Flavone C-glycosides from flowers of Trollius ledebouri, Phytochemistry, Volume 66, Issue 10, May 2005, Pages 1121-1125, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.03.021.
(http://www.sciencedirect.com/science/article/B6TH7-4G39H5N-3/2/310d4dfb3aaf4bb8351affa1be7eda21)
Abstract:
The ethanol extract of the flowers of Trollius ledebouri yielded four flavone C-glycosides, 2''-O-vanilloylvitexin, 2''-O-feruloylorientin, 2''-O-[beta]-l-galactopyranosylvitexin, and 2''-O-[beta]-l-galactopyranosylorientin, along with known compounds, 6''-O-acetylorientin, 2''-O-(4'''-hydroxybenzoyl)vitexin, vitexin, and orientin. Their structures were elucidated by means of UV, IR, MS and NMR spectroscopic analyses.
Keywords: Trollius ledebouri reichb; Ranunculaceae; Flavone C-glycosides; Acylated flavone C-glycosides

Takashi Nakatsuka, Masahiro Nishihara, Keiichiro Mishiba, Saburo Yamamura, Temporal expression of flavonoid biosynthesis-related genes regulates flower pigmentation in gentian plants,

Plant Science, Volume 168, Issue 5, May 2005, Pages 1309-1318, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.01.009.
(http://www.sciencedirect.com/science/article/B6TBH-4FC37WH-1/2/b1cc27b2465f9e7184bdf8a16bead540)
Abstract:
The cDNA clones encoding homologues of flavanone 3-hydroxylase (F3H), anthocyanidin synthase (ANS), flavonoid 3'-hydroxylase (F3'H) and flavone synthase II (FSII) genes were isolated from petals of Gentiana triflora. Deduced amino acid sequences exhibited 60-80% identities with the corresponding sequences from other dicotyledonous species. Southern blot analysis showed that they were present as multiple copies in the gentian genome, and Northern blot analysis showed that the flavonoid biosynthesis-related genes could be classified into three groups by their temporal expression patterns during gentian flower development. The first included chalcone synthase (CHS) and chalcone isomerase (CHI) expressing during all flower development stages; the second included F3'H and FSII expressing at flower early developmental stages; and the third included F3H, flavonoid 3',5'-hydroxylase (F3',5'H), dihydroflavonol 4-reductase (DFR), ANS, UDP-glucose:flavonoid 3-O-glucosyltransferase (3GT) and anthocyanin 5-aromatic acyltransferase (5AT) expressing at flower late developmental stages. In general, low or undetectable levels of expression were observed in both the leaves and stems. High performance liquid chromatography (HPLC) analysis revealed that flavone accumulates from the early flower bud stage, but anthocyanin accumulation peaked at the later flower anthesis stage. A significant correlation between gene expression and pigment accumulation has been found, indicating that flavonoid biosynthesis during gentian flower development is regulated by temporal expression of these genes.
Keywords: Anthocyanin; Flavone; Flavonoid biosynthesis; Gene expression; Gentian (Gentiana triflora)

Neil S. Mattson, John E. Erwin, The impact of photoperiod and irradiance on flowering of several herbaceous ornamentals, Scientia Horticulturae, Volume 104, Issue 3, 15 April 2005, Pages 275-292, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.08.018.
(http://www.sciencedirect.com/science/article/B6TC3-4DMX2H8-1/2/d3ca9b4ded3295bad50a1246265c5b95)
Abstract:
Forty-one herbaceous species were grown under short-days (8 h photoperiod, ambient irradiance averaged 12-13.2 and 6.4-8.3 mol m-2 day-1 for Experiments I and II, respectively) with or without supplemental high-pressure sodium lighting (+50, 100, or 150 [mu]mol m-2 s-1); or under long-days delivered using natural day lengths and irradiance with night interruption lighting (2200-0200 h at 2 [mu]mol m-2 s-1 from incandescent lamps) or under ambient daylight plus supplemental irradiance during the day and as a day extension to 18 h (0800-0200 h) with supplemental high pressure sodium lighting (+50, 100, or 150 [mu]mol m-2 s-1) to identify the impact of photoperiod and irradiance on flowering of each species. Days to first open flower, leaf number below first flower, and mean dry weight gain per day (MDWG) were measured when the first flower opened. Twenty-seven species were photoperiodic with examples of five photoperiodic response groups represented: obligate short-day (2), facultative short-day (5), obligate long-day (16), facultative long-day (4); 13 were day neutral (no photoperiod response in flowering). One species, Salvia sclarea L., did not flower. A facultative irradiance response was observed with 10 species; 28 species were irradiance indifferent; 2 had delayed flowering as irradiance increased. Photoperiod affected MDWG of 30 species. Increasing irradiance affected MDWG with 14 species. Photoperiod interacted with irradiance to affect MDWG of 11 species. Cobaea scandens had the greatest MDWG (0.40 g day-1) while Amaranthus hybridus had the least MDWG (0.01 g day-1) across photoperiod and irradiance levels.

Keywords: Flower induction; Flower initiation; Irradiance response group; Photoperiod response group; Light intensity; Daily light integral

Mark S. Roh, Flowering and inflorescence development of Lachenalia aloides `Pearsonii' as influenced by bulb storage and forcing temperature, Scientia Horticulturae, Volume 104, Issue 3, 15 April 2005, Pages 305-323, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.10.004.
(http://www.sciencedirect.com/science/article/B6TC3-4F4H9T3-1/2/b5cb32aaae64bd174902c3c4214d4186)
Abstract:
The effect of bulb storage and forcing temperatures on growth, flowering, and inflorescence development and blast of Lachenalia aloides Engl. `Pearsonii' was investigated. Bulb temperature treatments began when about five florets were developed. Bulbs were stored at 10 [degree sign]C, 12.5 [degree sign]C, 15 [degree sign]C, 20 [degree sign]C, and 25 [degree sign]C for 15, 30, or 45 days and forced in greenhouses at 17/15 [degree sign]C and 21/19 [degree sign]C, day (D)/night (N) temperature. Flowering was accelerated, and leaf length and floret number were reduced, when bulbs were stored at 10 [degree sign]C, 12.5 [degree sign]C, or 15 [degree sign]C for 45 days compared with storing at 20 [degree sign]C or 25 [degree sign]C. Flowering was further accelerated by forcing at 17/15 [degree sign]C compared with 21/19 [degree sign]C (Experiments 1 and 2). When bulbs were stored at 10 [degree sign]C, 15 [degree sign]C, 20 [degree sign]C, or 25 [degree sign]C for 4 weeks and grown in greenhouses at 17/15 [degree sign]C, 21/19 [degree sign]C, 25/23 [degree sign]C, and 29/27 [degree sign]C, D/N temperature, the incidence of inflorescence blast was increased when bulbs were stored at 10[degree sign] and 15 [degree sign]C and forced at 25/23 [degree sign]C compared with low temperatures (Experiment 3). Bulbs were stored at 10 [degree sign]C, 15 [degree sign]C, 20 [degree sign]C, or 25 [degree sign]C for 4 weeks and forced in greenhouses maintained at 18/16 [degree sign]C, 22/20 [degree sign]C, or 26/24 [degree sign]C, D/N temperature, for 12 weeks. During forcing, plants were subjected to a constant 18/16 [degree sign]C or temperatures were changed after 4 and 8 weeks (e.g., 18/16 [degree sign]C-22/20 [degree sign]C-18/16 [degree sign]C) (Experiment 4). Inflorescence blast occurred when the temperature was 26/24 [degree sign]C during the first 4 weeks after potting of bulbs that were stored at 15 [degree sign]C (83%) and 10 [degree sign]C (50%). Plants from bulbs stored at higher temperatures did not show inflorescence blast. To produce quality plants with short leaves, many florets, and short floral stems (scape plus inflorescence), it is recommended to store bulbs at 10-15 [degree sign]C before potting for 30 days and to force at 17/15 [degree sign]C to accelerate flowering. Inflorescence development during bulb storage at 10 [degree sign]C and inflorescence blast that occurred after only 3 days of 30 [degree sign]C was demonstrated using scanning electron microscopy and magnetic resonance imaging techniques.
Keywords: New floral crop; Potted plant; Bulb; Physiological disorder; Scanning electron microscopy; Magnetic resonance imaging

Robert J. Gegear, Terence M. Laverty, Flower constancy in bumblebees: a test of the trait variability hypothesis, Animal Behaviour, Volume 69, Issue 4, April 2005, Pages 939-949, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2004.06.029.
(http://www.sciencedirect.com/science/article/B6W9W-4FF9HD0-5/2/a2f8cdcb2f380162bf49b1aa33827af6)
Abstract:
Pollinators often sequentially visit one flower type while bypassing other equally rewarding flower types in the process. Many explanations for this pattern of flower choice in pollinators, known as flower constancy, have been proposed; yet, a sufficient answer to the question of why pollinators are constant still remains elusive. We tested the hypothesis that flower constancy in pollinators is related to the number of traits distinguishing available flowers by measuring the floral selectivity (both constancy and preference) of bumblebees, Bombus impatiens, when artificial flower types

differed in either colour only (variation in a single trait) or colour and other floral traits (variation in multiple traits). As expected, bees showed increased degrees of selectivity (constancy and preference) when available flower types differed in colour and other floral traits compared with when available flower types differed in colour only. In addition, bee foraging rates (measured in flowers visited per min) varied inversely with the number of variable floral traits added to colour but not with the number of colours. Together, these results are consistent with the idea that the mechanism underlying flower constancy in bumblebees is a limitation on their ability to effectively search for and/or remember multiple combinations of floral traits at the same time. We discuss the roles of floral-trait variation, flower constancy and pollinator cognitive limitations in the coevolution of flowering plants and their animal pollinators.

H.K. Ngugi, S. Dedej, K.S. Delaplane, A.T. Savelle, H. Scherm, Effect of flower-applied Serenade biofungicide (Bacillus subtilis) on pollination-related variables in rabbiteye blueberry, Biological Control, Volume 33, Issue 1, April 2005, Pages 32-38, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.01.002.
(http://www.sciencedirect.com/science/article/B6WBP-4FDJRVC-1/2/e0d2ee851439d5eae91823fb7d6bb8de)
Abstract:
Application of Serenade, a commercial biofungicide formulation containing the bacterium Bacillus subtilis, to the stigmatic surface of open blueberry flowers suppresses floral infection by the mummy berry fungus Monilinia vaccinii-corymbosi. The deliberate targeting of the stigma with the biocontrol agent in this pathosystem prompted us to evaluate potential negative impacts on pollination and pollination-related fruit characteristics. Application of Serenade to the stigmatic surface of detached blueberry flowers in the laboratory had no effect ($P > 0.05$) on the number of pollen tubes entering the style or their growth rates within the stylar canal. There was also no reciprocal effect, i.e., population dynamics of B. subtilis were unaltered by the presence of pollen. Application of the biocontrol product to open flowers, regardless of whether it was done 1 day before or immediately prior to pollination, did not impact fruit set or the number of seeds per berry, but marginally ($P = 0.048$) affected fruit weight in one of two experimental runs in the greenhouse; fruit weights in the two Serenade timing treatments were significantly different from each other but neither was different from that of the control that received pollen only. In a field experiment in which honey bees were utilized to vector the biocontrol product to open flowers, application of Serenade did not affect fruit weight but significantly reduced fruit set from 49.1 to 38.1% ($P = 0.0382$) and seed number to about half of that of the untreated control ($P = 0.0109$). However, fruit weights and seed numbers in the experiment were low even in treatments receiving no Serenade, indicative of poor pollination overall. Taken together, these results indicate that application of Serenade has no inherently adverse effects on pollination and associated fruit characteristics, but caution should be exercised in applying this product in conditions otherwise unfavorable for adequate pollination.
Keywords: Bacillus subtilis; Biocontrol risk assessment; Pollination; Fruit set; Rabbiteye blueberry; Vaccinium ashei

Un Taek Lim, Roy G. Van Driesche, A new potential host and transmission routes of Thripinema nicklewoodi, an entomogenous nematode of western flower thrips, Biological Control, Volume 33, Issue 1, April 2005, Pages 49-55, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.12.003.
(http://www.sciencedirect.com/science/article/B6WBP-4FC449J-1/2/92b0493b1899bd844eb27431e4cb4669)
Abstract:
Thripinema nicklewoodi Siddiqi is an obligate parasite of Frankliniella occidentalis Pergande. Potential parasitism by T. nicklewoodi of three other thrips species was examined under laboratory conditions. The test thrips included one predaceous thrips (Franklinothrips orizabensis Johansen)

and two phytophagous thrips in the family Thripidae, one of which is in the subfamily Thripinae (Thrips tabaci Lindeman) and the other in the subfamily Panchaetothripinae (Heliothrips haemorrhoidalis Bouche). After presenting the nematode with second instar larval thrips, we found that the nematode penetrated the test thrips in no choice tests. However, H. haemorrhoidalis and F. orizabensis were intrinsically unsuitable as hosts since the nematode did not produce any eggs 10 days after nematode penetration. Only T. tabaci, in the subfamily Thripinae, was suitable for reproduction by the nematode. The reproduction capability was equal to its usual host F. occidentalis. No significant differences in host preference were found between F. occidentalis and each of the three test species in choice tests. These results indicate that T. tabaci is a new potential host of T. nicklewoodi. In addition, in scanning electron microscopy studies, transmission routes of T. nicklewoodi were photographed in F. occidentalis. These photographs show that nematodes penetrated larval F. occidentalis through the intersegmental membranes of a coxal cavity or the abdomen and exited adult thrips via the anus.
Keywords: Frankliniella occidentalis; Thrips tabaci; Franklinothrips orizabensis; Heliothrips haemorrhoidalis; Host range; Host penetration; Greenhouse thrips; Onion thrips

Maryam Farzad, David F. Soria-Hernanz, Melissa Altura, Matthew B. Hamilton, Martha R. Weiss, Heidi G. Elmendorf, Molecular evolution of the chalcone synthase gene family and identification of the expressed copy in flower petal tissue of Viola cornuta, Plant Science, Volume 168, Issue 4, April 2005, Pages 1127-1134, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2004.12.014.
(http://www.sciencedirect.com/science/article/B6TBH-4F6K73F-1/2/a9306368d8a55f01ba2055edde64cbb9)
Abstract:
Chalcone synthase (CHS), the first committed enzyme in the flavonoid biosynthetic pathway, is commonly encoded by multi-gene families with select members of these families accounting for the majority of expression. We have examined the CHS gene family in Viola cornuta, a plant whose flowers undergo ontogenetic color change. Using both RNA and RNA/DNA samples isolated from floral tissues at different pigment stages, we obtained 14 unique sequences from 60 total clones of a 288 bp fragment from the catalytic region of CHS. The V. cornuta sequences were monophyletic when compared to CHS orthologs from other taxa. Substitution models generally indicated unequal rates of transition and transversion as well as significant rate variation among sites. With a Tamura-Nei correction, nucleotide divergence ranged from 0.3 to 10.6% with the vast majority as synonymous changes. The nucleotide divergence pattern suggests designation of three V. cornuta CHS clades; based on divergence of CHS orthologs, these clades are consistent with three CHS orthologs in V. cornuta. Sequences from only a single clade were found to be expressed in all three floral pigment stages.
Keywords: Anthocyanin biosynthesis; Floral color change; Chalcone synthase; Gene family; Viola cornuta; Nucleotide substitution

H. Friedman, S. Meir, I. Rosenberger, A.H. Halevy, S. Philosoph-Hadas, Calcium antagonists inhibit bending and differential ethylene production of gravistimulated Ornithogalum `Nova' cut flower spikes, Postharvest Biology and Technology, Volume 36, Issue 1, April 2005, Pages 9-20, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2004.11.002.
(http://www.sciencedirect.com/science/article/B6TBJ-4FG4BB6-6/2/6af36bf01ec2ad12e5e602409ae43049)
Abstract:
To study the role of calcium ions in the gravitropic response of cut flowering shoots, we have examined the effects of various calcium modulators on stem bending of Ornithogalum spp. `Nova' spikes following dry or wet gravistimulation. The most effective calcium chelators were further examined for their effects on the gravity- or IAA-induced ethylene formation, which represent signal transduction events in the gravity signalling pathway. The calcium chelators 1,2-bis(2-

aminophenoxy)ethane-N,N,N',N'-tetraacetic acid (BAPTA), ethylene glycol bis([beta]-aminoethylether) N,N,N',N'-tetraacetic acid (EGTA), trans-1,2-cyclohexane dinitro-N,N,N',N'-tetraacetic acid (CDTA), ethylenediamine-tetraacetic acid (EDTA), and the calcium channel blocker LaCl3, inhibited the gravitropic bending of Ornithogalum `Nova' spikes. This bending inhibition was obtained following stem gravistimulation both under dry transport (48 h dark at 6 [degree sign]C) or laboratory (24 h light at 20 [degree sign]C) conditions. On the other hand, the calcium ionophore A23187 enhanced the gravitropic response, further supporting the role of intracellular calcium in the gravitropic bending response. These calcium modulators had no deleterious effects on the flowering shoot, indicating that their inhibitory effect is not due to damage. An ethylene gradient was developed across the gravistimulated flowering shoot prior to the visual bending response, in favour of the lower stem flank. This was correlated with higher levels of 1-aminocylclopropane-1-carboxylic acid (ACC) and 1-(malonylamino)-cyclopropane-1-carboxylic acid (MACC) at the lower flank, indicating that the gravitropic stimulus may either lead to activation of ethylene biosynthesis enzymes or to lateral ACC movement. The ethylene gradient was abolished following spikes pulsing with EGTA or CDTA, which prevented the increased ethylene production at the lower flank. CDTA also abolished the IAA-induced ethylene production in vertical stems. This may imply that the calcium chelators inhibit ethylene production of the lower flank via inhibition of IAA action, which induces increased ethylene formation. This indicates that the calcium chelators act upstream to activation of ethylene biosynthesis, probably by abolishing earlier gravity-related processes. Our results further support our previous findings in snapdragon that calcium may act as an important mediator of the gravitropic signal transduction mechanism in cut flowering shoots.
Keywords: Calcium chelators; Ethylene; Gravitropism; LaCl3; Ornithogalum `Nova'; Stem bending

Michiharu Nakano, Akira Nakatsuka, Masayoshi Nakayama, Masaji Koshioka, Masumi Yamagishi, Mapping of quantitative trait loci for carotenoid pigmentation in flower tepals of Asiatic hybrid lily, Scientia Horticulturae, Volume 104, Issue 1, 15 March 2005, Pages 57-64, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.08.007.
(http://www.sciencedirect.com/science/article/B6TC3-4DG3DG4-1/2/e1faf4cecca72daf84fb899190178396)
Abstract:
Flower pigmentation is one of the most important traits for ornamental plants. To clarify the genetic basis for carotenoid pigmentation in flower tepals of Asiatic hybrid lily (Lilium sp.), we evaluated the segregation of a tepal-carotenoid content among F1 plants derived from a cross between `Montreux' (having a small amount of carotenoids) and `Connecticut King' (having a large amount of carotenoids), and mapped genetic loci for the carotenoid pigmentation onto the molecular linkage maps of `Montreux' and `Connecticut King' that we constructed previously. The tepal-carotenoid content among the F1 plants showed continuous segregation, indicating that several genes are associated with this trait. Quantitative trait loci (QTL) analysis identified one QTL, qCARmon6, on the sixth linkage group of the `Montreux' map. qCARmon6 explained 58.2% of the total phenotypic variation, that is, this locus had a large effect on the carotenoid accumulation. The result that qCARmon6 was mapped on the linkage group of `Montreux' which has a small amount of carotenoid pigments in tepals indicates that this locus has a dominant negative effect on carotenoid pigmentation.
Keywords: Carotenoids; Dominant negative gene; Double pseudo-testcross; Flower color; Genetic analysis; Lilium sp.; QTL mapping

Aleksej Tarasjev, Impact of genet size and flowering stage on fruit set in Iris pumila L. clones in wild, Acta Oecologica, Volume 27, Issue 2, March-April 2005, Pages 93-98, ISSN 1146-609X, DOI: 10.1016/j.actao.2004.09.007.

(http://www.sciencedirect.com/science/article/B6VR3-4DR03RM-2/2/ea8633197fe8cca039950c666504e976)
Abstract:
The interplay between vegetative propagation and sexual reproduction in clonal plants affects the fitness of individuals as well as the structure of genetic diversity. The relevance of studies of that interaction depends on how well chosen genotypes and environmental conditions reflect the real situation in natural populations. In order to analyze the relationship between genet size (and consequently its vegetative success) and fruit set (its female reproductive success) under undisturbed natural conditions I utilized 2916 ramets that bear hermaphrodite flowers on 137 naturally growing Iris pumila clones in a protected area of Deliblato Sand, Serbia. The number of flowers (i.e. flowering ramets) served as a fair estimator of genet size and the larger clones produced more fruits than the smaller ones. However, the smaller clones had significantly higher fruit to flower ratio compared to the larger ones and that difference was detectable in later flowering stages of a clone but not in the earlier ones. In the large clones, flowers that opened later had significantly lower fruit to flower ratio. Since the deleterious effect of geitonogamy on fruit set in I. pumila was documented by hand pollinations, the reduction of fruit to flower ratio in more abundant genets and in later flowering stages is most likely the result of increased geitonogamy. That reduction could lead to a different genetic structure in the seed bank compared to the structure in aboveground population, which can imply important ecological and micro-evolutionary consequences.
Keywords: Clonal plants; Reproductive success; Fruit to flower ratio; Maintenance of genetic diversity

Jose Luis Navarrete-Bolanos, Claudia Leticia Rangel-Cruz, Hugo Jimenez-Islas, Enrique Botello-Alvarez, Ramiro Rico-Martinez, Pre-treatment effects on the extraction efficiency of xanthophylls from marigold flower (Tagetes erecta) using hexane, Food Research International, Volume 38, Issue 2, March 2005, Pages 159-165, ISSN 0963-9969, DOI: 10.1016/j.foodres.2004.09.007.
(http://www.sciencedirect.com/science/article/B6T6V-4DS6VNN-1/2/796ddd675dffe3b809b5e62bd168923d)
Abstract:
The marigold flower (Tagetes erecta) is one of the richest natural sources of xanthophylls, mainly lutein. Its saponified extract is used as an additive in several food and pharmaceutical industries. However, the efficiency in the xanthophylls extraction from this natural source depends heavily upon an appropriate prior treatment, given to the flower, to increase wall-cells permeability and facilitate the diffusive mechanisms of mass exchange between immiscible phases during the lixiviation process. In this work, the effect of different treatments on marigold flower to increase the xanthophylls extraction efficiency is studied. The results clearly indicate the interrelation that exists between the treatment and the extraction. It is shown that almost full recovery of the xanthophylls contents can be achieved when the marigold is treated with hydrolytic enzymes synthesized by microbiota associated to marigold flowers. These results have significant impact on the cost-efficiency of the process.
Keywords: Marigold treatments; Xanthophylls extraction; Efficiency

Akiko Ito, Hiroko Hayama, Yoshiki Kashimura, Partial cloning and expression analysis of genes encoding NAD+-dependent sorbitol dehydrogenase in pear bud during flower bud formation, Scientia Horticulturae, Volume 103, Issue 4, 15 February 2005, Pages 413-420, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.07.006.
(http://www.sciencedirect.com/science/article/B6TC3-4DBJWC0-1/2/26335ae6f15ab82aeef4b81a598eb31d)
Abstract:

Partial fragments of five NAD+-dependent sorbitol dehydrogenase (NAD-SDH) genes were isolated from the developing buds of Japanese pear (Pyrus pyrifolia cv. Kosui) by RT-PCR (tentatively named PpySDH1-5). The derived amino acid sequences of PpySDH1-5 have 94 to 98% homology with NAD-SDH genes from apple. PpySDH1-4 were clearly distinguished from PpySDH5 based on primary structure, which showed 88-95% identity with each other, but only 69-71% identity with PpySDH5. Shading of limbs for 20 days increased NAD-SDH enzymatic activity in the buds and correspondingly increased the expression detected by PpySDH1. On the other hand, shoot bending increased NAD-SDH activity in lateral buds, and also increased the expression detected by PpySDH1. The expression of PpySDH5 was barely detected in any of these tissues. These results suggest that PpySDH1-5 encodes the isoforms of NAD-SDH protein which can be categorized into at least two groups and that PpySDH5 may not be requisite to bud growth, though some of the other NAD-SDH gene(s) may be. The increases of NAD-SDH activity, both by shading and shoot bending, are suspected to be regulated at the transcriptional level.
Keywords: Bud; Japanese pear; Pyrus pyriforia; Shading; Shoot bending

Nazrul Islam, Grete Grindal Patil, Hans Ragnar Gislerod, Effect of photoperiod and light integral on flowering and growth of Eustoma grandiflorum (Raf.) Shinn., Scientia Horticulturae, Volume 103, Issue 4, 15 February 2005, Pages 441-451, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.06.018.
(http://www.sciencedirect.com/science/article/B6TC3-4DPC716-1/2/a94fbe97243b0035ef41a8209f9f1c7e)
Abstract:
The aim of the study was to examine the effects of different photoperiod and light integral on floral initiation, development and subsequent growth of Eustoma grandiflorum (Raf.) Shinn. Six-weeks-old seedlings of `Echo Blue' and `Fuji Deep Blue' were placed under short day (SD, 10 h) and were transferred to long days (LD, 20 h) at 2-week intervals from 6 to 14 weeks after seeding. Plants initiated flower buds regardless of light regimes. Flower bud initiation was delayed by SD compared to LD; plants transferred after 6 weeks from seeding initiated flower buds at least 21 and 10 days earlier at LD at high (HL) and low (LL) daily light integral, respectively, compared to those at SD. Light regimes had little or no effect on time to flower bud development after initiation. Thus, it seems likely that LD and HL affected the initiation rather than development. Both the photoperiod and light integral strongly influenced the subsequent growth after initiation. SD delayed the time to visible bud (VB), increased the number of nodes to first open flower, number of branches, stem diameter and shoot dry weight compared to LD. HL promoted flowering and increased several shoot characteristics and flowering compared to LL.
The results indicate that Eustoma is a quantitative long-day plant. LD, and more specifically HL, enhanced flower bud initiation, development and subsequent growth. An initial SD period is preferred to increase the number of branches, number of flowering buds and flowers, stem diameter and shoot dry weight.
Keywords: Eustoma; Flower bud initiation; Growth; Photoperiod; Light integral

R. Martin-Mex, E. Villanueva-Couoh, T. Herrera-Campos, A. Larque-Saavedra, Positive effect of salicylates on the flowering of African violet, Scientia Horticulturae, Volume 103, Issue 4, 15 February 2005, Pages 499-502, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.06.020.
(http://www.sciencedirect.com/science/article/B6TC3-4DRBC13-1/2/4b8344e17c2a51eacfe644e65bdd0424)
Abstract:
Aqueous solutions of 1.0 [mu]M to 0.1 nM concentrations of salicylic acid (SA) were sprayed on African violet grown under greenhouse conditions to estimate its effect on the flower expression of the plant. These solutions were sprayed on the shoots of the plant on three occasions, 21, 28 and 35 days after being potted. Salicyliclate at 0.1 nM increased the number of leaves from 16 to 19, the number of flower primordia from 8 to 14, the rosette diameter from 130 to 177 mm in

comparison with the control. The same concentration induce flowering at 74 days of plant age whilest the control plants last 89 days to flower.
Keywords: Salicylic acid; Saint Paulia

Johannes Thiele, York Winter, Hierarchical strategy for relocating food targets in flower bats: spatial memory versus cue-directed search, Animal Behaviour, Volume 69, Issue 2, February 2005, Pages 315-327, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2004.05.012.
(http://www.sciencedirect.com/science/article/B6W9W-4DS93GH-7/2/008e45ec3df82db4e1f54bd7b58a83cb)
Abstract:
The search and orientation behaviours used during foraging depend both on a forager's perceptual and memory abilities and on the spatiotemporal pattern of food distribution. We examined whether nectar-feeding bats using spatially and temporally predictable resources can pinpoint known flower targets within patches from a spatial memory-based approach alone or whether only a coarse-grained spatial memory requires local search for the target's object features within patches. We developed echoacoustically distinct geometric objects as unique acoustic `colour markers' on experimental flowers. We could show that regional scale geometry of the local target environment influences orientation during target approach. Target choice was dependent on the relative positional information of local spatial cues when they were within a 20-cm radius around the target. For a dissociation experiment we first conditioned bats (in the laboratory and the Costa Rica rainforest) to a single target within an array of echoacoustically distinct feeders. During tests feeders were shifted and object cues rearranged. Bats directed initial choices most often at the feeder at the same absolute spatial coordinates as during the learning phase but later choices at the previously rewarded floral object cue. Thus bats had remembered both spatial and object attributes of their food target. However, their search strategy was to rely primarily on spatial memory and only secondarily on cue-based search. Flight approaches to feeders that were guided primarily by spatial memory were of significantly shorter duration than approaches that included active object-cue identification. This indicates a short-term energy advantage of the spatial memory-reliant strategy.

J. Sardans, F. Roda, J. Penuelas, Effects of water and a nutrient pulse supply on Rosmarinus officinalis growth, nutrient content and flowering in the field, Environmental and Experimental Botany, Volume 53, Issue 1, February 2005, Pages 1-11, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2004.02.007.
(http://www.sciencedirect.com/science/article/B6T66-4CTTHK5-1/2/8cf1f6bbc17e48b4d93aae68ba703e2a)
Abstract:
Rosmarinus officinalis is a dominant shrub species of calcareous Mediterranean communities that has increased its presence in wide areas due to fire frequency increase and field abandonment. We aimed to study the capacity of adult shrubs to respond to nutrient pulses such as those produced by fires and human driven eutrophycation. In a 5 years old post-fire Mediterranean shrubland we conducted an experiment to investigate the effects of irrigation and N and P fertilisation on the growth, nutrient status and flowering effort of adult plants of the dominant shrub R. officinalis in a post-fire shrubland. The responses were monitored during the immediate 3 years after fertilisation. P fertilisation increased plant growth, produced a great increase in P aerial mineralomass and P concentration in leaf and stems and had a slight positive effect on flowering effort. Irrigation increased plant growth, but did not have significant effects on nutrient contents and flowering. The results show that adult individuals of the Mediterranean shrub R. officinalis have a notable capacity to positively respond in growth and in nutritional status to a sudden increase of the limiting nutrient, in this case P, and in a lesser extent, to an increase of water supply. These capacities may be important under the more unpredictable nutrient and water

availability conditions expected for the near future; they will allow to take advantage of the pulses of higher nutrient and water availability in the middle of dry periods, thus increasing the community capacity to improve the nutrient retention in the ecosystem.
Keywords: Calcareous soil; Flowering; Irrigation; Growth; Mediterranean; Nitrogen; Nutrient content; Nutrient pulse; Phosphorus; Rosmarinus officinalis; Shrubland

D.P. Overy, J.C. Frisvad, U. Steinmeier, U. Thrane, Clarification of the agents causing blue mold storage rot upon various flower and vegetable bulbs: implications for mycotoxin contamination, Postharvest Biology and Technology, Volume 35, Issue 2, February 2005, Pages 217-221, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2004.08.001.
(http://www.sciencedirect.com/science/article/B6TBJ-4F05G4Y-1/2/d1f7debfb2f23deb9ea05b9ba0471f0f)
Abstract:
A considerable number of blue mold rot reports of various commercially grown bulbs and vegetables in the literature have been based on outdated taxonomy attributing crop losses to Penicillium corymbiferum Westling (a synonym of P. hirsutum Dierkx). The species P. corymbiferum has recently been subdivided into seven taxa which comprise the Pencillium series Corymbifera: P. albocoremium, P. allii, P. hirsutum, P. hordei, P. radicicola, P. tulipae and P. venetum. Results from pathogencity trials indicated that P. allii was the predominant pathogen of Allium cepa (red onion) and Allium sativum; however it did not infect either tulip or gladiolus. P. hirsutum, P. radicicola, P. tulipae and P. venetum were predominant pathogens of Tulipa gesneriana and P. hirsutum, P. tulipae and P. venetum were predominant pathogens of a Gladiolus sp. Six of the Corymbifera taxa (excluding P. hordei) caused a rot in the basal root plate of A. cepa (yellow onion); however as P. tulipae produces the mycotoxin penitrem A, which has been previously implicated in tremorgenic toxicosis, spoilage of yellow onion during storage due to this fungus is of particular concern.
Keywords: Penicillium bulb rot; Allium cepa; Allium sativum; Tulipa gesneriana; Gladiolus sp.; Mycotoxins

O. Karaguzel, I. Baktir, S. Cakmakci, V. Ortacesme, B. Aydinoglu, M. Atik, Responses of native Lupinus varius (L.) to culture conditions: effects of photoperiod and sowing time on growth and flowering characteristics, Scientia Horticulturae, Volume 103, Issue 3, 30 January 2005, Pages 339-349, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.06.017.
(http://www.sciencedirect.com/science/article/B6TC3-4D6370T-1/2/837de7fd1157ae6ead922f0f31c56999)
Abstract:
The effects of photoperiod and sowing time on growth and flowering characteristics of Lupinus varius were investigated during two growing periods to determine its responses to culture conditions as a potential native cut-flower crop. The seeds were sown in an unheated plastic greenhouse on 28 September, 28 October and 28 November under natural, 14- and 16-h day-length treatments. 14- and 16-h day-lengths were established by lengthening the natural day-lengths to 14 and 16 h with the use of night break photoperiodic lighting at 1.8-1.9 [mu]mol m-2 s-1 in 400-700 nm. Photoperiodic lighting, in particular the 16-h day-length treatments, slightly (maximally 15 days) shortened days to flowering and increased plant height in all sowing times relative to natural photoperiods. There were no significant differences in stem and branch inflorescence diameters, in lengths of branch, in main and branch inflorescences in plants grown under natural photoperiod, and 16-h day-length treatments. The highest main inflorescence diameter, the number of branches per plant, and flower numbers on main and branch inflorescences were recorded in plants grown under natural photoperiods, whereas 14-h day-length treatments did not provide sufficient specimens to allow for the measurement of most of the characteristics studied. These findings were interpreted to indicate that L. varius behaves as a

facultative long day plant. Additionally, there was a particular shortening of days to flower and growth, and flowering quality decreased linearly with delayed sowing dates under all photoperiodic treatments. The earliest and latest flowering dates were recorded for plants sown in September under 16-h day-length, and plants sown in November under natural photoperiods, respectively. Therefore, sowing in September under natural photoperiods or 16-h artificial day-length resulted in earlier flowering dates and a longer time from sowing to flowering and was consequently the best sowing time with respect to all of the characteristics considered in this study.
Keywords: Lupinus varius; Day-length; Sowing time; Unheated greenhouse

R.V. Molina, M. Valero, Y. Navarro, J.L. Guardiola, A. Garcia-Luis, Temperature effects on flower formation in saffron (Crocus sativus L.), Scientia Horticulturae, Volume 103, Issue 3, 30 January 2005, Pages 361-379, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.06.005.
(http://www.sciencedirect.com/science/article/B6TC3-4DTP2B7-9/2/8f86f8e8b823f4fd2df9d6f1527e50dc)
Abstract:
The temperature conditions for shoot growth and flower formation were characterised for saffron (Crocus sativus L.). Leaf withering occurred during late winter or spring depending on location, and coincided with a rise in temperature. No growth was detectable in the buds during the first 30 days after leaf withering, neither in underground corms nor in lifted corms incubated in the laboratory under controlled conditions. Flower initiation occurred during the first growth stages of the buds. The optimal temperature for flower formation was in the range from 23 to 27 [degree sign]C, 23 [degree sign]C temperature being marginally better. To ensure the formation of a maximum number of flowers, the incubation at these temperatures should exceed 50 days, although incubation longer than 150 days resulted in flower abortion. Flower emergence required the transfer of the corms from the conditions of flower formation to a markedly lower temperature (17 [degree sign]C). Incubation of the corms after lifting at a higher temperature (30 [degree sign]C), reduced flower initiation and caused the abortion of some of the initiated flowers. No flowers formed in corms incubated at 9 [degree sign]C. A variable proportion (20-100%) of the corms forced directly at 17 [degree sign]C without a previous incubation at 23-27 [degree sign]C formed a single flower. The wide differences in the timing of the phenological stages in different locations we found in this study seemed related to the ambient temperature. Leaf withering was followed shortly by flower initiation, which occurred during late spring or early summer as the rising temperature reached 20 [degree sign]C. A long hot summer delayed flower emergence which occurred in late autumn as the temperature fell to the range of 15-17 [degree sign]C.
Keywords: Crocus sativus; Dormancy; Flower forcing; Flowering; Saffron; Temperature

Harald W. Krenn, John D. Plant, Nikolaus U. Szucsich, Mouthparts of flower-visiting insects, Arthropod Structure & Development, Volume 34, Issue 1, January 2005, Pages 1-40, ISSN 1467-8039, DOI: 10.1016/j.asd.2004.10.002.
(http://www.sciencedirect.com/science/article/B6W66-4FD79FR-1/2/739e6ea190188b91d87a5d5bb0f43620)
Abstract:
This review deals with the morphology and function of adult insect mouthparts modified to feed on nectar, pollen or petals. Specialization to nectar-feeding is evident in formation of proboscides of various lengths and designs. Proboscides of many Hymenoptera and Diptera function according to adhesion mechanisms that load nectar onto extensible apical mouthpart regions before fluid is conveyed along the food canal to the mouth by capillarity and suction. Predominantly suctorial proboscides evolved once in Lepidoptera, probably twice in Coleoptera, variously in some Hymenoptera and several times with similar design in Diptera. Many of them are particularly long and have sealed food tubes, specialized apical regions, new proboscis resting positions and modified feeding movements. Mouthparts of obligate pollen-feeding insects can be characterized

by modified mandibles, specialized bristles for pollen manipulation and elaborate feeding movements. Often saliva is crucial for pollen retention and ingestion. In Coleoptera, intact pollen is gathered by sweeping movements of mouthparts; in Diptera, it is suspended in saliva prior to suction. Pollen is crushed by asymmetrical mandibles in aglossatan Lepidoptera and one group of basal Hymenoptera. Pollen-piercing mouthparts occur in Thysanoptera and one group of Diptera. Some butterflies and few Diptera extract nutrients from pollen by mixing it externally with saliva on their mouthparts. No mouthpart specializations to petal-feeding are reported in flower-visiting insects.
Keywords: Mouthparts; Proboscis; Anthophilous insects; Nectar; Pollen; Feeding; Morphology; Evolution

Lisa A. Berndt, Steve D. Wratten, Effects of alyssum flowers on the longevity, fecundity, and sex ratio of the leafroller parasitoid Dolichogenidea tasmanica, Biological Control, Volume 32, Issue 1, January 2005, Pages 65-69, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.07.014.
(http://www.sciencedirect.com/science/article/B6WBP-4DBJHR0-2/2/4bfc6ac50a386f320e750766909a0d07)
Abstract:
A laboratory experiment assessed the effect of floral food resources on the longevity, fecundity, and sex ratio of Dolichogenidea tasmanica (Cameron) (Hymenoptera: Braconidae), a parasitoid of leafrollers (Lepidoptera: Tortricidae). Alyssum (Lobularia maritima (L.), Brassicaceae) plants with flowers were compared with plants without flowers, with water available in both treatments. Adult parasitoids were provided with an excess of second-instar larval hosts, which were then reared to determine the composition of the F1 parasitoid generation. Female parasitoids with access to alyssum flowers lived, on average, seven times longer than those without flowers. Male longevity was three times greater with, than without flowers. The lifetime realised fecundity of D. tasmanica was also significantly increased in the presence of flowers, although this was a consequence of the increase in longevity, rather than an increase in daily fecundity. Without flowers, offspring sex ratios were strongly male biased, but when females had access to flowers an approximately equal sex ratio was produced. These results are discussed in relation to the use of flowers in agroecosystems for the conservation biological control of leafroller pests.
Keywords: Alyssum; Lobularia maritima; Nectar; Pollen; Floral feeding; Parasitoid; Dolichogenidea tasmanica; Braconidae; Fecundity; Longevity; Sex ratio; Leafroller Epiphyas postvittana; Tortricidae; Habitat manipulation

Stefan Dotterl, Lorne M. Wolfe, Andreas Jurgens, Qualitative and quantitative analyses of flower scent in Silene latifolia, Phytochemistry, Volume 66, Issue 2, January 2005, Pages 203-213, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2004.12.002.
(http://www.sciencedirect.com/science/article/B6TH7-4F3NXT0-1/2/78dc284935f3bcae6442d6ba31a1bf38)
Abstract:
The quantitative and qualitative variability in floral scent of 98 specimens of the dioecious species Silene latifolia belonging to 15 European and 19 North American populations was determined. Floral scent was collected from single flowers using dynamic headspace methods, and analysed by Micro-SPE and GC-MS methods. The flowers showed a nocturnal rhythm, and scent was emitted only at night. The amount of emitted volatiles varied greatly during the season, from 400 ng/flower/2 min in June to 50 ng/flower/2 min in August and September. The qualitative variability in the floral scent was high and different chemotypes, characterised by specific scent compounds, were found. Female and male flowers emitted the same type and amount of volatiles. The differences in floral scent composition between European and North American populations were small. Typical compounds were isoprenoids like lilac aldehyde isomers, or trans-[beta]-ocimene, and benzenoids like benzaldehyde, phenyl acetaldehyde, or veratrole. Some of these compounds

are known to attract nocturnal Lepidoptera species. The high qualitative variability is discussed in relation to the pollination biology of S. latifolia, and the results are compared with other studies investigating intraspecific variability of flower scent.
Keywords: Silene latifolia; Caryophyllaceae; White campion; Flower scent; Intraspecific variation; Micro-SPE, GC-MS, CNESS; Nocturnal rhythmic emission

Zaruhi P. Poghosyan, Katerina Giannoulia, Panagiotis Katinakis, Denis J. Murphy, Polydefkis Hatzopoulos, Temporal and transient expression of olive enoyl-ACP reductase gene during flower and fruit development, Plant Physiology and Biochemistry, Volume 43, Issue 1, January 2005, Pages 37-44, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2004.12.002.
(http://www.sciencedirect.com/science/article/B6VRD-4F60W84-1/2/78c7717ade43d7b29495679a9cc4c852)
Abstract:
Enoyl-ACP reductase is a catalytic component of the fatty acid synthetase (FAS) type II system in plants that is involved in the de novo fatty acid biosynthesis in plastids. A cDNA encoding an enoyl-ACP reductase responsible for the removal of the trans-unsaturated double bonds to form saturated acyl-ACP has been isolated from a library made from ripening fruits of Olea europaea L. The predicted protein contains 393 amino acid residues including a consensus chloroplast specific transit peptide. A strong homology was observed when olive enoyl-ACP reductase aligned with other plant sequences. Southern hybridization analysis revealed that enoyl-ACP reductase is encoded by a single gene in olives. Northern hybridization showed a transient expression of the enoyl-ACP reductase (ENR) gene at early stages of drupe (5-7 weeks after flowering, WAF), embryo and endosperm (13-16 WAF) while in mesocarp (13-19 WAF) the expression remained at high levels. In situ hybridization showed particularly prominent expression in the palisade and vascular tissue of young leaves, the tapetum, developing pollen grains and vascular tissue of anthers and to less extent in the embryo sac and transmitting tissue of the carpel. The distinctive spatial and temporal regulation of the ENR gene is consistent with major roles, not only in thylakoid membrane formation and fatty acid deposition, but also in the provision of precursor molecules for the biosynthesis of oxilipins that are important in plant tissues involved in transportation and reproduction.
Keywords: Development; Enoyl-ACP reductase; Gene expression; In situ hybridization; Olea

Sedat Serce, James F. Hancock, The temperature and photoperiod regulation of flowering and runnering in the strawberries, Fragaria chiloensis, F. virginiana, and F. x ananassa, Scientia Horticulturae, Volume 103, Issue 2, 1 January 2005, Pages 167-177, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.04.017.
(http://www.sciencedirect.com/science/article/B6TC3-4D9835R-1/2/a6bf9ab6962ef44dc62a1f0a84918533)
Abstract:
The temperature and photoperiod interactions of a number of elite genotypes of Fragaria virginiana, F. x ananassa, and F. chiloensis were studied in a series of growth chamber experiments. Several parameters were evaluated including: (1) the critical day-length (CDL) for flowering of short day (SD) genotypes under 8, 9, 10, and 11 h days at 18 [degree sign]C, (2) the floral and runnering response of single and multiple cropping genotypes under 8 and 16 h days at 18 [degree sign]C, and (3) the effect of temperature on flower bud formation in day-neutral (DN) genotypes held at 18, 22, 26, and 30 [degree sign]C under 12 h day-lengths. The same number of flowers were initiated under 15 and 30 day induction periods, regardless of photoperiod. Frederick 9, LH 50-4 and RH 30 (F. virginiana), `Aromas' and `Tribute' (F. x ananassa) and CFRA 0368 of F. chiloensis flowered under both long days (LDs) and SDs; while Eagle-14 (F. virginiana), `Fort Laramie' and `Quinalt' (F. x ananassa) flowered only under long days. While those genotypes that flowered under both LD and SD can be considered day-neutral, they varied in the degree of floral

response to the two photoperiods. CFRA 0368 and Frederick 9 produced the same number of flowers under both LDs and SDs, while `Aromas' and `Tribute' had more flowers under LDs and RH 30 had more under SDs. Of the DN genotypes, LH 50-4 and RH 30 were the only ones that produced runners under SDs. Flowering in `Fort Laramie' was least affected of any genotype by high temperature, although its dry weight was negatively impacted. Based on these data, several genotypes show promise as breeding parents: CFRA 0368 and Frederick 9 to equalize flower production under LD and SD conditions, LH 50-4 and RH 30 to produce more freely runnering DNs, and `Fort Laramie' for floral heat tolerance.
Keywords: Germplasm; Day-neutral; Short day; Long day; Critical day-length; Heat tolerance

Yuehui He, Richard M. Amasino, Role of chromatin modification in flowering-time control, Trends in Plant Science, Volume 10, Issue 1, January 2005, Pages 30-35, ISSN 1360-1385, DOI: 10.1016/j.tplants.2004.11.003.
(http://www.sciencedirect.com/science/article/B6TD1-4F1H61M-2/2/205569cf38fb467bcb6a626cc4595bc5)
Abstract:
The regulation of the FLC locus provides a plant model of how chromatin-modifying systems have emerged as important components in the control of a major developmental switch, the transition to flowering. Genetic and molecular studies have revealed that three systems of FLC regulation (vernalization, FRI and the autonomous pathway) all influence the state of FLC chromatin. Histone H3 trimethylation at lysine 4 and histone acetylation are associated with active FLC expression, whereas histone deacetylation and histone H3 dimethylation at lysines 9 and 27 are involved in FLC repression. These chromatin modifications provide an additional level of regulation of gene expression beyond that of the transcription factors that recruit RNA polymerase to target genes.

R. V. Molina, M. Valero, Y. Navarro, A. Garcia-Luis, J. L. Guardiola, The effect of time of corm lifting and duration of incubation at inductive temperature on flowering in the saffron plant (Crocus sativus L.), Scientia Horticulturae, Volume 103, Issue 1, 31 December 2004, Pages 79-91, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.04.008.
(http://www.sciencedirect.com/science/article/B6TC3-4CYR2V3-6/2/2869803dae8eab3190ffd73446e9a2dd)
Abstract:
After the formation of the replacement corms of saffron (Crocus sativus L.) the leaves withered and the apical buds entered dormancy. This dormancy was released by high summer temperature. Optimal flower formation was obtained under controlled conditions when corms were held at 25 [degree sign]C longer than 55 days followed by forcing at 17 [degree sign]C. Since the shoot apical meristem of the replacement corms was formed long before leaf withering, it was feasible to accelerate flowering by an early harvest. Corms lifted 1 month before leaf withering, incubated for 55 days at 25 [degree sign]C, and then forced at 17 [degree sign]C, flowered by early September, 6 weeks earlier than in the open. Flowering could be further accelerated (up to 7 days) by curing the corms for 20 days at 30 [degree sign]C prior to 25 [degree sign]C storage. This high temperature incubation shortened the rest period of the buds. However, a longer exposure to 30 [degree sign]C was deleterious for bud growth and flower formation. A 24 h incubation with ethylene (1-10 ppm) had no effect on dormancy or flower formation. The flowering of corms lifted after leaf withering could be delayed until early December by extending the incubation at 25 [degree sign]C for 150 days. A longer incubation at 25 [degree sign]C resulted in flower abortion. Combining the date of corm lifting and the duration of 25 [degree sign]C incubation, corms could be flowered from early September to mid-December. Since a batch of corms needed an average of 13 days in a lighted greenhouse at 17 [degree sign]C to complete flowering, 7-8 batches of corms may be forced each growing season. At the corm density used in our experiments (457 corms m-2), 67.2 g of the spice saffron per square meter was obtained. This yield was 30 times

higher than the maximum yield reported under field conditions, and about 300-fold higher than the average yield in many saffron-producing regions. Furthermore, the harvest of the container-grown saffron may be easily mechanised.
Keywords: Crocus sativus L.; Dormancy; Ethylene; Flowering; Forcing of corms; Saffron; Temperature requirements

Derya Esen, Shepard M. Zedaker, Jeffrey L. Kirwan, Paul Mou, Soil and site factors influencing purple-flowered rhododendron (Rhododendron ponticum L.) and eastern beech forests (Fagus orientalis Lipsky) in Turkey, Forest Ecology and Management, Volume 203, Issues 1-3, 13 December 2004, Pages 229-240, ISSN 0378-1127, DOI: 10.1016/j.foreco.2004.07.052.
(http://www.sciencedirect.com/science/article/B6T6X-4DDXSD7-1/2/d1a37b18491a0c96dda00cfbe030264a)
Abstract:
Eastern beech (Fagus orientalis Lipsky) is the major timber species growing in the Black Sea Region (BSR) forests of Turkey. Purple-flowered rhododendron (Rhododendron ponticum L.) is native to the region and currently dominates the understory of almost the entire eastern beech forest, reducing tree regeneration and growth. An aging beech overstory with little or no regeneration is the current state of most of the beech-rhododendron forests. We examined whether and how major environmental and disturbance factors have influenced the distribution and growth of rhododendron and beech in the region by determining the effects of canopy light, topography (aspect, elevation, slope), soil (moisture content, depth, texture, pH), and disturbance (anthropogenic and fire) on the establishment, abundance, and growth rate of rhododendron and beech in two rhododendron-invaded beech forests with different anthropogenic disturbance histories in the western BSR. We also studied the age and size structures of current beech stands and rhododendron to understand their origins and their future under varying levels of anthropogenic pressure.
The two sites had different stem-size class distributions. A weak relationship was found between diameter at breast height and age for beech, whereas there was a strong correlation between groundline diameter and age for rhododendron. The rhododendron understory was established after the beech overstory. Charcoal-density analysis and beech stem ages suggested that fire has not been a major regenerative disturbance for these sites, at least in the past 150-200 years. Rhododendron reduced both beech regeneration and long-term growth. The rhododendron-population structure suggested continuing domination in the near future, with increasing density and proportion of small stems. Soil moisture was an important environmental factor affecting rhododendron and beech abundance and growth. Adequate soil aeration was critical for rhododendron.
Use of foliar herbicides with burning during tree-regeneration efforts will probably provide greater success on rhododendron control. Establishing mixed beech-conifer stands might lower expansion of current and future rhododendron populations in the long term.
Keywords: Anthropogenic disturbance; Black Sea Region; Charcoal; Ecology of Rhododendron ponticum and Fagus orientalis; Soil; Topography; Tree growth; Turkey

Katia Oliveira Campos, Gilberto Barbante Kerbauy, Thermoperiodic effect on flowering and endogenous hormonal status in Dendrobium (Orchidaceae), Journal of Plant Physiology, Volume 161, Issue 12, 13 December 2004, Pages 1385-1387, ISSN 0176-1617, DOI: 10.1016/j.jplph.2004.07.008.
(http://www.sciencedirect.com/science/article/B7GJ7-4DN13JR-1/2/4435ebb1603527c746f139e3c381fb57)
Abstract: Summary
Two year-old cloned plants of Dendrobium Second Love were submitted to 25 [degree sign]C (light) and 10 [degree sign]C (dark) under a 12 h photoperiod (60 [mu]mol m-1 s-1) for 30 days.

The endogenous levels of IAA, ABA, and the cytokinins Z, [9R]Z, iP, and [9R]iP were measured 15, 22, and 30 days after the start of the thermoperiodic treatment in lateral buds and leaves. The endogenous levels of IAA and cytokinins, especially the zeatin-derived forms, increased significantly in buds after 15 days of treatment. On the other hand, the amount of ABA decreased progressively and significantly throughout the treatment. The treatment conspicuously accelerated flower-bud development. The found correlation suggests that hormones are involved in the signal transduction pathway of thermoperiodic flowering control.
Keywords: Flowering; Orchid; Hormones; Temperature

N. Alburquerque, L. Burgos, J. Egea, Influence of flower bud density, flower bud drop and fruit set on apricot productivity, Scientia Horticulturae, Volume 102, Issue 4, 10 December 2004, Pages 397-406, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.05.003.
(http://www.sciencedirect.com/science/article/B6TC3-4DTP2B7-5/2/60241100d5b12f57658a9bb9296d8a58)
Abstract:
Flower bud density, flower bud drop and fruit set were studied for nine apricot cultivars in order to understand the influence of these variables on apricot biology and productivity. Cultivars in southern Spain were chosen as representatives of different flowering times and productivity. Results indicate differences among cultivars in the studied parameters. Low flower bud production, high flower bud drop and low fruit set were often recorded in mid- to late flowering cultivars. These traits subsequently led to poor yields. Early blooming varieties, which are frequently good producers, generally showed the highest flower bud density, medium flower bud drop and high percentage of fruit set. The influence of the cultivar was more determinant than the seasonal effect on fruit yield. This information should be useful to breeders for choosing the best parents for productivity.
Keywords: Flower bud; Fruit set; Genetic variation; Prunus armeniaca L.

Andrew J. Macnish, Donald E. Irving, Daryl C. Joyce, Vasanthe Vithanage, Alan H. Wearing, Allan T. Lisle, Variation in ethylene-induced postharvest flower abscission responses among Chamelaucium Desf. (Myrtaceae) genotypes, Scientia Horticulturae, Volume 102, Issue 4, 10 December 2004, Pages 415-432, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.05.002.
(http://www.sciencedirect.com/science/article/B6TC3-4CYR2V3-4/2/2dbd08558b46b0f07e6df90bfc752723)
Abstract:
Postharvest flower abscission is an ethylene-mediated process that can reduce the marketability of cut Chamelaucium Desf. (Myrtaceae) flowers. The sensitivity of 51 Chamelaucium cut flower genotypes to ethylene was evaluated. Sensitivity varied among genotypes both between and within different species and crosses. Chamelaucium uncinatum x Chamelaucium micranthum cv. `Sweet Georgia' and C. uncinatum cvv. `Early Nir', `Paddy's Late', `Purple Pride', `CWA Pink' and `Early Hard' flowers were highly sensitive to ethylene. These genotypes shed 10% of their flowers in response to a 12 h treatment with <0.01 [mu]l l-1 ethylene at 20 [degree sign]C. In contrast, C. megalopetalum `Winter White' and `Iceberg' flowers were insensitive to ethylene even at 100 [mu]l l-1 for 12 h at 20 [degree sign]C. Sensitivity to ethylene varied between harvests during the flowering season and for the same genotypes harvested from different farms. Sensitivity of C. uncinatum cv. `Purple Pride' flowers to treatment with 1 [mu]l l-1 ethylene also decreased towards the end of vase life in association with slight dehydration. Variation in ethylene-induced abscission responses highlights the need to screen flowers from multiple harvests and varying growing conditions when assessing ethylene sensitivity. Screening genotypes for ethylene sensitivity should facilitate selection of Chamelaucium species with greater durability for export handling.
Keywords: Chamelaucium; Ethylene-sensitivity; Flower abscission; Postharvest transport

E. S. du Toit, P. J. Robbertse, J. G. Niederwieser, Temperature regime during bulb production affects foliage and flower quality of Lachenalia cv. Ronina pot plants, Scientia Horticulturae, Volume 102, Issue 4, 10 December 2004, Pages 441-448, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.06.003.
(http://www.sciencedirect.com/science/article/B6TC3-4DTP2B7-2/2/8248a0eab9778c82d57df9ed875b8910)
Abstract:
Flowering-sized bulbs of Lachenalia that developed under three different temperature regimes [S. Afr. J. Plant Soil 18 (1) (2001a) 28] were used to assess the quality of subsequent pot plants. Plants were grown in a growth cabinet at a 15/10 [degree sign]C day/night temperature regime. When the oldest flower of the inflorescences opened, the pot plants were transferred to a growth cabinet that provided a constant temperature of 22 [degree sign]C with lower lighting conditions to simulate office conditions. The flowering date, keeping ability as well as the morphology of the inflorescences were evaluated. After the senescence of the inflorescences, the plants were harvested and dissected into different plant parts for evaluation. The temperature pre-treatments had a major effect on the performance of the subsequent pot plants. Flowering occurred 8 weeks earlier compared to plants normally grown in outdoor conditions in the Pretoria region (summer rainfall area). Furthermore, the low temperature regime (LTR) treated bulbs produced inflorescences with the longest keeping ability and simultaneous flowering was noticed. The lower the temperature regime during the bulb production phase, the greater is the peduncle length, rachis length, floret number as well as the peduncle diameter of the primary, secondary and tertiary inflorescences.
Keywords: Lachenalia; Temperature; Plant morphology; Flower quality

J. Rubio, F. Flores, M. T. Moreno, J. I. Cubero, J. Gil, Effects of the erect/bushy habit, single/double pod and late/early flowering genes on yield and seed size and their stability in chickpea, Field Crops Research, Volume 90, Issues 2-3, 8 December 2004, Pages 255-262, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.03.005.
(http://www.sciencedirect.com/science/article/B6T6M-4CB0B0M-2/2/740871d8acfaaa59343b24b4a4ad1a97)
Abstract:
The development of ascochyta blight resistant chickpea lines has allowed autumn sowing of this crop, and increased seed yields as result of higher biomass production than the traditional spring sowing in the Mediterrranean region. A second step in the chickpea yield improvement could be to increase harvest index. In this sense, the effect of the erect/bushy habit, single/double pod and late/early flowering genes on yield and seed size and their stability was studied using eleven F6:7 ascochyta blight resistant chickpea lines. These lines were derived from a cross between an erect, single podded and late flowering line and a bushy, double podded early line. Six lines out of eleven were erect and late flowering (three being single and three double podded), two were single podded, bushy and late flowering, two double podded, bushy and early flowering, and finally one single podded, bushy and early flowering. A multilocation trial during four and 3 years under autumn and spring sowing, respectively, in the south of Spain was performed for yield and seed size. The stability of these lines was studied by AMMI analysis. Our results suggest that the double pod gene has no effects on both yield and seed size, although, confers a higher yield stability than the single pod gene. The mean yield of the lines with bushy growth habit, across all environments, was higher than that of the erect habit lines; 208.1 and 179.8 g/m2 in autumn and 120 and 101.4 g/m2 in spring sowing, respectively. Mean yield of the early lines, across all environments was higher than that of late lines; earliness was more important under spring sowing with yields of 130.2 and 102.3 g/m2 for early and late lines, respectively. Thus, for developing new chickpea cultivars under Mediterranean conditions, breeding programs should consider that (i) for spring sowing, early flowering and bushy types are the characters with greater influence on yield and

yield stability, respectively, and (ii) for autumn sowing, the important characters are bushy habit on yield and double pod and earliness on yield stability.
Keywords: Cicer arietinum; Autumn sowing; Spring sowing; Multilocation trial

Fumi Tatsuzawa, Yuki Mikanagi, Norio Saito, Flower anthocyanins of Calystegia in Japan, Biochemical Systematics and Ecology, Volume 32, Issue 12, December 2004, Pages 1235-1238, ISSN 0305-1978, DOI: 10.1016/j.bse.2004.05.008.
(http://www.sciencedirect.com/science/article/B6T4R-4CVX2G4-2/2/f6045869d3aef9f9f8b1115778d22fd0)
Keywords: Calystegia hederacea; C. japonica; C. sepium; C. soldanella; Convolvulaceae; Cyanidin 3-glucoside; Cyanidin 3-rutinoside; Cyanidin 3-malonylglucoside

Tatsuya Uemachi, Yoshie Kato, Toshihiko Nishio, Comparison of decorative and non-decorative flowers in Hydrangea macrophylla (Thunb.) Ser., Scientia Horticulturae, Volume 102, Issue 3, 19 November 2004, Pages 325-334, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.02.009.
(http://www.sciencedirect.com/science/article/B6TC3-4CC7W6R-3/2/f3a4a2dca691476439fd4964e395eaf5)
Abstract:
A comparison was made between decorative and non-decorative flowers in Hydrangea macrophylla. The external appearance of petals, stamens, and pistils were similar in both types of flowers. The locules and placentas of the decorative flower were smaller than those of the non-decorative flower. On the other hand, the decorative flower's receptacle was much more developed than that of the non-decorative flower. In the development of ovules, no differences were obvious between both types of flowers. There were no significant differences in pollen fertility between both types of flowers as estimated by germination tests and acetocarmine staining tests. Pollen from both flower types functioned normally to produce germinable seeds in controlled pollination tests. Both types of flowers showed female fertility in open pollination tests. The non-decorative flowers were pentamerous, whereas most decorative flowers were tetramerous. These results which revealed the differences between decorative and non-decorative flowers will help to elucidate the mechanism of decorative flower formation.
Keywords: Hydrangea macrophylla; Decorative flower; Fertility; Pollen germination; Pollen stainability; Floral organ

H. Kibbler, M. E. Johnston, R. R. Williams, Adventitious root formation in cuttings of Backhousia citriodora F. Muell: 2. Seasonal influences of temperature, rainfall, flowering and auxins on the stock plant, Scientia Horticulturae, Volume 102, Issue 3, 19 November 2004, Pages 343-358, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.02.007.
(http://www.sciencedirect.com/science/article/B6TC3-4CF5F6P-1/2/2a9c2a4ba79e479089af3baab99b7cc9)
Abstract:
A 2-year study was carried out on established trees at two sites in southeastern Queensland, Australia, to identify environmental factors that influenced rooting of Backhousia citriodora from cuttings. Complex interactions of rainfall events above 20 mm from the preceding month and mean maximum temperature on stock plants resulted in a correlation with rooting success of r=0.81 and 0.74 for sites at The University Of Queensland, Gatton Campus, and Cedar Glen, respectively. A more detailed investigation under controlled environmental conditions showed that maintaining stock plants at temperatures between 10 and 30 [degree sign]C had no direct effect on rooting capacity. However, temperature was correlated with growth, which may have an indirect effect on root formation. In spring, floral initiation was found to only delay rooting and had no effect on the final rooting percentage.

A series of seasonal experiments demonstrated that application of the auxins indole-3-acetic acid, indole-3-butyric acid and napthaleneacetic acid over a range of concentrations (1000-8000 [mu]g/ml) did not significantly increase rooting compared to the control and there is no practical advantage in applying auxins. Seasonal results and the temperature experiment also suggest that under a glasshouse environment with higher temperatures in winter and an adequate supply of water, B. citriodora cuttings can be successfully rooted over the whole year.
Keywords: Stock plant; Cuttings; Temperature; Flowering; Auxin; Season

David A. Laurie, Simon Griffiths, Roy P. Dunford, Vangelis Christodoulou, Scott A. Taylor, James Cockram, James Beales, Adrian Turner, Comparative genetic approaches to the identification of flowering time genes in temperate cereals, Field Crops Research, Volume 90, Issue 1, Linking Functional Genomics with Physiology for Global Change Research, 8 November 2004, Pages 87-99, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.07.007.
(http://www.sciencedirect.com/science/article/B6T6M-4D16VCC-1/2/6c476ab3bde835d0dfe3f00826e66d11)
Abstract:
The timing of flowering during the year is an important adaptive character which impacts yield and quality in crop plants. The genetic basis of flowering time control is best understood in the model dicot arabidopsis (Arabidopsis thaliana [L.] Heynh.) and results from this system are briefly summarized. Recent results from rice are discussed in relation to arabidopsis, particularly in relation to conserved genes regulating flowering by photoperiod. How these results might benefit studies of temperate cereals is then considered. Genetic analysis of photoperiod and vernalization response in temperate cereals is summarized in relation to recent data pointing to greater evolutionary conservation of photoperiod response than vernalization response. The implications of these results for identifying additional genes in cereals are discussed. The aim of gene identification is to provide a better understanding of how plant development is controlled by environmental cues such as day length and temperature and to allow researchers to determine how many alleles of each gene are available. This information could be combined with physiologically-based whole plant growth models to provide an improved description of crop development. Improved understanding of the control of flowering would assist plant breeders in the selection of varieties with enhanced adaptation to existing environments or to new environments arising from climate change.
Keywords: Wheat; Barley; Rice; Arabidopsis; Flowering; Photoperiod; Vernalization; Comparative mapping

Selim Dedej, Keith S. Delaplane, Harald Scherm, Effectiveness of honey bees in delivering the biocontrol agent Bacillus subtilis to blueberry flowers to suppress mummy berry disease, Biological Control, Volume 31, Issue 3, November 2004, Pages 422-427, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.07.010.
(http://www.sciencedirect.com/science/article/B6WBP-4D634Y8-1/2/4432692b4f52a85ed59bfd5ea33b77b3)
Abstract:
Honey bees are important pollinators of commercial blueberries in the southeastern United States, and blueberry producers often use supplemental bees to achieve adequate fruit set. However, honey bees also vector the plant pathogenic fungus Monilinia vaccinii-corymbosi which infects open blueberry flowers through the gynoecial pathway causing mummy berry disease. Here, we report the results of a 3-year field study to test the hypothesis that using bee hives equipped with dispensers containing the biocontrol product Serenade, a commercial formulation of the bacterium Bacillus subtilis which has shown activity against flower infection by M. vaccinii-corymbosi in laboratory experiments, can reduce mummy berry disease incidence when honey bees are used as pollinators in blueberries. Individual honey bees carried 5.1-6.4 x 105 colony-forming units

(CFU) of B. subtilis when exiting hive-mounted dispensers with Serenade. On caged rabbiteye blueberry bushes in the field, population densities of B. subtilis vectored by honey bees reached a carrying capacity of <103 CFU per flower stigma within 2 days of exposure, and there was a highly significant non-linear relationship between B. subtilis populations per stigma and bee activity, expressed as number of legitimate flower visits per time interval per cage ($R = 0.6928$, $P < 0.0001$, $n = 32$). Honey bee density (1600 or 6400 individuals per 5.8-m3 cage) and Serenade treatment (presence or absence of the product in hive-mounted dispensers) significantly ($P < 0.05$) affected the incidence of fruit mummification on caged bushes, whereby increasing bee density increased disease incidence and application of Serenade reduced disease levels. Taken together, results of this study suggest that use of a hive-dispersed biocontrol product such as Serenade as a supplement during pollination can reduce the risk of mummy berry disease. This may be a prudent practice that optimizes the benefits to pollination of high bee densities while reducing the associated disease-vectoring risk.
Keywords: Mummy berry disease; Monilinia vaccinii-corymbosi; Biological control; Bacillus subtilis; Honey bee; Apis mellifera; Rabbiteye blueberry; Vaccinium ashei

Un Taek Lim, Roy G. Van Driesche, Impatiens necrotic spot virus infection and feeding behavior of nematode-parasitized western flower thrips, Biological Control, Volume 31, Issue 3, November 2004, Pages 438-444, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.06.003.
(http://www.sciencedirect.com/science/article/B6WBP-4CVX2W4-1/2/54061a5009e9709d4c686e24506f5b80)
Abstract:
The effects of parasitism by the nematode Thripinema nicklewoodi Siddiqi (Tylenchida: Allantonematidae) on tospovirus infection and feeding behavior of Frankliniella occidentalis Pergande (Thysanoptera: Thripidae) were studied in the laboratory. In an initial experiment, nematode parasitism reduced the numbers of adult thrips that were positive to Impatiens necrotic spot virus (INSV) by enzyme-linked immunosorbent assay (ELISA) compared to controls. Three hypotheses on possible mechanisms causing this reduction were tested. H1: nematodes have a tendency to penetrate healthy thrips rather than INSV-infected thrips; H2: parasitized first instar thrips are less able to acquire virus during feeding; or H3: INSV replication is suppressed in parasitized thrips. H1 and H2 were proven false as we found no difference in nematode attack rate between healthy thrips and thrips that have taken up INSV and no difference in virus uptake or feeding activity between parasitized and non-parasitized larval thrips. H3 was not supported by data from our tests ($P=0.07$) but remains the explanation most worthy of future investigation. Interestingly, INSV transmission was not affected by nematode parasitism even though it reduced feeding activity of adult female thrips by 81% on leaves, 38% on pollen, and 22% on honey. However, despite lowered total feeding, probing by parasitized thrips (in honey) was not reduced, and this may explain why lowered feeding did not result in lowered virus transmission.
Keywords: Thripinema nicklewoodi; Frankliniella occidentalis; INSV; Insect vector; Tospovirus; Entomoparasitic nematode

Musa Ozcan, Haydar Haciseferogullari, Fikret Demir, Some physico-mechanic and chemical properties of capers (Capparis ovata Desf. var. canescens (Coss.) Heywood) flower buds, Journal of Food Engineering, Volume 65, Issue 1, November 2004, Pages 151-155, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.01.006.
(http://www.sciencedirect.com/science/article/B6T8J-4BS0FH3-3/2/5e44e54511dbc30e7b2c6e4510dc5648)
Abstract:
The physico-mechanic and chemical properties were established in developing Capparis ovata Desf. var. canescens (Coss.) Heywood buds from Konya (Selcuklu) to investigate potential uses. Raw flower buds contained crude ash, crude oil, crude protein, crude fiber, total carotenoid, crude

energy, water- and ether-soluble extract, dimethyl sulfite (DMS) and essential oil. In addition, physical properties such as length and diameter of buds, mass of buds, projected area, volume, porosity, bulk density, bud density, thermal velocity, hardness were measured.
Keywords: Capers; Capparis ovata Desf.; Capparaceae; Physico-mechanic and chemical properties

Kanok Bunya-atichart, Saichol Ketsa, Wouter G. van Doorn, Postharvest physiology of Curcuma alismatifolia flowers, Postharvest Biology and Technology, Volume 34, Issue 2, November 2004, Pages 219-226, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2004.05.009.
(http://www.sciencedirect.com/science/article/B6TBJ-4DCDD3M-8/2/d28ed6337c0a95aecbbae36510193909)
Abstract:
Flowering stems of Curcuma alismatifolia (Zingiberaceae) cv. Chiang Mai Pink contain small flower buds and open flowers, surrounded by large pink bracts. Vase life is limited by browning at the bract tips. This browning may relate to ethylene production as it was hastened by treatment with exogenous ethylene. Browning was apparently not due to lack of carbohydrates, as sugar treatment had no effect, and was also apparently not due to xylem plugging with microbes because antimicrobial compounds (8-hydroxyquinoline sulphate (HQS) and dichloroisocyanuric acid (DICA)) were ineffective.
The stems had a very short vase life after 3 days of dry storage. When stored in water, the optimum temperature for storage was 7 [degree sign]C. After 3 or 6 days of storage at 7 [degree sign]C the vase life was not different from that of unstored controls (about 18 days). However, if flowers were held at 5 [degree sign]C for 3 days they had a vase life of only 2 days. It is concluded that C. alismatifolia is an attractive cut flower with a considerable length of vase life (usually more than 2 weeks, in freshly harvested stems). The flowers are chilling-sensitive, and cannot be stored dry but they can be stored in water at 7 [degree sign]C for about 6 days. Since vase life is rather long, it is also possible to store the flowers in water for a few days at ambient temperatures.
Keywords: Curcuma alismatifolia; Bracts; Chilling injury; Ethylene; Gibberellic acid; Tip browning; Water relations

Alonso Gonzalez, Ping Lu, Warren Muller, Effect of pre-flowering irrigation on leaf photosynthesis, whole-tree water use and fruit yield of mango trees receiving two flowering treatments, Scientia Horticulturae, Volume 102, Issue 2, 1 November 2004, Pages 189-211, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.12.011.
(http://www.sciencedirect.com/science/article/B6TC3-4BVPTN4-5/2/33eb31fb07f90d3b3ffbb27045391d53)
Abstract:
Two flowering treatments and two irrigation treatments were applied to mango trees of cultivar Kensington Pride in a commercial orchard near Darwin, northern Australia. Paclobutrazol (PBZ) was applied as a soil drench. For the mango flowering treatment (MFT) a cincture was cut into each tree trunk and a length of twine soaked in a solution of morphactin was tied into the cincture. Extra irrigation treatment (XTI) was applied between 30 and 46 days before peak flowering, and normal irrigation (NI) was applied when flowering activity was detected in about 65% of the tree canopy. Leaf light-saturated carbon assimilation (Alsat), stomatal conductance (gs), chlorophyll fluorescence parameters, whole-tree water use, flowering activity, fruit growth and fruit yield were recorded over three years.
Alsat, gs, and electron transport rates (ETR) were low at time of flowering regardless of the irrigation or flowering treatment. A significant increase in Alsat, and gs (10-20%) was detected at some dates in trees receiving extra irrigation. ETR of XTI trees was significantly higher than that of NI trees at flowering and during early phase of fruit growth, but not later in the season. In both flowering treatments whole-tree water use of XTI trees was significantly higher than that of NI trees

in the pre-flowering and flowering period but not near the end of the fruiting season. XTI treatment did not change flowering intensity; however, it caused flowering to be more variable. XTI treatment resulted in larger fruits in PBZ treated trees and increased fruit retention in MFT treated trees. Fruit relative growth rate was higher in fruits from XTI trees early in the season but was similar to those from NI trees later in the season. Regression analysis of the proportion of flowering and fruit number/yield during the 3 years of the experiment reflected a similar conversion of flowers to fruits in the M-XTI and all PBZ trees, but was lower in the M-NI trees. After 3 years of treatment, XTI resulted in trees with larger trunk circumference and higher leaf area index compared to NI trees. The effect of low C availability at time of flowering on fruit yield is discussed.
Keywords: Irrigation; Fruit growth; Photosynthesis; Kensington Pride; Mangifera indica; Sap flow; Whole-tree water use

Assenna Todorova, Shoichiro Asakawa, Tetsuya Aikoh, Preferences for and attitudes towards street flowers and trees in Sapporo, Japan, Landscape and Urban Planning, Volume 69, Issue 4, 30 October 2004, Pages 403-416, ISSN 0169-2046, DOI: 10.1016/j.landurbplan.2003.11.001.
(http://www.sciencedirect.com/science/article/B6V91-4BT192B-1/2/6e64226decbfdfb4b6704dc24e84ffe5)
Abstract:
The benefits of street vegetation, in particular the importance of trees, for urban dwellers have been given wide attention. There is, however, a lack of research on flowers as an element of street vegetation. This paper explores preferences for various street-planting models, particularly those with different compositions of flowers, with or without trees. Eighty-one residents of Sapporo evaluated 59 photomontage simulations and answered a questionnaire concerning their attitudes to street flowers. Results revealed trees to be the factor with the greatest influence on preference. Among possible elements for the space beneath trees from a choice including soil, grass, hedge and flowers, flowers were the most favoured. In particular, low and ordered compositions of brightly coloured flowers were the most preferred. Tall flowers were not found to be either attractive or appropriate for streetscapes in this case study. A factor analysis of the variables related to attitudes towards street flowers revealed the following five factors: 'psychological benefits and aesthetic value', 'natural-environmental', 'practical concerns', 'effort to maintain' and 'non-aesthetic'. The highest rated items were all related to the aesthetic and psychological benefits of street flowers. Flowers were the most preferred element beneath street trees and were seen as not only contributing to the aesthetic quality of a street but as also having a positive influence on psychological well-being.
Keywords: Street flowers; Street trees; Street-planting models; Preferences; Attitudes

Xiaobing Fang, Prasanta K. Subudhi, Bradley C. Venuto, Stephen A. Harrison, Alicia B. Ryan, Influence of flowering phenology on seed production in smooth cordgrass (Spartina alterniflora Loisel.), Aquatic Botany, Volume 80, Issue 2, October 2004, Pages 139-151, ISSN 0304-3770, DOI: 10.1016/j.aquabot.2004.07.007.
(http://www.sciencedirect.com/science/article/B6T4F-4DK680Y-1/2/f897fdbd8887d6bf3e4ec69fdf268e46)
Abstract:
Smooth cordgrass (Spartina alterniflora Loisel.), a dominant salt marsh grass along the Atlantic and Gulf Coast of North America, is used extensively for reclamation and restoration of eroding coastal wetlands. Aerial seeding is both economical and practically feasible to vegetate large areas of marsh land. It can accelerate coastal restoration efforts by replacing the expensive hand planting of vegetative clones. However, unavailability of large quantities of viable seed, due to poor seed set in S. alterniflora, is a major hindrance. Our objective was to study the effect of flowering phenology on seed production in 20 native smooth cordgrass accessions collected from south Louisiana. Flowering initiated in early July and ended by middle of October, with peak flowering

between early September and early October. Total florets per panicle decreased as the season progressed while the seed set and 1000-kernel weight steadily increased. Thousand-kernel weight, flowering date, and seed weight per panicle showed positive correlation with seed set, and direct effects of these traits were significant, as revealed in path-coefficient analysis. The average seed set was 47 +/- 2%. The range of 0-94% provides an opportunity to identify superior lines for developing populations with improved seed production. It is evident from this study that flowering is an important determinant influencing seed set, and selection could be made for plants that flower within the peak flowering period resulting in the highest number of filled seeds with improved germination and higher kernel weight.
Keywords: Flowering phenology; Germination; Spartina alterniflora; Seed set; Wetland restoration

Andreas Jurgens, Flower scent composition in diurnal Silene species (Caryophyllaceae): phylogenetic constraints or adaption to flower visitors?, Biochemical Systematics and Ecology, Volume 32, Issue 10, October 2004, Pages 841-859, ISSN 0305-1978, DOI: 10.1016/j.bse.2004.03.009.
(http://www.sciencedirect.com/science/article/B6T4R-4CPD4SG-6/2/f75056cfc16211e8d0f7d2e5e97769cc)
Abstract:
A comparative analysis of the flower volatiles of 10 day-flowering Silene species native to Central Europe was made to improve the understanding of the pollination biology and evolution of floral odours in the genus. Floral scent was collected by dynamic headspace adsorption and analysed via gas chromatography-mass spectrometry. In total, 60 compounds could be identified by their mass spectra as well as by their relative retention times. The number of compounds per species ranged between 16 in Silene rupestris and 40 in S. viscaria. Main compounds in most species were fatty acid derivatives (FADs, cis-3-hexen-1-ol, cis-3-hexenyl acetate, n-nonanal), benzenoids (benzaldehyde, phenylacetaldehyde, methyl benzoate), and monoterpenes (limonene, linalool), accompanied by sesquiterpenes, and nitrogen-containing compounds.
Nonmetric multidimensional scaling (CNESS, NMDS) based on relative amounts of single components leads to the same conclusion as visualization of similarities based on component classes reflecting to some degree biosynthetic pathways: differences in floral scent composition can be related to both the taxonomy and the pollination biology of the species investigated. In all but one species of the Silene group, and all species of the Lychnis group (S. dioica, S. flos-cuculi, S. flos-jovis, S. pendula), the dominating compound classes are benzenoids followed by FADs. The relatively high amounts of aromatic compounds (e.g. benzaldehyde, phenylacetaldehyde, methyl benzoate) are indicative of an adaptation towards butterfly pollination. Species of the Viscaria and Eudianthe groups showed high relative amounts of FADs but a lower content of benzenoids. Relatively high amounts of monoterpenes (>10%) were found in S. alpestris, S. coeli-rosa, S. gallica, and S. viscaria. It is suggested that the high relative content of the most volatile monoterpene alkenes (e.g. limonene) in S. gallica and S. coeli-rosa may be indicative of an adaptation to bees as pollinators in these species.
Keywords: Caryophyllaceae; Lychnis; Silene; Day-flowering; Floral scent; GC-MS

Gordon G Simpson, The autonomous pathway: epigenetic and post-transcriptional gene regulation in the control of Arabidopsis flowering time, Current Opinion in Plant Biology, Volume 7, Issue 5, October 2004, Pages 570-574, ISSN 1369-5266, DOI: 10.1016/j.pbi.2004.07.002.
(http://www.sciencedirect.com/science/article/B6VS4-4CY0K1G-1/2/feff3651b1a537dd0dbad749dfb20989)
Abstract:
Mechanisms that mediate the control of flowering time have been accessed through a molecular genetic approach in Arabidopsis. Flowering is regulated by different pathways and, in the past year, all of the known components of the so-called autonomous pathway have been identified. The

autonomous pathway comprises a combination of factors involved in RNA processing and epigenetic regulation that downregulate the floral repressor, FLOWERING LOCUS C (FLC). However, components of the autonomous pathway are more widely conserved in plant species other than Arabidopsis than is FLC. Therefore, the broadest lessons we learn from dissecting the function of the autonomous pathway may be in revealing how precision in regulated gene expression is delivered.

Joost Lucker, Pat Bowen, Jorg Bohlmann, Vitis vinifera terpenoid cyclases: functional identification of two sesquiterpene synthase cDNAs encoding (+)-valencene synthase and (-)-germacrene D synthase and expression of mono- and sesquiterpene synthases in grapevine flowers and berries, Phytochemistry, Volume 65, Issue 19, October 2004, Pages 2649-2659, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2004.08.017.
(http://www.sciencedirect.com/science/article/B6TH7-4DDXM2R-2/2/90df0569d6c9a7155490c1019a4e22dd)
Abstract: Graphical abstract
Terpenoids are important for a variety of quality traits in the grapevine, Vitis vinifera.
Valencene is a volatile sesquiterpene emitted from flowers of grapevine, Vitis vinifera L. A full-length cDNA from the cultivar Gewurztraminer was functionally expressed in Escherichia coli and found to encode valencene synthase (VvVal). The two major products formed by recombinant VvVal enzyme activity with farnesyl diphosphate (FPP) as substrate are (+)-valencene and (-)-7-epi-[alpha]-selinene. Grapevine valencene synthase is closely related to a second sesquiterpene synthase from this species, (-)-germacrene D synthase (VvGerD). VvVal and VvGerD cDNA probes revealed strong signals in Northern hybridizations with RNA isolated from grapevine flower buds. Transcript levels were lower in open pre-anthesis flowers, flowers after anthesis, or at early onset of fruit development. Similar results were obtained using a third probe, (-)-[alpha]-terpineol synthase, a monoterpenol synthase. Sesquiterpene synthase and monoterpene synthase transcripts were not detected in the mesocarp and exocarp during early stages of fruit development, but transcripts hybridizing with VvVal appeared during late ripening of the berries. Sesquiterpene synthase transcripts were also detected in young seeds.
Keywords: Vitis vinifera; Vitaceae; Grape vine; Wine flavour and aroma; Terpene cyclase; Floral scent; Nootkatone; Nutraceutical

Margarete Magalhaes Souza, Telma N. Santana Pereira, Alexandre Pio Viana, Messias Gonzaga Pereira, Antonio Teixeira do Amaral Junior, Herika Chagas Madureira, Flower receptivity and fruit characteristics associated to time of pollination in the yellow passion fruit Passiflora edulis Sims f. flavicarpa Degener (Passifloraceae), Scientia Horticulturae, Volume 101, Issue 4, 30 September 2004, Pages 373-385, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.11.020.
(http://www.sciencedirect.com/science/article/B6TC3-4C52P13-1/2/9d6149ae04d9dc9b9d231b0f76710cfa)
Abstract:
Flower receptivity during the period the flower is open was assessed with two histochemical tests, alpha-naphtil acetate and hydrogen peroxide, and with a controlled pollination test in a yellow passion fruit population, from midday to 17:00 h, in two seasons, autumn and summer. The fruit obtained from the pollinated stigmas were assessed for four characteristics: weight, length, diameter and seed number. The time of the day affected flower receptivity and the fruit characteristics. The histochemical tests indicated that flower receptivity was approximately 80% even 5 h after the flower opened. The controlled pollination test resulted in contrasting flower receptivity and mean values of less than 35% receptivity at the end of the period of flower opening. There was high correlation between fruit weight and seed number and between fruit length and diameter. The results indicated that flower receptivity tended to decline sharply after 14:00 h in

both autumn and summer while fruit mean values reach the greatest mean percentage in the summer.
Keywords: Passiflora edulis f. flavicarpa; Yellow passion fruit; Pollination; Flower receptivity; Fruit production

J. Paulo De Melo-Abreu, Diego Barranco, Antonio M. Cordeiro, Joan Tous, Bento M. Rogado, Francisco J. Villalobos, Modelling olive flowering date using chilling for dormancy release and thermal time, Agricultural and Forest Meteorology, Volume 125, Issues 1-2, 20 September 2004, Pages 117-127, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2004.02.009.
(http://www.sciencedirect.com/science/article/B6V8W-4CSYNNF-1/2/c40d909df6a6c86e336d66a595fe12ec)
Abstract:
Phase development of the olive tree is important for many purposes (e.g. adaptability, management, crop modelling). Many studies on the prediction of flowering used only data from one location and/or use a simple thermal time approach, what impairs the model ability to be used under different conditions. In this study, three models were evaluated and compared. Model 1 is a chill-heating model, that is a generalisation and simplification of the Utah model, with a thermal time approach in the forcing phase; Model 2 has a below 7 [degree sign]C chill-hours model, followed by the same approach in the forcing phase; and Model 3 has no chilling description, and relies on a thermal time approach after 1 February. All models were calibrated using a data set of dates of flowering of five olive varieties that were grown in at least three locations, and the total chilling units accumulated (TU) until bud dormancy release, in the first two models, and the thermal time (TT) from this phase until flowering occurrence were determined. Validation followed on pooled data from 10 varieties grown in Cordoba, using the parameters from the calibration process (i.e. species level parameters) and the variety-specific TUs and TTs. The modelling efficiency was 0.92, 0.90 and 0.85, and the root mean square error of the predictions was 2.2, 2.5 and 2.8 days for Models 1-3, respectively. Although all three models depicted a good performance, Model 1 is more appropriate because it is physiologically meaningful. It should be preferred in all cases that the satisfaction of the chilling requirements of the species or variety is in doubt, and under different climate conditions. Three global warming scenarios A-C (daily maximum-minimum temperature increases of 1-3 [degree sign]C) were analysed, using the three models. All models and scenarios predict that there is a substantial advancement of the date of flowering. Only Models 1 and 2 show that the warmer scenarios indicate no normal flowering in some varieties/years. Models 1 and 2 further show the possibility that some compensation occurs in the warmer scenarios. Scenario A predicts that flowering is 10.0 and 9.3 days earlier than normal using Models 1 and 2, respectively. Scenario C shows that the advance of flowering for 1 [degree sign]C average temperature increase, in relation to Scenario B, is 7.4 and 5.2 days for Models 1 and 2, respectively. Model 1 and the algorithm that accompanies it might be useful to model the flowering occurrence of other woody species.
Keywords: Olive trees; Olea europaea; Chilling; Thermal time; Dormancy; Global warming

Mohsen K. H. Ebrahim, Comparison, determination and optimizing the conditions required for rhizome and shoot formation, and flowering of in vitro cultured calla explants, Scientia Horticulturae, Volume 101, Issue 3, 10 September 2004, Pages 305-313, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.11.002.
(http://www.sciencedirect.com/science/article/B6TC3-4BBVW57-2/2/2415bb7b0b5951e3ecbfab0ca62e6834)
Abstract:
Aseptic cultures of calla were established from rhizome-bud explants which were surface-sterilized in 4% NaOCl solution for 5 min. Cultures were initiated on a medium containing Murashige and Skoog (MS)-salts, benzyladenine (2 mg l-1=8.9 [mu]M) and agar (5 g l-1). Explants were

transferred at 4-week intervals, on MS basal medium supplemented with kinetin (5 mg l-1=23.2 [mu]M), until the onset of proliferation (ca. 2 months). Thereafter, four subcultures were made in liquid media similar to the latter one. Shoots produced developed rhizomes and/or rooted plantlets depending on the culture conditions. Rhizomes were successfully formed on MS-basal media containing sucrose (70 g l-1) and Na-dikegulac (1.69 [mu]M=0.5 mg l-1). They were germinated and grown in greenhouse to develop flowering potplants. The highest multiplication rate and lowest hyperhydricity were achieved, in a medium containing 2-isopentenyladenine (12.3 [mu]M=2.5 mg l-1), by culturing the explants at 4-week intervals in two ways: (1) on solid media (6 g agar l-1) or (2) alternatively in liquid (no agar) and solid (6 g agar l-1) media. Adding alpha-naphthalene acetic acid (1 mg l-1=5.4 [mu]M) to a solid MS-basal medium containing MS salts at a half strength supported the fastest growth and development of roots. Hardening-off and acclimatizing the rooted plantlets led to development of flowering potplants served for producing white attractive cutflowers.
Keywords: Zantedeschia aethiopica; Sucrose; Growth regulators; Gelation; Hardening-off; Acclimatization

L. G. Verdi, I. M. C. Brighente, J. Schripsema, R. Braz Filho, M. G. Pizzolatti, Kaurene diterpenes and flavonoids from Baccharis illinita flowers, Biochemical Systematics and Ecology, Volume 32, Issue 9, September 2004, Pages 837-840, ISSN 0305-1978, DOI: 10.1016/j.bse.2003.11.008.
(http://www.sciencedirect.com/science/article/B6T4R-4C47J46-1/2/767400e465e268759975dccd1d05e9a3)
Keywords: Baccharis illinita; Flavonoids; Kaurene

Hiroyuki Enomoto, Katsunori Kohata, Masayoshi Nakayama, Yuichi Yamaguchi, Kazuo Ichimura, 2-C-methyl--erythritol is a major carbohydrate in petals of Phlox subulata possibly involved in flower development, Journal of Plant Physiology, Volume 161, Issue 8, 19 August 2004, Pages 977-980, ISSN 0176-1617, DOI: 10.1016/j.jplph.2004.01.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4CXKWJB-C/2/7a02839bd317944dca42d53771c59b4d)
Abstract:
2-C-methyl--erythritol, a soluble carbohydrate that is not ubiquitously found in higher plants, was detected in the ethanol extract from Phlox subulata petals and isolated using HPLC. The isolated compound was identified by 1H-NMR, 13C-NMR and CI-MS spectra. 2-C-methyl--erythritol was a major soluble carbohydrate in petals, leaves and stems. In petals, the concentration of 2-C-methyl--erythritol markedly increased during flower development and opening and was similar in concentration to glucose, a ubiquitous metabolic sugar. This suggests that 2-C-methyl--erythritol may contribute to flower opening in association with glucose in the P. subulata.
Keywords: 2-C-methyl--erythritol; Flower bud development; Phlox subulata; Soluble carbohydrate; Sorbitol

Robert A Raguso, Flowers as sensory billboards: progress towards an integrated understanding of floral advertisement, Current Opinion in Plant Biology, Volume 7, Issue 4, August 2004, Pages 434-440, ISSN 1369-5266, DOI: 10.1016/j.pbi.2004.05.010.
(http://www.sciencedirect.com/science/article/B6VS4-4CJCYMP-3/2/e3fd1c6ac91304cdbbdc28ea637dab4c)
Abstract:
This paper explores the landscape of integrated sensory signals that are produced by flowers, and the contextual information that modulates pollinator responses to such signals. Chiloglottis orchids are pollinated by mimicking the pheromone and posture of female thynnine wasps, but floral height provides the context within which male wasps respond to these signals. The odor and appearance of carrion attract blowflies to Helicodiceros inflorescences, but flies are more likely to enter the

floral chamber when heat is present as a contextual cue. Finally, fragrance, UV-visual cues and echo fingerprints are redundant signals that Glossophaga bats can use to find flowers, depending on prior experience and the photic environment.

Bengt Oxelman, Nori Yoshikawa, Betty L. McConaughy, Jie Luo, Amy L. Denton, Benjamin D. Hall, RPB2 gene phylogeny in flowering plants, with particular emphasis on asterids, Molecular Phylogenetics and Evolution, Volume 32, Issue 2, August 2004, Pages 462-479, ISSN 1055-7903, DOI: 10.1016/j.ympev.2004.01.014.
(http://www.sciencedirect.com/science/article/B6WNH-4C2R2CM-1/2/eb3430b164ce8337f931bd08cacea888)
Abstract:
Two, apparently functional, paralogues of the RPB2 gene, which encodes the second largest subunit of RNA polymerase II, are shown to be present in two major groups of asterid plants. Although all other land plants surveyed so far have been found to have only one of these two copies, the RPB2 gene phylogeny inferred from the 3' half of the gene for 35 angiosperm taxa and six other land plants indicates that the duplication of the RPB2 gene occurred earlier than the time for origin of the asterid group, probably near the origin of 'core eudicots.' The d copy is present in all plants which are unambiguously assigned to the core eudicots, whereas the I copy is retained only in the lamiid clade, Ericales, and Escallonia, all belonging to the asterid group of plants. Both parsimony and likelihood analyses of sequences from the 3' half of the gene give strong bootstrap support for these conclusions. There is no support for monophyly of the taxa having both copies. Thus, numerous losses of one of the copies must be inferred. Structurally, both paralogues appear functional, and transcription is demonstrated for both copies. In the lamiid group, the d copy has lost introns 18-23. The well supported phylogenetic relationships implied by the RPB2 gene phylogeny are largely congruent with well supported phylogenetic hypotheses based on other sequence data. However, Ilex, usually assigned to the campanuliid clade, is instead supported as being a member of the lamiid clade, both from sequence data and the presence of an I copy as well as the loss of introns 18-23 in the d copy. Escallonia, supported as a member of the campanuliid clade both by RPB2-d-sequences and previously published DNA sequence data, has all the introns 18-23 in its d copy, as do all other members studied from the campanuliid group. We used the Markov Chain Monte Carlo (MCMC) approach of the MrBayes program to implement Maximum Likelihood bootstrapping. Under the same model of evolution, bootstrapping frequencies are significantly lower than the Bayesian posterior probabilities inferred from the MCMC chain.
Keywords: RPB2; Flowering plants; Gene duplications

Toshio Ando, Motoko Takahashi, Taku Nakajima, Yukiko Toya, Hitoshi Watanabe, Hisashi Kokubun, Fumi Tatsuzawa, Delphinidin accumulation is associated with abnormal flower development in petunias, Phytochemistry, Volume 65, Issue 15, August 2004, Pages 2219-2227, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2004.06.028.
(http://www.sciencedirect.com/science/article/B6TH7-4D09DDH-B/2/ad4b46ec49cd2af2e5be82d0eb86bd66)
Abstract: Graphical abstract
No commercial petunia lines highly accumulate delphinidin 3-glucoside in the in flower. Active flavonoid 3',5'-hydroxylase (F3'5'H) and inactive anthocyanidin 3-glucoside-rhamnosyltransferase (RT) are considered to be associated with a dull-coloured crumpled corolla-limb.
The relative floral anthocyanidin contents of 195 commercial petunias with floral colours other than white and yellow were determined using HPLC, and the presence of five anthocyanidins cyanidin, peonidin, delphinidin, petunidin, and malvidin was confirmed. Pelargonidin was not detected, and delphinidin was not a major component. Using a principal component analysis of the relative anthocyanidin contents, the petunias were classified into three phenotype-groups accumulating cyanidin, peonidin, or malvidin, plus petunidin as the major anthocyanidin. A fourth phenotype was

segregated in the progeny obtained by self-pollinating an F1 hybrid of the malvidin group; this accumulated delphinidin 3-glucoside in a markedly crumpled corolla-limb (delphinidin group). Such inferior floral traits, associated with the accumulation of delphinidin 3-glucoside, are thought to be the driving force that removed the delphinidin group from commercial petunias. A comparison of flowers of the delphinidin group and those of the other groups may provide a useful tool towards a deeper understanding of how anthocyanin biosynthesis relates to normal development of the corolla.
Keywords: Petunia; Solanaceae; Anthocyanin biosynthesis; Crumpled flower; Principal component analysis; Flavonoid 3',5'-hydroxylase; Anthocyanidin 3-glucoside-rhamnosyltransferase

Fumi Tatsuzawa, Norio Saito, Hiroko Seki, Masato Yokoi, Tomohisa Yukawa, Koichi Shinoda, Toshio Honda, Acylated anthocyanins in the flowers of Vanda (Orchidaceae), Biochemical Systematics and Ecology, Volume 32, Issue 7, July 2004, Pages 651-664, ISSN 0305-1978, DOI: 10.1016/j.bse.2004.02.004.
(http://www.sciencedirect.com/science/article/B6T4R-4CB63HH-1/2/5054e2ca00666355542fd9f9b14d3594)
Abstract:
More than 11 anthocyanins were observed in the violet-blue and red-purple flowers of Vanda hybrid cultivars (Orchidaceae), from which eight major acylated anthocyanins were isolated. Four of those pigments were based on cyanidin 3,7,3'-triglucoside and the other four pigments were based on delphinidin 3,7,3'-triglucoside as their deacylanthocyanins, which were acylated with two molecules of hydroxycinnamic acid and/or one molecule of malonic acid, respectively. Apart from four known acylated anthocyanins, two novel anthocyanins were unambiguously elucidated to be delphinidin 3-O-[6-O-(malonyl)-[beta]-glucopyranoside]-7,3'-di-[6-O-(trans-sinapoyl)-[beta]-glucopyranoside] and its demalonyl derivative by spectral and chemical methods. Another novel anthocyanin was determined to be delphinidin 3-O-malonylglucoside-7,3'-diferuloylglucoside by chromatographical methods. One further acylated anthocyanin was tentatively identified to be sinapoylferuloyl 3-malonylglu coside-7,3'-diglucoside of delphinidin. The distribution of these pigments was investigated in the flowers of four species and 13 hybrids by the analytical process of HPLC. Also the flower colour effects of these pigments are discussed.
Keywords: Vanda species and hybrids; Orchidaceae; Cyanidin 3,7,3'-triglucoside; Delphinidin 3,7,3'-triglucoside; Malonic and sinapic acids; Malonylglucoside; Violet-blue and red-purple flowers

Mahmuda Begum, Geoff M. Gurr, Steve D. Wratten, Helen I. Nicol, Flower color affects tri-trophic-level biocontrol interactions, Biological Control, Volume 30, Issue 3, July 2004, Pages 584-590, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.03.005.
(http://www.sciencedirect.com/science/article/B6WBP-4C4DXC5-1/2/73d22de9f1edda69a6c63616dae9180c)
Abstract:
The adults of many parasitoid species require nectar for optimal fitness, but very little is known of flower recognition. Flight cage experiments showed that the adults of an egg parasitoid (Trichogramma carverae Oatman and Pinto) benefited from alyssum (Lobularia maritima L.) bearing white flowers to a greater extent than was the case for light pink, dark pink or purple flowered cultivars, despite all cultivars producing nectar. Survival and realised parasitism on all non-white flowers were no greater than when the parasitoids were caged on alyssum shoots from which flowers had been removed. The possibility that differences between alyssum cultivars were due to factors other than flower color, such as nectar quality, was excluded by dying white alyssum flowers by placing the roots of the plants in 5% food dye (blue or pink) solution. Survival of T. carverae was lower on dyed alyssum flowers than on undyed white flowers. Mixing the same dyes with honey in a third experiment conducted in the dark showed that the low level of feeding on dyed flowers was unlikely to be the result of olfactory or gustatory cues. Flower color appears,

therefore, to be a critical factor in the choice of plants used to enhance biocontrol, and is likely also to be a factor in the role parasitoids play in structuring invertebrate communities.
Keywords: Flower color; Trichogramma carverae; Epiphyas postvittana; Lobularia maritima; Biological control; Parasitoids

Justyna Veit, Edgar Wagner, Jolana T.P. Albrechtova, Isolation of a FLORICAULA/LEAFY putative orthologue from Chenopodium rubrum and its expression during photoperiodic flower induction, Plant Physiology and Biochemistry, Volume 42, Issues 7-8, July-August 2004, Pages 573-578, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2004.06.008.
(http://www.sciencedirect.com/science/article/B6VRD-4CX6SJP-1/2/83007ba5b9e0fac1667c814cd302e31c)
Abstract:
The short day plant (SDP) Chenopodium rubrum L. (ecotype 374) has been a model plant for physiological studies on photoperiodic flower initiation for many years. Using reverse transcription-polymerase chain reaction (RT-PCR) we identified a C. rubrum putative orthologue of the FLORICAULA/LEAFY genes from Antirrhinum majus and Arabidopsis thaliana, referred to as CrFL. Kinetics of the expression of CrFL in the apical part of C. rubrum during flower induction was followed using semi-quantitative RT-PCR. Expression of CrFL in vegetative apices was relatively high and started to decrease after 6 h of darkness (critical photoperiod). It reached its minimum between the 9th and the 12th hour of the 12-h inductive dark span, stayed at low levels for the next 6 h and increased again after the flower induction was completed. Our results indicate that expression of CrFL is regulated by photoperiod and that it is important both in the vegetative state and during flower development.
Keywords: Chenopodium rubrum; Floral meristem identity gene; FLORICAULA/LEAFY; Photoperiodic flower induction; Semi-quantitative RT-PCR; Shoot apical meristem

Pavel Lizal, Jirina Relichova, Localization of seven new late-flowering mutations on the genetic map of Arabidopsis thaliana using a newly generated CAPS marker, Plant Science, Volume 167, Issue 1, July 2004, Pages 143-149, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2004.03.010.
(http://www.sciencedirect.com/science/article/B6TBH-4C5MGMT-2/2/9eef0fc32e93a5e5f0796fd901dea034)
Abstract:
The genetic analysis of seven new late-flowering mutants is reported. One mutation was found to be recessive (dn) and six to be dominant. The relevant loci were located at distinct positions on chromosomes one and four. A new protocol for converting Restriction Fragment Length Polymorphism (RFLP) markers to Cleaved Amplified Polymorphic Sequences (CAPS) as PCR-based markers was developed using the Arabidopsis thaliana genome database. RFLP marker MI122 was successfully converted to a CAPS, which allowed more precise mapping of five late-flowering mutations.
Keywords: Arabidopsis thaliana; DNA markers; Late-flowering mutants; Map position

Un Taek Lim, Roy G. Van Driesche, Population dynamics of nematode transmission in western flower thrips on caged impatiens, Biological Control, Volume 30, Issue 2, June 2004, Pages 504-510, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.02.004.
(http://www.sciencedirect.com/science/article/B6WBP-4BX797D-3/2/f6bf628adf563ba0a31dcff2bb5490fb)
Abstract:
To evaluate potential of Thripinema nicklewoodi (Tylenchida: Allantonematidae) as a biological control agent of western flower thrips, Frankliniella occidentalis (Thysanoptera: Thripidae), dynamics of nematode transmission were studied in two experimental thrips populations with different initial parasitism rates in caged impatiens plants. The initial parasitism rates of adult

female thrips were set at 50% in a `Low nematode' treatment and at 70% in a `High nematode' treatment and were compared to a control population. Transmission of T. nicklewoodi persisted for seven host generations in both nematode treatments. There was convergence in both number of parasitized thrips and percent parasitism among all the subpopulations of the western flower thrips, and no differences were found between the two treatments. The highest parasitism rates were in adult female thrips, reaching 52% in the second generation of the `Low nematode' treatment and 48% in the fifth generation of `High nematode' treatment. Populations of healthy (i.e., not parasitized) female thrips declined 50-79% in the `Low nematode' treatment and 39-73% in `High nematode' treatment compared to the control thrips population between the fourth and seventh generations. However, no significant reductions were found in numbers of larval thrips in either treatment, compared to controls, and the numbers of larval thrips were not different between the two treatments. Higher proportion of male in thrips populations with nematode was observed during the last four sampling dates when adult female thrips declined significantly in both treatments compared to control population.
Keywords: Thripinema nicklewoodi; Frankliniella occidentalis; Population dynamics; Nematode transmission; Sex ratio; Parasite; Impatiens; Degree day

Silvia Coimbra, Leonel Torrao, Ilda Abreu, Programmed cell death induces male sterility in Actinidia deliciosa female flowers, Plant Physiology and Biochemistry, Volume 42, Issue 6, June 2004, Pages 537-541, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2004.05.004.
(http://www.sciencedirect.com/science/article/B6VRD-4CK7N38-1/2/46ae692cb80cef573e41a273a6b571e5)
Abstract:
The importance of programmed cell death (PCD) during the life cycle of plants is well established, although the underlying molecular mechanisms are still poorly defined. An emerging system for the study of PCD during development in plants is that of sex organ abortion. In this work we investigate the degeneration of microspores in the anthers of Actinidia deliciosa female flowers. The kiwifruit, A. deliciosa, is a dioecious species native to China. Pollen development in female flowers is equivalent to pollen development in the male flowers, until the microspores are released from the tetrads. At this time the first differences appear, and include the condensation and shrinkage of the cytoplasm, blebbing of the plasma membrane and of the nuclear envelope, and condensation of chromatin. However, at the time these events are occurring, all other cellular organelles, including mitochondria, have their structures well preserved. Fragmentation of DNA was detected in situ by the TUNEL procedure, which involves the end labeling of the DNA fragments by terminal deoxynucleotidyl transferase with UTP conjugated to a detectable marker. This assay confirmed the morphological characterization of PCD in this system.
Keywords: Kiwifruit; Microspores; Programmed cell death; TUNEL

Delphine Joly, Mireille Perrin, Claude Gertz, Jocelyne Kronenberger, Gerard Demangeat, Jean Eugene Masson, Expression analysis of flowering genes from seedling-stage to vineyard life of grapevine cv. Riesling, Plant Science, Volume 166, Issue 6, June 2004, Pages 1427-1436, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.12.041.
(http://www.sciencedirect.com/science/article/B6TBH-4BKGCB9-1/2/d9142856d64fb459ff04436b70819b3a)
Abstract:
The development of grapevine (Vitis vinifera L.) differs significantly from annuals species in having distinct juvenile and adult periods. Although intimately linked to the transition from one to the other, flowering per se takes 2 years in adult plants. Using grapevine cv. Riesling orthologues of the Arabidopsis flowering genes LEAFY, APETALA1, AGAMOUS, TERMINAL FLOWER1 and SEPALLATA3, we came up with a comprehensive temporal and spatial molecular analysis of the flowering in this species.

Expression of VvLEAFY and VvTFL1 is detected early after germination in the shoot apical meristem of seedlings and later in the latent buds of juvenile plants, however, it is not sufficient to induce flowering which only occurs after 3-6 years of vegetative development.
On adult plants, the latent buds are set the first season but remain apparently dormant in winter. Expression analysis in established vineyards provides molecular evidence for continuous gene expression of VvLEAFY over two growing seasons even at mean temperatures below -10 [degree sign]C. On the following spring, only latent buds that develop into flower-bearing shoots show expression of VvTFL1, VvLEAFY, VvAP1, VvAG and VvSEP3 suggesting that their expression is required for flower ontogenesis.
Keywords: Grapevine; Development; Flowering genes; Juvenile phase; Adult phase

S. J. Blaikie, V. J. Kulkarni, W. J. Muller, Effects of morphactin and paclobutrazol flowering treatments on shoot and root phenology in mango cv. Kensington Pride, Scientia Horticulturae, Volume 101, Issues 1-2, 3 May 2004, Pages 51-68, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.09.009.
(http://www.sciencedirect.com/science/article/B6TC3-4B5BCWP-2/2/95ed46dd395a48bde21b60ea43e1620d)
Abstract:
Mango cv. Kensington Pride, is the major horticultural tree crop in the tropical region of northern Australia. The warm, humid climate encourages vegetative growth and growers need to implement flowering treatments to maximise opportunities for high fruit yields. Two chemical-based flowering treatments have recently been introduced to the north Australian mango region. The first, paclobutrazol (P), inhibits the synthesis of gibberellins and is applied as a soil drench. The second, known as mango flowering treatment (M), uses the plant growth regulator morphactin which is applied by tying a length of twine that has been soaked in a solution of the chemical into a cincture cut around the circumference of the tree trunk. This experiment evaluated the effects of P and M on shoot phenology and the relationship between vegetative and floral growth of trees grown on nine commercial orchards in the Darwin-Katherine region of northern Australia over three consecutive seasons. In a supplementary experiment the effects of M on root growth were studied. In the year following application of P and M trees generally flowered more profusely, with the maximum intensity of flowering being up to twice that of control (C) trees at some sites. The effectiveness of M was not as consistent in the second year and by the third year this treatment had no effect on flowering. The P treatment consistently improved flowering but the attainment of maximum intensity of flowering in the Darwin region was delayed in the third year when there were fewer cool days in the pre-flowering period compared with the first 2 years. Vegetative growth was reduced by M and P at many sites, with canopy surface area of trees in these treatments being 20-30% lower than in C. Root growth of M trees was restricted to levels that were generally 33-50% of the growth achieved in C, although by the end of the year following treatment root growth in M and C was similar.
Growers need to implement flowering treatments to maximise the potential for flowering of mango cv. Kensington Pride in the Australian tropics. The P treatment usually enhances flowering but may require a sustained period of cool weather in the pre-flowering period for maximum effect. The M treatment usually enhances flowering in the season following treatment but loses its effect in subsequent seasons. Root growth is reduced in M during the season following treatment which may be associated with the effects on vegetative growth and flowering and also affect the ability of trees to take up water and nutrients.
Keywords: Mango; Mangifera indica L. cv. Kensington Pride; Flowering; Morphactin; Paclobutrazol; Roots

Suguru Sato, Mary M. Peet, Randolph G. Gardner, Altered flower retention and developmental patterns in nine tomato cultivars under elevated temperature, Scientia Horticulturae, Volume 101, Issues 1-2, 3 May 2004, Pages 95-101, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.10.008.
(http://www.sciencedirect.com/science/article/B6TC3-4B5JPGJ-1/2/74ade2a36e3b1bfea172d00d743c91e9)
Abstract:
Moderately elevated temperature effects on flower development were examined in nine tomato cultivars (Lycopersicon esculentum Mill.). Plants were grown under high (HT, 32/28 [degree sign]C day/night temperatures) and control (CT, 26/22 [degree sign]C) temperature conditions. Fate of flowers developed was categorized as seeded fruit, parthenocarpic fruit, undeveloped flowers, or aborted flowers. Although HT decreased seeded fruit set in all nine cultivars, the degree of sensitivity and the pattern of reaction to the elevated temperature differed among cultivars. FLA7156 was the most tolerant cultivar, although under HT seeded fruit set was less than half that at CT (22.5% compared to 46.8%). The remaining cultivars had very few or no seeded fruit set at all at HT. The percentage of parthenocarpic fruit increased at HT compared to CT in all cultivars. Aborted flowers also increased in FLA7156, NC8288, NCHS1 and NC46E, but did not change in `Piedmont', NC279HS, and NC403HS, or decreased in `Fresh Market 9' and TH318. Reduction of flower abortion and increase of parthenocarpic fruit set can be advantageous traits for breeding of high temperature tolerant tomato cultivars.
Keywords: Lycopersicon esculentum Mill.; Parthenocarpy; Undeveloped flowers; Flower abortion; High temperature stress

M. Silberbush, J. H. Lieth, Nitrate and potassium uptake by greenhouse roses (Rosa hybrida) along successive flower-cut cycles: a model and its calibration, Scientia Horticulturae, Volume 101, Issues 1-2, 3 May 2004, Pages 127-141, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.10.009.
(http://www.sciencedirect.com/science/article/B6TC3-4B5JPGJ-2/2/16203f20b8cad9d56e0b6cb1e988580d)
Abstract:
Rose (Rosa hybrida L.) plants grown for cut-flower production in greenhouses produce flowers in flushes year-round. Crop models for this system must handle the cyclical nature of productivity, which is determined by the horticultural production methods. Nutrition was not accounted for in previous rose growth models, since little is known about uptake of the essential nutrients by rose roots. The aim of the current study was to measure uptake rates of nitrogen and potassium by roses, to be included in a production model. Rose plants var. `Kardinal' were grown in the greenhouse in aero-hydroponics nutrient solution with 3 mM nitrate (NO_3)-N and 1 mM potassium (K). After several flower growth/harvest cycles, the plants were transferred to a growth chamber in groups of three, every 10 days. The growth chamber provided 25 [degree sign]C and 16 h day length. The nutrient solutions were sampled periodically while maintaining the volume constant at 5 l, and analyzed for NO_3 and K concentrations reduction. The roots were harvested at the end of each depletion series, and their lengths measured. Influx of NO_3 and K into roots was obtained by fitting a Michaelis-Menten function to the concentration depletion data. There was a cyclic rhythm of both the nutrients' influx rates over time, with a decline in uptake after shoot harvest, and an increase during flower development, with maximal values towards flower opening. The results were incorporated in a simulation model for nutrient uptake by roses along successive flower-cutting cycles. This simulation assumes a constant number of identical flowering branches, which would be cut sequentially at flower maturity, and result in new shoot growth, assumed to follow a logistic function of time. Uptake rates of NO_3 and K were assumed to follow the changes in leaf area and shoot nutrient percentage, to compensate for N and K demand by the shoot; the root system dimensions and its effective aging are assumed constant. Simulated N and K uptake

agreed with published data of their accumulation and percentage in growing rose branches along a flower-cut cycle.
Keywords: Aero-hydroponics; Crop modeling; Feedback inhibition; Flower-cut cycle; Floriculture; Nitrate nitrogen; Nutrient uptake mechanism; Potassium; Rose (Rosa hybrida)

Renato Bruni, Alessandro Medici, Elisa Andreotti, Carlo Fantin, Mariavittoria Muzzoli, Marco Dehesa, Carlo Romagnoli, Gianni Sacchetti, Chemical composition and biological activities of Ishpingo essential oil, a traditional Ecuadorian spice from Ocotea quixos (Lam.) Kosterm. (Lauraceae) flower calices, Food Chemistry, Volume 85, Issue 3, May 2004, Pages 415-421, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2003.07.019.
(http://www.sciencedirect.com/science/article/B6T6R-4BD9THR-2/2/932d6e851bcf7694c74a433b55b0875c)
Abstract:
The essential oil of Ishpingo (Ocotea quixos, Lauraceae) fruit calices was analysed by GC (gas chromatography) and GC-MS (gas chromatography-mass spectrometry). Fourty-four compounds were identified. The main components detected were trans-cinnamaldehyde (27.9%), methylcinnamate (21.6%), 1,8-cineole (8.0%), benzaldehyde (3.6%), and [beta]-selinene (2.1%). In vitro antioxidant properties of the essential oil, obtained by DPPH (1,1-diphenyl-2-picrylhydrazyl) and [beta]-carotene bleaching assays, were also evaluated. The oil exerted a relatively good capacity to act as a non-specific donor of hydrogen atoms or electrons when checked by the diphenylpicrylhydrazyl assay, quenching 52% of the radical. On the other hand, it showed weak effects in inhibiting oxidation of linoleic acid when assayed by the [beta]-carotene bleaching test. Antibacterial activity of the essential oil was also checked against gram positive (Enterococcus foecalis, Staphylococcus aureus) and gram negative strains (Escherichia coli, Pseudomonas aeruginosa). The oil also showed a dose-dependent antifungal activity against Candida albicans, Saccharomyces cerevisiae, phytopathogen Pythium ultimum and dermatophyte Trichophyton mentagrophytes.
Keywords: Ocotea quixos; Lauraceae; Essential oil; Antioxidant activity; Antibacterial activity; Antifungal activity; Cinnamaldehyde; Methyl cinnamate

Benard F. Juma, Runner R. T. Majinda, Erythrinaline alkaloids from the flowers and pods of Erythrina lysistemon and their DPPH radical scavenging properties, Phytochemistry, Volume 65, Issue 10, May 2004, Pages 1397-1404, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2004.04.029.
(http://www.sciencedirect.com/science/article/B6TH7-4CRX1NG-5/2/4a2032d5fd657013ab5e54d30b1bca73)
Abstract:
Fourteen different erythrinaline alkaloids have been isolated from the flowers and pods of Erythrina lysistemon with four being reported for the first time in nature and five for the first time in this species and the rest having been re-isolated. The new compounds are (+)-11[beta]-hydroxyerysotramidine (1), (+)-11[beta]-methoxyerysotramidine (2), (+)-11[beta]-hydroxyerysotrine N-oxide (4) and (+)-11[beta]-hydroxyerysotrine (8). (+)-11[alpha]-Hydroxyerysotrine N-oxide (3), earlier misidentified as erythrartine N-oxide ([beta]-hydroxyerysotrine N-oxide 4), was also re-isolated along with four other alkaloids. Correct identification of compounds 4 and 8 was aided by the fact that the two sets of C-11 epimers 3, 4 and 8, 9 were both isolated in this study thus making it easier to identify and assign the individual epimers. (+)-Erythristemine (14) was found distributed in most of the plant parts investigated. Preliminary work on the crude chloroform/methanol (1:1) showed moderate toxicity to brine shrimp (LC50 23 ppm) and moderate (IC50 86 [mu]g/ml) radical scavenging properties against stable 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical. The DPPH radical scavenging properties of the isolated compounds were assessed using TLC autographic and spectrophotometric assays whereupon only compounds 11 (1 [mu]g; 90 [mu]g/ml) and 12 (0.1 [mu]g; 160 [mu]g/ml) showed any notable activity. It appears

the two compounds are slow reacting and do not reach steady state conditions within the standard half an hour time frame but only seemed to have reached steady state conditions after 4 h.
Keywords: Erythrina lysistemon; Fabaceae-Papilioniodeae; Erythrinaline alkaloids; C-11 epimers; Radical scavenging properties

Ana Paula A. Vaz, Rita de Cassia L. Figueiredo-Ribeiro, Gilberto B. Kerbauy, Photoperiod and temperature effects on in vitro growth and flowering of P. pusilla, an epiphytic orchid, Plant Physiology and Biochemistry, Volume 42, Issue 5, May 2004, Pages 411-415, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2004.03.008.
(http://www.sciencedirect.com/science/article/B6VRD-4C4BWWN-2/2/6605a8040fdf1874121aaa0bc6999637)
Abstract:
Psygmorchis pusilla Dodson and Dressler, an epiphytic orchid, has been shown to be an interesting model to study in vitro flower formation. In the present study, the effects of photoperiod and temperature on vegetative and reproductive development were investigated. Although photoperiod had limited effects on leaf number, an etiolating process was verified in darkness and a higher growth was detected under long days. A positive relationship was observed between long days and floral spike formation. However, plant incubation under 20 h photoperiod or longer days negatively affected floral bud development, inhibiting anthesis and reducing flower longevity. Higher soluble sugar and starch levels were detected in plants cultivated under long days, while chlorophyll and carotenoids contents were negatively affected under these conditions. Plants showed great sensitivity to temperature variations; 27 [degree sign]C being the most adequate for growth, leaf and floral spike formation. Temperatures of 22 and 32 [degree sign]C were not appropriate for in vitro development of P. pusilla.
Keywords: Carbohydrates; Flowering; Orchids; Photoperiod; Pigments; Temperature

Otto Miersch, Heiko Weichert, Irene Stenzel, Bettina Hause, Helmut Maucher, Ivo Feussner, Claus Wasternack, Constitutive overexpression of allene oxide cyclase in tomato (Lycopersicon esculentum cv. Lukullus) elevates levels of some jasmonates and octadecanoids in flower organs but not in leaves, Phytochemistry, Volume 65, Issue 7, April 2004, Pages 847-856, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2004.01.016.
(http://www.sciencedirect.com/science/article/B6TH7-4BWMP1R-1/2/deb5a328ab2a97d9b7daea8a045a1f4d)
Abstract:
The allene oxide cyclase (AOC), an enzyme in jasmonate biosynthesis, occurs in vascular bundles and ovules of tomato flowers which exhibit a tissue-specific oxylipin signature (Plant J. 24, 113-126, 2000). Constitutive overexpression of the AOC did not led to altered levels of jasmonates in leaves, but these levels increased upon wounding or other stresses suggesting regulation of jasmonate biosynthesis by substrate availability (Plant J. 33, 577-589, 2003). Here, we show dramatic changes in levels of jasmonic acid (JA), of 12-oxo-phytodienoic acid (OPDA), their methyl esters (JAME, OPDAME), and of dinor-OPDA in most flower organs upon constitutive overexpression of AOC. Beside a dominant occurrence of OPDAME and JA in most flower organs, the ratio among the various compounds was altered differentially in the organs of transgenic flowers, e.g. OPDAME increased up to 53-fold in stamen, and JA increased about 51-fold in buds and 7.5-fold in sepals. The increase in jasmonates and octadecanoids was accompanied by decreased levels of free lipid hydro(per)oxy compounds. Except for 16:2, the AOC overexpression led to a significant increase in free but not esterified polyunsaturated fatty acids in all flower organs. The data suggest different regulation of JA biosynthesis in leaves and flowers of tomato.
Keywords: Allene oxide cyclase; Transgenic tomato plants; Oxylipin levels; Flower organs

A. F. M. Jamal Uddin, Fumio Hashimoto, Toshiki Miwa, Katsuhiro Ohbo, Yusuke Sakata, Seasonal variation in pigmentation and anthocyanidin phenetics in commercial Eustoma flowers, Scientia Horticulturae, Volume 100, Issues 1-4, 19 March 2004, Pages 103-115, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.07.002.
(http://www.sciencedirect.com/science/article/B6TC3-49M6RRM-1/2/9280e295bc18a1eeb082bddb93899113)
Abstract:
The seasonal change in petal color and pigmentation of 29 commercial Eustoma cultivars was studied. The flowers are basically divided into four groups according to the major anthocyanidin phenotype in association with petal coloration, i.e., delphinidin (Dp)-based (purple flower), cyanidin (Cy)-based (reddish purple flower), pelargonidin (Pg)-based (pink flower), and none (white flower) groups. The constitution of petal anthocyanidins was not changed by forcing treatment in most of the flowers. Lightness (L*) and chroma (C*, color saturation) showed a change along with the increase/decrease of hue angle difference ([Delta]H*), thus simultaneously the chromatic tonalities tended to move to redder and bluer, respectively. Floral pigment clustering described two flower groups in a dendrogram, based on anthocyanidin constitutions as phenetic markers, which are apparently the Dp- and Pg-based phenotypes of anthocyanidin syntheses. The Cy-based flowers made a subcluster with the Pg-based flowers, indicating a close relationship in the biosynthesis of the two anthocyanidins, and suggesting the Dp- and Pg-syntheses complement one another.
Keywords: Anthocyanidin; Color difference; Eustoma grandiflorum; Flower color; Forcing cultivation; Gentianaceae; Lisianthus; Principal component analysis

Niels Bredmose, Jorgen Nielsen, Effects of thermoperiodicity and plant population density on stem and flower elongation, leaf development, and specific fresh weight in single stemmed rose (Rosa hybrida L.) plants, Scientia Horticulturae, Volume 100, Issues 1-4, 19 March 2004, Pages 169-182, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.08.019.
(http://www.sciencedirect.com/science/article/B6TC3-4B1XTG1-B/2/35409638b6d90d1a5617b37d4f86f44f)
Abstract:
Thermoperiodicity, i.e. growth in the alternating temperature regime with the same diurnal mean compared with growth at the constant temperature at which optimal growth occurs, was studied at three plant population densities in four cultivars of Rosa hybrida L. Single-node cuttings with five-leaflet leaves were excised and grown as single-stemmed rose plants at an average photosynthetic photon flux density of about 260 [mu]mol m-2 s-1 and supplied with carbon dioxide at about 1000 [mu]mol mol-1. The optimal constant temperature regime was 22 [degree sign]C day (20 h)/22 [degree sign]C night (4 h); alternating temperatures were 23 [degree sign]C day (20 h)/18 [degree sign]C night (4 h). The plant population densities were 100, 131 and 178 plants m-2 of bench area. Thermoperiodicity was absent, or could not be detected, in the parameters related to the growth period, the formation of fresh biomass, the bloom quality, and most parameters related to shoot elongation. However, classic thermoperiodic effects of alternating regime were significant in the cultivars Red Velvet and Sonia, with shoot elongation promoted (7.1 and 10.5%, respectively) in the growth phase from onset of axillary bud growth until the flower bud became visible. Compared with the other two cultivars, plants of Red Velvet and Sonia tended to develop longer internodes. The results, obtained concurrently at three different plant population densities, suggest that thermoperiodicity can affect (single-stemmed) plant growth and development in R. hybrida. Increased plant population density also increased plant height at visible flower bud, but the bloom quality, expressed as specific fresh weight, and the flower height at anthesis was decreased at the highest density. Increased plant population density increased the number of five-leaflet leaves developed in Red Velvet, but had no effect on leaf number in Texas and Sonia, while, in Lambada the leaf number was decreased at the highest density.
Keywords: Plant density; Plant growth; Rosa hybrida; Thermoperiodicity

Ravi S. Gadagi, P. U. Krishnaraj, J. H. Kulkarni, Tongmin Sa, The effect of combined Azospirillum inoculation and nitrogen fertilizer on plant growth promotion and yield response of the blanket flower Gaillardia pulchella, Scientia Horticulturae, Volume 100, Issues 1-4, 19 March 2004, Pages 323-332, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.10.002.
(http://www.sciencedirect.com/science/article/B6TC3-4B1XTG1-5/2/18a6bae5c65f13ebf60a89692166762c)
Abstract:
The investigation was carried out to examine the performance of Azospirillum isolates on growth and N uptake of Gaillardia pulchella with two nitrogen levels. Azospirillum strain OAD-2 inoculation significantly increased plant height, number of leaves per plant, branches per plant and total dry mass accumulation in G. pulchella than other inoculations and/or uninoculated control. The application of 150 kg N ha-1 further enhanced the above plant growth parameters significantly over application of 112 kg N ha-1. The N uptake of G. pulchella was enhanced due to Azospirillum strain OAD-2 inoculation, which was further augmented in the presence of nitrogen. The combination of Azospirillum strain OAD-2 and 150 kg N ha-1 showed the highest N uptake at 120 DAT. Plant growth and yield parameters also increased when inoculated with the non-diazotrophic, but efficient IAA producing, Azospirillum strain OAD-57. From this investigation, it can be concluded that Azospirillum strains OAD-2 and OAD-11 can play an important role in the N nutrition of G. pulchella.
Keywords: Field inoculation; IAA; Nitrogen fixation; PGPB

Virginia Simonds, C. M. S. Plowright, How do bumblebees first find flowers? Unlearned approach responses and habituation, Animal Behaviour, Volume 67, Issue 3, March 2004, Pages 379-386, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2003.03.020.
(http://www.sciencedirect.com/science/article/B6W9W-4BN0FYB-1/2/6518b6f1d5b0491b717d41ef3bf87fc2)
Abstract:
To examine how bees distinguish between possible food sources and nonrewarding objects in the absence of previous experience with flowers, we presented flower-naive bumblebees, Bombus impatiens, with unrewarding stimuli (colours or patterns) in a radial arm maze and compared their approach responses to each stimulus. Bees showed a significant preference for yellow and blue over other colours, and for radial patterns over concentric patterns or unpatterned discs. Habituation was demonstrated when the proportion of choices for the same pattern by the same bees decreased over two testing sessions. When an attractive novel pattern was presented in the third session, the trend was reversed. The results of this study confirm both that truly flower-naive bees have unlearned colour and pattern preferences and that learning not to approach stimuli occurs in the absence of reward.

F. L. Wackers, Assessing the suitability of flowering herbs as parasitoid food sources: flower attractiveness and nectar accessibility, Biological Control, Volume 29, Issue 3, March 2004, Pages 307-314, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2003.08.005.
(http://www.sciencedirect.com/science/article/B6WBP-49PYMBC-1/2/1bd564d9be9a1d7d96d1b04c0f7f4f10)
Abstract:
Eleven insect-pollinated plant species were investigated with respect to their olfactory attractiveness and nectar accessibility for the parasitoid species Cotesia glomerata (Hymenoptera: Braconidae), Heterospilus prosopidis (Hymenoptera: Braconidae), and Pimpla turionellae (Hymenoptera: Ichneumonidae). Flowers differed considerably with respect to both their attractiveness and nectar accessibility. The results obtained from the three parasitoid species, on the other hand, showed a high level of congruency. Considering both parameters, flower

attractiveness was not strictly correlated with nectar accessibility. Out of the 11 plant species tested, only two species (Aegopodium podagraria [Apiaceae] and Origanum vulgare [Lamiaceae]) were optimal as a parasitoid food source, as they combined olfactory attractiveness with accessible nectar. Two other species (Galium mollugo [Rubiaceae] and Leucanthemum vulgare [Asteraceae]) were attractive without providing an accessible food source. The remaining plant species either failed to attract the parasitoids (Daucus carota [Apiaceae], Erigeron annuus [Asteraceae], Medicago lupulina [Fabaceae], and Trifolium repens [Fabaceae]), or even repelled them (Achillea millefolium [Asteraceae], Trifolium pratense [Fabaceae], and Vicia sepium [Fabaceae]). These results show that the mere presence of flowering plants in an agroecosystem is not sufficient to guarantee nectar supply for parasitoids. It also underscores that mechanistic investigations can be a valuable tool in helping us tailor agroecosystems to the requirements of biological control agents.
Keywords: Parasitoid; Nectar; Flower; Odor; Attraction; Repellent; Conservation; Biological control; Biodiversity

H.K. Ngugi, H. Scherm, Pollen mimicry during infection of blueberry flowers by conidia of Monilinia vaccinii-corymbosi, Physiological and Molecular Plant Pathology, Volume 64, Issue 3, March 2004, Pages 113-123, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2004.08.004.
(http://www.sciencedirect.com/science/article/B6WPC-4DN9J87-2/2/8841a894bd833708504790d12346aabf)
Abstract:
Infection of blueberry flowers by Monilinia vaccinii-corymbosi, which causes mummy berry disease, occurs via the gynoecium and involves conidial germination on the stigmatic surface followed by hyphal ingress into the stylar canal and subsequent colonization of the ovary. The extent to which these events mimic pollen-pistil interactions during pollination was investigated. Similar to blueberry pollen tubes, conidial germ tubes of M. vaccinii-corymbosi adhered selectively to imprints of stylar transmitting tract tissue on nitrocellulose membrane, with adhesion in both cases occurring at the tips of the tubes. By contrast, hyphae of the related Monilinia fructicola, which is nonpathogenic on blueberry and does not cause gynoecial infection, adhered indiscriminately to the entire membrane. Using monoclonal antibodies, the presence of epitopes of esterified and unesterified pectins and of arabinogalactan proteins (AGPs), which have been implicated in adhesion and pollen tube guidance in other plant species, was documented on blueberry pollen tubes in vitro. Epitopes of certain AGPs, but not of pectins, were also localized on conidia and hyphae of M. vaccinii-corymbosi. However, such epitopes were also detected on M. fructicola, suggesting that they are unlikely to be a discriminatory factor between fungi capable or not capable of gynoecial infection. Microscopic observation of inoculated pistils showed that similar to pollen tubes, hyphae of M. vaccinii-corymbosi tracked the lobes of the stylar lumen, grew directionally (i.e. with very limited branching) in close proximity to cells of the stylar adaxial epidermis and to one another, and were surrounded by extracellular matrix. By contrast, hyphae of M. fructicola, while being able to ingress into the style, branched profusely within the stylar canal, showing no directional growth or affinity to specific regions of the lumen. We propose these results as evidence of specialized opportunism by M. vaccinii-corymbosi, whereby fungal hyphae appear to mimic host pollen tubes and take advantage of an infrastructure intended to support host reproduction in order to facilitate infection of the ovary.
Keywords: Monilinia vaccinii-corymbosi; Mummy berry; Blueberry; Vaccinium spp.; Host-pathogen interaction; Pollen-pistil interaction; Mimicry

Wouter G. van Doorn, Andrea Sinz, Monic M. Tomassen, Daffodil flowers delay senescence in cut Iris flowers, Phytochemistry, Volume 65, Issue 5, March 2004, Pages 571-577, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2003.12.008.

(http://www.sciencedirect.com/science/article/B6TH7-4BJ1XJK-2/2/005b99b3253895541aed692bc388fb47)
Abstract:
Visible symptoms of tepal senescence in cut Iris x hollandica (cv. Blue Magic) flowers were delayed by placing one cut daffodil flower (Narcissus pseudonarcissus, cv. Carlton) in the same vase. Addition of mucilage, exuded by daffodil stems, to the vase water had the same effect as the flowering daffodil stem. The active compound in the mucilage was identified as narciclasine (using LC/MS, GC/MS, 1H and 13C-NMR, and comparison with an authentic sample of narciclasine). The delay of senescence, either by mucilage or purified narciclasine, was correlated with a delayed increase in protease activity, and with a considerable reduction of maximum protease activity. Narciclasine did not affect in vitro protease activity, but is known to inhibit protein synthesis at the ribosomal level. Its effects on senescence and protease activity were similar to those of cycloheximide (CHX), another inhibitor of protein synthesis, but the effective narciclasine concentration was about 100 times lower than that of CHX. It is concluded that the delay of Iris tepal senescence by daffodil stems is due to narciclasine in daffodil mucilage, which apparently inhibits the synthesis of proteins involved in senescence.
Keywords: Iris x hollandica; Narcissus pseudonarcissus; Alkaloids; Cut flowers; Mucilage; Narciclasine; Programmed cell death; Protease; Senescence

Hsiao-Ching Lee, Dah-Wei Chiou, Wen-Huei Chen, Albert H. Markhart, Yao-Huang Chen, Tsai-Yun Lin, Dynamics of cell growth and endoreduplication during orchid flower development, Plant Science, Volume 166, Issue 3, March 2004, Pages 659-667, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.10.034.
(http://www.sciencedirect.com/science/article/B6TBH-4B5J8VT-3/2/450095830ca14a79cfdfc73a9a50f928)
Abstract:
Endoreduplication, a process to amplify nuclear DNA without cell division, is widespread in plants. This study aims to formulate endoreduplication process as a dynamic system using orchid flowers in favor of their slow growth rate. We analyzed the ploidy levels during orchid flower development and proposed an improved model to describe the relationship between endoreduplication and cell growth. Our model combined a logistic growth model with an endoreduplication model of Schweizer et al. [Proc. Natl. Acad. Sci. U.S.A. 92 (1995) 7070]. We found that using the Fermi function to describe the transition rates from one C value to next higher C value significantly improved simulation of changes in growth and endoreduplication. The growth rate, endoreduplication transition rates, and nuclei number of each C level at different developmental stages were computed. Our results indicated that cells with higher C values had lower transition rates and less potential for further endoreduplication, and the time that endoreduplication stopped occurred at the same time flower fresh weight stopped increasing. In addition, average cell fresh weight was positively correlated to average C value, suggesting that endoreduplication is a contributing factor to cell growth.
Keywords: Endoreduplication; Flow cytometry; Oncidium; Phalaenopsis; Transition rate; Fermi function

Yoshiko Koshita, Toshio Takahara, Effect of water stress on flower-bud formation and plant hormone content of satsuma mandarin (Citrus unshiu Marc.), Scientia Horticulturae, Volume 99, Issues 3-4, 27 February 2004, Pages 301-307, ISSN 0304-4238, DOI: 10.1016/S0304-4238(03)00113-4.
(http://www.sciencedirect.com/science/article/B6TC3-49DN79R-1/2/67f7e23a96601ca88ee5c3941365707d)
Abstract:

The effect of water stress on plant hormones (GAs, IAA and ABA) level in the leaves and flower-bud formation of the satsuma mandarin (Citrus unshiu Marc.) trees was investigated to determine the relationship between flower-bud induction and the level of endogenous plant hormones as a result of water stress. Severe water stress (-1.5 to -2.0 MPa) in autumn, which causes heavy leaf fall, reduced the percentage of flowering nodes by one third of the moderately water-stressed ones (-0.5 to -1.0 MPa). The quantity of GA1/3 from the middle of October through early December was significantly higher in the leaves of the trees under severe water stress than in the leaves of the trees enduring moderate water stress. The content of IAA in the leaves of the trees under moderate water stress was higher in late February. These findings indicate that the levels of GA1/3 are enhanced by severe water stress, higher in the leaves from the branches that produce fewer flowers during flower-bud induction periods. The levels of IAA were higher in the leaves from the branches that produced more flowers during the season when flower-buds develop.
Keywords: Citrus; GAs; IAA; ABA; Water stress; Flower-bud formation

Margit Nothnagl, Andrea Kosiba, Rolf U. Larsen, Predicting the effect of irradiance and temperature on the flower diameter of greenhouse grown Chrysanthemum, Scientia Horticulturae, Volume 99, Issues 3-4, 27 February 2004, Pages 319-329, ISSN 0304-4238, DOI: 10.1016/S0304-4238(03)00096-7.
(http://www.sciencedirect.com/science/article/B6TC3-49CT0YY-2/2/7b9f0d8555fabf577eb5ebe0dd32c2a3)
Abstract:
A model was developed describing the influence of irradiance and temperature in the greenhouse on the size of Chrysanthemum flowers. In the model, flower diameter increment was related to a development index ranging from zero (start of SD) to unity (anthesis). The growth of the visible flower was divided into two different phases. In the first phase a linear function described the growth and development of the early visible flower bud, while the second phase, representing the opening process of the flower was best described with a monomolecular growth function. The effect of the climate on the two growth phases was modelled using empirical climate functions. Data, collected from a light and a temperature experiment, showed that low light integrals and temperatures above 20 [degree sign]C had a retarding effect on flower growth. When the model was fitted to the observed data from the light experiment the R2-values varied from 0.999 to 0.965. Even the simulated diameter values matched the observed values from the temperature experiment well (R2-values from 0.998 to 0.966). When validated on independently collected data from two trials, the model could simulate the variations in the data with R2-values of 0.993 and 0.997.
Keywords: Chrysanthemum indicum; Chrysanthemum morifolium; Flower size; Growth model; Greenhouse climate; Dendranthema

Soo-Hyung Kim, J. Heinrich Lieth, Effect of shoot-bending on productivity and economic value estimation of cut-flower roses grown in Coir and UC Mix, Scientia Horticulturae, Volume 99, Issues 3-4, 27 February 2004, Pages 331-343, ISSN 0304-4238, DOI: 10.1016/S0304-4238(03)00099-2.
(http://www.sciencedirect.com/science/article/B6TC3-496NMH9-1/2/b447f21265ebb7f19484cc01d5a70d87)
Abstract:
Shoot-bending, a common cultural practice in cut-flower rose production, results in a canopy consisting of horizontally bent shoots in addition to upright shoots. Production of this bent canopy was compared with hedgerow canopy for two rose cultivars, `Kardinal' and `Fire N Ice'. In conjunction with the two canopy styles, two soil-less horticultural systems with different growing media (Coir versus UC Mix) were tested in a 2x2 factorial experiment. We investigated the number and length of all harvested flowering shoots as indicators of productivity and quality, respectively, from September 1997 to August 1999. While bent canopy produced longer stems and higher

biomass of individual flowering shoots in both cultivars, this also resulted in significantly fewer harvestable flowering shoots. The comparison between Coir versus UC Mix was not as conclusive. `Fire N Ice' plants grown in Coir produced more harvestable flowering shoots than plants grown in UC Mix, while `Kardinal' did not. Neither cultivar showed differences in stem length and biomass production of the flowering shoots between Coir and UC Mix. Calculation of market value using a linearly increasing value index with stem length showed that with `Fire N Ice' the improvement in stem length achieved by bent canopy did not offset the economic loss due to the reduction in the number of shoots per square meter. For `Kardinal' the increased quality as a result of shoot-bending did offset the reduced production. In neither case did the combination of bent canopy and Coir generate significant improvements in value. Bent canopy became economically feasible when both short-stem discount and long-stem bonus were applied together.
Keywords: Rosa hybrida L.; Canopy management; Economic analysis; Hydroponics

Hiroyuki Yoshida, Yoshio Itoh, Yoshihiro Ozeki, Tsukasa Iwashina, Masa-atsu Yamaguchi, Variation in chalcononaringenin 2'-O-glucoside content in the petals of carnations (Dianthus caryophyllus) bearing yellow flowers, Scientia Horticulturae, Volume 99, Issue 2, 6 February 2004, Pages 175-186, ISSN 0304-4238, DOI: 10.1016/S0304-4238(03)00093-1.
(http://www.sciencedirect.com/science/article/B6TC3-495VHWY-3/2/9aeeaecf4338935391995f626dad2f46)
Abstract:
Chalcononaringenin 2'-O-glucoside (Ch2'G) was found to be the major pigment molecule in the petals of carnations bearing yellow flowers. The concentration of this pigment varied from 5.5 to 100.0% (relative value with amounts in the line `7154-03' assumed to be 100%) in 31 carnation genotypes investigated. The transcription of both phenylalanine ammonia-lyase (PAL) and chalcone synthase (CHS) genes was active in the petals of both yellow carnation flowers and a cyanic control cultivar. The transcripts derived from the chalcone-flavanone isomerase (CHI) gene in the petals of yellow carnation flowers were below the level detectable by Northern blot analysis, but could be detected by RT-PCR. This is possible to produce subtle amounts of CHI protein translated from suspicious amounts of the mRNA to catalyze chalcone, resulting in the variation of the concentration of Ch2'G. Other probable factors caused to the variation include the amount of substrates supplying the flavonoid biosynthetic pathway, spontaneous isomerization flowing over the CHI step producing flavonol derivatives, and chalcone 2'-glucosyltransferase (CHGT) activity.
Keywords: Carnation; Dianthus caryophyllus; Chalcone-flavanone isomerase; Chalcone 2'-glucosyltransferase; Chalcononaringenin 2'-O-glucoside; Yellow flower color

Takashi Onozaki, Hiroshi Ikeda, Michio Shibata, Video evaluation of ethylene sensitivity after anthesis in carnation (Dianthus caryophyllus L.) flowers, Scientia Horticulturae, Volume 99, Issue 2, 6 February 2004, Pages 187-197, ISSN 0304-4238, DOI: 10.1016/S0304-4238(03)00094-3.
(http://www.sciencedirect.com/science/article/B6TC3-49567HR-2/2/d700cdaa02204cf1652093e3da361b4a)
Abstract:
Differences in ethylene sensitivity among carnation (Dianthus caryophyllus L.) cultivars were evaluated using a time-lapse video recording system. Measurement of time to petal inrolling of `White Sim', `Nora', `Chinera', and line 64-54 flowers subjected to a range of 1-20 [mu]l l-1 ethylene showed that 10 [mu]l l-1 was the optimum concentration for sensitivity evaluation with our video system. With this system we found clear differences in ethylene sensitivity among 10 cultivars and one line. `Candy', `Pallas', `Chinera', and line 64-54 had lower ethylene sensitivities than the other seven cultivars. Line 64-54 had the longest ethylene response time (20.6 h to start of petal inrolling). Video monitoring is a simple and accurate way of evaluating ethylene sensitivity. We have also used the system to study changes in the ethylene sensitivity of carnation flowers after anthesis. We were able to detect a shift in responsiveness to ethylene that was impossible to

detect by previous methods. In the Sim-type carnation cultivars tested (`White Sim', `Scania', `U Conn Sim', and `Nora'), ethylene sensitivity after anthesis decreased significantly with age in both early-cut and late-cut flowers. These results clearly showed that decline of ethylene sensitivity is caused by the increasing physiological age of flowers. Ethylene sensitivity after anthesis decreased with age in normal Sim-type carnations in the same way as in long-vase-life variants such as `Sandrosa'.
Keywords: Video recording system; Wilting; Petal inrolling; Carnation; Responsiveness to ethylene

H. Scherm, H. K. Ngugi, A. T. Savelle, J. R. Edwards, Biological control of infection of blueberry flowers caused by Monilinia vaccinii-corymbosi, Biological Control, Volume 29, Issue 2, February 2004, Pages 199-206, ISSN 1049-9644, DOI: 10.1016/S1049-9644(03)00154-3.
(http://www.sciencedirect.com/science/article/B6WBP-49D1YW4-4/2/00aa4a82e19ce1096f8050ba3d10fba9)
Abstract:
Monilinia vaccinii-corymbosi, the fungus that causes mummy berry disease, infects open blueberry flowers via the stigma-style pathway, followed by internal colonization and subsequent mummification of the developing fruit. The potential for use of the commercial biocontrol products Serenade (Bacillus subtilis QRD137) and BlightBan (Pseudomonas fluorescens A506) to suppress floral infection in this pathosystem was investigated. B. subtilis exhibited marked antibiosis against the pathogen in vitro, reducing radial growth rates of M. vaccinii-corymbosi to less than one-half of those of the untreated control after 1 week of co-culture on potato-dextrose agar (P=0.0029). In contrast, P. fluorescens did not reduce fungal growth compared with the untreated control (P=0.3182). When Serenade was applied to stigmatic surfaces of detached blueberry flowers in the laboratory, population densities of B. subtilis, determined by dilution-plating, were variable 1 and 2 days after application, followed by a consistent drop in bacterial numbers after 3 and 4 days. In contrast, population densities of P. fluorescens increased exponentially 1 and 2 days after application of BlightBan and remained constant thereafter. The greatest mean population densities observed were 1.6 x 105 and 1.5 x 105 colony-forming units per stigma for B. subtilis and P. fluorescens, respectively. In a separate experiment, conidia of M. vaccinii-corymbosi were applied to detached flowers 24 h before or after application of the biocontrol products to flower stigmas. Serenade significantly reduced the number and growth rates of hyphae penetrating the stylar canal to less than one-fifth of those measured in the untreated control, whereas fungal suppression following application of BlightBan was less pronounced. Reductions in fungal growth rate in flowers treated with B. subtilis isolated from Serenade and reformulated by freeze-drying in skim milk were intermediate between the untreated control and the Serenade treatment, suggesting that part of the observed activity of Serenade was due to the formulation of that product. The results of these experiments identify Serenade as a promising candidate for further testing against mummy berry disease.
Keywords: Bacillus subtilis; Pseudomonas fluorescens; Biological control; Mummy berry disease; Monilinia vaccinii-corymbosi; Blueberry; Vaccinium spp.

O. Y. Alabi, J. A. Odebiyi, M. Tamo, Effect of host plant resistance in some cowpea (Vigna unguiculata {L.} Walp.) cultivars on growth and developmental parameters of the flower bud thrips, Megalurothrips sjostedti (Trybom), Crop Protection, Volume 23, Issue 2, February 2004, Pages 83-88, ISSN 0261-2194, DOI: 10.1016/S0261-2194(03)00171-6.
(http://www.sciencedirect.com/science/article/B6T5T-49FB7VP-1/2/68ad0c39ddb88d0fd9050ba40ae20b66)
Abstract:
The effect of host plant resistance on growth and developmental parameters of the bean flower thrips Megalurothrips sjostedti Trybom was determined on nine cowpea (Vigna unguiculata {L.}Walp.) cultivars under laboratory conditions. Newly emerged adults M. sjostedti were confined

on peduncles with floral buds of the different cowpea cultivars. M. sjostedti suffered 100% pre-imaginal mortality on cowpea lines Moussa local, TVu1509, TVx3236, Sewe and Sanzibanili. Antibiosis is believed to be the mechanism of resistance operating in these cultivars. On KVx404-8-1, M. sjostedti had a prolonged developmental period though not significantly different from Vita 7, the susceptible check at $P<0.01$. IT91K-180 supported the development and survival of M. sjostedti with the suitability index (growth index) not significantly different from the susceptible check (Vita 7) at $P<0.01$. Hence the mechanism of its resistance is tolerance.
Keywords: Megalurothrips sjostedti; Vigna unguiculata; Resistance; Developmental time; Growth index

Silvia Ferrario, Richard GH Immink, Gerco C Angenent, Conservation and diversity in flower land, Current Opinion in Plant Biology, Volume 7, Issue 1, February 2004, Pages 84-91, ISSN 1369-5266, DOI: 10.1016/j.pbi.2003.11.003.
(http://www.sciencedirect.com/science/article/B6VS4-4B4S6XR-1/2/00bfbafeee221b6de18ef2a671659955)
Abstract:
During the past decade, enormous progress has been made in understanding the molecular regulation of flower development. In particular, homeotic genes that determine the identity of the floral organs have been characterised from different flowering plants, revealing considerable conservation among angiosperm species. On the other hand, evolutionary diversification has led to enormous variation in flower morphology. Increasing numbers of reports have described differences in the regulation, redundancy and function of homeotic genes from various species. These fundamentals of floral organ specification are therefore an ideal subject for comparative analyses of flower development, which will lead to a better understanding of plant evolution, plant development and the complexity of molecular mechanisms that control flower development and morphology.

Ki-Jeong Hong, Anthonomus (Anthonomus) persicae sp. nov. on Peach Flower Bud and a Key to Korean Anthonomini (Coleoptera, Curculionidae), Journal of Asia-Pacific Entomology, Volume 7, Issue 1, February 2004, Pages 29-32, ISSN 1226-8615, DOI: 10.1016/S1226-8615(08)60198-3.
(http://www.sciencedirect.com/science/article/B8JJN-4V6TFFT-4/2/897a3cd5d4a2ef9999b7a065d25ea1a9)
Abstract:
One weevil species was collected on the flower buds of peach tree (Primus persicae (L.)) on April, 1998 in southern part of Korea. It is described as a new species, Anthonomus (Anthonomus) persicae sp. nov. with the illustrations of morphological characters. A key to genera, subgenera and species of the tribe Anthonomini in Korea, including the new species, is also provided.
Keywords: Anthonomini; Coleoptera; Curculionidae; Curculioninae; Korea; peach; taxonomy

Leon A. Terry, Daryl C. Joyce, Nimal K. B. Adikaram, Bhupinder P. S. Khambay, Preformed antifungal compounds in strawberry fruit and flower tissues, Postharvest Biology and Technology, Volume 31, Issue 2, February 2004, Pages 201-212, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2003.08.003.
(http://www.sciencedirect.com/science/article/B6TBJ-4BFXTHG-3/2/0334b66dde7b7703ce41b1f62fc13025)
Abstract:
Antifungal activity against the pathogen, Botrytis cinerea, and a bioassay organism, Cladosporium cladosporioides, declined with advancing strawberry fruit maturity as shown by thin layer chromatography (TLC) bioassays. Preformed antifungal activity was also present in flower tissue. The fall in fruit antifungal compounds was correlated with a decline in natural disease resistance (NDR) against B. cinerea in planta. Crude extracts of green stage I fruit (7 days after anthesis)

contained at least two preformed antifungal compounds (Rf=0.44 and 0.37) that were not present in white and red stage fruit. These compounds were shown with TLC reagent sprays to be neither phenolics nor alkaloids. Positive reactions to Ehrlich's reagent suggested that Rf=0.37 was a terpene. Most antifungal activity was found in the achenes of green stage I fruit. However, antifungal activity was found in all tissue types (viz. pith, cortex, epidermis) of green stage I fruit. TLC bioassays revealed that all fruit stages yielded antifungal activity at the origin (Rf=0.00). The approximate area of fungal inhibition at the origin in green stage 1 fruit extracts was 1.87- and 1.73-fold greater than in white and red stages, respectively. TLC reagent sprays showed that the antifungal compound(s) at origin included phenolics. This observation is consistent with previous reports that phenolic compounds in strawberry fruit are inhibitory to B. cinerea.
Keywords: Botrytis cinerea; Grey mould; Natural disease resistance; Phytoanticipin; Thin layer chromatography bioassay

Atsushi Oda, Sumire Fujiwara, Hiroshi Kamada, George Coupland, Tsuyoshi Mizoguchi, Antisense suppression of the Arabidopsis PIF3 gene does not affect circadian rhythms but causes early flowering and increases FT expression, FEBS Letters, Volume 557, Issues 1-3, 16 January 2004, Pages 259-264, ISSN 0014-5793, DOI: 10.1016/S0014-5793(03)01470-4.
(http://www.sciencedirect.com/science/article/B6T36-4BBM3XN-3/2/cc1bf5a014fb492497a66c0b8e940abc)
Abstract:
Photoperiodic control of flowering is regulated by light and a circadian clock. Feedback regulation of the transcription of clock components is one of the most common and important mechanisms that control clock functions in animals, fungi, and plants. The Arabidopsis circadian clock is believed to involve two myb-related proteins, LHY (late elongated hypocotyl) and CCA1 (circadian clock associated 1), which negatively regulate TOC1 (timing of cab expression 1) gene expression through direct binding to the TOC1 promoter. PIF3 (phytochrome-interacting factor 3), a bHLH transcription factor binds promoter regions of the LHY and CCA1 genes, affecting the light induction of these genes, and interacts with TOC1 protein. Although the positive feedback regulation of clock components in plants has been predicted, and PIF3 has been assumed to be involved, the molecular nature of this process has not been elucidated. Here we demonstrate that the antisense suppression of the PIF3 gene causes higher levels of mRNA of floral activator genes CO (constans) and FT (flowering locus T) and results in early flowering under long days (LD). Neither the circadian rhythms of the clock-controlled genes (CCGs) under constant conditions nor the diurnal rhythms of the CCGs under LD conditions are affected by the reduction in PIF3 gene expression. These results suggest that PIF3 may play an important role in the control of flowering through clock-independent regulation of CO and FT gene expression in Arabidopsis.
Keywords: Circadian clock; Feedback regulation; Transcriptional regulation; Flowering time; Photoperiod; Arabidopsis

O. Tudor, R. L. H. Dennis, J. N. Greatorex-Davies, T. H. Sparks, Flower preferences of woodland butterflies in the UK: nectaring specialists are species of conservation concern, Biological Conservation, Volume 119, Issue 3, October 2004, Pages 397-403, ISSN 0006-3207, DOI: 10.1016/j.biocon.2004.01.002.
(http://www.sciencedirect.com/science/article/B6V5X-4BRTFDT-1/2/483f6706923fcbf210e554d6b5cf6b8d)
Abstract:
We report on a long-term study of the flower preferences of feeding adult butterflies undertaken in the Wyre Forest, UK. Examination of 5638 observations of nectar-feeding clearly demonstrates several findings: (i) that butterflies differ in their range of flower use, some are generalists and others specialists, respectively, exploiting more or less sources than expected; (ii) certain flower species are preferred over others. We find that (iii) generalism and specialism in flower use

corresponds to generalism and specialism, respectively, in larval host range and biotope occupancy; that (iv) generalism in flower use is accounted for by life history and resource variables that increase opportunity for contact with a wider variety of flowering herbs; that (v) specialist flower users are more typically woodland butterflies and generalist flower users species of more open biotopes. A key finding is that (vi) many specialist flower users are butterfly species of conservation concern listed in Biodiversity Action Plans. We suggest that management of woodland sites for butterfly conservation should give as much consideration to nectar sources as to host plant sources.
Keywords: Nectar; Lepidoptera; Specialism; Life history; Habitat

L. Ebssa, C. Borgemeister, H. -M. Poehling, Effectiveness of different species/strains of entomopathogenic nematodes for control of western flower thrips (Frankliniella occidentalis) at various concentrations, host densities, and temperatures, Biological Control, Volume 29, Issue 1, January 2004, Pages 145-154, ISSN 1049-9644, DOI: 10.1016/S1049-9644(03)00132-4.
(http://www.sciencedirect.com/science/article/B6WBP-4961TGG-4/2/ab872cb19d18061e93216d7ccdf82038)
Abstract:
Entomopathogenic nematode (EPN) species/strains (Rhabditida: Steinernematidae and Heterorhabditidae) were tested at a concentration of 200 infective juveniles (IJs) per cm2 against mixed soil-dwelling life stages (i.e., second-instar larvae, prepupae, and pupae) of the western flower thrips (WFT) Frankliniella occidentalis (Thysanoptera: Thripidae), in a plant growing substrate under laboratory conditions. The different EPN species/strains resulted in WFT corrected mortality (CM) values ranging between 2.6 and 60%. In general, Heterorhabditis spp. were more virulent than Steinernema spp. Increasing concentrations of selected EPN species/strains led to an increase in thrips CM, with significant differences among species/strains. Heterorhabditis indica LN2 caused higher CM than the other strains, with 30 and 90% as highest CM at the lowest and highest concentration tested, i.e., 100 and 1000 IJs cm-2, respectively. In an experiment with different WFT densities, CM caused by Steinernema bicornutum negatively correlated with host density. However, with H. indica LN2, CM increased, though not always significantly, with increasing host densities. Generally, the effect of host density on efficacy of EPNs depended on concentrations. When tested over a range of temperatures, 25 [degree sign]C was the optimal temperature for both H. indica LN2 and S. bicornutum. H. indica LN2, tropical in origin, and S. bicornutum, isolated from a more temperate environment, performed better at higher and lower temperatures, respectively.
Keywords: Western flower thrips; Frankliniella occidentalis; Entomopathogenic nematodes; Biological control; Soil-dwelling life stages; Concentrations; Temperature; Host density

Thomas Fabbro, Christian Korner, Altitudinal differences in flower traits and reproductive allocation, Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 199, Issue 1, 2004, Pages 70-81, ISSN 0367-2530, DOI: 10.1078/0367-2530-00128.
(http://www.sciencedirect.com/science/article/B7GX0-4DTSMX4-3J/2/d94880470831bf4e6084d83744480019)
Abstract: Summary
We tested whether alpine plants increase their effort to attract pollinators to compensate for assumed pollinator scarcity at high altitude. A three times larger fraction of the shoot was allocated to flowers in alpine plants (30 species, 2700m asl) compared to lowland plants (20 species, 600m asl), while leaf mass fraction did not differ between the altitudes. At high elevation, a three times smaller fraction of the shoot was allocated to stems, which was accompanied by a change in its function from leaf support for photosynthesis at low altitude to support for flowers at high altitude. Although shoot mass is massively reduced at high altitudes, display area and biomass of individual flowers were remarkably similar at both altitudes. All flowers together attracted pollinators with

about the same total display area relative to overall plants size, but generally alpine plants maintain their flowers longer. Together with decreased plant height this leads to an increased self-shading which is likely to cause reductions in carbon gain in alpine plants. The results of this field survey emphasize the importance of outcrossing in alpine plants and its priority over growth
Keywords: alpine plant ecology; biomass; biometry; allometry; flower longevity; Swiss Alps

Maria Micaela Cerana, Flower morphology and pollination in Mikania (Asteraceae), Flora - Morphology, Distribution, Functional Ecology of Plants, Volume 199, Issue 2, 2004, Pages 168-177, ISSN 0367-2530, DOI: 10.1078/0367-2530-00145.
(http://www.sciencedirect.com/science/article/B7GX0-4DTSMY6-3W/2/d307fc1c8968067960329805c592405a)
Abstract: Summary
Morphological and functional changes of the floret whorls of Mikania urticifolia Hook. et Arn. (Asteraceae, Eupatorieae) in relation to pollination and the role of floral visitors have been observed in two Argentine localities. Flowers are dichogamous protandrous with secondary pollen presentation ('brushing' type). This feature favours cross-pollination over autogamy, but both reproductive systems coexist and they complement each other. The heads were visited by insects from different orders such as Hemiptera, Coleoptera, Lepidoptera, Hymenoptera and Diptera during the third floral phase (middle anthesis) and the beginning of the fourth phase (late anthesis). Hymenoptera, particularly bees are the most important pollinators because of their number and their diversity.
Keywords: Mikania; Asteraceae; pollination; floral behavior; flower visitors; seed-set

Adriana Szmidt-Jaworska, Krzysztof Jaworski, Andrzej Tretyn, J.a.n. Kopcewicz, The involvement of cyclic GMP in the photoperiodic flower induction of Pharbitis nil, Journal of Plant Physiology, Volume 161, Issue 3, 2004, Pages 277-284, ISSN 0176-1617, DOI: 10.1078/0176-1617-01122.
(http://www.sciencedirect.com/science/article/B7GJ7-4DPXGMG-J8/2/afaec4692a3d3532377840bdc8d3e95c)
Abstract: Summary
The involvement of cGMP in the regulation of the flowering of Pharbitis nil was investigated through exogenous applications of cGMP and chemicals that are able to change the cGMP level and analyses of endogenous cGMP level.
Exogenous applications of cGMP and 8-pCPT-cGMP (a cyclic GMP non hydrolyzed analog) to P. nil plants, which were exposed to a 12-h-long subinductive night, significantly increased flowering response. NS-2028 (guanylyl cyclase inhibitor) inhibited flowering when that compound was applied during a 16-h-long inductive night, whereas SNP (guanylyl cyclase activator) increased the flowering when plants were subjected to a 12-h-long subinductive night. The inhibitors of cyclic nucleotides phosphodiesterase (isobutyl-methylxanthine and dipyridamole), which increase the cytosolic cGMP level, promoted the flowering and allowed the length of the dark period necessary for induction of flowering to be reduced.
The endogenous cGMP level was also measured after the treatment of P. nil seedlings with those chemicals. Results have clearly shown that compounds that were used in physiological experiments modulated endogenous cGMP level.
There was a significant difference in the cyclic GMP level between 16-h-long night conditions and a long night with a night-break. During a long inductive night the oscillation of cGMP was observed with four main peaks in 4, 7, 11, 14 h, whereas a 10 min flash of red light in the middle of the night was able to modify these rhythmical changes in the second half of the long night. These results have shown that there are oscillations in the concentration of cGMP in the night and the biosynthesis and/or deactivation of cGMP is affected by light treatment and therefore it may be involved in the regulation of photoinduction processes in cotyledons.

From these combined results, we propose a hypothesis that cGMP is involved in the control of photoperiodic flower induction in Pharbitis nil.
Keywords: cGMP; flowering; Pharbitis nil; photoperiod