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Tahun 2004-2008 (51 judul)**

Elisabetta Loffredo, Nicola Senesi, In vitro and in vivo assessment of the potential of compost and its humic acid fraction to protect ornamental plants from soil-borne pathogenic fungi, *Scientia Horticulturae*, Volume 122, Issue 3, 1 October 2009, Pages 432-439, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.05.030.

(<http://www.sciencedirect.com/science/article/B6TC3-4WMKXV0-2/2/79faf911b59f755bc191cd82e7c38f72>)

Abstract:

Five humic acid fractions (HAs) were isolated from various organic substrates used for plant growth in containers, including both conventional ones, i.e. peat (P) and coconut fiber (CF), and newly introduced ones, i.e. compost (Co) and mixtures at 20% and 60% (v/v) of Co with P (Co20 + P and Co60 + P) and Co with CF (Co20 + CF and Co60 + CF). The effects of these HAs at 50 and 300 mg L⁻¹ were evaluated on the mycelial growth of two soil-borne phytopathogens, *Pythium ultimum* (PYT) and *Fusarium oxysporum* f. sp. *callistephi* (FOC), in a series of in vitro experiments. Furthermore, in experiments performed in a climatic chamber, the bulk substrates were tested on the growth and health of two ornamental plant species: impatiens (*Impatiens walleriana* Hook) and China aster (*Callistephus chinensis* L. Nees), repeatedly infected respectively with PYT and FOC. In general, any HA at either dose reduced significantly the radial growth of PYT mycelium after 42 h, whereas Co-HA and P-HA at the higher concentration showed a high inhibition on PYT during the whole experiment. A significant inhibition of FOC growth was exerted by all HAs, especially at the higher dose, during the 192-h experimental time. No significant correlation exists between the extent of the inhibitory action on the two fungi and the chemical and functional properties of HA. The only exception is the existence of a negative correlation between the inhibition of PYT and the HA oxygen content. The various substrates used in trials conducted in vivo caused different plant growth response. The treatments with Co alone or its mixtures at 60% with P or CF were lethal for both plants, even before the first fungal inoculation. The substrates Co20 + P and Co20 + CF were very effective in controlling the fungal attack and increasing the growth of impatiens and China aster.

Keywords: Compost; Plant growing substrate; Humic acid fraction; Ornamental plant; Phytopathogenic soil-borne fungi

Avital Bechar, Gad Vitner, A weight coefficient of variation based mathematical model to support the production of 'packages labelled by count' in agriculture, *Biosystems Engineering*, In Press, Corrected Proof, Available online 20 August 2009, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.08.003.

(<http://www.sciencedirect.com/science/article/B6WXV-4X1XYK1-2/2/b8cd320700931c4672f908d78f1dc12e>)

Abstract:

Accurate weight-based packing of 'packages labelled by count' necessitates very low 'coefficients of variation (CVs) of unit weight. For agricultural products, with relatively high CVs, the usual weighing methods are therefore not suitable. An innovative weighing methodology was developed to produce 'packages labelled by count' utilising a weighing procedure. It was shown that each product is uniquely characterised by its CV, and a mathematical weight-CV-based model was developed for cuttings 'packages labelled by count'. It determines the critical package weight most compatible with the package specifications, according to the particular product CV. Five packaging characteristics were defined, and were examined for packaging various numbers of cuttings of several ornamental plant varieties. It was found that the coefficients of the 'strategy regression

equation' (BV coefficients) are invariant constants, independent of the nature of the product or its CV and they can be utilised to generate a unique equation which determines the dependency of the critical package weight on the CV. This methodology can be applied when the CV is high and the counting procedure is inaccurate and expensive.

Karin Schlangen, Silvija Miosic, Fuat Topuz, Gerlinde Muster, Thomas Marosits, Christian Seitz, Heidi Halbwirth, Chalcone 3-hydroxylation is not a general property of flavonoid 3'-hydroxylase, *Plant Science*, Volume 177, Issue 2, August 2009, Pages 97-102, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.04.002.

(<http://www.sciencedirect.com/science/article/B6TBH-4W3WXWW-1/2/32a8bbd73714dfd192f588f2a955ea62>)

Abstract:

In contrast to the well-studied B-ring hydroxylation of several flavonoid classes, knowledge on the establishment of the B-ring hydroxylation pattern in chalcones is still limited. Previous studies using enzyme preparations from *Dahlia variabilis* petals showed that a NADPH-dependent, membrane bound enzyme is responsible, but the possible involvement of the common flavonoid 3'-hydroxylase (F3'H) remained unclear. Therefore, we tested for the first time recombinant F3'Hs from eleven ornamental plant species, mostly Asteraceae, for their acceptance of chalcones as substrates. Ten of the 11 enzymes tested were not able to hydroxylate the 6'-deoxychalcone isoliquiritigenin at position 3, indicating the involvement of a specific enzyme in the hydroxylation of chalcones in ring B. Recombinant F3'H from *Tagetes erecta* accepted isoliquiritigenin as a substrate but low conversion rates and kinetic data clearly indicate that flavonoids are the preferred substrates. As microsomal preparations from *Tagetes erecta* petals do not hydroxylate chalcones at position 3, the observed low chalcone 3-hydroxylase activity of recombinant *Tagetes* F3'H seems to be a result of the use of a heterologous overexpression system. Cytochrome P450 reductase-specific antibodies provided final evidence that the CH3H reaction is catalyzed by a cytochrome-P450-dependent monooxygenase. This supports future cloning strategies based on respective conserved regions.

Keywords: Flavonoids; Chalcones; Flavonoid 3'-hydroxylase (F3'H); Chalcone 3-hydroxylase (CH3H); Asteraceae

Nicole Gardner, Roderick Felsheim, Alan G. Smith, Production of male- and female-sterile plants through reproductive tissue ablation, *Journal of Plant Physiology*, Volume 166, Issue 8, 15 May 2009, Pages 871-881, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.10.002.

(<http://www.sciencedirect.com/science/article/B7GJ7-4V4M2NR-1/2/45ac4bb5897c9738d3555740fe1159d7>)

Abstract: Summary

Male and female sterilities have many useful applications in horticultural crops, including reducing the invasive potential of new ornamentals, elimination of pollen allergens and redirecting resources from seeds to vegetative growth. In this study, we tested a male- and female-sterility (MS; FS) gene construct in *Nicotiana tabacum* to evaluate its effectiveness and effect on phenotype. Three T1 *Nicotiana tabacum* lines expressing the MS (p108:barnase) and FS (sp41:barnase) genes (MS/FS lines) and a control *Nicotiana tabacum* line (WT GUS) were measured for plant height, leaf length and width, corolla length, number of nodes on the main stem and stem diameter. No significant differences were found in these growth measurements between MS/FS lines and WT GUS. No pollen was observed on any of the lines carrying the MS and FS genes, indicating that the male sterility was complete. Seed set was greatly reduced or completely eliminated in plants with the MS and FS genes, after heavy pollinations of mature flowers with WT GUS pollen. However, pollinations of immature flowers resulted in very low seed set. This may be due to the nature of the promoter controlling expression of the FS gene as it had the highest expression levels at anthesis. The combination of male- and female-sterility genes was effective in eliminating

seed set in all the lines examined and has direct application for reducing invasiveness of ornamental plants.

Keywords: Barnase; Barstar; Invasiveness; Pollen; Transmitting tract

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 andreaeanum* 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. andreaeanum* 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

Ph. Morel, G. Galopin, N. Dones, Using architectural analysis to compare the shape of two hybrid tea rose genotypes, *Scientia Horticulturae*, Volume 120, Issue 3, 1 May 2009, Pages 391-398, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.11.039.

(<http://www.sciencedirect.com/science/article/B6TC3-4VCNF3V-1/2/e841395b06f9851cd6769fd3a0663ae5>)

Abstract:

In the area of ornamental horticulture, it is necessary to compare individuals to assess the effect of an experimental treatment or to distinguish between two genotypes. This is especially true for the hybrid tea rose, a plant species widely used throughout the world as a garden rose and represented by a very large number of cultivars. Normally, this diversity is approached by a more or less subjective analysis of the shape, with terms such as upright or spreading, and compact vs. laxly branched. Even when evaluated by a panel of experts, this approach quickly reaches its limits when it is necessary to objectively quantify the differences observed. The architectural analysis proposed here allows us to satisfy this objective. Two rose genotypes were studied: *Rosa hybrida* 'Radrazz' Knock-Out(R) (KO) and 'Meiratcan', *Lovely Meiland*(R) (LM). These two genotypes share both architectural similarities and differences. As for the similarities: (i) the axes

are of two highly differentiated types, long and short; (ii) the proportions of each type of axis vary from 100% of long axes for order 1, to 100% of short axes for the last branching order; and (iii) all of the flowering axes have a comparable profile, with the continuous development of their morphological components, from their base to their extremity. Despite these similarities, the two genotypes are very clearly differentiated. The number of orders and axes is greater for KO, whereas axis length and the number of metamers per axis are much greater for LM. The architectural analysis proposed here makes it possible to effectively quantify the major shape components of an ornamental plant like the rose. As a result, it provides a truly effective tool for objectively assessing plant shape.

Keywords: Ornamental plant; Plant architecture; Topology; Multiscale tree graph

Brian Christensen, Renate Muller, *Kalanchoe blossfeldiana* transformed with rol genes exhibits improved postharvest performance and increased ethylene tolerance, *Postharvest Biology and Technology*, Volume 51, Issue 3, March 2009, Pages 399-406, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.08.010.

(<http://www.sciencedirect.com/science/article/B6TBJ-4TWSWJY-2/2/3aea172c98481751207366e050f2279c>)

Abstract:

Kalanchoe blossfeldiana transformed with rol genes, termed root-inducing (Ri) lines, which had been produced through transformation using *Agrobacterium rhizogenes* wild-type strain ATCC15834, were tested for their postharvest performance. Flower longevity, ethylene sensitivity and display quality varied among control and chemical growth retarded plants and the Ri lines. Both chemical growth retardation and transformation with rol genes reduced the number of flowers in comparison to control plants. Detached single flowers of the two Ri lines tested, Ri line 306 and 331, had a longevity, defined as the stage where the flowers were 70% open, of 32 and 34 d, respectively, whereas chemical growth retarded and control plants had a longevity of 28 and 26 d, respectively. Ri line 331 had the significantly longest display life of 34 d to reach the stage of losing the ornamental value of the whole plant, defined as 10% wilted flowers. The corresponding display life of control and chemical retarded plants and plants of Ri line 306 was 25 d. The opening of the flowers was more synchronous in the Ri lines than control plants. Exposed to ethylene, the flowers of the Ri lines exhibited reduced responsiveness whereas chemical growth retarded and control plants were sensitive. Possible mechanisms behind the improved postharvest performance of plants transformed with rol genes are discussed.

Keywords: *Agrobacterium rhizogenes*; Chemical growth retardants; Display quality; Ornamental plants; Flower senescence

Dennis Konnerup, Thammarat Koottatep, Hans Brix, Treatment of domestic wastewater in tropical, subsurface flow constructed wetlands planted with *Canna* and *Heliconia*, *Ecological Engineering*, Volume 35, Issue 2, Pollution control by wetlands, 9 February 2009, Pages 248-257, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2008.04.018.

(<http://www.sciencedirect.com/science/article/B6VFB-4VJ5V4B-C/2/162ca39f90effd140d5090abfcf4001f>)

Abstract:

Constructed wetlands have a good potential for wastewater treatment in developing countries due to the simple operation and low implementation costs. Ornamental plants like *Canna* and *Heliconia* are used in the wetlands to increase their aesthetic value and these two species were compared in this study. Six pilot scale horizontal subsurface flow constructed wetland units were constructed at the Asian Institute of Technology (AIT) campus in Bangkok, Thailand, of which three were planted with *Heliconia psittacorum* L.f. x *H. Spathocircinata* (Aristeguieta) and three with *Canna* x *generalis* L. Bailey. The beds were loaded with domestic wastewater in four trials with hydraulic loading rates ranging from 55 to 440 mm d⁻¹ corresponding to nominal detention times between 12 h and

4 days. Both plant species grew well in the systems and especially Canna had high growth rates (3100 +/- 470 g DW m⁻² yr⁻¹) compared to Heliconia (550 +/- 90 g DW m⁻² yr⁻¹). TSS mass removal rates were very high with efficiencies >88% even at hydraulic loading rates of 440 mm d⁻¹. COD mass removal rates varied between 42 and 83% depending on the loading rates. The removal rate constants for COD as fitted by the first-order k-C* model were estimated to be 0.283 and 0.271 m d⁻¹ for Canna and Heliconia beds, respectively (C* = 28.1 and 26.7 mg l⁻¹). Removals of nitrogen (N) and phosphorus (P) were low compared to the loading rates, but removal of total-N was higher in the beds planted with Canna than in beds with Heliconia because of the higher growth rate of Canna. It is concluded that ornamental species like Canna and Heliconia can be used to enhance the aesthetic appearance and hence the public acceptance of wastewater treatment systems in tropical climates. Canna is the preferred species from a treatment perspective because of its more vigorous growth, but since Heliconia has an economic potential as cut flowers may be preferred in many cases.

Keywords: Domestic wastewater; Constructed wetland; Tropical; Canna; Heliconia; Ornamental plants; Removal rate coefficients; First-order model

Neeraj Kumar, Pamita Bhandari, Bikram Singh, Shamsheer S. Bari, Antioxidant activity and ultra-performance LC-electrospray ionization-quadrupole time-of-flight mass spectrometry for phenolics-based fingerprinting of Rose species: *Rosa damascena*, *Rosa bourboniana* and *Rosa brunonii*, Food and Chemical Toxicology, Volume 47, Issue 2, February 2009, Pages 361-367, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.11.036.

(<http://www.sciencedirect.com/science/article/B6T6P-4V3HFFJ-1/2/aa6e8eb3dcbcea9fb60a4ac156442ea7>)

Abstract:

Roses are one of the most important groups of ornamental plants and their fruits and flowers are used in a wide variety of food, nutritional products and different traditional medicines. The antioxidant activity of methanolic extracts from fresh flowers of three rose species (*Rosa damascena*, *Rosa bourboniana* and *Rosa brunonii*) was evaluated by 1,1-diphenyl-2-picrylhydrazyl (DPPH) free-radical method. The ability to scavenge DPPH radical was measured by the discoloration of the solution. The methanolic extract from *R. brunonii* exhibited maximum free-radical-scavenging activity (64.5 +/- 0.38%) followed by *R. bourboniana* (51.8 +/- 0.46%) and *R. damascena* (43.6 +/- 0.25%) at 100 [μg/ml]. Simultaneously, ultra-performance liquid chromatography coupled with electrospray ionization-quadrupole time-of-flight mass spectrometry (UPLC-ESI-QTOF-MS) was used to study phenolic composition in the methanolic extracts from the fresh flowers of rose species. The phenolic constituents were further investigated by direct infusion-ESI-QTOF-MS/MS in negative ion mode. Characteristic Electrospray ionization tandem mass spectrometry (ESI-MS/MS) spectra with other diagnostic fragment ions generated by retro Diels-Alder (RDA) fragmentation pathways were recorded for the flavonoids. Distinct similarities were observed in the relative distribution of polyphenolic compounds among the three species. The dominance of quercetin, kaempferol and their glycosides was observed in all the three species.

Keywords: *Rosa damascena*; *Rosa bourboniana*; *Rosa brunonii*; Phenolics; Antioxidant activity; Ultra-performance liquid chromatography-electrospray ionization mass spectrometry

Jonathan M. Lehrer, Mark H. Brand, Jessica D. Lubell, Induction of tetraploidy in meristematically active seeds of Japanese barberry (*Berberis thunbergii* var. *atropurpurea*) through exposure to colchicine and oryzalin, Scientia Horticulturae, Volume 119, Issue 1, 10 December 2008, Pages 67-71, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.003.

(<http://www.sciencedirect.com/science/article/B6TC3-4T5HJ5R-2/2/c2f641611317cb1ec5a5c7ea33f3fb85>)

Abstract:

Japanese barberry (*Berberis thunbergii* DC) is an invasive shrub, widely naturalized across the United States, whose numerous cultivars remain an important horticultural commodity. Maintaining this crop for the future necessitates the development of sterile clones. Exposure to the mitotic inhibitors colchicine and oryzalin is a traditional method for inducing tetraploidy in breeding lines as a precursor to creating sterile genotypes. Treatments utilized pre-germinated *B. t.* var. *atropurpurea* seeds with emerged radicles. Seeds were immersed in aqueous solutions of colchicine (.02%, .05%, .1% and .2%) and oryzalin (.002%, .005%, .01% and .02%) dissolved in 1% DMSO for 6, 12 and 24 h durations. Seedling ploidy level was determined via flow cytometry following 6 and 52 weeks of growth in the greenhouse. Both anti-mitotic chemicals proved effective at inducing tetraploidy and produced comparable efficiency rates. The survival rate of treated seeds decreased in response to both increased mitotic inhibitor concentration and longer exposure duration. While exposure to oryzalin produced greater seed mortality than colchicine, most seedlings that survived had altered ploidy levels. The most efficient oryzalin concentration was 0.002% with a rating of 28%, while the most efficient colchicine concentrations were in the range from 0.05% to 0.2%. Duration of exposure to mitotic inhibitor was not a significant factor over the range from 6 to 24 h. Reversion of tetraploid plants to the diploid state occurred at a low frequency following a dormancy period. Some tetraploid seedlings derived from exposure to both chemicals displayed foliar abnormalities including irregular leaf margins and mottled lamina. The primary advantage of colchicine was low seedling toxicity, while oryzalin was notable for its ability to induce tetraploidy at low concentrations.

Keywords: Invasive plant; Sterile breeding; Tetraploid; Flow cytometry; Ornamental plant

Walter Chavez, Adalberto Di Benedetto, Gabriela Civeira, Raul Lavado, Alternative soilless media for growing *Petunia x hybrida* and *Impatiens wallerana*: Physical behavior, effect of fertilization and nitrate losses, *Bioresource Technology*, Volume 99, Issue 17, November 2008, Pages 8082-8087, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.03.063.

(<http://www.sciencedirect.com/science/article/B6V24-4SH1HVY-2/2/ce6d30453e65e6c617c257bb3b56297d>)

Abstract:

The use of alternative soilless media for the production of potted plants requires knowledge of their physical and chemical characteristics to result in the best conditions for plant growth. We investigated the use of alternative soilless media based on river waste and *Sphagnum* sp. and *Carex* sp. from Argentinean peatlands on *Petunia x hybrida* and *Impatiens wallerana* production at two fertilization levels (200 and 400 mg l⁻¹ N). River waste or 'temperate peat' is the name given to a material, resulting from the accumulation of aquatic plant residues under an anaerobic subtropical environment, which is dredged from river banks. Our results showed that alternative substrates based on river waste can be used to grow high quality plants. This result was not fully explained on the basis of established methods to evaluate substrate quality. Highly concentrated fertigation solution decreased the substrate quality parameters and plant growth. Nitrate leaching from the alternative substrates containing river waste was lower than the standard peat-based materials, which makes river waste desirable from a sustainable pot production system perspective. River waste and *Carex* peat are suitable alternatives to *Sphagnum* peat from the Northern Hemisphere.

Keywords: Ornamental plant; Peat; River waste; Nutrient leaching

Jan Hanspach, Ingolf Kuhn, Petr Pysek, Evelin Boos, Stefan Klotz, Correlates of naturalization and occupancy of introduced ornamentals in Germany, *Perspectives in Plant Ecology, Evolution and Systematics*, Volume 10, Issue 4, 20 October 2008, Pages 241-250, ISSN 1433-8319, DOI: 10.1016/j.ppees.2008.05.001.

(<http://www.sciencedirect.com/science/article/B7GVV-4T41PNB-1/2/0f9dbf28d0c8542a4589a438e247e94c>)

Abstract:

Invasions are multistage processes and the performance of a species at different stages depends on socio-economic, biogeographical, ecological and evolutionary factors. Most studies addressing the factors that determine invasion success focus on one particular stage, usually by examining data on introduced species that have successfully naturalized, whereas species that fail to naturalize are often not considered. In this study, we examined naturalization success (whether a species escaped from cultivation and became naturalized in the wild) and occupancy (the number of grid cells of 6' longitude x 10' latitude in which it is recorded) of up to 8018 ornamental plant species introduced into botanical gardens in Germany. Data on these introductions were extracted from the SYSTAX database (Information System of German Botanical Gardens), information on successful naturalization in Germany from the BioFlor database and data on species traits from SYSTAX and the European Garden Flora. The effect of propagule pressure, biogeography, winter hardiness, life strategy, morphology and genetic variability on the probability of naturalization and the number of grid cells occupied was tested using regression models. The influence of phylogenetic dependence was considered within simple single variable models as a nested random effect. All traits that appeared significant in these simple models were combined in a multivariable model. The simplified multivariable model revealed an increasing probability of naturalization for species with a higher winter hardiness, a wider native range and a higher planting frequency in botanical gardens (Nagelkerke-R² of 0.196). Moreover, interactions between plant height and planting frequency and between growth form and winter hardiness also affected the probability of naturalization. The number of grid cells occupied was best explained by the winter hardiness (pseudo-R² of 0.61). The stratified pre-selection of ornamental plants by gardeners may hold the key to their successful escape from cultivation and subsequent naturalization.

Keywords: Alien plants; Genetic variability; Invasion process; Planting frequency; Traits; Winter hardiness

D. Dutt, J.S. Upadhyaya, C.H. Tyagi, A. Kumar, M. Lal, Studies on *Ipomea carnea* and *Cannabis sativa* as an alternative pulp blend for softwood: An optimization of kraft delignification process, *Industrial Crops and Products*, Volume 28, Issue 2, September 2008, Pages 128-136, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.02.001.

(<http://www.sciencedirect.com/science/article/B6T77-4S4S5KT-1/2/ae4c780cbd3b7cace6b5b425d9a02b4e>)

Abstract:

Ipomea carnea Jacq, a common weed known as 'Beshram' was introduced in India, as an ornamental plant. Surprisingly, except fiber length, other morphological characteristics like, cell wall thickness, lumen diameter, flexibility coefficient and wall fraction of *I. carnea* resemble with softwoods like, *Pinus kesiya*, and *Picea abies*. *Cannabis sativa* L., a common weed known as soft hemp consists of both bast fiber as well as core fiber. The unique morphological characteristics of *I. carnea* like, cell wall thickness and flexibility coefficient, which resembles with softwoods along with long fibers of *C. sativa*, in which *I. carnea* deficits in a proper blend ratio, can be used in a better way for the development of high quality value added paper. The optimum kraft cooking conditions for *I. carnea* and *C. sativa* were: active alkali 16%, sulfidity 20%, temperature 165 [degree sign]C, time (at temperature) 120 min and wood to liquor ratio of 1:4 for *I. carnea* and 1:3.5 for *C. sativa*. The screened pulp yield of *I. carnea* and *C. sativa* were found to be 49.3 and 54.3% at Kappa number of 29, respectively. An anthraquinone (AQ) dose of 0.1% increases the pulp yield to the tune of around 0.6% as well reduce the Kappa number to the tune of 22%. CEHH bleaching of *C. sativa* produces pulp brightness of 82% (Elrepho) at total chlorine demand of 5.07%. On contrary to this the *I. carnea* kraft pulp at same chlorine demand produce a pulp with improved brightness of 85.4% (Elrepho).

Keywords: Ipomea carnea; Cannabis sativa; Morphology and chemical analysis; Kraft pulping; Kappa number; Mechanical strength properties

XiaoPeng Fu, GuoGui Ning, LiPing Gao, ManZhu Bao, Genetic diversity of Dianthus accessions as assessed using two molecular marker systems (SRAPs and ISSRs) and morphological traits, Scientia Horticulturae, Volume 117, Issue 3, 23 July 2008, Pages 263-270, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.04.001.

(<http://www.sciencedirect.com/science/article/B6TC3-4SJ9GD7-1/2/0167bdd7ce06d4038622f1e736d595d6>)

Abstract:

Dianthus chinensis, *Dianthus barbatus* and *Dianthus superbus* are members of the Caryophyllaceae and are grown widely as ornamental plants. Information about relative genetic relationships can facilitate breeding programs. Here, we have compared two polymerase chain reaction (PCR)-based systems (sequence-related amplified polymorphisms (SRAPs) and inter-simple sequence repeats (ISSRs)) and morphological trait measurements for their relative effectiveness in estimating the genetic diversity found between 22 Chinese pink (*D. chinensis*) inbred-lines, one accession of *D. barbatus* and one accession of *D. superbus*. Interspecific differences were readily detected but the markers were less reliable in distinguishing the accessions according to their region of origin or in separating the wild species from the cultivars. Morphological traits were found to be the least effective genetic markers. The relative effectiveness of the three systems as markers for genetic diversity was concluded to be SRAP > ISSR > morphological traits, but the combined data from ISSR + SRAP analyses was superior to all three. The information generated by the SRAP marker system correlated more closely with morphological variability than did the ISSR marker system. The morphological markers of plant height/crown size ratio, lower leaf length, ovary shape index and calyx length showed strong correlations with the genetic diversity index (GD_{ij}, PPB(II) and PSB) as generated by the percentage of polymorphic bands and percentage of special bands of the PCR-based markers.

Keywords: *Dianthus chinensis*; Genetic distance; ISSR; Molecular marker; Morphological traits; SRAP

Philip W. Lambdon, Francisco Lloret, Philip E. Hulme, How do introduction characteristics influence the invasion success of Mediterranean alien plants?, Perspectives in Plant Ecology, Evolution and Systematics, Volume 10, Issue 3, 15 July 2008, Pages 143-159, ISSN 1433-8319, DOI: 10.1016/j.ppees.2007.12.004.

(<http://www.sciencedirect.com/science/article/B7GVV-4S7HSHH-1/2/ceb0665766fa5a53c5eba06a8eaa5825>)

Abstract:

Invasive plant species are becoming increasingly widespread following accelerated anthropogenic activity in the Mediterranean region. Humans have played a central role in the expansion process, and it is important to incorporate such considerations into management plans. Using generalized linear models, our first aim was to describe how the invasion success of 862 prominent alien plant species on Mediterranean islands is related to characteristics of the introduction process: introduction frequency, date and region of origin, range size and purpose of import. The importance of each was measured by the numbers of species present and their average invasiveness. The main findings were: (a) accidental imports and ornamentals accounted for a high proportion of all aliens, although neither group had particularly high average invasiveness; (b) introduction frequency had a comparatively modest influence, with the most commonly-introduced species naturalized only three times more widely than those rarely-introduced; (c) rates of species introduction appear to have increased dramatically in the last century, although aliens which have been present in the region for more than 200 years were most widespread, indicating that it may be centuries before some species fill their potential range; (d) there were small tendencies for

successful invaders to originate in the Neotropics or in regions with Mediterranean climate biomes and to have large range sizes. Our second aim was to determine whether the number or average invasiveness of species introduced via a given pathway had the most influence on the overall probability of invasion on a given island. An elasticity analysis suggested that the number of species was substantially the best predictor of the two. This finding arises largely because invasion events are rare and remain unpredictable, and has significant implications for assessing invasion risk. We discuss how substantial sources of error and intrinsic variability in invasiveness within species groups limit the potential for developing accurate risk models.

Keywords: Accidental introductions; Biological invasions; Introduction pathways; Invasion success; Ornamental plants; Screening protocols

F. Zurita, M.A. Belmont, J. De Anda, J. Cervantes-Martinez, Stress detection by laser-induced fluorescence in *Zantedeschia aethiopica* planted in subsurface-flow treatment wetlands, *Ecological Engineering*, Volume 33, Issue 2, 3 June 2008, Pages 110-118, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2008.02.004.

(<http://www.sciencedirect.com/science/article/B6VFB-4S97J9T-3/2/daa65f62a8a2fe42c6746fdc8bfdaf06>)

Abstract:

In developing countries, the use of constructed wetlands for domestic wastewater treatment has been limited despite their advantages over conventional treatment systems. In order to make the use of constructed wetlands more attractive in these countries, where the economic resources are very scarce, it is necessary to find a way that the resources invested in the construction and maintenance of the system can be recovered in a relatively short time. This could be accomplished through the combination of wastewater treatment and the production of commercially valuable ornamental plants.

There are recent studies on the feasibility to produce flowers in treatment wetlands, but there are no studies conducted to evaluate the health of the plants to assess if the plants are suffering stress from the flooding conditions of the wetlands. In this work, laser-induced fluorescence (LIF) and physical measurements were used to evaluate and compare the health of an ornamental plant - *Zantedeschia aethiopica* - under two patterns of flow in subsurface-flow constructed wetlands. The plants were studied when 7 months old and 9 months old. The fluorescence spectra and the calculated ratio F690 nm/F740 nm indicated that the plants in a horizontal flow wetland (HFW) were healthier than those in a vertical flow wetland (VFW). The physical measurements led to the same conclusion. The results suggest that the plants in the VFW were stressed because of the less water available for them under the cyclic flooding and draining characteristic in this type of wetland. It is also possible that the use of non-stratified media influenced by reducing the water-root contact time.

Keywords: Ratio F690/F740; Treatment wetland; Domestic wastewater; Ornamental plants

J.N. Petit, M.S. Hoddle, J. Grandgirard, G.K. Roderick, N. Davies, Short-distance dispersal behavior and establishment of the parasitoid *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) in Tahiti: Implications for its use as a biological control agent against *Homalodisca vitripennis* (Hemiptera: Cicadellidae), *Biological Control*, Volume 45, Issue 3, June 2008, Pages 344-352, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.01.020.

(<http://www.sciencedirect.com/science/article/B6WBP-4RRFNBC-1/2/0bc47791f981d703c5e9331afe169c97>)

Abstract:

The egg parasitoid *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae), was introduced into French Polynesia as a biological control agent to control the invasive plant feeding pest *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae). The short-distance dispersal of *G. ashmeadi* was monitored as part of the biological control program. *G. ashmeadi* showed

exponential dispersal capacity with 47 m/day being a minimum estimate of its natural rate of spread at high host densities (>150 nymphs per minute of sweep net sampling) in urbanized areas at sea level, which were characterized by a high diversity of exotic ornamental plants. This rate of spread contrasted starkly with almost nonexistent establishment and dispersal where host densities were very low (<2 nymphs per minute of sweep net sampling) at high elevation (800 m) with relatively undisturbed native vegetation. Survey results across different altitudes revealed an effect of vegetative diversity and host density on the measurable mobility and establishment of *G. ashmeadi*. In contrast, no significant influence of wind direction was found on *G. ashmeadi* dispersal rate or direction. Survey results for *G. ashmeadi* from French Polynesia suggest that the best release establishment strategies for classical biological control of *H. vitripennis* are: (1) many small releases where host density is high, or (2) larger and fewer releases where host densities are low.

Keywords: *Gonatocerus ashmeadi*; *Homalodisca vitripennis*; Classical biological control; Dispersal rate

Manuel Porcar, Francesc Gomez, Axel Gruppe, Antonio Gomez-Pajuelo, Inmaculada Segura, Roland Schroder, Hymenopteran specificity of *Bacillus thuringiensis* strain PS86Q3, *Biological Control*, Volume 45, Issue 3, June 2008, Pages 427-432, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.02.002.

(<http://www.sciencedirect.com/science/article/B6WBP-4RSYC91-2/2/ad88bd3f7b58ad1841bc8b47bdf5e21a>)

Abstract:

The biological activity of *Bacillus thuringiensis* (Bt) strain PS86Q3 against five Hymenopteran species was determined by means of bioassays adapted to each species. Four species of sawfly that are important pests of conifers (*Diprion pini*, *Gilpinia hercyniae* and *Pristiphora abietina*) or ornamental plants (*Arge rosae*), as well as the non-target honeybee, *Apis mellifera*, were studied. Two out of the four sawfly species tested were found to be sensitive to PS86Q3 crystals or spore/crystal suspensions. A sporulated culture of this strain was moderately active on *D. pini*, and a complete bioassay with solubilized crystals was performed to estimate the LC₅₀ of 4.9 mg/ml. *Pristiphora abietina* was also found to be sensitive to PS86Q3, with an LC₅₀ of 1.6 mg/ml. By contrast, at the concentrations tested, PS86Q3 did not prove active on the remaining sawflies, *G. hercyniae* and *A. rosae*. The strain was administered orally to check its effects on honeybees which were fed sucrose solutions supplemented with a PS86Q3 sporulated suspension, in a field assay using commercial beehives. No significant differences in larval mortality (as deduced by comparing the number of larvae, pupae and empty cells) were found between the Bt and control treatments. On the basis of the results presented here, the suitability of PS86Q3 for the control of Hymenopteran pests, particularly sawflies, in terms of both potency and environmental safety, is discussed.

Keywords: *Bacillus thuringiensis*; Strain PS86Q3; *Diprion pini*; *Gilpinia hercyniae*; *Pristiphora abietina*; *Arge rosae*; *Apis mellifera*; Biopesticides; Forest pest; Non-target insect; Hymenoptera

R.M. Banik, D.K. Pandey, Optimizing conditions for oleanolic acid extraction from *Lantana camara* roots using response surface methodology, *Industrial Crops and Products*, Volume 27, Issue 3, May 2008, Pages 241-248, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2007.09.004.

(<http://www.sciencedirect.com/science/article/B6T77-4R2GRXC-2/2/b89d7b77182bc2c2ffd439861b62f6ee>)

Abstract:

Lantana camara is an ornamental plant used in traditional medicine for the treatment of various diseases. The roots of *L. camara* is a rich source of oleanolic acid which has shown anti-inflammatory, hepatoprotective, antitumor, antioxidant and anti-hyperlipidemic activity. Optimization of various extraction parameters using response surface methodology (RSM) was

performed to assess maximum yield of oleanolic acid from *L. camara* roots. Plackett-Burman design criterion was applied to identify the significant effects of various extraction parameters such as temperature, time, mean particle size, solvent-solid ratio, solvent composition and number of extraction steps on extraction of oleanolic acid. Among the six variables tested extraction time, mean particle size, solvent-solid ratio and solvent composition were found to have significant effect on oleanolic acid extraction. Optimum levels of the significant variables were determined by using a central composite design. The most suitable condition for extraction of oleanolic acid was found to be a single step extraction at extraction temperature 35 [degree sign]C, extraction time 55 min, solvent-solid ratio 55:1, mean particle size 0.5 mm and solvent composition 52.5% methanol in a methanol-ethyl acetate mixture. At these optimum extraction parameters, the maximum yield of oleanolic acid obtained experimentally (1.74% dry weight of root) was found to be very close to its predicted value of 1.69% dry weight of root. The mathematical model developed was found to fit well with the experimental data of oleanolic acid extraction.

Keywords: *Lantana camara*; Oleanolic acid; Solid-liquid extraction; Central composite design; Response surface methodology

Cigdem Alev Ozel, Khalid Mahmood Khawar, Seher Karaman, Mevlude Alev Ates, Orhan Arslan, Efficient *in vitro* multiplication in *Ornithogalum ulophyllum* Hand.-Mazz. from twin scale explants, *Scientia Horticulturae*, Volume 116, Issue 1, 10 March 2008, Pages 109-112, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.11.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4RFD6DY-2/2/733bc12d878b316d87a591c7607747cd>)

Abstract:

Ornithogalum ulophyllum Hand.-Mazz. with beautiful white flowers is an important medicinal and ornamental plant of the Middle Eastern countries and need exploitation for commercial propagation. The study reports *in vitro* mass proliferation of bulblets achieved from twin scales and 'in vitro regenerated bulblet' explants on MS medium supplemented with various concentrations of BAP-NAA. The best regeneration on twin scales and 'in vitro regenerated bulblets' was obtained on MS medium containing 2 mg l⁻¹ BAP-0.5 mg l⁻¹ NAA and 2 mg l⁻¹BAP-1 mg l⁻¹ NAA, respectively. However, bulb scales seemed to be more potent for bulblet regeneration. A large number of the developing bulblets rooted on the regeneration medium. Remaining non-rooting bulblets were rooted on MS medium containing 1 mg l⁻¹ NAA. All plants were acclimatized in the environmental chamber for 4 weeks and were transferred to the greenhouse for flowering. Regenerated bulblets developed into morphologically normal plants.

Keywords: Cytokinins; Bulblet regeneration; *In vitro* regenerated bulblets; Twin scales; Rooting

Sabine Demotes-Mainard, Rachid Boumaza, Sylvie Meyer, Zoran G. Cerovic, Indicators of nitrogen status for ornamental woody plants based on optical measurements of leaf epidermal polyphenol and chlorophyll contents, *Scientia Horticulturae*, Volume 115, Issue 4, 21 February 2008, Pages 377-385, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.10.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4R5G8FY-2/2/7d92feb0a0be013996386df2ebcb06dc>)

Abstract:

Indicators of plant nitrogen (N) status adapted to woody ornamental plants are essential for the adjustment of fertilization practices in nurseries. The objective of this study was to investigate whether optical measurements of leaf epidermal polyphenol (EPhen) and chlorophyll (Chl) contents could be used as N status indicators for woody deciduous and evergreen ornamental plants. One-year-old plants of *Lagerstroemia indica*, *Callicarpa bodinieri* and *Viburnum tinus* were grown outdoors in containers. They received low (TN1, 4 mg L⁻¹) or high (TN2, 105 mg L⁻¹) levels of N during 2 months in spring and summer. TN1 treatment limited shoot growth from 28 to 37 days after treatment initiation in *Lagerstroemia* and *Callicarpa*, respectively. Shoot growth was

unaffected until day 176 in *Viburnum*. The mass-based leaf N content (NM) of a sample of young expanded leaves exposed to direct sunlight was tightly correlated with shoot N content and differentiated treatments several weeks before shoot growth reduction for the three species. NM was therefore used as an index of plant N status. EPhen and Chl contents were recorded with Dualex(TM) and SPAD-502 leaf-clip meters, respectively. Dualex values were strongly and negatively correlated with NM, and differentiated the treatments early in the experiment, in all three species. SPAD values were positively correlated with NM for *Lagerstroemia* and *Callicarpa*, but not for *Viburnum*, because large variations in leaf mass per area (LMA) in this species compensated for variations in leaf dry mass invested in Chl. The SPAD/Dualex ratio was used to assess changes in the proportion of leaf dry mass allocated to proteins and polyphenols in response to fertilization. It differentiated between the treatments early in the experiment and was correlated with NM in all three species.

Keywords: Nitrogen nutrition indicator; SPAD; Dualex; Ornamental plants; *Lagerstroemia indica*; *Callicarpa bodinieri*; *Viburnum tinus*

Alejandro S. Escandon, Liliana. M. Alderete, Juan C. Hagiwara, In vitro polyploidization of *Mecardonia tenella*, a native plant from South America, *Scientia Horticulturae*, Volume 115, Issue 1, 10 December 2007, Pages 56-61, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.07.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4PGPM2H-1/2/286093bdda1b73ca5d14eaab84455839>)

Abstract:

Mecardonia tenella is an herbaceous plant widely distributed in the temperate region of South America. Both plant architecture and flower size are characteristics that can be improved to become a viable new ornamental plant. Chromosome doubling by the use of agents such as colchicine is an available methodology to this end. Nodal segments from in vitro grown plants of *M. tenella* were submerged in the following doses of colchicine in 1% (v/v) dimethyl-sulfoxide (DMSO) solution (% v/v): 0.0, 0.001 and 0.01 (24 and 48 h). The DNA content of the regenerated plants was measured by flow cytometer. A total of 68 tetraploid plants were detected out of 126 colchicine treated plants. The flowers and leaves of the tetraploid plants were bigger compared to those from the wild diploid type (control). Under field conditions, the selected tetraploid plants showed a more compact shape than the control plants.

Keywords: Tissue culture; Colchicine; Ornamental plants; Scrophulariaceas

K. Lin, K. Wu, Y. Zhang, Y. Guo, Overwintering and population dynamics of *Bemisia tabaci* biotype B in greenhouse during the spring in northern China, *Crop Protection*, Volume 26, Issue 12, December 2007, Pages 1831-1838, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.04.002.

(<http://www.sciencedirect.com/science/article/B6T5T-4NSPVPH-1/2/7862a96bd23a2f7b57b2ee04317e0411>)

Abstract:

Since the sweetpotato whitefly, *Bemisia tabaci* (Gennadius) biotype B invaded southern China in the mid-1990s, it had spread to most other regions of the country, and become an important pest in agricultural and horticultural production. Investigations on overwintering of *B. tabaci* biotype B and its spring reproduction in northern China were conducted to determine the main factors that might contribute to an understanding of the population dynamics of this pest for developing improved pest control strategies. A cold hardiness test showed that when exposed for 10 h at -10 [degree sign]C, mortalities of eggs, nymphs, and adults reached to 86.6%, 88.4%, and 100%, respectively, suggesting that it is probably impossible for feral populations of *B. tabaci* to survive in the winter under natural environmental conditions in northern China. A survey on vegetables, ornamental plants and weeds in greenhouses at Hebei Province and Beijing in northern China revealed at least 14 species of plants on which *B. tabaci* fed during the winter and spring. *Lycopersicon esculentum* Mill, *Brassica alboglabra* Bailey, *Ficus carica* L., *Euphorbia pulcerrima*

Wild, and *Hemelia patens* Haence were the main host plants. Further research on the population dynamics of *B. tabaci* on three major greenhouse hosts; tomato, cucumber, and melon, indicated that densities remained at a low level during the winter, but increased steadily from February to March until migration into field crops in April. It is concluded that the control of the insect in greenhouse in winter and spring can play an important role for seasonal management of this pest in northern China.

Keywords: *Bemisia tabaci*; Population dynamics; Overwintering hosts; Cold hardiness

Yanyou Wu, Pingping Li, Yuguo Zhao, Jizhan Wang, Xiangming Wu, Study on photosynthetic characteristics of *Orychophragmus violaceus* related to shade-tolerance, *Scientia Horticulturae*, Volume 113, Issue 2, 26 June 2007, Pages 173-176, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.02.004.

(<http://www.sciencedirect.com/science/article/B6TC3-4NB38K0-1/2/427776e5a7010634c3a688e29b7f22e0>)

Abstract:

Orychophragmus violaceus is annual or biennial shade-tolerance, wild ornamental plant. *Brassica juncea* is shade-intolerance plant. The photosynthetic parameters in the attached leaves of *O. violaceus* and *B. juncea* related to shade-tolerance were measured. Light compensation point, CO₂ compensation point, and the carboxylation efficiency in *O. violaceus* are significantly lower than those in *B. juncea*. The net CO₂ assimilation rate and the CO₂ terminal concentration of sealed photosynthetic reaction flask of detached leaves of the two species of plants under the weak illumination (34 $\mu\text{mol m}^{-2} \text{s}^{-1}$) were also determined. The results show that the net CO₂ assimilation rate varies in 1 day with the time when the leaves are detached. The net CO₂ assimilation rate of *O. violaceus* is much higher than that of *B. juncea*. The extracellular carbonic anhydrase inhibitor-acetazolamide obviously inhibits the net CO₂ assimilation rate of the two species of plants. The net CO₂ assimilation rate of *O. violaceus* is positive in 1 day, and there is no obvious photosynthetic midday depression under the weak illumination. The CO₂ terminal concentration of sealed photosynthetic reaction flask of detached leaves of *O. violaceus* is lower than that of *B. juncea*. It proves that the CO₂ compensation point of *O. violaceus* is lower than that of *B. juncea*, and the net CO₂ assimilation rate is much higher than that of *B. juncea* under the same illumination duration. Modulating water metabolism relationship by the higher activity carbonic anhydrase is an important shade-tolerance mechanism of *O. violaceus*.

Keywords: *Brassica juncea*; CO₂ compensation point; Light compensation point; Net CO₂ assimilation rate; *Orychophragmus violaceus*; Shade-tolerance

Fernando Fornes, Rosa Maria Belda, Carolina Carrion, Vicente Noguera, Pilar Garcia-Agustin, Manuel Abad, Pre-conditioning ornamental plants to drought by means of saline water irrigation as related to salinity tolerance, *Scientia Horticulturae*, Volume 113, Issue 1, 5 June 2007, Pages 52-59, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.01.008.

(<http://www.sciencedirect.com/science/article/B6TC3-4N2M6MJ-4/2/e75cc77ba7db55a060e06f7db07855e1>)

Abstract:

This study examines the feasibility of using saline irrigation water for commercial pot cultivation of three ornamentals: *Calceolaria hybrida*, *Calendula officinalis* and *Petunia hybrida*. Two saline treatments were assayed: irrigation with low saline tap water (electrical conductivity = 1.16 dS m⁻¹), and irrigation with a high saline solution of NaCl 100 mM + CaSO₄ 10 mM + MgSO₄ 2.5 mM (electrical conductivity = 12.5 dS m⁻¹). When the control plants reached marketable size the watering was stopped and the plant response to drought was studied. *Petunia* and *Calceolaria* were tolerant to salinity. *Petunia* saline-treated plants reduced their growth slightly and increased N and chlorophyll contents in the leaves. *Calceolaria* experienced a strong reduction in growth and a delay in flowering but no toxicity symptoms or mortality was recorded. These species were

moderate NaCl accumulators. *Calendula* was sensitive to salinity: 16% of the plants died and the surviving ones experienced a heavy reduction of growth, a decrease in chlorophyll and a large accumulation of NaCl in the leaves. Saline pre-conditioned plants of *Calceolaria* and *Petunia* were tolerant to drought. In these plants, leaf water content and, specifically, leaf relative water content were sustained longer than in non-pre-conditioned plants throughout the drought period. In *Calendula*, leaf relative water content decreased at the same rate in pre-conditioned and non-pre-conditioned plants. Consequently, salinization did not confer drought resistance upon this species. Possible factors determining the tolerance to drought in saline pre-conditioned plants are discussed.

Keywords: Ornamentals; Salinity tolerance; Drought tolerance; Water stress; Soilless growing media; Mediterranean climate

L.C. Foxcroft, D.M. Richardson, Ornamental plants as invasive aliens: Problems and solutions in the Kruger National Park, South Africa, *South African Journal of Botany*, Volume 73, Issue 2, April 2007, Page 288, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.045.
(<http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-1F/2/23770f394cdde3387b51f01344304923>)

G. Prinsloo, E. Van der Heever, M. Mofokeng, Establishing a medicinal incubator at the Agricultural Research Council -- Vegetable and Ornamental Plant Institute, *South African Journal of Botany*, Volume 73, Issue 2, April 2007, Page 308, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.104.
(<http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-3J/2/ad5a90b0fdd25d29855ecbb12d617f12>)

Christian Seitz, Matthias Vitten, Peter Steinbach, Sabrina Hartl, Jorg Hirsche, Wiebke Rathje, Dieter Treutter, Gert Forkmann, Redirection of anthocyanin synthesis in *Osteospermum hybrida* by a two-enzyme manipulation strategy, *Phytochemistry*, Volume 68, Issue 6, March 2007, Pages 824-833, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.12.012.
(<http://www.sciencedirect.com/science/article/B6TH7-4N0GDWP-1/2/ae60bfb06a9ec93e7f197bf1b987653e>)

Abstract:

Modern biotechnology has developed powerful tools for genetic engineering and flower colours are an excellent object to study possibilities and limitations of engineering strategies. *Osteospermum hybrida* became a popular ornamental plant within the last 20 years. Many cultivars display rose to lilac flower colours mainly based on delphinidin-derived anthocyanins. The predominant synthesis of delphinidin derivatives is referred to a strong endogenous flavonoid 3',5'-hydroxylase (F3'5'H) activity. Furthermore, since dihydroflavonol 4-reductase (DFR) of *Osteospermum* does not convert dihydrokaempferol (DHK) to leucopelargonidin, synthesis of pelargonidin-based anthocyanins is naturally not realised. In order to redirect anthocyanin biosynthesis in *Osteospermum* towards pelargonidin derivatives, we introduced cDNAs coding for DFRs which efficiently convert DHK to LPg. But neither the expression of *Gerbera hybrida* DFR nor of *Fragaria x ananassa* DFR - the latter is characterised by an unusual high substrate preference for DHK - altered anthocyanin composition in flowers of transgenic plants. However, chemical inhibition of F3'5'H activity in ray florets of dfr transgenic plants resulted in the accumulation of pelargonidin derivatives. Accordingly, retransformation of a transgenic plant expressing *Gerbera* DFR with a construct for RNAi-mediated suppression of F3'5'H activity resulted in double transgenic plants accumulating predominantly pelargonidin derivatives in flowers.

Keywords: *Osteospermum hybrida*; Asteraceae; Genetic engineering of flower colour; Flavonoid biosynthesis; Anthocyanin; Dihydroflavonol 4-reductase; Flavonoid 3',5'-hydroxylase; RNAi

So-Young Kim, Pil-Yong Yun, Tatsuya Fukuda, Toshinori Ochiai, Jun Yokoyama, Toshiaki Kameya, Akira Kanno, Expression of a DEFICIENS-like gene correlates with the differentiation between sepal and petal in the orchid, *Habenaria radiata* (Orchidaceae), *Plant Science*, Volume 172, Issue 2, February 2007, Pages 319-326, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.09.009.

(<http://www.sciencedirect.com/science/article/B6TBH-4M4CTJP-2/2/754d453a0295cd0f649ffce5ba214176>)

Abstract:

The B-class MADS-box genes play an important role in controlling petal development in dicots, and orthologs have been isolated from many plants. The Orchidaceae includes many species with petaloid sepals in whorl 1, while there are also several genera with two whorls of perianth, petals and greenish sepals. Since the morphological differentiation between sepals and petals is observed in different orchid groups such as *Cypripedium* and *Habenaria*, this characteristic would be evolved independently in Orchidaceae. *Habenaria radiata*, which is an ornamental plant, has green sepals and white petals in its perianth. Among the cultivars of *H. radiata*, one floral homeotic mutant has undergone an alteration from sepals to petaloid organs in whorl 1. In order to investigate the molecular mechanism of the morphological differentiation between sepals and petals in Orchidaceae, it is very interesting to analyze the B-class gene expression in wild type and petaloid-sepal mutant of *H. radiata*. In this study, we isolated and characterized three B-class genes, HrGLO1, HrGLO2 and HrDEF, from this species. Northern hybridization and RT-PCR analyses revealed that HrGLO1 and HrGLO2 were expressed in sepals, petals and columns, whereas HrDEF expression was detected only in the petals and columns, but not in the first whorl, sepals. In the petaloid-sepal mutant, all three B-class genes were expressed in petaloid-sepals, petals and columns. These results suggest that the distinctive expression of HrDEF plays a role in differentiation between sepal and petal in *H. radiata*.

Keywords: MADS-box gene; B-class gene; DEFICIENS-like gene; GLOBOSA-like gene; Orchidaceae; *Habenaria*

Dina Aranovich, Efraim Lewinsohn, Michele Zaccai, Post-harvest enhancement of aroma in transgenic lisianthus (*Eustoma grandiflorum*) using the *Clarkia breweri* benzyl alcohol acetyltransferase (BEAT) gene, *Postharvest Biology and Technology*, Volume 43, Issue 2, February 2007, Pages 255-260, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.09.001.

(<http://www.sciencedirect.com/science/article/B6TBJ-4MKV2KM-1/2/71051f567c5856b3d0d647c6e9c8e8d3>)

Abstract:

Lisianthus (*Eustoma grandiflorum*) is an ornamental plant with beautiful but scentless flowers. In an attempt to induce a fragrance in their flowers, lisianthus plants were transformed with the *Clarkia breweri* gene coding for benzyl alcohol acetyltransferase (BEAT), catalyzing the synthesis of the volatile compound benzyl acetate under the regulation of the CaMV35S promoter. An external supply of benzyl alcohol induced five to seven times higher production of benzyl acetate in detached flowers and leaves of transgenic lisianthus plants, compared to non-transformed plants. No benzyl acetate was detected in tissues of both control and transgenic plants fed with water. When fed with additional alcoholic compounds, i.e. hexanol, benzyl alcohol, isoamyl alcohol, phenethyl alcohol, and cinnamyl alcohol, assumed to be used as substrates by BEAT, transgenic in vitro-grown lisianthus plantlets produced significantly higher levels of acetates than control plants. These results demonstrate the possibility of producing substrate-dependent acetates in transgenic lisianthus plants, which could lead to induction of new aromas.

Keywords: Lisianthus; Fragrance; Transformation; Volatiles

M.A. Ansari, F.A. Shah, L. Tirry, M. Moens, Field trials against *Hoplia philanthus* (Coleoptera: Scarabaeidae) with a combination of an entomopathogenic nematode and the fungus *Metarhizium*

anisopliae CLO 53, Biological Control, Volume 39, Issue 3, December 2006, Pages 453-459, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.07.004.

(<http://www.sciencedirect.com/science/article/B6WBP-4KG2K80-1/2/88a40e4c4fbd305fd1fc995054ee2df8>)

Abstract:

The white grub, *Hoplia philanthus* Fuessly (Coleoptera: Scarabaeidae), is a major pest of turf and ornamental plants in Belgium. Previously, the combination of lethal concentration of the entomopathogenic nematodes *Heterorhabditis megidis* or *Steinernema glaseri* with the entomopathogenic fungus *Metarhizium anisopliae* (strain CLO 53) caused additive or synergistic mortality to third-instar *H. philanthus* in the laboratory and greenhouse. In this present study, we examined this interaction under field conditions and compared a combination of a commercial formulation of *Heterorhabditis bacteriophora* (Nema-green(R)) and *M. anisopliae*. Controls were *M. anisopliae*, chlorpyrifos (Dursban 5 Granules) and *H. bacteriophora*. Field applications (surface or subsurface) were made against a mixed population of second/third-instar *H. philanthus* at a sport field and lawn infested in the province of West-Flanders. In both trials, the combination of *M. anisopliae* with *H. bacteriophora* at 5×10^{12} conidia/ha + 2.5×10^9 infective juveniles/ha resulted in additive or synergistic effects, causing more than 95% grub mortality when the nematodes was applied 4 weeks after the application of fungus. However, application of nematode, chlorpyrifos or fungus alone provided 39-66%, 42-60% (surface) and 33-76%, 82-100% or 37-65%, (subsurface) control of *H. philanthus*. We concluded that the pathogen combinations we tested are compatible elements of integrated pest management and are likely to improve control of *H. philanthus* larvae and perhaps other insect pests beyond what is expected from single application of the pathogen.

Keywords: Chlorpyrifos; Combined applications; *Hoplia philanthus*; *Heterorhabditis bacteriophora*; *Metarhizium anisopliae*; Scarab beetles; Synergism

Maria Antonietta Germana, Benedetta Chiancone, Nathalie Levy Guarda, Pilar S. Testillano, Maria-Carmen Risueno, Development of multicellular pollen of *Eriobotrya japonica* Lindl. through anther culture, Plant Science, Volume 171, Issue 6, December 2006, Pages 718-725, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.07.005.

(<http://www.sciencedirect.com/science/article/B6TBH-4KJV205-1/2/22d76ebcf46c93a263af98f9a5afe7db>)

Abstract:

Eriobotrya japonica Lindl. is a worldwide known tree important for its use as horticultural and ornamental plant, especially in sub-tropical and Mediterranean countries. Microspore embryogenesis through in vitro anther culture is a widely used method to generate genetic variability by obtaining gametic or somatic embryos with many applications for plant breeding. In this work, a protocol has been set up for anther culture in loquat which resulted in the formation of multicellular pollen as a first step to further attempt haploid-plant production via pollen-derived structures. The response of nine of the most widely grown loquat cultivars to anther culture has been evaluated, and four cultivars being selected due to their higher response. The occurrence of anther swelling and the development of calli were analyzed as typical morphological features and potential markers that accompany pollen induction and reprogramming in many systems. Microscopical analysis in responsive anthers and the comparison with the normal gametophytic pollen development was carried out to characterize the cellular changes promoted by the treatment in the anther. The presence of multicellular pollen in the in vitro system developed here indicated the switch of developmental programme which constitutes a crucial step in the design of protocols for the regeneration of microspore-derived embryos and plants. Monitoring structural analysis at different times of the culture revealed specific features of the early microspore embryogenic pathway as well as the cellular organization changes.

Keywords: Microspore embryogenesis; Loquat; Cell structure; Cytochemistry

Jan Jedlicka, Karel Prach, A comparison of two North-American asters invading in central Europe, *Flora - Morphology, Distribution, Functional Ecology of Plants*, Volume 201, Issue 8, 23 November 2006, Pages 652-657, ISSN 0367-2530, DOI: 10.1016/j.flora.2006.01.002.

(<http://www.sciencedirect.com/science/article/B7GX0-4M0J4D7-1/2/bc660c003adb632f65e1e48d6132b8d1>)

Abstract:

Perennial North-American asters have become common in central Europe since the 17th century when they started to be cultivated as ornamental plants. Today, they are widely spreading especially in alluvial sites in lowlands. Two of the most common aster species, *Aster lanceolatus* and *Aster novi-belgii*, were investigated for their generative reproduction, including seed production and germination, and vegetative propagation (growth of rhizomes). Experimental sites with and without competition from the surrounding vegetation were used to test for differences between the species. Germination experiments showed that the asters produced a relatively high number of viable and easily dispersed seeds, which often germinated immediately after ripening and usually did not require any special treatment. Some aster clones produced more than 100 new rosettes from one initial rosette within a year. Apparently, asters are able to form large polycorms in a relatively short time. However, their rapid vegetative spread can be reduced by competition from established vegetation.

Keywords: Alien plants; Alluvial sites; Clonality; Competition; Generative reproduction; Germination; Vegetative spread

Marta Benito, Alberto Masaguer, Ana Moliner, Roberto De Antonio, Chemical and physical properties of pruning waste compost and their seasonal variability, *Bioresource Technology*, Volume 97, Issue 16, November 2006, Pages 2071-2076, ISSN 0960-8524, DOI: 10.1016/j.biortech.2005.09.011.

(<http://www.sciencedirect.com/science/article/B6V24-4HHWW34-2/2/1f26ac9adc808e717625cf0746d4538d>)

Abstract:

Selected chemical and physical properties of 12 different pruning waste compost (PWC) samples were evaluated to assess their suitability as substrates for ornamental plants. Samples were taken periodically from the same composting facility over 18 months in order to determine if there was any seasonal variability. In addition to the PWC samples, a Canadian Sphagnum peat and a commercial growing medium (CGM) were used as standard materials. With respect to PWC properties, pH values were above 8, significantly higher than the pH of peat and the commercial substrate. All samples showed adequate levels of organic matter and correspondingly high cation-exchange capacity (CEC) values. The C/N ratio varied between 22 and 48, significantly higher than the optimal values of 15-20. Although composts were sampled from piles established in different seasons, no significant differences were found in their chemical properties. However, water retention characteristics were affected by seasonal changes in components entering the facility. Comparing the properties of PWC to those of peat and commercial growing medium, this material appears to be an acceptable component of a substrate for container-grown ornamental plants.

Keywords: Pruning waste compost; Growing media; Soilless cultivation; Peat substitute

Jianjun Chen, Yuncong Li, Coal fly ash as an amendment to container substrate for *Spathiphyllum* production, *Bioresource Technology*, Volume 97, Issue 15, October 2006, Pages 1920-1926, ISSN 0960-8524, DOI: 10.1016/j.biortech.2005.08.009.

(<http://www.sciencedirect.com/science/article/B6V24-4H8MNSY-1/2/dce20bba9a46d8bb027b523509786e3c>)

Abstract:

Coal fly ash, possessing alkalinity and containing some essential mineral elements, could be an alternative to lime amendment and a nutrient source of container substrates for ornamental plant growth. This study examined physiochemical properties of three fly ashes collected from Florida, Michigan, and North Carolina and container substrates formulated by incorporating commercial dolomite and the three fly ashes, respectively into a soilless basal substrate. The basal, dolomite- and fly ash-amended substrates were used to grow peace lily (*Spathiphyllum* Schott 'Ty's Pride'), a popular ornamental foliage plant, in 15-cm diameter containers in a shaded greenhouse. Electrical conductivities and pH of the substrates were monitored monthly. Plant canopy heights and widths, shoot fresh and dry weights were recorded five months after transplanting, and tissue nutrient contents were measured. Three fly ashes and the commercial dolomite were able to raise pH of the basal substrate from 3.8 to about 6.8. Canopy heights and widths as well as shoot fresh and dry weights of plants produced from fly ash-amended substrates were comparable to those produced from dolomite-amended substrate but significantly different from those produced from the basal substrate. On an average, five necrotic leaves appeared from plants produced in the basal substrate; however, less than one necrotic leaf occurred on plants produced in either dolomite- or fly ash-amended substrates. As a result, the quality grade of plants grown in the basal substrate was low, and plants were not marketable. Additionally, electrical conductivities of fly ash-amended substrates were consistently higher during the course of plant growth, suggesting that, in addition to neutralizing pH, the amended fly ashes provide nutrients for peace lily growth, which was confirmed by high nutrient contents in plant shoots. This study demonstrates that the three fly ashes can be alternatives to commercial dolomites used as amendments to soilless substrates for ornamental plant production. Utilization of fly ashes as container substrate amendments should represent a new market for the beneficial use of coal combustion byproducts.

Keywords: Container substrate amendment; Fly ash; Peace lily; Tropical ornamental foliage plants

Pauline Glocke, Graham Collins, Margaret Sedgley, 6-Benzylamino purine stimulates in vitro shoot organogenesis in *Eucalyptus erythronema*, *E. stricklandii* and their interspecific hybrids, *Scientia Horticulturae*, Volume 109, Issue 4, 15 August 2006, Pages 339-344, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.05.010.

(<http://www.sciencedirect.com/science/article/B6TC3-4K6CPY2-1/2/8b7606ebf5190c4905536ab66b9511bc>)

Abstract:

In vitro bud and shoot organogenesis was investigated for the ornamental plants *Eucalyptus erythronema* var. *erythronema*, *E. stricklandii* and their interspecific hybrids cv. 'Urrbrae Gem' and 'Hybrid 2.5' by using 0.0, 0.1, 0.25, 0.5 or 1.0 [μ M] BAP on apex and leaf explants. Callus developed on all explants and increased with all concentrations of BAP without significant differences between BAP concentrations. Buds formed on apex and leaf explants of *E. erythronema* and *E. cv. 'Urrbrae Gem'* especially with 1.0 [μ M] BAP, but these buds rarely developed into shoots. Bud clusters formed on *E. erythronema* and *E. cv. 'Urrbrae Gem'* apex and leaf explants whereas *E. stricklandii* and 'Hybrid 2.5' produced fewer, individual buds on the explant. Shoots regenerated from apex explants of all genotypes with all levels of BAP, whereas few shoots of any genotype regenerated from leaf explants regardless of the number of buds formed. Shoots from apex explants could be multiplied successfully. Light microscopy showed meristems developed within the callus, and at the callus and bud surfaces. However, few shoots developed considering the level of bud and meristem formation. This report is the first for successful shoot organogenesis and multiplication in an ornamental eucalypt.

Keywords: Micropropagation; Ornamentals; Adventitious shoot regeneration

Nickolee Zollinger, Roger Kjelgren, Teresa Cerny-Koenig, Kelly Kopp, Rich Koenig, Drought responses of six ornamental herbaceous perennials, *Scientia Horticulturae*, Volume 109, Issue 3, 21 July 2006, Pages 267-274, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.05.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4K7FJN9-1/2/e5e4e754a22a541b504f45b4af7d5653>)

Abstract:

Although low water use landscaping is becoming common in arid regions, little is known about drought tolerance and drought responses of many ornamental plants, especially herbaceous perennials. Drought responses were assessed for six herbaceous ornamental landscape perennials in a 38 l pot-in-pot system in northern Utah over a 2-year period. The first year was an establishment period. During the second year, drought responses were evaluated for established *Echinacea purpurea* (L.) Moench, *Gaillardia aristata* Pursh, *Lavandula angustifolia* P. Mill., *Leucanthemum x superbum* (J.W. Ingram) Berg. ex Kent, 'Alaska', *Penstemon barbatus* Roth var. *praecox nanus rondo*, and *Penstemon x mexicali* Mitch. 'Red Rocks'. Plants were irrigated at frequencies of 1 (control), 2, or 4 weeks between June and September, simulating well-watered conditions, moderate drought, or severe drought. Osmotic potential ([Psi]_s), gas exchange, visual quality, leaf area, and dry weight were assessed. In a confined root zone, *P. barbatus* showed the greatest tolerance to all levels of drought, avoiding desiccation by increasing root:shoot ratio and decreasing stomatal conductance as water became limiting. *L. angustifolia* and *P. x mexicali* showed tolerance to moderate drought conditions, but died after exposure to the first episode of severe drought. Neither *G. aristata* nor *L. superbum* were able to regulate shoot water loss effectively. Instead, both species displayed drought avoidance mechanisms, dying back when water was limiting and showing new growth after they were watered. Compared to control plants, *G. aristata* shoot dry weight was reduced by 50% and 84%, and *L. superbum* shoot dry weight was reduced by 47% and 99% for the 2- and 4-week irrigation intervals, respectively. Root dry weights were affected similarly for both species. *E. purpurea* exhibited poor visual quality at all irrigation intervals, in particular wilting severely in both drought treatments, but regaining turgor when watered again. *P. barbatus* is recommended for ornamental landscapes that receive little or no supplemental irrigation, while *E. purpurea* is not recommended for low water landscapes because of low visual quality under even mild drought.

Keywords: Drought tolerance; Gas exchange; Herbaceous perennial; Osmotic adjustment; Low water use landscaping

Eric J. Rebeck, Clifford S. Sadof, Lawrence M. Hanks, Influence of floral resource plants on control of an armored scale pest by the parasitoid *Encarsia citrina* (Craw.) (Hymenoptera: Aphelinidae), *Biological Control*, Volume 37, Issue 3, June 2006, Pages 320-328, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.10.009.

(<http://www.sciencedirect.com/science/article/B6WBP-4HPKBWS-1/2/d0cf3ba89a123b0ac1e69f666bb9456c>)

Abstract:

We tested the hypothesis that control of an herbivorous pest would be improved by providing floral resources for adult natural enemies. The herbivore was euonymus scale, *Unaspis euonymi* (Comstock) (Homoptera: Diaspididae), a serious pest of woody ornamental plants. The experimental landscape consisted of 3 x 3 m plots, each containing a central bed of *Euonymus fortunei* (Turcz.) that was infested with the scale. Floral resource plants were cultivars of four species that overlapped in bloom periods to provide a continuous supply of floral resources during summer: *Trifolium repens* L., *Euphorbia epithymoides* L., *Coreopsis verticillata* L. var. 'Moonbeam,' and *Solidago canadensis* L. var. 'Golden Baby.' Plots contained either low or high densities of all four species, or no resource plants. Densities of euonymus scale were typically lower in plots containing resource plants than in plots without them. Parasitism by *Encarsia citrina* (Craw.) (Hymenoptera: Aphelinidae) was rarely influenced by the experimental treatments, flower biomass, whole-plant biomass, or scale density, but in some cases was inversely correlated with density of scales within a generation and in the subsequent generation. Parasitism occasionally reduced densities of scales in plots containing resource plants, but this effect apparently was

related to vegetative, not floral qualities of plants. A steady increase in parasitism rate over the three-year course of the experiment across the entire landscape was associated with decreasing density of scales, suggesting a numerical response by the parasitoid population. These findings suggest that the parasitoid is capable of effectively controlling euonymus scale in ornamental landscapes where environmental conditions are favorable.

Keywords: Conservation biological control; Habitat manipulation; *Unaspis euonymi*; *Encarsia citrina*; *Euonymus fortunei*; *Trifolium repens*; *Euphorbia epithymoides*; *Coreopsis verticillata*; *Solidago canadensis*

B. Velazquez-Marti, C. Gracia-Lopez, A. Marzal-Domenech, Germination Inhibition of Undesirable Seed in the Soil using Microwave Radiation, *Biosystems Engineering*, Volume 93, Issue 4, April 2006, Pages 365-373, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2006.01.005.

(<http://www.sciencedirect.com/science/article/B6WXV-4JD118D-1/2/04317d0a6b8f9d60252b74c1bd835385>)

Abstract:

Research was carried out to determine the effects of thermal treatment with microwaves on the germination of weed seeds in different growing conditions. Firstly, the elimination of weed seeds buried in the ground at several depths was evaluated using a waveguide designed to obtain a wide superficial distribution of the irradiated energy. Secondly, flowerpots and trays being treated with soils or substrata that will subsequently be employed for ornamental plant cultivation were considered. A modular prototype oven that can be placed in an automatic sowing line was tested to disinfect seedbed trays for horticultural plants. To inhibit germination of buried seeds in fields requires greater exposure times or power, a minimum of 21 MJ m⁻². However, germination inhibition in flowerpots was achieved with short exposure energies, of between 60 and 80 MJ m⁻³, since the use of microwave radiation was viable for this application. The modular oven offers a practical application for seed elimination in the soils or substrata placed in sowing trays for either horticultural nurseries or ornamental plant nurseries, where the soil can be disinfected in the module introduced in the automatic sowing line.

Liping Chen, Yanju Wang, Chunxia Xu, Mingshui Zhao, Jianguo Wu, In vitro propagation of *Lychnis senno* Siebold et Zucc., a rare plant with potential ornamental value, *Scientia Horticulturae*, Volume 107, Issue 2, 10 January 2006, Pages 183-186, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.09.002.

(<http://www.sciencedirect.com/science/article/B6TC3-4HDX8SD-1/2/c49e109e11acc4a2203264161b5fec38>)

Abstract:

Lychnis senno is a rare and valued ornamental plant. Seed propagation is not efficient because of the low germination rate. To grow commercially *L. senno* in China, a protocol for in vitro germination and propagation of this species was developed. Various germination rates were obtained by treating seeds with GA₃ during 1-6 months storage period. The highest germination rate reached 19.4% when seeds were treated with 250 mg/l GA₃ and stored for 5 months at 4 [degree sign]C. Axillary shoot proliferation was induced in the nodal segments of the seedlings on medium containing specific concentrations of BA and NAA [Murashige, T., Skoog, F., 1962. A revised medium for rapid growth and bioassays with tobacco tissue culture. *Physiol. Plant* 15, 473-497]. Maximum number of shoots was developed on a medium supplemented with 5 mg/l BA and 0.5 mg/l NAA, while the higher shoots were observed on a medium supplemented with 0.5 mg/l BA and 0.05 mg/l NAA. Rooting was induced in 91.7% of the regenerated explants on a half-strength MS medium supplemented with 0.5 mg/l NAA. The plantlets grew well and flowered after transfer to the greenhouse. The chromosome numbers of seedlings and propagated plants were also determined to be 2n = 2x = 24.

Keywords: In vitro germination; Multiplication; Chromosome observation; *Lychnis senno*

Thomas Syros, Traianos Yupsanis, Demitrios Petkou, Athanasios S. Economou, Protein, leucine aminopeptidase, esterase, acid phosphatase and photosynthetic responses of oleander (*Nerium oleander* L.) during cold acclimation and freezing treatments, *Journal of Plant Physiology*, Volume 162, Issue 8, 23 August 2005, Pages 886-894, ISSN 0176-1617, DOI: 10.1016/j.jplph.2004.10.011.

(<http://www.sciencedirect.com/science/article/B7GJ7-4FJTNSF-4/2/5e532d69416a593f0b4830e6d4d19603>)

Abstract: Summary

Six-month-old oleander (*Nerium oleander* L.) pot plants, derived from vegetative propagation by cuttings, were tested for their ability to cold hardening. Damage of the non-acclimated (NA) plants was visible when treated by low freezing temperatures (below -2 [degree sign]C). The responses of total proteins, leucine aminopeptidase (LAP), esterase (EST) and acid phosphatase (ACP) isoforms of NA and cold-acclimated (CA; 4 [degree sign]C for 14 days) plants were compared using polyacrylamide gel electrophoresis. These molecular markers were also compared in NA and CA plants which received for 2 h temperatures of 0, -2, -4, -6 and -8 [degree sign]C. A new 38-kDa polypeptide appeared from day 7 to 14 during the acclimation treatment in the bark extracts and on day 14 in the leaf extracts. The above-mentioned polypeptide band (38 kDa) strongly appeared in all freezing treatments (0, -2, -4, -6 and -8 [degree sign]C) in both bark and leaf extracts of the CA plants. Alterations in the number and the intensity of LAP and EST isoforms as well as in the intensity of ACP isoforms were observed in both bark and leaf of the CA oleander plants. A newly expressed EST isoform is proposed as biochemical marker for the cold acclimation treatment. CO₂ assimilation rates (A) as well as transpiration rates (E) in NA plants were positive in 0 [degree sign]C and negative in all temperatures below zero in the freezing treatments. In contrast, CO₂ assimilation rates (A) and transpiration rates (E) were positive in CA plants in all temperatures of freezing treatment. A significant decrease ($P < 0.05$) in chlorophyll (Chl) a, Chl a+b concentration and Chl a/b ratio were noticed in oleander plants during the acclimation treatment (from day 0 to 14), while Chl b concentration was unchanged at the respective time. On the other hand, no significant ($P < 0.05$) differences were observed in the freezing treatments.

Keywords: Cold acclimation; Freezing tolerance; Ornamental; Plant photosynthesis

M. Ugglå, B.U. Carlson-Nilsson, Screening of fungal diseases in offspring from crosses between *Rosa* sections *Caninae* and *Cinnamomeae*, *Scientia Horticulturae*, Volume 104, Issue 4, 15 May 2005, Pages 493-504, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.11.001.

(<http://www.sciencedirect.com/science/article/B6TC3-4F29HV1-2/2/b71315ccfaf61c99f9d3ccc6c2011660>)

Abstract:

Roses constitute one of the most important ornamental plant crops. Recently an increasing interest has been noted also for the fruits; rose hips. Plant breeding of dogroses (section *Caninae*) is complicated by their unique meiosis with an unequal distribution of chromosomes, which results in strongly matroclinal offspring. Disease resistance was evaluated for blackspot, leaf spot, powdery mildew and rust in 649 field-grown offspring from eleven families. One genotype of *Rosa dumalis* and two of *R. rubiginosa* were used as pistillate parents and six selected genotypes derived from open pollination of 'Uralskij Champion' were used as pollinate parents. Blackspot was the most serious disease, followed by leaf spot, whereas powdery mildew and rust were rare. Significant differences between families with different staminate parents were found for blackspot, leaf spot and powdery mildew, indicating the possibility to select for resistance to these diseases in seedlings from crosses involving section *Caninae* in spite of the *Canina* meiosis.

Keywords: *Diplocarpon rosae*; *Marssonina rosae*; *Phragmidium*; *Rosa dumalis*; *Rosa rubiginosa*; *Sphaceloma rosarum*; *Sphaerotheca pannosa*

W.E. Klingeman, M.W. van Iersel, J.G. Kang, R.M. Auge, J.L. Moore, P.C. Flanagan, Whole-plant gas exchange measurements of mycorrhizal 'Iceberg' roses exposed to cyclic drought, *Crop Protection*, Volume 24, Issue 4, April 2005, Pages 309-317, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.08.012.

(<http://www.sciencedirect.com/science/article/B6T5T-4F9N6WS-1/2/29e48eca62d7208e46bac2a065054001>)

Abstract:

Nursery stock is purported to benefit from arbuscular mycorrhizal (AM) symbioses when subjected to drought, low fertility, or transplant stress. Yet these benefits have not been well defined. Whole-plant gas exchange measurements describe plant performance under environmental strain more reliably than individual leaf measurements. Understanding the whole-plant response to drought stress will yield decision-making tools for ornamental plant producers about benefits from mycorrhizal symbiosis. Container-grown *Rosa x hybrida* 'Iceberg' rose plants were subjected to repeated drought episodes intended to simulate missed irrigation cycles during commercial production or retail sales periods. Whole-plant gas exchange parameters of mycorrhizal, low phosphorus (ML) and non-mycorrhizal, low (NML) and high (NMH) phosphorus treated roses were compared using 14-day continuous measurements. The NMH plants, which were provided supplemental KH_2PO_4 fertilization, had larger plant canopies and initially had higher whole-plant photosynthesis (P_{net}) rates than similar-sized NML and ML plants. Gas exchange, carbon, and water use efficiencies of 'Iceberg' roses were not significantly improved by colonization with the AM fungus *Glomus intraradices*. All plants had similar water and carbon use efficiencies at the end of the third drought episode. Photosynthetic capacity decreased after 'Iceberg' roses were rewatered, following water deficit stress, regardless of mycorrhizal status. During the second drought cycle, maximum P_{net} approximated 70% of pre-drought levels and continued to decline. Improved shoot hydration, and thus aesthetic appearance during drought strain episodes, was not achieved by *G. intraradices* colonization of 'Iceberg' roses.

Keywords: Carbon use efficiency; Floribunda rose; *Glomus intraradices*; Mycorrhizae; Photosynthesis; Respiration; Transpiration; Water use efficiency

P. Rodriguez, A. Torrecillas, M. A. Morales, M. F. Ortuno, M. J. Sanchez-Blanco, Effects of NaCl salinity and water stress on growth and leaf water relations of *Asteriscus maritimus* plants, *Environmental and Experimental Botany*, Volume 53, Issue 2, April 2005, Pages 113-123, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2004.03.005.

(<http://www.sciencedirect.com/science/article/B6T66-4D2FGH5-1/2/42db69e8a1894184af92790abbb2ef8e>)

Abstract:

Potted plants of *Asteriscus maritimus* (L.) Less were submitted to water stress (during two consecutive cycles, irrigation water was withheld for 5 days followed by a recovery period of 25 days) and saline stress (150 days of exposure to 0, 70 and 140 mM NaCl daily irrigation) in order to assess the effect on leaf water relations and growth parameters. Plants under saline and water stress conditions showed lower biomass and an early reduction in leaf expansion growth. Both stresses promoted a substantial degree of stomatal regulation; but, in spite of this, the plants showed signs of leaf tissue dehydration, decreases in RWC and $[\Psi]_{\text{pd}}$ values. However, salt-treated plants, developed a NaCl inclusion mechanisms, underwent osmotic adjustment, which was able to maintain leaf turgor. Under both stress conditions g_l was independent to plant water status in the range between -0.8 and 1.0 MPa. Under water stress conditions, midday leaf water potential showed a threshold value (around -1.1 MPa), below which leaf conductance remained constant. In the salt-treated plants, the gradual closure of the stomata over a wide range of $[\Psi]_{\text{md}}$ may be important in maintaining some level of photosynthesis.

Keywords: Ornamental plants; Stomatal conductance; Osmotic adjustment; Plant growth; Turgor potential; Xylem water potential

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

Marta Benito, Alberto Masaguer, Roberto De Antonio, Ana Moliner, Use of pruning waste compost as a component in soilless growing media, *Bioresource Technology*, Volume 96, Issue 5, March 2005, Pages 597-603, ISSN 0960-8524, DOI: 10.1016/j.biortech.2004.06.006.

(<http://www.sciencedirect.com/science/article/B6V24-4D2FKV6-1/2/b87487da7a1f3aa12725399912d45641>)

Abstract:

The objective of this work was to study the use of pruning wastes compost (PWC) as a growing media component for ornamental plants. The main physical, chemical and biological characteristics of PWC were analysed in order to evaluate its suitability for use in soil-less cultivation. Six growth substrates were prepared by mixing PWC with peat (P), ground leaves (GL), sand (S) and spent mushroom compost (SMC) in different proportions. Two different pot experiments were carried out to test its characteristics of production using perennial ryegrass (*Lolium perenne* L.) and cypress (*Cupressus sempervirens* L.) as indicators and the different media as treatments.

The growth experiments showed that PWC required mixing with a nutrient-richer material to produce higher results. Therefore, substrates containing SMC (PWC + P + SMC and PWC + SMC) seems to be the most adequate growing media. After the statistical analysis, we concluded that the PWC could be used as a growing media component.

Keywords: Pruning waste compost; Growing media; Peat substitute; *Cupressus sempervirens*

Duncan Knowler, Edward Barbier, Importing exotic plants and the risk of invasion: are market-based instruments adequate?, *Ecological Economics*, Volume 52, Issue 3, Integrating Ecology and Economics in Control Bioinvasions, 15 February 2005, Pages 341-354, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2004.06.019.

(<http://www.sciencedirect.com/science/article/B6VDY-4F4H9SX-5/2/54a1f9245453c9c9589e607a391cf530>)

Abstract:

Exotic plant species are often intentionally imported into regions outside of their normal range as ornamental plants or as breeding stock, thereby generating benefits for consumers and producers. However, one of the unintended side effects of such introductions is that the exotic plant species may become invasive. Prohibiting sale of this type of exotic plant species, on the basis that it may become invasive, will have social costs in the form of foregone consumer benefits and nursery profits. We develop a model of a private commercial plant breeding industry that imports an exotic plant species into a region. The risk associated with invasion is modeled using a probabilistic 'hazard function', the key determinants of which are the characteristics of the exotic plant and the number of commercial nurseries contributing to its dispersal. We consider the possibility of employing market-based instruments (e.g., Pigovian tax) consistent with the concept of 'introducers pay', to regulate the nursery industry. We then provide an empirical illustration using the historical introduction of saltcedar (*Tamarisk* spp.) into the United States. Our results indicate that the mere presence of a risk of invasion does not mean that it is socially optimal to prevent commercial sales of an exotic plant species. Indeed, there appear to be plausible forms of the functional relationships involved that require only a modest reduction in the private industry optimum. In contrast, no sales of the exotic plant should occur at all under several sets of assumptions about the level of invasion risk and the linkage between dispersal sites and invasion hazard.

Keywords: Biological invasion; Introducers pay tax; Saltcedar; Tamarisk; Economics

Lourdes Hernandez-Apaolaza, Antonio M. Gasco, Jose M. Gasco, Francisca Guerrero, Reuse of waste materials as growing media for ornamental plants, *Bioresource Technology*, Volume 96, Issue 1, January 2005, Pages 125-131, ISSN 0960-8524, DOI: 10.1016/j.biortech.2004.02.028.

(<http://www.sciencedirect.com/science/article/B6V24-4C1FCWK-3/2/ca513d640422c03cbb444cd96cf0dcfd>)

Abstract:

The use of different waste materials: pine bark, coconut fibre and sewage sludge as substrates in the production of ornamental plants was studied, with an special interest on the suitability of coconut fibre as growing substrate for conifer plants. The plant species tested were *Pinus pinea*, *Cupressus arizonica* and *C. sempervirens* and the substrate mixtures were: (1) pine bark, (2) pine bark with 15% of sewage sludge compost, (3) pine bark with 30% of sewage sludge compost, (4) coconut fibre, (5) coconut fibre with 15% of sewage sludge compost and (6) coconut fibre with 30% of sewage sludge compost. Substrates were physically and chemically well characterized, and 75-cm plants were grown on them for one year. Plant and substrate status were periodically tested along the experiment. As biosolid recycling is the main objective of the present work, the mixtures with 30% of composted sewage sludge will be the most convenient substrate to use. For *C. sempervirens* and *C. arizonica*, a mixture between pine bark or coconut fibre and 30% of biosolid compost in volume gave the best results, but the lower cost of the pine bark than the coconut fibre substrate indicated the use of the PB + 30% CSS. For *P. pinea* the research of new combinations between waste products is recommended to attain better results.

Keywords: Pine bark; Coconut fibre; Sewage sludge compost; Chemical and physical characterization; *Pinus pinea*; *Cupressus sempervirens*; *Cupressus arizonica*

Marco A. Belmont, Eliseo Cantellano, Steve Thompson, Mark Williamson, Abel Sanchez, Chris D. Metcalfe, Treatment of domestic wastewater in a pilot-scale natural treatment system in central Mexico, *Ecological Engineering*, Volume 23, Issues 4-5, 30 December 2004, Pages 299-311, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2004.11.003.

(<http://www.sciencedirect.com/science/article/B6VFB-4FH5K5C-1/2/d591b4b3c2caf070e987b273b82eb4c2>)

Abstract:

There is severe degradation of the water quality of the Texcoco River in central Mexico as a result of discharges of raw sewage from communities into the watershed. Constructed wetlands may be appropriate technologies for treating the domestic wastewater generated by small communities in central Mexico. To assess the removal of pollutants from wastewater, we constructed a pilot-scale treatment wetland in the small community of Santa Maria Nativitas in the Rio Texcoco watershed. The system, consisting of sedimentation terraces, stabilization pond, subsurface flow wetland (SSFW) and vertical flow wetland (VFW), removed >80% of TSS, COD and nitrate from domestic sewage. Removal of ammonium was less efficient at about 50%. This study also showed that ornamental flowers with high economic value planted in the SSFW performed as well as cattail (*Typha angustifolia*) in removing TSS and nitrogen. The treated water was suitable for irrigation, which could help to alleviate the scarcity of water in the Rio Texcoco watershed. Modeling exercises indicated that the pilot-scale wetland could be readily adapted to treat sewage from six families.

Keywords: Natural treatment systems; Treatment wetlands; Domestic wastewater; Ornamental plants; Developing countries; Mexico

ALEX A. APPIAH, PHIL JENNINGS, JUDITH A. TURNER, *Phytophthora ramorum*: one pathogen and many diseases, an emerging threat to forest ecosystems and ornamental plant life, *Mycologist*, Volume 18, Issue 4, November 2004, Pages 145-150, ISSN 0269-915X, DOI: 10.1017/S0269-915X(04)00413-6.

(<http://www.sciencedirect.com/science/article/B7XMS-4R10WR9-3/2/d36b85b78ad845dcdb8633a419faf9e1>)

Abstract:

Phytophthora ramorum is a recently described species responsible for sudden oak death syndrome and also causes symptoms such as twig wilt and dieback, stem lesions, necrosis of leaf midrib from the petiole and leaf tip necrosis on a range of ornamental plant species. In the USA, a reported epidemic of *P. ramorum* infections on trees belonging to several families including Fagaceae, Lauraceae and Ericaceae seems to be increasing and there are fears of similar epidemics occurring in woodlands in the UK and mainland Europe. This paper reviews the current state of knowledge and the research efforts being made to understand the biology, manage the disease and prevent widespread outbreaks of *P. ramorum* infections across Europe and the USA.

Keywords: sudden oak death; quarantine organism; oomycete

Haw Chuan Lim, Navjot S. Sodhi, Responses of avian guilds to urbanisation in a tropical city, *Landscape and Urban Planning*, Volume 66, Issue 4, 15 February 2004, Pages 199-215, ISSN 0169-2046, DOI: 10.1016/S0169-2046(03)00111-7.

(<http://www.sciencedirect.com/science/article/B6V91-4B7YF6D-1/2/e767628cc06160049af33d0ab0fbf090>)

Abstract:

Avian ecology in tropical urban area is poorly understood. We determined, through surveys in 29 sites, how birds with different dietary and nesting requirements responded in terms of guild richness and abundance to various facets of urbanisation in Singapore. The sites selected were representative of the full range of urbanisation outside of the undisturbed native forests. Among the dietary guilds, we found that insectivores and carnivores were adversely affected by increased urbanisation. Frugivores were favoured by low-density housing, probably because more fruit-bearing ornamental plants were planted in such estates. Richness and abundance of shrub and shrub/tree nesters, and primary cavity excavators declined with increased urbanisation. We believe that the availability of nesting sites was an important factor in their decline. Exotic species accounted for only 13% of the total species richness detected in our surveys but they were numerically dominant (accounting for 61% of overall bird abundance). Abundance of native resident birds declined monotonically with increasing amount of built-up environment while birds of

exotic species appeared to be more abundant in sites with intermediate amount of built-up environment. While urban greenery serves architectural and other functions, it has little effect on overall bird community assembly. The preponderance of exotic species in Singapore city suggests that birds of tropical rainforests are poor colonisers of this relatively novel environment. Many of the native urban species originated from mangrove and coastal scrub forests, so the maintenance of rainforests is necessary for the preservation of many native bird species.

Keywords: Birds; Insectivores; Nesting; Singapore; Urban ecology