KOMODITAS: KAPAS

TEEAL 2006-2008

DEVELOPMENT ECONOMICS AND POLICIES (1 Jdl)

Recent and Prospective Adoption of Genetically Modified Cotton: A Global Computable General Equilibrium Analysis of Economic Impacts
Economic Development and Cultural Change. 2008. 56 (2). 265-296
Author(s): Anderson-K. Valenzuela-E. Jackson-L-A
Author Affiliation: U Adelaide and World Bank. U Adelaide and World Bank. WTO
Abstract:

This article provides estimates of the economic impact of initial adoption of genetically modified (GM) cotton and of its potential impacts beyond the few countries where it is currently common. Use is made of the latest version of the GTAP database and model. Our results suggest that if other developing countries--especially in sub-Saharan Africa--were to follow the lead of China, South Africa, and most recently India, adoption of GM cotton varieties could provide even larger proportionate gains to farmer and national welfare than in those early-adopting countries. Furthermore, those estimated gains are shown to exceed--and reinforce--those from a successful campaign under the WTO's Doha Development Agenda to reduce/remove cotton subsidies and import tariffs globally

Descriptors: Agricultural R&D; Agricultural Technology; Agricultural Extension Services

AGRO INDUSTRY (1 jdl)

Creating competitive advantage through ingredient branding and brand ecosystem: the case of Turkish cotton and textiles
Journal of International Food & Agribusiness Marketing. 2008. 20 (1). 29-56
Author(s): Pinar-M. Trapp-P-S
Author Affiliation: College of Business Administration, Valparaiso University, Valparaiso, IN 46383, USA
Abstract:

Ingredient branding has proven very successful for many companies across a variety of industries in recent years. Prominent examples include Intel, NutraSweet, and DuPont's Teflon. The main goal of ingredient branding is to take advantage of the potential synergy of two or more brands that share a common brand space. The Turkish cotton and textile industry can employ ingredient branding as a competitive strategy to differentiate and promote its products in the global marketplace. In recent years, the Turkish textile industry has been coming under increasing pressure from cheaper Asian textiles. This article suggests that Turkey could implement an ingredient branding

strategy using its high quality cotton to differentiate its cotton and textile products in the global marketplace, and also to improve its competitive position prior to possible EU entry. In addition to presenting specific ingredient branding strategic options, the article makes some specific recommendations in implementing an ingredient branding strategy as an initial step towards creating competitive advantage through the development of a Turkish cotton and textile "brand ecosystem"

Descriptors: cotton. market-competition. marketing. quality-labelling. terms-of-trade. textile-industry. textiles. trade-marks

CROP HUSBANDRY (4 jdl)

Cotton (Gossypium barbadense L.) yield and fiber properties as affected by plant growth retardants and plant density

Journal of Crop Improvement. 2008. 21 (2). 171-189

Author(s): Sawan-Z-M. Mahmoud-M-H. Fahmy-A-H

Author Affiliation: Cotton Research Institute, Agricultural Research Center, Ministry of Agriculture and Land Reclamation, 9 Gamaa street, 12619, Giza, Egypt

Abstract:

Chemicals may be used to reduce plant size in cotton (Gossypium barbadense L.), which can increase cotton yield by allowing an increased number of plants per unit area. Foliar sprays of growth retardants Cycocel and Alar were applied at concentrations of 250, 500, and 750 ppm 105 days after planting (square and boll setting stage) to Egyptian cotton cultivar Giza 75 planted at three plant densities (166 000, 222 000, and 333 000 plant ha-1). The objectives of this two-year study were to determine if growth retardants may be substituted for plant density, and vice versa, and to investigate their effects on yield and fiber properties. Number of opened bolls plant-1, seed-cotton yield plant-1, and earliness increased as plant density decreased in both years, as did seed-cotton and lint yield ha-1 in the second season. In the first year, the intermediate plant density gave the highest yields. Plant density had no significant effect on lint percentage or fiber properties. Both Cycocel and Alar increased the number of opened bolls plant-1, boll weight, seed and lint indices, seed-cotton yield plant-1, and both seed-cotton and lint yield ha-1, but effects were not always significant and response varied for different traits. Neither Cycocel nor Alar affected lint percentage, yield earliness, or fiber properties at any plant density. The interaction of plant density x growth retardant was significant for the number of opened bolls m-2 and plant-1, seed-cotton yield plant-1 and ha-1, and for lint yield ha-1. The lowest plant densities, combined with application of Cycocel or Alar, gave the highest number of opened bolls m-2 and plant-1, seed-cotton yield plant-1 and ha-1, and lint yield ha-1. This implied that the effect of growth retardants on cotton yield depended essentially on the number of plants per unit area or space available to each plant and that applying growth retardants could enhance the effect of low plant density

Descriptors: application-rates. bolls. chlormequat. crop-density. crop-yield. daminozide. fibre-quality. growth-retardants. plant-growth-regulators. yield-components

The effect of higher temperatures on cotton lint yield production and fiber quality
Crop Science. 2008. 48 (1). 278-285
Author(s): Pettigrew-W-T
Author Affiliation: USDA-ARS, Crop Genetics and Production Research Unit, P.O. Box 345, Stoneville, MS 38776, USA
Abstract:

An optimal temperature range exists for cotton (Gossypium hirsutum L.). When Mississippi Delta cotton experiences temperatures above the upper threshold, as can occur during the summer, it is not entirely clear what growth parameters are affected by the heat. The objectives of this study were to document differences in agronomic and physiological performance for two cotton genotypes (SureGrow 125 and SureGrow 125BR) when grown under an ambient temperature control and a warm temperature regime (about 1 deg C warmer). Field studies were conducted from 2003 through 2005. White bloom counts, nodes above white bloom (NAWB) data, dry matter partitioning data, lint yield, yield components, and fiber quality data were collected. Genotypes responded similarly to the temperature regimes. Warmer temperatures resulted in lower NAWB data, indicating a slightly advanced crop maturity. In two out of three years, the lint yield from the warm regime was 10% lower than that of the control. This reduction was primarily caused by a 6% smaller boll mass, with 7% fewer seed produced per boll in the warm regime. Fiber produced in the warm temperature regime was consistently 3% stronger than fiber in the control treatment. When temperatures become too hot, ovule fertilization may be compromised, leading to fewer seeds produced per boll, smaller boll masses, and ultimately, lint yield reductions
Descriptors: cotton. crop-yield. dry-matter-accumulation. fibre-quality. lint. maturation. temperature

A review of the changes in soil quality and profitability accomplished by sowing rotation crops after cotton in Australian Vertosols from 1970 to 2006
Australian Journal of Soil Research. 2008. 46 (2). 173-190
Author(s): Hulugalle-N-R. Scott-F
Author Affiliation: New South Wales Department of Primary Industries and Cotton Catchment Communities Co-operative Research Centre, Australian Cotton Research Institute, Locked Bag 1000, Narrabri, NSW 2390, Australia
Abstract:

In agricultural systems, soil quality is thought of in terms of productive land that can maintain or increase farm profitability, as well as conserving soil resources so that future farming generations can make a living. Management practices which can modify soil quality include tillage systems and crop rotations. A major proportion of Australian cotton (Gossypium hirsutum) is grown on Vertosols (approx equal to 75%), almost 80% of which is irrigated. These soils have high clay contents (40-80 g/100 g) and strong shrink-swell capacities, but are frequently sodic at depth and prone to deterioration in soil physical quality if incorrectly managed. Due to extensive yield losses caused by widespread deterioration of soil structure and declining fertility associated with tillage, traffick, and picking under wet conditions during the middle and late 1970s, a major

research program was initiated with the objective of developing soil management systems which could improve cotton yields while concurrently ameliorating and maintaining soil structure and fertility. An outcome of this research was the identification of cotton-winter crop sequences sown in a 1:1 rotation as being able to sustain lint yields while at the same time maintaining soil physical quality and minimizing fertility decline. Consequently, today, a large proportion (approx equal to 75%) of Australian cotton is grown in rotation with winter cereals such as wheat (Triticum aestivum), or legumes such as faba bean (Vicia faba). A second phase of the research on cotton rotations in Vertosols was initiated during the early 1990s with the main objective of identifying sustainable cotton-rotation crop sequences; viz. crop sequences which maintained and improved soil quality, minimized disease incidence, facilitated soil organic carbon sequestration, and maximized economic returns and cotton water use efficiency in the major commercial cotton-growing regions of Australia. The objective of this review is to summarize the key findings of both phases of Australian research with respect to soil quality and profitability, and identify future areas for research. Wheat rotation crops under irrigated and dryland conditions and in a range of climates where cotton is grown can improve soil quality indicators such as subsoil structure, salinity, and sodicity under irrigated and dryland conditions, while leguminous crops can increase available nitrogen by fixing atmospheric nitrogen, and by reducing N volatilization and leaching losses. Soil organic carbon in most locations has decreased with time, although the rate of decrease may be reduced by sowing crop sequences that return about 2 kg/m2.crop cycle of residues to the soil, minimizing tillage and optimizing N inputs. Although the beneficial effects of soil biodiversity on quality of soil are claimed to be many, except for a few studies on soil macrofauna such as ants, conclusive field-based evidence to demonstrate this has not been forthcoming with respect to cotton rotations. In general, lowest average lint yields per hectare were with cotton monoculture. The cotton-wheat systems generally returned higher average gross margins/ML irrigation water than cotton monoculture and other rotation crops. This indicates that where irrigation water, rather than land, is the limiting resource, cotton-wheat systems would be more profitable. Recently, the addition of vetch (Vicia villosa) to the cotton-wheat system has further improved average cotton yields and profitability. Profitability of cotton-wheat sequences varies with the relative price of cotton to wheat. In comparison with cotton monoculture, cotton-rotation crop sequences may be more resilient to price increases in fuel and fertilizer due to lower overall input costs. The profitability of cotton-rotation crop sequences such as cotton-wheat, where cotton is not sown in the same field every year, is more resilient to fluctuations in the price of cotton lint, fuel and nitrogen fertilizer. This review identified several issues with respect to cotton-rotation crop sequences where k owledge is lacking or very limited. These are: research into 'new' crop rotations; comparative soil quality effects of managing rotation crop stubble; machinery attachments for managing rotation crop stubble in situ in permanent bed systems; the minimum amount of crop stubble which needs to be returned per cropping cycle to increase SOC levels from present values; the relative efficacy of C3 and C4 rotation crops in relation to carbon sequestration; the interactions between soil biodiversity and soil physical and chemical quality indicators, and cotton yields; and the effects of sowing rotation crops after cotton on farm and cotton industry economic indicators such as the economic incentives for adopting new cotton rotations,

farm level impacts of research and extension investments, and industry- and community/catchment-wide economic modelling of the impact of cotton research and extension activities

Descriptors: cotton. crop-yield. faba-beans. irrigation-water. legumes. limiting-factors. monoculture. nitrogen. nitrogen-fixation. organic-carbon. prices. profitability. returns. rotations. sodic-soils. soil-fertility. soil-management. soil-salinity. soil-structure. soil-types. Vertisols. water-use-efficiency. wheat

Effect of row proximity to in-row subsoiled zones on cotton productivity

Applied Engineering in Agriculture. 2008. 24 (5). 573-579

Author(s): Raper-R-L. Bergtold-J-S. Schwab-E-B

Author Affiliation: USDA-ARS National Soil Dynamics Laboratory, 411 S. Donahue Drive, Auburn, AL 36832, USA

Abstract:

Producers in the Coastal Plain of the southeastern United States manage soil compaction in conservation tillage systems by in-row subsoiling prior to planting. However, planting directly over the loosened zone of soil can be difficult in high-residue conservation tillage systems where cover crop production is maximized, because the loosened soil is often covered by the large amounts of cover crop residue. Tractors equipped with guidance systems could assist with placement of in-row subsoiling and planting operations, but little is known about the accuracy necessary to maximize rooting development, reduce succeeding soil compaction, and optimize crop yield. An experiment was conducted in south-central Alabama to determine the maximum distance in-row subsoiling performed by three different implements could be from the cotton row without reducing cotton growth and increasing soil compaction. Results showed that if the cotton row was within 5.1 cm of in-row subsoiling, the relative seed cotton yield is 44% greater than a corresponding no-subsoiling treatment. No significant differences were found between the three in-row subsoiling implements used in the experiment. Recommendations resulting from this experiment indicate that to maximize crop yields and minimize soil compaction in the row, the subsoiled zone should be kept within 5 cm of the row

Descriptors: cotton. crop-yield. implements. row-spacing. soil-compaction. subsoiling. tractors

Managing yields of high fruit retention in transgenic cotton (Gossypium hirsutum L.) using sowing date

Australian Journal of Agricultural Research. 2008. 59 (8). 733-741

Author(s): Bange-M-P. Caton-S-J. Milroy-S-P

Author Affiliation: CSIRO Plant Industry and Cotton Catchment Communities Cooperative Research Centre, Locked Bag 59, Narrabri, NSW 2390, Australia

Abstract:

Recently, genetically engineered (transgenic) cottons expressing genes from Bacillis thuringiensis (Bt) have been made available to cotton growers throughout the world. In Australia, cotton growers have access to Bt cotton that contains genes expressing the insecticidal proteins Cry1Ac and Cry2Ab (Bollgard II(R)). Bollgard II offers significant potential to reduce pesticide use for the control of major Lepidopteran pests (particularly Helicoverpa spp. in Australia). As a consequence of the improved insect control, retention of squares (flower buds) and young bolls is higher in Bollgard II varieties than in non-Bollgard varieties. A concern raised by Australian cotton growers is that in some regions, yield potential for Bollgard II may be limited because the demands of earlier high fruit retention reduce resources for continued growth and fruiting, thus leading to earlier maturity and reduced yield. Non-Bollgard crops with high early retention are known to mature earlier sometimes reducing yield. Three field experiments over three seasons, which varied sowing date and compared non-Bollgard II and Bollgard II cotton cultivars, were conducted to test the hypothesis that delaying sowing date in Bollgard II will increase canopy size (without delaying crop development) and alleviate the potential concerns for the effect of higher fruit retention reducing canopy size and the time to maturity, limiting the yield of Bollgard II. In non-Bollgard II crops, larger canopies resulting from early loss of fruit or apical meristem damage can support more fruit growth for longer, provided season length allows fruit to mature. Results showed that delayed sowing did not increase the yield of the Bollgard II cultivar through increased leaf area index at flowering compared with normal sowing dates. However, in comparison with the conventional cultivar, which had yields that became lower with later sowings, Bollgard II maintained its yield presumably through the shorter fruiting cycle (because of its consistently higher earlier fruit retention), allowing time to support growth of the same number of bolls as earlier sowings. Improvements in fibre quality were also recorded with later sowings for both cultivars. Varying sowing dates for Bollgard II in different production regions may offer opportunities for Australian growers to help optimise yield, fibre quality, and reduce risks associated with poor crop establishment when crops are sown too early

Descriptors: Gossypium. Gossypium-hirsutum bolls. cotton. crop-yield. fibre-quality. leaf-area-index. sowing-date

Solid and skip-row spacings for irrigated and nonirrigated upland cotton

Agronomy Journal. 2008. 100 (3). 672-680

Author(s): Gwathmey-C-O. Steckel-L-E. Larson-J-A

Author Affiliation: Dep. of Plant Sci., Univ. of Tennessee, 605 Airways Blvd., Jackson, TN 38301, USA

Abstract:

Producers of upland cotton (Gossypium hirsutum L.) are interested in alternative row spacings and planting patterns to improve productivity. We conducted factorial experiments for 3 yr in adjacent irrigated and nonirrigated fields at Milan, TN, of cotton grown in 25-, 76- and 102-cm rows, each planted in a solid and 2x1 skip-row pattern. Narrower rows and solid plantings tended to close canopy earlier and more completely,

to suppress weed growth, and to mature earlier than in wider rows and skip-row patterns. Incomplete canopy closure in wider skip-row spacings resulted in less weed suppression, but weed growth in skipped rows diminished with narrower row spacing. Skip-row cotton matured later than solid planting, but this effect also diminished with narrower rows. Without irrigation, row spacing and configuration for maximum lint yield depended on growing conditions of the particular year. Under irrigation, however, solid planted 76-cm rows consistently yielded more than either 25- or 102-cm solid or skip-row cotton. With or without irrigation, lint yields were 13 to 15% lower in 102-cm skip-row cotton than in 102-cm solid planting, but yields did not differ between solid and skip-row in narrower rows. Across years and treatments, plant density was the most influential yield component in nonirrigated cotton, but plant density and bolls plant-1 had similar influence under irrigation. Cotton producers interested in skip-row planting should consider rows spaced 76-cm or less to minimize weed problems and yield loss

Descriptors: bolls. canopy. cotton. crop-density. crop-yield. cultural-control. irrigation. lint. maturation. row-spacing. weed-control. weeds. yield-components. yield-losses

FERTILIZERS (3 jdl)

Nitrogen and phosphorus fertilizer and residual response in cotton-sorghum and cotton-cotton sequences

Agronomy Journal. 2007. 99 (3). 607-613

Author(s): Booker-J-D. Bronson-K-F. Trostle-C-L. Keeling-J-W. Malapati-A
Author Affiliation: Texas Agric. Exp. Stn., 1102 E FM 1294, Lubbock, TX, 79403, USA

Abstract:

Nitrogen and P fertilizer response for cotton (Gossypium hirsutum L.) and sorghum [Sorghum bicolor (L.) Moench] in a reduced tillage rotation system in the Southern High Plains has not been well studied. During 2000 to 2003, an irrigated study of cotton-sorghum rotation vs. continuous cotton evaluated the crop rotation effects on cotton lint yield and assessed N and P fertilizer and residual fertilizer response for the two systems. Preplant soil samples were collected each spring to determine fertilizer rates. Cotton lint yields and cottonseed N were not affected by rotation with sorghum compared with continuous cotton. Nitrogen fertilizer response was observed in lint yields from 2001 to 2003 in cotton following sorghum, but not in continuous cotton. No P fertilizer or soil residual P response in cotton lint yields was found, regardless of rotation. Grain sorghum yields responded to N fertilizer in 2 yr. No grain sorghum response was observed to P fertilizer, but in 1 yr a yield response to residual P fertilizer relative to zero-P plots was noted. Seed N uptake was greater in sorghum than in cotton. Nitrogen fertility level increased seed N in sorghum and in cotton following sorghum. Infrequent crop response to P fertilizer was not unexpected, especially when Mehlich-3 soil P in zero-P subplots was near the 95% sufficiency level of 20 mg P kg-1. The main finding of this study is that N fertilizer response was more consistent for cotton following sorghum than in a continuous cotton system. In refining N fertilizer recommendations, N debits may be needed for N immobilization in sorghum residue.

Nitrogen credit may be appropriate from leaf litter for crops following cotton and for NO3-N in irrigation water

Descriptors: cotton. cropping-systems. nitrate-nitrogen. nitrogen-fertilizers. phosphorus-fertilizers. residual-effects. sequential-cropping

Productivity and cotton growth submitted to mepiquat chloride and N doses

Bragantia. 2008. 67 (4). 891-897

Author(s): Teixeira-I-R. Kikuti-H. Borem-A

Author Affiliation: Universidade Estadual de Goias (UEG), Unidade Universitaria de Ipameri, Rodovia GO 330, Km 241, Anel Viario, 75780-000 Ipameri, GO, Brazil

Abstract:

The productivity and growth of cotton (Gossypium hirsutum) treated with mepiquat chloride [mepiquat] and N fertilizer were studied. The treatments consisted of 4 N rates (0, 60, 120 and 180 kg/ha) with and without mepiquat chloride (50 g/ha) applied at 40, 60 and 80 days after plant emergence (12.5, 17.5 and 20 g/ha, respectively). The N rates increased cotton boll mass, 100-seed weight and yield. The application of the growth regulator reduced plant size and enhanced yield by 12%. N at 131 kg/ha resulted in the greatest productivity (3.633 kg/ha). The growth regulator and N fertilizer had no significant effects on productivity index and precocity

Descriptors: application-rates. cotton. crop-yield. growth. mepiquat. nitrogen-fertilizers. plant-growth-regulators. productivity. seed-weight. yield-components

Organic amendments influence nutrient availability and cotton productivity in irrigated Vertosols

Australian Journal of Agricultural Research. 2008. 59 (11). 1068-1074

Author(s): Subhadip-Ghosh. Hulugalle-N. Lockwood-P. King-K. Kristiansen-P. Daniel-H

Author Affiliation: Agronomy and Soil Science, School of Environmental and Rural Science, University of New England, Armidale, NSW 2351, Australia

Abstract:

There is increasing interest in the use of organic amendments in the Australian cotton (Gossypium hirsutum L.) industry because of perceived benefits to soil health and the environment. A 2-year field experiment was conducted at the Australian Cotton Research Institute (ACRI), near Narrabri, NSW, using three locally available organic amendments applied at typical farmers' rates to irrigated cotton. The amendments used were cattle manure (10 t/ha), composted cotton gin trash (7.5 t/ha), and a commercial liquefied vermicompost (50 L/ha), and their effects on soil quality characteristics were compared with those of control soil where no amendment was added. The soil (0-0.10 m) was sampled on six occasions and analysed for selected chemical and microbiological properties. The physiological characteristics and nutrient uptake of mature cotton plants were also examined. The organic amendments did not have a significant effect on microbiological properties as measured by microbial biomass and

respiration. Of the chemical properties measured, manure-amended plots showed higher nitrate-nitrogen, available phosphorus, and exchangeable potassium (K) concentrations over 2 years. Exchangeable K was 28% higher where cattle manure was applied than in control plots during the active growth stage of cotton in the first year of experiment. Higher nutrient uptake by mature cotton plants and lower nutrient concentration in soil were observed in the second year. Cotton physiological properties and lint yield were not significantly affected by the application of organic amendments. Seasonal parameters had a strong effect. The results suggest that there are few short-term benefits to be gained in terms of soil quality from application of organic amendments to Vertosols at the rates used in these trials

Descriptors: cattle-manure. composts. cotton. crop-yield. nitrate-nitrogen. nutrient-uptake. organic-amendments. phosphorus. potassium. soil-fertility. vermicompost. yield-components

Nutrient dynamics from broiler litter applied to no-till cotton in an upland soil

Agronomy Journal. 2008. 100 (3). 564-570

Author(s): Adeli-A. Shankle-M-W. Tewolde-H. Sistani-K-R. Rowe-D-E

Author Affiliation: Waste Management & Forage Research Unit, USDA-ARS, 810 Hwy. 12 East, Mississippi State, MS 39762, USA

Abstract:

Applying broiler litter to the soil surface of a no-till field of cotton (Gossypium hirsutum L.) increases the potential loss of its nutrients via runoff and volatilization. An experiment was conducted over 3 yr on an upland Atwood silt loam soil (fine-silty, mixed, semiactive, thermic Typic Paleudalfs) near Pontotoc, MS, to determine the effect of broiler litter incorporation into the surface soil of no-till cotton on nutrient availability, movement, and accumulation. The experimental design was a randomized complete block with six treatments replicated four times. Treatments were an unfertilized control, inorganic N-P-K fertilizer at the recommended rate, broiler litter at the rate of 5.2 Mg ha-1 plus 34 kg ha-1 supplemental N, and broiler litter at 7.8 Mg ha-1 without supplemental N. A surface incorporated treatment was also included for each litter rate to test for the effects of incorporation. Broiler litter significantly increased soil nutrient concentrations compared to the control. Incorporating litter into the surface soil retained more nutrients in the soil and enhanced C sequestration over nonincorporation, indicating losses of nutrients without incorporation. Application of litter at the higher rate exceeded cotton nutrient utilization as evidenced by increasing soil NO3-N and accumulation of P, K, Cu, and Zn in the top 5 cm of the soil. Incorporating litter increased soil nutrient content higher than nonincorporation. Incorporation of litter into the surface soil of a no-till cotton significantly reduces nutrient losses from the field

Descriptors: Alfisols. application-rates. copper. cotton. crop-yield. nitrate-nitrogen. no-tillage. NPK-fertilizers. nutrient-availability. organic-amendments. phosphorus. potassium. poultry-manure. silt-loam-soils. soil-amendments. soil-fertility. soil-types. upland-soils. waste-management. waste-utilization. zinc

SOIL CULTIVATION (1 jdl)

Near-field dust exposure from cotton field tilling and harvesting
Journal of Environmental Quality. 2008. 37 (2). 551-556
Author(s): Hiscox-A-L. Miller-D-R. Holmen-B-A. Yang-W-L. Wang-J-M
Author Affiliation: Natural Resources Management and Engineering, The University of Connecticut, 1376 Storrs Rd. U-4087, Storrs, CT 06269, USA
Abstract:
The frequency and intensities of dust exposures in and near farm fields, which potentially contribute to high intensity human exposure events, are undocumented due to the transient nature of local dust plumes and the difficulties of making accurate concentration measurements. The objective of this study is to measure near-field spatial concentrations of the dust plumes emitted during tilling and harvesting of an irrigated cotton field outside of Las Cruces, NM (soil class: fine-loamy, mixed, superactive, thermic Typic Calciargid). A comparison of remote lidar measurements of plumes emitted from cotton field operations with in situ samplers shows a strong agreement between the two techniques: r2=0.79 for total suspended particulates (TSP) and r2=0.61 for particulate matter with diameter less than or equal to 10 micro m (PM10). Plume movement was dependent on the short-term wind field and atmospheric stability. Horizontal spread rate of the plumes, determined from lidar measured Gaussian dispersion parameters, was less than expected by a factor of 7. Thus, in-plume downwind concentrations were higher than expected. Vertical dispersion was dependent on the rise of "cells" of warm air convecting off the soil surface. On a windy day, discing the field showed TSP and PM10 concentrations at the source itself of up to 176 micro g m-3 and 120 micro g m-3, respectively. These resulted in in-plume peak TSP concentrations of about 1.22 micro g m-3 at 10 m downwind and 0.33 micro g m-3 at 100 m downwind. The measured concentrations highlight a potential exposure risk to people in and around farming operations
Descriptors: air-pollutants. cotton. discing. dispersion. dust. emission. exposure. harvesting. remote-sensing. tillage

CROPPING PATTERNS AND SYSTEMS (3 jdl)

Development and validation of SUCROS-Cotton: a potential crop growth simulation model for cotton
Netherlands Journal of Agricultural Science. 2008. 56 (1-2). 59-83
Author(s): Zhang-L. Van-Der-Werf-W. Cao-W. Li-B. Pan-X. Spiertz-J-H-J
Author Affiliation: Laboratory for Plant and Soil Interaction Processes, College of Natural Resources and Environmental Sciences, China Agricultural University, Beijing, 100094, China

Abstract:
A model for the development, growth and potential production of cotton (SUCROS-Cotton) was developed. Particular attention was given to the phenological development of the plant and the plasticity of fruit growth in response to temperature, radiation, daylength, variety traits, and management. The model is characterized by a comparatively simple code and transparent algorithms. The model was parameterized for Chinese cotton varieties and validated with extensive independent datasets on cotton growth and production from the Yellow River region and Xinjiang Province. The model validation showed that the phenology, growth and yield were simulated satisfactorily. The root mean square error (RMSE) for date of emergence, date of flowering, date of open boll stage and duration from sowing to boll opening was less than four calendar days, both for cotton grown in monoculture and cotton grown in a relay intercropping system with wheat. The RMSE of predicted total dry matter compared with observations was at most 6.6%, of lint yield 6.6%, and for number of harvestable bolls 10.0%. SUCROS-Cotton provides a tool to (1) assess production opportunities of cotton in various ecological zones in response to temperature, incoming radiation and management, (2) identify optimal cotton ideotypes for different agro-ecological conditions and for guiding breeding efforts, and (3) explore resource-use-efficient cropping systems, including intercropping options, and crop management practices such as plastic film mulching and sowing date
Descriptors: development; development-time; growth; intercropping; lint-yield; physiological-day

Cotton roots, earthworms, and infiltration characteristics in sod-peanut-cotton cropping systems
Agronomy Journal. 2007. 99 (2). 390-398
Author(s): Katsvairo-T-W. Wright-D-L. Marois-J-J. Hartzog-D-L. Balkcom-K-B. Wiatrak-P-P. Rich-J-R
Author Affiliation: Univ. of Florida, NFREC, 155 Research Rd, Quincy, FL 32351, USA
Abstract:
Diverse cropping systems offer many advantages to farmers. We evaluated root growth, soil water infiltration, and earthworm population densities in a conventional peanut (Arachis hypog'a L.)/cotton (Gossypium hirsutum L.) rotation using conservation tillage (CT), and a peanut/cotton/bahiagrass (Paspalum notatum Fluegge) farming system. The rotations were initiated in 2000 in Quincy, FL, and in 2001 in Headland, AL, in both cases on a Dothan sandy loam (fine, loamy siliceous, thermic Plinthic Kandiudults). In 2003, a year with more uniform rainfall, cotton in the sod-based rotation had larger average crown root diameter per plant (22.6 vs. 16.3 mm), root area (87.2 vs. 57.4 cm2), root length (640 vs. 460 cm), and root biomass (18.59 vs. 10.45 g) as compared with cotton in the peanut/cotton rotation. Water infiltration rates were higher in both cotton and peanut after bahiagrass compared with the conventional peanut/cotton rotation in 2003. Earthworm population densities were greater in the sod rotation compared with the traditional peanut/cotton cropping system. Water infiltration was positively correlated to earthworm population densities. Despite the improvements

in soil quality, cotton yield in the sod rotation was the same as the traditional cropping systems. Cotton developed excessive vegetative growth in the bahiagrass system at the expense of lint yield. Further research is needed to determine the N rate for the sod-based rotation in comparison with the conventional cotton/peanut rotation

Descriptors: biomass. conservation-tillage. cotton. crop-yield. groundnuts. growth. infiltration. population-density. roots. rotation. soil-water

Economic sustainability of cotton-wheat cropping system as influenced by prilled urea, Azotobacter and farmyard manure

Journal of Sustainable Agriculture. 2008. 32 (1). 37-50

Author(s): Anup-Das. Shivay-Y-S. Prasad-M

Author Affiliation: Division of Agronomy, ICAR Research Complex for NEH Region, Umiam 793 103, Meghalaya, India

Abstract:

The productivity of the cotton-wheat cropping system used in the Indo-Gangetic plains is low, mainly due to improper and imbalanced use of chemical fertilizer and organic manure. An experiment was carried out between 2001 and 2003 at the Research Farm of Agronomy Division, Indian Agricultural Research Institute, New Delhi, under irrigated conditions. The objective of the experiment was to study the effect of inorganic and organic sources of nitrogen (prilled urea fertilizer nitrogen, farmyard manure (FYM), and Azotobacter) alone and in their various combinations on the performance of cotton (Gossypium hirsutum L.) and their residual effect on succeeding wheat (Triticum aestivum L.). The results of this study showed considerable improvement in growth, yield attributes, and yield of cotton with addition of higher doses of fertilizer N through prilled urea. The performance of cotton with FYM at 12 t ha-1 was found to be intermediate (from 30 to 60 kg N ha-1). The highest growth and yield (2.33 t seed cotton ha-1) was recorded following an integrated application of 30 kg N ha-1 through prilled urea and FYM at12 t ha-1 along with Azotobacter (M4), and was 48.2% higher than control. The combined application of 30 Kg N ha-1 and FYM at 121 ha-1 along with Azotobacter (M4) also gave the highest residual effect on the succeeding wheat crop, realized in terms of higher growth figures, yield attributes, and yields. The highest seed cotton equivalent yield (3.88 t ha-1) and production efficiency (12.79 kg ha-1 day-1) were achieved with an integrated application of 30 Kg N ha-1 through prilled urea and FYM at 12 t ha-1 along with Azotobacter (M4). The same combination also gave the highest net returns (US $ 954.7 ha-1)

Descriptors: application-rates. cotton. crop-yield. cropping-systems. efficiency. farmyard-manure. growth. nitrogen-fertilizers. organic-fertilizers. productivity. returns. sustainability. urea-fertilizers. wheat

PLANT GENETICS AND BREEDING (11 jdl)

The R2R3 MYB Transcription Factor GhMYB109 Is Required for Cotton Fiber Development

Genetics. 2008. 180 (2). 811-820

Author(s): Pu-L. Li-Qu. Fan-Xiaopin. Yang-Weica. Xue-Yongbiao. (ybxue@genetics.ac.cn)

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Abstract:

Cotton (Gossypium hirsutum L.) fibers are single highly elongated cells derived from the outer epidermis of ovules. A large number of genes are required for fiber differentiation and development, but so far, little is known about how these genes control and regulate the process of fiber development. Here we examine the role of the cotton-fiber-specific R2R3 MYB gene GhMYB109 in cotton fiber development. Transgenic reporter gene analysis revealed that a 2-kb GhMYB109 promoter was sufficient to confirm its fiber-specific expression. Antisense-mediated suppression of GhMYB109 led to a substantial reduction in fiber length. Consistently, several genes related to cotton fiber growth were found to be significantly reduced in the transgenic cotton. Our results showed that GhMYB109 is required for cotton fiber development and reveal a largely conserved mechanism of the R2R3 MYB transcription factor in cell fate determination in plants

Descriptors: Molecular Genetics (Biochemistry and Molecular Biophysics); Agronomy (Agriculture)

Identification of unknown genetically modified material admixed in conventional cotton seed and development of an event-specific detection method

Electronic Journal of Biotechnology. 2008. 11 (2). 1-8

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Abstract:

Entering the second decade of commercialization of biotech crops, the global area cultivated with transgenic plants constantly expands and national legislations in many countries, particularly in the European Union, require identification and labeling of genetically modified material in food and feed. We describe here a procedure for characterizing transgenic material of unknown origin present in conventional seed lots using a genome walking strategy for isolation and characterization of the junction between the inserted transgene construct and the host plant genomic DNA. The procedure was applied to transgenic cotton detected as adventitious or technically unavoidable presence in a conventional commercial cultivar. The structure of the

isolated region revealed that the transgenic material derived from Monsanto's event 1445 transgenic cotton. Due to the random incorporation of the transgene into the host plant's genome, the sequence of the junction region obtained using the genome walking strategy, provided the means to develop an event-specific identification method without prior knowledge for the nature of the transformation event. Thus, we documented a methodology for developing an event-specific detection protocol even without prior knowledge of the genetic modification event

Descriptors: Molecular Genetics (Biochemistry and Molecular Biophysics); Agronomy (Agriculture) genetically modified material, genome walking strategy, plant genomic DNA

Identification of differentially expressed genes in developing cotton fibers (Gossypium hirsutum L.) through differential display

Electronic Journal of Biotechnology. 2008. 11 (1). 1-10

Author(s): Iqbal-Saima. (saimaqbl@yahoo.com). Bashir-Aftab. (aftabbashir@nibge.org). Naseer-Hafiza-Masooma. (masoomasajid@yahoo.com). Ahmed-Moddassir. (moddassir@nibge.org). Malik-Kauser-A. (kamalik@comsats.net.pk)

Author Affiliation**:** Iqbal, Saima ; Natl Inst Biotechnol and Genet Engn, Plant Biotechnol Div, POB 577,Jhang Rd, Faisalabad, Pakistan

Abstract:

Cotton fibers are differentiated, non-dividing cells that originate from the epidermal layer of developing ovules. To identify genes involved in cotton fiber development, we performed non-radioactive differential display reverse transcriptase PCR (DDRT-PCR) on the purified mRNA. This technique was tested on mRNA isolated from five different developmental stages of cotton fiber including 0, 5, 10, 15 and 20 DPA (days after pollination). The mRNA purified from total RNA was reversibly transcribed using three anchored oligo-dT primers. Polymerase chain reaction (PCR) amplification of each cDNA preparation was carried out in combination with seven arbitrary primers. The amplified products were resolved on 1% agarose gel containing ethidium bromide. DNA was extracted from seventeen differentially expressed bands and cloned in pTZ57R/T vector. The sequencing and BLAST search analysis indicated that 12 of the differentially expressed genes matched the previously characterized genes, while 3 of them matched the uncharacterized sequences of cotton fiber expressed sequence tags (ESTs) reported previously to be associated with cotton fiber and 2 of the clones had homology with putative proteins. The technique can be used to efficiently identify differentially expressed genes and can be expanded to large scale studies by increasing the number of random decamers

Descriptors: Methods and Techniques; Molecular Genetics (Biochemistry and Molecular Biophysics) developmental stage, BLAST search, differential display, cotton fiber development

Cotton genetic diversity study by AFLP markers
Electronic Journal of Biotechnology. 2006. 9 (4). 456-460
Author(s): Murtaza-Naveed. (naveedm@bzu.edu.pk)
Author Affiliation: Murtaza, Naveed; Bahauddin Zakaryia Univ, Dept Plant Breeding and Genet, Multan, Pakistan
Abstract:

Amplified fragmentlength polymorphism (AFLP) markers have been used to ascertain the intensity of inherent diversity and relatedness in cotton (Gossypium spp.) plants. The effectiveness of this method to distinguish inter and intra specific difference in cotton could be handy in cultivar recognition and in marker assisted parental selection tool for plant breeders. Twenty cotton cultivars belonging to Gossypium hirsutum L., and G. arborium L. from the Pakistan and US origin were used for AFLP based genetic diversity estimates. The objective of this study was to assess the level of genetic variation among some cotton cultivars belonging to the old and new world species of cotton. Four EcoRI-MseI primer-pair combinations were used forthe AFLP analysis. The AFLP data assigned the genotypes into groups that corresponded with their origin and lineage relationships and showed a narrow genetic base among these cultivars
Descriptors: Biochemistry and Molecular Biophysics; Population Genetics (Population Studies) genetic diversity

Genetic gain in yield potential of upland cotton under varying plant densities
Crop Science. 2008. 48 (2). 601-605
Author(s): Schwartz-B-M. Smith-C-W
Author Affiliation: Dep. of Soil and Crop Sciences, Texas A&M Univ., College Station, TX 77843-2474, USA
Abstract:

Genetic gain studies have been used to evaluate the historical improvement of different traits, to provide insights into magnitudes of gain possible in future cultivars, and to defend the role of genetics during periods of stagnant or decreasing yield trends. This study was conducted over a 2-yr period and included nine current or obsolete cotton (Gossypium hirsutum L.) cultivars grown in five plant densities to evaluate genetic gain with varying levels of interplant competition. The rates of genetic gain for lint yield were highest in the commercial, 1 by 0.3 m, and 1 by 1 m plant spacing treatments with slopes of 8.7, 8.2, and 7.1 kg ha-1 yr-1, respectively. Slopes were reduced in the 2 by 2 m and 3 by 3 m spacing treatments with gains of 3.6 and 1.5 kg ha-1 yr-1, respectively, implying that for lint yield, genetic gains have been made for tolerance to interplant competition and not only yield potential per se
Descriptors: cotton. crop-density. crop-yield. cultivars. genetic-gain

Heterotic effects in topcrosses of modern and obsolete cotton cultivars
Crop Science. 2008. 48 (2). 593-600
Author(s): Campbell-B-T. Bowman-D-T. Weaver-D-B
Author Affiliation: USDA-ARS, Coastal Plains Soil, Water, and Plant Research Center, 2611 W. Lucas St., Florence, SC 29501, USA
Abstract:

Historically, reselection, pedigree, and mass-selection breeding methods have been used to develop open-pollinated cultivars of upland cotton (Gossypium hirsutum L.). As a result, modern cotton cultivars should have accumulated additive genetic effects with time, while also possessing fewer nonadditive gene effects than obsolete cultivars. A topcross test was conducted to compare the heterotic effects of obsolete and modern cultivars for yield, yield components, and fiber quality. Significant differences were detected between heterosis values for the modern and obsolete cultivar groups for seed cotton yield, lint yield, lint percentage, and boll weight. No significant heterotic effects were detected for fiber quality. The obsolete group of cultivars showed average lint yield heterosis values of 34% compared with 23% for the modern cultivars. Both cultivar groups displayed significant, but similar heterosis values for the number of bolls per square meter (17 and 15%, respectively). The major yield component associated with lint yield heterosis for both groups was bolls per square meter, although boll weight heterosis also contributed to lint yield heterosis for the obsolete cultivars. Although modern cultivars produced considerable heterotic effects for yield, this study demonstrates that obsolete cultivars may provide an additional source of nonadditive genetic effects that can be exploited in a hybrid production system
Descriptors: bolls. cotton. crop-yield. cultivars. fibre-quality. heterosis. lint. topcrossing. yield-components

Characteristics and analysis of simple sequence repeats in the cotton genome based on a linkage map constructed from a BC1 population between Gossypium hirsutum and G-barbadense
Genome. 2008. 51 (7). 534-546
Author(s): Zhang-Yanxin. (xlzhang@mail.hzau.edu.cn). Lin-Zhongx. Xia-Qizhon. Zhang-Mingj. Zhang-Xianlon
Author Affiliation: Zhang, Yanxin ; Huazhong Agr Univ, Natl Key Lab Crop Genet Improvement, Wuhan 430070, Peoples R China
Abstract:

In the past decade, several molecular maps of cotton have been constructed using diverse DNA molecular markers and mapping populations. In this study, an interspecific linkage map of allotetraploid cotton was developed using a BC1 population ((Gossypium hirsutum x G. barbadense) x G. hirsutum). This map was genome-wide and was based entirely on simple sequence repeat (SSR) markers. Forty-four linkage groups were assigned to 26 chromosomes, with 917aloci spanning 5452.2 cM of the genome. The average distance between loci was 5.9 cM, providing uniform coverage of the A subgenome and D subgenome. Characteristics of this map were analyzed in

detail, including the distributions of genomic SSRs, expressed sequence tag (EST)-SSRs, and distorted markers. Furthermore, the relationships between motif characteristics (size, type, length) and the level of polymorphism in EST-SSRs were also surveyed. The results showed that tetranucleotide and dinucleotide repeats had similar levels of polymorphism, and ACAT, AC, and ACT repeats had the highest polymorphism rates. Loci with lengths of 27 bp, 33 bp, and 24 bp were more likely to be polymorphic. This work will provide information to assist in designing future EST-SSRs

Descriptors: Methods and Techniques; Agronomy (Agriculture) mapping population

Within-boll yield components of high yielding cotton cultivars

Crop Science. 2007. 47 (5). 2108-2112

Author(s): Bednarz-C-W. Nichols-R-L. Brown-S-M

Author Affiliation: Texas Tech Univ. and the Texas Agricultural Experiment Station, Box 42122, Lubbock, TX 79409, USA

Abstract:

Cotton (Gossypium hirsutum L.) within-boll yield components have changed throughout the last 30 yr of cultivar development. The question arises, how do within-boll yield components differ in contemporary high yielding cultivars? Nine commercially available cotton cultivars were over-seeded and hand-thinned to 10.8 plants m-2 in 2001, 2002, and 2003. Before machine harvest, plants from 6 m of one row were removed from each plot and hand-harvested by fruiting position. After hand-harvest, seed cotton from each fruiting position was ginned separately. Boll number, lint mass, seed number, seed mass, seed surface area, and fibre properties were determined for each fruiting position. These data were then used for within-boll yield component calculations. One of the top yielding cultivars in this investigation (DPL 33 B), characterized by a smaller seed mass, produced greater total seed surface area per unit of land area, but lower lint mass and fibre number per unit of seed surface area. The other two top yielding cultivars in this investigation (DPL 491 and STV 4892 BR), characterized by a larger seed mass, produced lower total seed surface area per unit of land area, but greater lint mass and fibre number per unit of seed surface area. These data indicate fibre number and lint mass per unit of seed surface area are linked to seed size, which should be considered when selecting for increased lint mass or fibre number per unit of seed surface area

Descriptors:cotton. crop-quality. crop-yield. cultivars. fibre-quality. genetic-diversity. genetic-variation. genotypes. plant-fibres. yield-compon

Introgression of resistance to nematode Rotylenchulus reniformis into upland cotton (Gossypium hirsutum) from Gossypium longicalyx

Crop Science. 2007. 47 (5). 1865-1877

Robinson-A-F. Bell-A-A. Dighe-N-D. Menz-M-A. Nichols-R-L. Stelly-D-M

Author Affiliation: USDA-ARS, 2765 F&B Rd, College Station, TX 77845, USA

Abstract:

Absence of sources of resistance to the reniform nematode, Rotylenchulus reniformis Linford & Oliveira, 1940, is a major impediment to the production of upland cotton (Gossypium hirsutum L.) in the USA. In this study, two trispecies hybrids of G. hirsutum, G. longicalyx J.B. Hutch. & B.J.S. Lee, and either G. armourianum Kearney or G. herbaceum L. were used as bridges to introgress high resistance to the nematode from G. longicalyx into G. hirsutum. Introgression was accomplished by recurrent backcrosses to G. hirsutum with cytogenetic analysis of early backcross generations to assess progress toward the euploid state (2n=52), selection for nematode resistance at each generation, and examination of self progeny at the first, third, sixth, and seventh backcross to identify and eliminate lineages with undesired recessive traits. Altogether, 689 BC1 progeny were generated from the two male-sterile hybrids. Introgression was pursued from 28 resistant BC1 plants, each of which was backcrossed four to seven times to G. hirsutum to derive agronomically suitable types. The resistance trait segregated (resistant/susceptible) 1:1 in backcross progeny and 3:1 in self progeny. There was no obvious diminution of the resistance across backcross generations. Advanced backcross plants were indistinguishable from agronomic cotton under greenhouse conditions, and comparisons of 240 homozygous resistant BC6S2 plants with heterozygous, susceptible, and recurrent parent plants in field plantings in 2006 showed normal lint quality and quantity. The upcoming release of seed from this project is expected to provide the cotton industry with a major new tool for managing the reniform nematode in cotton, which costs U.S. producers about $100 million annually

Descriptors: backcrosses. cotton. genetic-diversity. genetic-variation. genotypes. introgression. pest-resistance. plant-genetic-resources. plant-parasitic-nematodes. plant-pests. wild-relatives

Parallel domestication, convergent evolution and duplicated gene recruitment in allopolyploid cotton

Genetics. 2008. 179 (3). 1725-1733

Author(s): Hovav-Ra. Chaudhary-Bhupendr. Udall-Joshua-A. Flagel-Le. Wendel-Jonathan-F. (jfw@iastate.edu)

Author Affiliation: Wendel, Jonathan F.; Iowa State Univ, Dept Ecol Evolut and Organismal Biol, 251 Bessey Hall, Ames, IA 50010 USA

Abstract:

A putative advantage of allopolyploidy is the possibility of differential selection of duplicated (homeologous) genes originating from two different progenitor genomes. In this note we explore this hypothesis Using a high throughput, SNP-specific microarray technology applied to seed trichomes (cotton) harvested from three developmental time points in wild and modern accessions of two independently domesticated cotton

species, Goissypium hirsulum and G. barbadense. We show that homeolog expression ratios are dynamic both developmentally and over the several-thousand-year period encompassed by domestication and crop improvement, and that domestication increased the modulation of homeologous gene expression. In both species, D-genome expression was preferentially enhanced tinder human selection pressure, but for nonoverlapping sets of genes for the two independent domestication events. Our data suggest that human selection may have operated on different components of the fiber developmental genetic program in G. hirsulum and G. babadense, leading to convergent rather than parallel genetic alterations and resulting morphology

Descriptors: Genetics convergent evolution, allopolyploidy, parallel domestication, duplicated gene recruitment

QTL analysis and epistasis effects dissection of fiber qualities in an elite cotton hybrid grown in second generation

Crop Science. 2007. 47 (4). 1384-1392

Author(s): Wang-BaoHua. Wu-YaoTing. Guo-WangZhen. Zhu-XieFei. Huang-NaiTai. Zhang-TianZhen

Author Affiliation: National Key Lab. of Crop Genetics and Germplasm Enhancement, Cotton Research Institute, Nanjing Agricultural Univ., Nanjing 210095, China

Abstract:

The purpose of the research presented here was to explore the genetic basis of cotton (Gossypium hirsutum L.) fiber quality traits through quantitative trait locus (QTL) analysis and epistasis effects dissection, and further discuss the mechanism of heterosis. An immortalized F2 population was developed by intercrossing Xiangzamian 2-derived recombinant inbred lines (RILs) (XZM2). Fiber quality traits were investigated in F1 and F2 generations of hybrid XZM2, its two parents, and the immortalized F2 population in multiple environments in China. The low level of heterosis in XZM2 and in the immortalized F2 population suggested a lack of dominant and dominant x dominant interaction. In general, the low correlations of genotypic heterozygosity with trait performance and midparent heterosis showed that heterozygosity was not always advantageous for performance, and they excluded overdominance as a major genetic basis of heterosis. A total of 50 QTLs for fiber quality were identified by single-locus QTL analysis. Although partial dominance and overdominance were detected, additive genetic variance was predominant. Common QTLs were detected both in the homozygous RILs and in the heterozygous immortalized F2 populations. Additionally, single-locus heterotic effects and epistasis effects at the two-locus level were detected. Our results indicated that additive gene action was the primary mechanism responsible for genetic variability in fiber quality traits. Additionally, we found that single-locus heterotic effects and epistasis effects contributed to heterosis of fiber quality traits in XZM2

Descriptors: cotton. epistasis. genetic-analysis. quantitative-trait-loci hypostasis

IRRIGATION (1 jdl)

Drip irrigation and rainfed crop cultivation nexus: the case of cotton crop
Indian Journal of Agricultural Economics. 2008. 63 (3). 487-501
Author(s): Narayanamoorthy-A
Author Affiliation: Centre for Rural Development, School of Rural Studies, Alagappa University, Karaikadu - 630003 (Tamil Nadu)

Abstract:

The intensification of agriculture along with the increased demand for water from other sectors has put tremendous pressure on the limited water resources in recent years in India. An estimate by the Central Water Commission (CWC) shows that by 2050, the annual requirement of water from all sectors (1447 BCM) would exceed the annual utilisable water from both surface and groundwater sources in India (1122 BCM) (CWC, 2005). While the available freshwater supplies for future use has been declining at a faster rate, the requirement of food and other agricultural commodities has been on the rise because of continuous population growth and feed requirement for livestock (see, Bhalla et al., 1999; Amarasinghe et al., 2007; Chand, 2007). Since irrigation contributes substantially to the gross production of agriculture commodities, the fast increase in demand for irrigation water puts enormous pressure on the policy makers to find out ways and means to improve the production of agricultural commodities while economising irrigation water. The conventional method predominantly followed throughout the world for crop cultivation is flood irrigation. It is considered to be inefficient in terms of field application efficiency and eventually the overall water use efficiency as it allows heavy losses of water through conveyance and distribution (Shreshtha and Gopalakrishnan, 1993; Rosegrant and Meinzen-Dick, 1996; Rosegrant et. al., 2002; Postal et al., 2001). Quite a few supply side efforts have been made to increase the water use efficiency under flood irrigation method (FIM) in India and elsewhere in the world. However, those efforts/strategies have not made any significant impact on the overall water use efficiency in both the canal and groundwater irrigated area as of today

Descriptors: irrigation; irrigated-agriculture; dryland-agriculture; crops; cotton; water

PLANT PHYSIOLOGY AND BIOCHEMISTRY (1 jdl)

Identification, characterization and expression of drought related alpha-crystalline heat shock protein gene (GHSP26) from desi cotton
Crop Science. 2007. 47 (6). 2437-2444
Author(s): Asma-Maqbool. Muzna-Zahur. Muhammad-Irfan. Uzma-Qaiser. Bushra-Rashid. Tayyab-Husnain. Shiekh-Riazuddin
Author Affiliation: Center of Excellence in Molecular Biology, University of the Punjab, 87-Canal Bank Road, Thokar Niaz Baig Lahore (53700), Pakistan

Abstract:

In response to water deficit stress, plants show quantitative and qualitative differences in gene expression. By using differential display and RACE (rapid amplification of cDNA ends) polymerase chain reaction (PCR) techniques an alpha crystalline-type small heat shock protein gene (GHSP26) was isolated and characterized from Gossypium arboreum L. Alignments of 1108 bp genomic and 1026 bp cDNA sequences revealed that the GHSP26 gene comprises a single open reading frame of 230 amino acids and it contains a single intron. The gene product contains the highly conserved alpha crystalline region, spanning amino acid residues 133 to 217 and a Met-rich region from 94 to 117aa at the N terminus. Predicted amino acid sequence shares 65%, 63%, 59%, 58%, 56%, 55%, 53%, and 22% identities with Petunia hybrida, Nicotiana tabacum, Arabidopsis thaliana, Zea mays, Agrostis stolonifera, Triticum aestivum, Oryza sative, and Nitrosococcus oceani, respectively. Expression profile of the gene was studied from leaf, stem, and root tissues, through reverse transcriptase polymerase chain reaction (RT-PCR) and quantitative real-time RT-PCR analysis. The results indicated that the gene was expressed in all tissues tested in both fully hydrated and dehydrated plants. However, the gene was 100-fold more abundant in dehydrated leaves, while only two-fold abundant in stressed root and stem as compared to control tissues

Descriptors: amino-acid-sequences. amino-acids. complementary-DNA. cotton. drought. gene-expression. genes. heat-shock-proteins. introns. leaves. nucleotide-sequences. open-reading-frames. plant-water-relations. roots. stems. stress. stress-response. water-stress

PLANT PHYSIOLOGY-NUTRITION (1 jdl)

Characterization of pigmentation and cellulose synthesis in colored cotton fibers

Crop Science. 2007. 47 (4). 1540-1547

Author(s): Hua-ShuiJin. Wang-XueDe. Yuan-ShuNa. Shao-MingYan. Zhao-XiangQian. Zhu-ShuiJin. Jiang-Lixi

Author Affiliation: Dep. of Agronomy, College of Agriculture and Biotechnology, Zhejiang Univ., 268 Kaixuan Rd., Hangzhou, 310029, China

Abstract:

Naturally colored cotton (Gossypium hirsutum L.) fibers (CCFs) are of interest in the textile industry because they require little dyeing and result in less environmental pollution. Pigmentation is one of the most important factors that differentiate CCFs from white cotton fiber (WCF) during fiber maturation. Many factors are involved in pigmentation, some of which we compared between CCFs and WCF with isogenetic backgrounds. These included the type of pigment, the activity of phenylalanine ammonia lyase (PAL), the concentration of total carbohydrates, and the type of soluble saccharide. We aimed to determine the causes of different fiber colors and found that flavonoids were the dominant type of pigment in the CCFs. At maturity (50 d post anthesis [DPA]), the WCF had only about 1/3 the amount of flavonoids as the brown

cotton fiber (BCF) and 1/10 that of the green cotton fiber (GCF). During the course of fiber maturation (in particular, the stage before 8 DPA), CCFs had much higher PAL activity than the WCF. Of the fibers, the GCF had the highest concentration of carbohydrates over the course of maturation. However, higher concentrations of total carbohydrates did not always lead to higher concentrations of cellulose. This was very likely due to the synthesis of flavonoids and their derivatives consuming a large amount of carbohydrates that otherwise might be used for the synthesis of cellulose

Descriptors: carbohydrates. cellulose. cotton. enzyme-activity. enzymes. phenylalanine-ammonia-lyase. plant-pigments

PLANT PHYSIOLOGY-GROWTH AND DEVELOPMENT (1 jdl)

Expression of sucrose synthase in the developing endosperm is essential for early seed development in cotton

Functional Plant Biology. 2008. 35 (5). 382-393

Author(s): Ruan-YongLing. Llewellyn-D-J. Liu-Qing. Xu-ShouMin. Wu-LiMin. Wang-Lu. Furbank-R-T

Author Affiliation: School of Environmental and Life Sciences, The University of Newcastle, Callaghan, NSW 2308, Australia

Abstract:

Successful seed development requires coordinated interaction of the endosperm and embryo. In most dicotyledonous seeds, the endosperm is crushed and absorbed by the expanding embryo in the later stages of seed development. Little is known about the metabolic interaction between the two filial tissues early in seed development. We examined the potential role of sucrose synthase (Sus) in the endosperm development of cotton. Sus was immunologically localised in the cellularising endosperm, but not in the heart-stage embryo at 10 days after anthesis. The activities of Sus and acid invertase were significantly higher in the endosperm than in the young embryos, which corresponded to a steep concentration difference in hexoses between the endosperm and the embryo. This observation indicates a role for the endosperm in generating hexoses for the development of the two filial tissues. Interestingly, Sus expression and starch deposition were spatially separated in the seeds. Silencing the expression of Sus in the endosperm using an RNAi approach led to the arrest of early seed development. Histochemical analyses revealed a significant reduction in cellulose and callose in the deformed endosperm cells of the Sus-suppressed seed. The data indicate a critical role of Sus in early seed development through regulation of endosperm formation

Descriptors: cotton. endosperm. flowering. gene-expression. gene-silencing. genes. hexoses. RNA-interference. seed-development. sucrose-synthase

PESTS OF PLANTS (12 jdl)

Vertical distribution, population density, and natural egg parasitism of cotton leafworm on cotton under IPM

Revista Colombiana de Entomologia. 2007. 33 (1). 27-30

Fernandes-M-G. Moreira-M-A-S. Degrande-P-E. Cubas-A-C. Silva-A-M

Abstract:

Alabama argillacea is one of the most important pests of cotton crops in Brazil, and therefore it is necessaryto research its behavior and natural biological control in areas under IPM conditions to improve the management of its population. In the pursuit of this objective, experiments were carried out on cotton crops in Dourados, Mato Grosso do Sul, in the 1997-1998 growing season. With the object of determining the population density and vertical distribution of eggs, larvae, and pupae, the total number of eggs, small, medium and large sized larvae and pupae found on the upper, middle, and lower sections of the plants were weekly recorded. This was conducted in an area where pest management was done according to IPM techniques and tactics. In the same area, eggs of this species were also gathered to determine the proportion of parasitism. The pest lays the majority of eggs on the upper part of the plants where the majority of mid and large-sized larvae were also found. Small larvae were generally found on both middle and lower parts of the plants. A growing percentage of parasitism by Trichogramma pretiosum was found from the beginning through the end of the crop season, reaching almost 100% parasitized eggs by the end of plant development. The average number of eggs found per plant was high during almost the whole crop cycle, reaching about 30 eggs per plant by the end of the cycle. The total number of small caterpillars was high and constant during the whole evaluation period, while medium and large ones were more abundant in the final phase of the crop cycle. The total caterpillar population reached peaks of around four caterpillars per plant

Identifiers: Universidade Federal da Grande Dourados

Kaolin particle film associated with increased cotton aphid infestations in cotton

Entomologia Experimentalis et Applicata. 2007. 124 (1). 55-60

Author(s): Showler-A-T. Armstrong-J-S

Author Affiliation: USDA-ARS, Integrated Farming and Natural Resources Research Unit (IFNRRU), 2413 East Highway 83, Weslaco, TX 78596, USA

Abstract:

Highly reflective white kaolin-based particle film was sprayed on cotton, Gossypium hirsutum L. (Malvace'), plots in south Texas during 2004 and 2005 to observe its effect on the cotton aphid, Aphis gossypii Glover (Homoptera: Aphidid'). Populations of cotton aphids on the ventral surfaces of leaves in the kaolin-treated plots were greater than in non-treated control plots during both years. Alate cotton aphids were attracted less to white than to other pan trap colors, and parasitism by Lysiphlebus spec. (Hymenoptera: Aphidiid') was either unaffected or greater in the kaolin-treated plots, hence these two factors (color and parasitism) do not explain the increased infestations in the treated plots. However, mean temperatures on the ventral surfaces of

kaolin-treated cotton leaves were cooler than those of control leaves. The observed temperature difference where cotton aphids reside on cotton leaves is a potential reason for the greater infestations in the kaolin treatment plots. Our study demonstrates that applications of kaolin can exacerbate a pest infestation in cotton

Descriptors: cotton. infestation. insect-pests. kaolin. parasitism. parasitoids. plant-pests. temperature

Long-term impacts of elevated carbon dioxide and transgenic Bt cotton on performance and feeding of three generations of cotton bollworm

Entomologia Experimentalis et Applicata. 2007. 124 (1). 27-35

Author(s): Chen-FaJun. Wu-Gang. Parajulee-M-N. Ge-Feng

Author Affiliation: State Key Laboratory of Integrated Management of Pest Insects and Rodents, Institute of Zoology, Chinese Academy of Sciences, Beijing 100080, China

Abstract:

The effects of elevated carbon dioxide (CO2) on growth, metabolism, and performance of three generations of cotton bollworm, Helicoverpa armigera (Hubner) (Lepidoptera: Noctuid'), were studied. The insects were continuously fed transgenic Bacillus thuringiensis (Berliner) (Bt) cotton [Cry1A(c)] grown in open-top chambers. Two levels of CO2 (ambient and 2x ambient) and two cotton cultivars (non-transgenic Simian-3 and transgenic Bt GK-12) were used and bollworm larv' were reared on all four treatment combinations for three generations. CO2 level and cotton variety significantly affected the growth and food digestibility parameters of H. armigera, with the exception of larval consumption rate for cotton variety. Overall, elevated CO2 and transgenic Bt cotton both increased larval lifespan, food consumption rate, relative consumption rate, and approximate digestibility, while decreasing pupal weight, survival rate, fecundity, frass output, relative and mean relative growth rates (RGR/MRGR), and the efficiency of conversion of ingested and digested food (ECI/ECD). Moreover, there were significant CO2*variety interactions on pupal weight and ECD, and CO2*generation interactions on pupal weight, frass output, and MRGR. Furthermore, transgenic Bt cotton significantly decreased the population-trend index compared to non-transgenic cotton for the three successive bollworm generations, especially at elevated CO2. Damage inflicted by the cotton bollworm on cotton, irrespective of the presence of insecticidal genes, is predicted to be higher under elevated CO2 conditions because of individual compensatory feeding on host plants. Conversely, population abundance is presumed to be lower under elevated CO2 compared to that under ambient CO2, particularly in combination with transgenic technologies

Descriptors: carbon-dioxide. carbon-dioxide-enrichment. cotton. feeding-behaviour. food-consumption. growth. insect-pests. lifespan. metabolism. plant-pests. transgenic-plants

Assessment of cotton aphids, Aphis gossypii, and their natural enemies on aphid-resistant and aphid-susceptible wheat varieties in a wheat-cotton relay intercropping system

Entomologia Experimentalis et Applicata. 2006. 121 (3). 235-241

Author(s): Ma-XiaoMu. Liu-XiaoXia. Zhang-QingWen. Zhao-J-Z. Cai-QingNian. Ma-YongAn. Chen-DongMei

Author Affiliation: Department of Entomology, College of Agronomy and Biotechnology, China Agricultural University, Beijing 100094, China

Abstract:

The cotton aphid, Aphis gossypii Glover (Homoptera: Aphididae), is an important cotton pest in northern China, especially in the seedling stage of cotton. After large scale commercial use of transgenic Bt cotton, cotton aphids became one of the most important cotton pests. A 2-year study was conducted to evaluate the role of four winter wheat varieties that were resistant or susceptible to wheat aphid, Sitobion avenae Fabricius (Homoptera: Aphididae), in conserving arthropod natural enemies and suppressing cotton aphids in a wheat-cotton relay intercropping system in northern China. The results indicated that wheat-cotton intercropping preserved and augmented natural enemies more than a monoculture of cotton. The density of natural enemies in cotton was significantly different among relay-intercropping fields with different wheat varieties. The highest density of natural enemies and low cotton aphid populations were found in the treatment of cotton in relay intercropped with the wheat variety Lovrin10, which is susceptible to wheat aphid. The lowest density of predators and parasitoids associated with high cotton aphid populations were found with the wheat variety KOK1679, which is resistant to wheat aphid. The results showed that wheat varieties that are susceptible or moderately resistant to wheat aphid might reduce cotton aphids more effectively than an aphid-resistant variety in the intercropping system by enhancing predators to suppress cotton aphids during the cotton seedling stage

Descriptors: cotton. cultivars. insect-pests. intercropping. natural-enemies. parasitoids. plant-pests. predators. predatory-insects. wheat

A GIS-based approach for areawide pest management: the scales of Lygus hesperus movements to cotton from alfalfa, weeds, and cotton

Entomologia Experimentalis et Applicata. 2006. 118 (3). 203-210

Author(s): Carriere-Y. Ellsworth-P-C. Dutilleul-P. Ellers-Kirk-C. Barkley-V. Antilla-L

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Abstract:

Understanding the effect of cropping patterns on population dynamics, dispersal, and habitat selection of insect pests has been an unresolved challenge. Here, we studied the western tarnished plant bug, Lygus hesperus (Knight) (Heteroptera: Miridae), in cotton during early summer in central Arizona. We used a general approach based on global positioning system (GPS) and geographic information system (GIS) technologies combined with spatial statistics to assess the maximum distance at which forage and seed alfalfa, fallow fields with weeds, and cotton affect L. hesperus

population density. Using a set of 50 cotton fields as focal fields, we found that forage and seed alfalfa as well as weeds acted as L. hesperus sources for these cotton fields. The source effect did not extend beyond 375, 500, and 1500 m for forage alfalfa, weeds, and seed alfalfa, respectively. Conversely, cotton fields acted as L. hesperus sinks, but this effect did not extend further than 750 m from the focal cotton fields. These findings suggest that specific spatial arrangements of these field types could reduce L. hesperus damage to cotton. The spatially explicit approach used here provides a direct evaluation of the effects of agroecosystem heterogeneity on pest population dynamics, dispersal, and habitat selection, which is a significant asset for the development and improvement of areawide pest management

Descriptors: cotton. crop-damage. dispersal. fallow. forage. geographical-information-systems. global-positioning-systems. habitat-selection. insect-pests. lucerne. pest-control. pest-management. plant-pests. population-density. population-dynamics. seeds. spatial-distribution. techniques. weeds

Susceptibility of four noctuid pests (Lepidoptera) to the Cry1Ac gene of Bacillus thuringiensis incorporated into cotton

Revista Colombiana de Entomologia. 2008. 34 (1). 41-50

Author(s): Zenner-de-Polania-I. Alvarez-Rodriguez-J-A. Arevalo-Maldonado-H-A. Mejia-Cruz-R. Bayona-R-M-A

Author Affiliation: Facultad de Ingenieria Agronomica, Universidad de Ciencias Aplicadas y Ambientales U.D.C.A, Calle 222 No. 54-37, Bogota, Colombia

Abstract:

Transgenic plants possessing genes of the bacteria Bacillus thuringiensis (Bt) which codify for toxin production effective against some pests, are considered useful within the management of insects. However, these commercial cultivars do not control satisfactorily all noctuids, and besides, at a distance, induce resistance. Diverse populations of native Heliothis virescens, Helicoverpa zea, Spodoptera frugiperda and S. sunia strains were evaluated to determine the susceptibility to the toxin Cry1Ac of the cultivar Bollgard(R), planted in Colombia. Cry1Ac was obtained from a Bt gene cloned in Escherichia coli and from MVP(R) (protoxin encapsulated in Pseudomonas). Neonate larvae were exposed to seriated dose of the toxin, incorporated within meridic diet and also fed with fresh transgenic cotton tissue. Weight and adult emergency of the survivors were determined. Results were submitted to an Anova and LC was obtained by Probit analysis. An acceptable susceptibility of H. virescens, LC50 of 3.52 and 3.81 micro g/mL, 2005A y 2006A, respectively, and a 100% mortality when feeding neonates with terminal leaves was found. LC50 for H. zea varied from 3.42 to 6.12 micro g/mL; as the toxin dose increased, the pupal weight decreased and a high percentage of deformed pupae were observed. For Spodoptera spp., LC50 oscillated between 192 y 1.178 micro g/mL, showing its resistance to the toxin. It was concluded that, at the moment, the transgenic cotton provides satisfactory control of the Heliothine, but no of the Spodoptera complex

Descriptors: adults. bacterial-insecticides. bacterial-toxins. biological-control. biological-control-agents. cotton. developmental-stages. eclosion. entomopathogenic-bacteria. entomopathogens. genetic-engineering. genetic-transformation. insect-pests. microbial-pesticides. natural-enemies. pathogens. plant-pests. pupae. resistance. transgenic-plants

Detection of suppressiveness against Rotylenchulus reniformis in soil from cotton (Gossypium hirsutum) fields in Texas and Louisiana

Journal of Nematology. 2008. 40 (1). 35-38

Author(s): Robinson-A-F. Westphal-A. Overstreet-C. Padgett-G-B. Greenberg-S-M. Wheeler-T-A. Stetina-S-R

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Abstract:

Rotylenchulus reniformis is a major problem confronting cotton production in the central part of the cotton belt of the United States of America. In this study, the hypothesis that natural antagonists in some cases are responsible for unusually low densities of the nematode in certain fields was tested by assaying soils from 22 selected fields for the presence of transferable agents in pots containing cotton plants. In one field, soil from four different depths was tested. In the first of two types of assays, one part nematode infested soil was added to nine parts test soil with or without autoclaving and this mixture was used to fill pots; in the second type of assay, one part test soil was added to 9 or 19 parts pasteurized fine sand, and nematodes were introduced in aqueous suspension. In three experiments representing both types of assay, transferable or autoclavable agent(s) from four fields in South Texas suppressed nematode populations 48, 78, 90, and 95%. In one experiment, transferable agents in five fields in Louisiana suppressed population buildup 37 to 66%. Identification and evaluation of these agents for biological control of R. reniformis merits further study

Descriptors: antagonists. autoclaving. biological-control. control. cotton. crop-production. evaluation. identification. plant-parasitic-nematodes. soil

Spread of Rotylenchulus reniformis in an Arkansas Cotton Field Over a Four-Year Period

Journal of Nematology. 2008. 40 (3). 161-166

Author(s): Monfort-W-S. (smonfort@uaex.edu). Kirkpatrick-T-L. Mauromoustakos-A

Author Affiliation: Monfort, W. S. ; Univ Arkansas, Lonoke Extens Ctr, 2001 HWY 70E,POB 357, Lonoke, AR 72086 USA

Abstract:

Rotylenchulus reniformis was first detected in a single grid (100 m(2)) in May 2001 in it cotton field in Ashley County, AR, that wits being utilized to evaluate the utility of grid-sampling for detection of Meloidogyne incognita. A total of 512 grids were

sampled in the 6-ha field in the spring and fall for four years (2001 - 2004), nematode populations were determined for each grid, and nematode population density maps were constructed utilizing Global Positioning Systems and Geographic Information Systems. In May 2001, It reniformis population density in the single grid where it was detected was 6,364 juveniles and adult. reniform nematodes/500 cm, soil. fly the end of the first year (October 2001), the nematode was found in 17 of the 512 plots with population densities ranging from 682 to 10,909 nematodes/500 cm(3) soil. Over the course of the 4-yr period, reniform nematode incidence increased to 107 of 512 plots, With Population density ranging Front 227 to 32,727 nematodes/500 cm(3) soil. Reniform nematode spread could be explained by the direction of tillage and water flow in the low end of the field. Highest: population densities were observed in the areas of the field with soil types ranging from 54% to 60% silt. fraction. In addition to Reniformis,Meloidogyne incognita was commonly types detected in many of the grids, and Tylenchorhynchus spp., Helicotylenchus spp., Paratrichodorus minor and Hoplolaimus magnistylus were detected occasionally

Descriptors: Agronomy (Agriculture) population density

Alternate row placement is ineffective for cultural control of Meloidogyne incognita in cotton

Journal of Nematology. 2008. 40 (3). 197-200

Author(s): Davis-Richard-F. (Richard.Davis@ars.usda.gov)
Author Affiliation: Davis, Richard F.; ARS, USDA, Crop Protect and Management Res Unit, POB 748, Tifton, GA 31793 USA

Abstract:

The objective of this study was to determine if planting cotton into the space between the previous year's rows reduces crop loss due to Meloidogyne incognita compared to planting in the same row every year. Row, placement had a significant (P <= 0.05) effect on nematode population levels only on 8 July 2005. Plots receiving 1,3-dichloropropene plus aldicarb had lower nematode population levels than non-fumigated plots on 24 May and 8 July in 2005, but not in 2004. The effect of nematicide treatment on nematode populations was not affected by row placement. Row placement did not have a significant effect on root galling or yield in 2004 or 2005. Nematicide treatment decreased root galling in all years, and the decrease was not influenced by row placement. Yield was increased by nematicide application in 2004 and 2005, and the increase vas not affected by row placement. Percentage yield loss was not affected by row placement. Changing the placement of rows reduced nematode population levels only on one sampling date in one year, but end-of-season root galling and lint yield were not affected by changing the placement of rows, nor was the effect of fumigation on yield influenced by row placement. Therefore, row placement is unlikely to contribute to M. incognita management in cotton

Descriptors: Parasitology; Agronomy (Agriculture) crop loss, root yield, root galling, alternate row placement, percentage yield loss

Photosynthetic response of cotton to spider mite damage: interaction with light and compensatory mechanisms

Crop Science. 2007. 47 (5). 2047-2057

Author(s): Reddall-A-A. Wilson-L-J. Gregg-P-C. Sadras-V-O

Author Affiliation: CSIRO Plant Industry and Cotton Catchment Communities CRC, Locked Bag 59, Narrabri NSW 2390, Australia

Abstract:

We investigated the photosynthetic responses of cotton (Gossypium hirsutum L.) leaves to two-spotted spider mite (Tetranychus urticae K.) damage. Light-response curves of mite-infested (+M) and uninfested (-M) leaves diverged as mite populations increased. At 17 adult female mites per leaf, photosynthetic rate of +M leaves at photosynthetic photon flux density of about 1600 micro mol m-2 s-1 was halved from 31 micro mol CO2 m-2 s-1 in -M to 16 micro mol CO2 m-2s-1 in +M but there was no effect on either respiration or apparent maximum quantum yield. This has important implications when comparing the response to mites of individual leaves versus canopies. In the field (i) photosynthesis declined with crop age, but the rate of decline was faster in mite-infested leaves, and (ii) mite damage progressed downward in the canopy and from basal to distal leaf positions. We found no evidence of within-leaf (i.e., basal vs. distal section) or within-plant (top vs. mid or bottom leaf) increases in photosynthesis in compensation for mite damage, except for a minor enhancement of photosynthesis in bottom leaves of mite-infested crops due to greater light penetration in canopies severely defoliated by mite damage

Descriptors: cotton. insect-pests. leaves. light. light-relations. photosynthesis. plant-pests

Tracking pyrethroid resistance in the polyphagous bollworm, Helicoverpa armigera (Lepidoptera: Noctuidae), in the shifting landscape of a cotton-growing area

Bulletin of Entomological Research. 2008. 98 (6). 565-573

Author(s): Brevault-T. Achaleke-J. Sougnabe-S-P. Vaissayre-M

Author Affiliation: CIRAD, UPR Annual Cropping System, TA B-10/02, Avenue Agropolis, F-34398 Montpellier Cedex 5, France

Abstract:

In cotton-growing areas of Central Africa, timing of host crops and pest management practices in annual rainfed cropping systems result in a shifting mosaic of habitats that influence the dynamics and resistance of Helicoverpa armigera (Hubner) populations on spatial scales, both within and across seasons. From 2002 to 2006, regional and local resistance was monitored among cotton fields and among the major host plants of the bollworm. From 2002, pyrethroid resistance increased within and across cotton-growing seasons to reach a worrying situation at the end of the 2005 growing season. Cotton crops played a fundamental role in the increase in seasonal resistance, even if the intensive use of insecticides on local tomato crops strongly concentrated resistance alleles in residual populations throughout the off-season. Due to the relative stability of resistance in H. armigera populations despite a long off-season, we believe that after the dispersal of the moths southwards at the end of the

growing season, reverse migration mainly accounts for the reconstitution of populations at the onset of the following growing season. In addition, local resistance monitoring in 2005 and 2006 showed that it was possible to control the increase in resistance by temporarily stopping the use of pyrethroids during the period of peak infestation of cotton by H. armigera. On the other hand, the similar resistance frequency of populations sampled from sprayed and unsprayed synchronous hosts confirmed the absence of reproductive isolation between adults. As a result, diversity in cropping systems should be encouraged by planting alternative host plants to provide a mosaic of habitats, which in return would provide insecticide-free refuges. The implications for insecticide resistance management in annual cropping systems are discussed

Descriptors: cotton. cropping-systems. dispersal. insect-pests. insecticide-resistance. landscape. pest-resistance. plant-pests. populations. pyrethroids. rain. tomatoes

Genotypic diversity of the cotton-melon aphid Aphis gossypii (Glover) in Tunisia is structured by host plants

Bulletin of Entomological Research. 2008. 98 (4). 333-341

Author(s): Charaabi-K. Carletto-J. Chavigny-P. Marrakchi-M. Makni-M. Vanlerberghe-Masutti-F

Author Affiliation: Laboratoire de Genetique Moleculaire, Immunologie et Biotechnologie, Faculte des Sciences de Tunis, 2092 El Manar, Tunisia

Abstract:

The study of intraspecific variation with respect to host plant utilization in polyphagous insects is crucial for understanding evolutionary patterns of insect-plant interactions. Aphis gossypii (Glover) is a cosmopolitan and extremely polyphagous aphid species. If host plant species or families constitute selective regimes to these aphids, genetic differentiation and host associated adaptation may occur. In this study, we describe the genetic structure of A. gossypii collected in six localities in Tunisia on different vegetable crops, on citrus trees and on Hibiscus. The aim was to determine if the aphid populations are structured in relation to the host plants and if such differentiation is consistent among localities. The genetic variability of A. gossypii samples was examined at eight microsatellite loci. We identified only 11 multilocus genotypes among 559 individuals. Significant deviations from Hardy-Weinberg equilibrium, linkage disequilibria and absence of recombinant genotypes, confirmed that A. gossypii reproduces by continuous apomictic parthenogenesis. Genetic differentiation between localities was not significant, whereas a strong differentiation was observed between host plant families ($0.175 < FST < 0.691$). The great majority of aphids exhibited one of three predominant multilocus genotypes that were repeatedly and respectively associated to the three plant families, Cucurbitaceae, Solanaceae and Rutaceae, demonstrating host specialization in A. gossypii. These specialized genotypes were simultaneously found with other clones on Hibiscus, suggesting that this perennial host could act as a refuge plant between two vegetable crop seasons

Descriptors: clones. equilibrium. genetic-diversity. genetic-variation. genotypes. host-plants. insect-pests. loci. microsatellites. parthenogenesis. plant-pests. populations

Evaluation of aerial delivery systems for spray deposition and efficacy against sweet potato whitefly on cotton

Applied Engineering in Agriculture. 2008. 24 (4). 415-422

Author(s): Latheef-M-A. Kirk-I-W. Bouse-L-F. Carlton-J-B. Hoffmann-W-C

Author Affiliation: USDA-ARS-Areawide Pest Management Research Unit, 2771 F&B Road, College Station, TX 77845, USA

Abstract:

Sweet potato whiteflies (SWF), Bemisia argentifolii, live on the bottom surface of cotton leaves. Except crawlers, nymphal stages of the insect will not move about to contact insecticides. Aerial sprays to suppress SWF require improved application techniques designed to increase spray deposition and penetration to the lower layers of cotton canopy. Using Rotary atomizers, Winglets, and Trumpet nozzles with combination of air speed and boom heights, fenpropathrin 2.4E+acephate 90S at 0.22+0.56 kg active ingredient/ha, respectively, were applied at 46.7 L/ha on furrow-irrigated cotton near Maricopa, Arizona. Deposition of active ingredients and season long efficacy against SWF were determined and compared with conventional CP-03 nozzle. Neither spray deposit nor percentage coverage of active ingredients significantly varied consistently between aerial delivery systems. Rotary nozzles produced significantly smaller droplet size and higher droplet density compared to Winglets, Trumpet, and CP-03 nozzles. There was no consistent trend favoring one aerial delivery system over the other treatments against suppression of B. argentifolii on cotton. Further improvements in aerial delivery systems are needed to achieve increased control of insects that live and feed on the bottom surface of cotton leaves

Descriptors: acephate. application-methods. application-rates. chemical-control. cotton. fenpropathrin. insect-control. insect-pests. insecticides. nozzles. pest-control. plant-pests

Production of Helicoverpa spp. (Lepidoptera, Noctuidae) from different refuge crops to accompany transgenic cotton plantings in eastern Australia

Au***stralian Journal of Agricultural Research***. 2008. 59 (8). 723-732

Author(s): Baker-G-H. Tann-C-R. Fitt-G-P

Author Affiliation: CSIRO Entomology and Cotton Catchment Communities Cooperative Research Centre, GPO Box 1700, Canberra, ACT 2601, Australia

Abstract:

The adoption of transgenic (Bt) cotton varieties has markedly reduced feeding damage by noctuid pests, Helicoverpa armigera and H. punctigera, in Australian cotton crops. However, the potential for Bt resistance to evolve within these insect pests is a major concern. To reduce the likelihood of Bt resistance occurring, it is mandatory for growers of Bt cotton to also grow refuge crops which produce large numbers of Bt-susceptible moths. We present here findings from a series of field studies which sought to identify the relative Helicoverpa productivity of different refuge crop options. The abundance of Helicoverpa pupae (during the cotton season) was compared under crops of Ingard(R) (transgenic, single Bt gene) cotton, sprayed conventional cotton, and

various unsprayed refuge crops (cotton, sorghum, maize, pigeon pea) from 1996 to 2003 in the major cotton-producing regions of northern New South Wales, plus St George and Dirranbandi in southern Queensland. Unsprayed, conventional cotton was used as the 'control' refuge in these studies. Productivity of adult Helicoverpa was estimated by surveying for pupae and discounting those that were parasitised and dead. Some supplementary experiments were also conducted to evaluate specific issues, in particular the value of additional refuge crops sown late in 2000-01 (due to accidental over-planting of Ingard(R) cotton that year) and the potential productivity of mixed plantings of various refuge crops which individually flowered at different times throughout the cotton season. Unsprayed refuges generally produced many more pupae than sprayed, conventional cotton and Ingard(R) cotton. Overall, pigeon pea, which has the advantage of prolonged flowering and thus on-going attractiveness to Helicoverpa, was the most reliable and productive refuge option, producing about twice as many pupae as unsprayed cotton. The seed mix refuge is perhaps a viable alternative option, although logistically more difficult for growers to adopt. Laboratory rearing of live pupae until moth emergence indicated that parasitism can be a substantial source of mortality in some refuge crops, especially sorghum. The most common parasitoid of Helicoverpa pupae was the ichneumonid wasp, Heteropelma scaposum. Such parasitism can greatly reduce productivity of adult Helicoverpa from refuges and needs to be taken into account when assessing relative refuge 'value', although such refuges will obviously contribute to the abundance of these beneficial species across the landscape

Descriptors: beneficial-insects. biological-control-agents. cotton. insect-pests. maize. mixed-cropping. parasitism. parasitoids. pigeon-peas. plant-pests. transgenic-plants

PLANT DISEASES (5 jdl)

Evaluation of cotton germ plasm for resistance to the whitefly and cotton leaf crumple (CLCr) disease and etiology of CLCr in California's Imperial Valley

Plant Disease. 2006. 90 (7). 877-884

Author(s): Seo-Y-S. Zhou-Y-C. Turini-T-A. Cook-C-G. Gilbertson-R-L. Natwick-E-T

Author Affiliation: Department of Plant Pathology, University of California, Davis, CA 95616, USA

Abstract:

Cotton (Gossypium hirsutum) entries were evaluated for resistance to the whitefly (Bemisia tabaci biotype B) and cotton leaf crumple (CLCr) disease during the 1999 to 2001 growing seasons in the Imperial Valley of California. Entries were evaluated for densities of whitefly adults and nymphs, and for CLCr, by visual rating and squash/dot blot hybridization analyses. Differences in whitefly densities were detected among entries, but none were highly resistant, nor was there any correlation with CLCr disease severity. Entries AP 4103 and AP 6101 had relatively low whitefly densities and were highly susceptible (high CLCr disease severity ratings and viral titers), whereas

NK 2387C and DPX 1883 also had low whitefly densities but were highly resistant (no symptoms or detectable viral titers). Other entries showed moderate CLCr resistance, which was independent of whitefly density. Geminivirus DNA-A and DNA-B components were consistently detected in cotton leaves with CLCr symptoms by polymerase chain reaction (PCR) with degenerate begomovirus primers, and full-length DNA-A and DNA-B clones were obtained. Cotton seedlings inoculated with these cloned DNAs by particle bombardment developed CLCr symptoms, and progeny virus was whitefly-transmissible. Sequence analysis revealed that these clones comprised the genome of a California isolate of the bipartite begomovirus Cotton leaf crumple virus (CLCrV-CA). Thus, CLCr disease in the Imperial Valley is caused by CLCrV-CA, and cotton entries with high levels of resistance were identified

Descriptors: cotton. disease-resistance. disease-vectors. genes. genetic-analysis. genetic-markers. germplasm. insect-pests. leaves. nucleotide-sequences. pest-resistance. plant-diseases. plant-pathogens. plant-pests. plant-viruses. polymerase-chain-reaction

Use of pyrosequencing to quantify incidence of a specific Aspergillus flavus strain within complex fungal communities associated with commercial cotton crops

Phytopathology. 2008. 98 (3). 282-288

Author(s): Das-M-K. Ehrlich-K-C. Cotty-P-J

Author Affiliation: Agricultural Research Service, United States Department of Agriculture, Department of Plant Sciences, University of Arizona, Tucson, AZ 85721-0036, USA

Abstract:

Atoxigenic strains of Aspergillus flavus have been used as aflatoxin management tools on over 50,000 hectares of commercial crops since 2000. To assess treatment efficacy, atoxigenic strain incidence is routinely monitored by vegetative compatibility analyses (VCA) that require culturing, generation of auxotrophs, and complementation with tester mutants. Two pyrosequencing assays (PA) that require no culturing were developed for monitoring incidences of atoxigenic strains on ginned cottonseed. The assays, which quantify frequencies of characteristic single nucleotide polymorphisms (SNPs) in the aflR and pksA genes, were validated against standard VCA on cottonseed collected from commercial gins in South Texas, Arizona, and Southern California where the atoxigenic strain AF36 is used to manage aflatoxin contamination. Cottonseed washings were subjected to both VCA and PA. PA was performed directly on DNA isolated from particulates pelleted from the wash water by centrifugation. Addition of CaCl2 and diatomaceous earth prior to pelleting increased the amount of DNA isolated. Accuracy and reproducibility of the PA were contrasted with those for the VCA that has been used for over a decade. Correlation coefficients between VCA and PA indicated good correspondence between the results from the two assays (r=0.91 for aflR assay and r=0.80 for pksA assay). PAs were highly variable for samples with low incidences of A. flavus due to variability in the initial polymerase chain reaction step. This held for both DNA isolated from cottonseed washes and for mixtures of purified DNA. For samples yielding low quantities of A. flavus DNA, averaging of results from 4

to 5 replicates was required to achieve acceptable correlations with VCA. Pyrosequencing has the potential to become a powerful tool for monitoring atoxigenic strains within complex A. flavus communities without limitations imposed by traditional culturing methods

Descriptors: aflatoxins. biological-control. cotton. DNA. fungal-diseases. gene-expression. genes. genetic-diversity. genetic-variation. genotypes. plant-diseases. plant-pathogenic-fungi. plant-pathogens. strains

Evolution of virulence in Fusarium oxysporum f. sp. vasinfectum using serial passage assays through susceptible cotton

Phytopathology. 2008. 98 (3). 296-303

Author(s): Wang-B. Brubaker-C-L. Tate-W. Woods-M-J. Burdon-J-J

Author Affiliation: CSIRO Plant Industry, G.P.O. Box 1600, Canberra ACT 2601, Australia

Abstract:

Fifty strains of Fusarium oxysporum, recovered from rhizosphere soil around native Gossypium species and found to be mildly virulent on cotton (Gossypium hirsutum), were used to assay the propensity for evolution of virulence using serial passage assays through cotton. Only one lineage A strain, 2613, successfully completed 10 successive passages, while all others lost the ability to cause foliar disease symptoms at various stages during this process. Based on 46 amplified fragment length polymorphism (AFLP) markers generated with four EcoRI x MseI primer combinations, mutants were identified in offspring isolates from strain 2613 regardless of whether serial passages occurred in cotton or on water agar, suggesting the occurrence of spontaneous mutations. Significantly increased virulence was observed in the offspring isolates generated on cotton, while no increasing virulence was found in those obtained on water agar, suggesting that the evolution of virulence in F. oxysporum f. sp. vasinfectum is associated with the presence of cotton. No clear correlation was observed between the AFLP mutations and increased virulence in this study

Descriptors: cotton. disease-resistance. fungal-diseases. genetic-diversity. genetic-variation. genotypes. mutations. plant-diseases. plant-pathogenic-fungi. plant-pathogens. susceptibility. virulence

Antifungal traits of a 14 kDa maize kernel trypsin inhibitor protein in transgenic cotton

Journal of Crop Improvement. 2008. 22 (1). 1-16

Rajasekaran-K. Cary-J-W. Chen-Z-Y. Brown-R-L. Cleveland-T-E

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Abstract:

Transgenic cotton plants expressing the maize kernel trypsin inhibitor protein (TIP) were produced and evaluated for antifungal traits. This 14 kDa trypsin inhibitor protein has been previously associated with resistance to aflatoxin-producing fungus Aspergillus flavus. Successful transformation of cotton (Gossypium hirsutum L.) and expression of trypsin inhibitor was demonstrated by PCR and Northern analysis, respectively. Proteins extracted from cottonseed and leaf tissues of transgenic plants were separated using SDS-PAGE, and it indicated the presence of a 15-16 kDa protein in transgenic tissues as compared to control. Only transgenic cottonseed tissue reacted with the TIP antibody, indicating the expression in cottonseed. No cross-reaction to the TIP antibody was detected from leaf extracts, indicating the TIP was either not expressed or expressed at a level too low to be detected by Western blot. Crude leaf extracts from transgenic cotton plants did not show significant control of colonies from pre-germinated spores of Aspergillus flavus or Verticillium dahliae; however, extracts from transgenic cottonseed tissue showed about 60% reduction of V. dahliae colonies, indicating the antifungal nature of the maize TIP by itself. Cotton bolls inoculated with a green fluorescent protein (GFP) expressing A. flavus strain showed no difference among controls or transgenic cotton plants indicating that the expression of TIP in cottonseed is not high enough to prevent A. flavus colonization

Descriptors: antifungal-properties. cotton. fungal-diseases. gene-expression. genes. kernels. maize. plant-diseases. plant-pathogenic-fungi. plant-pathogens. plant-proteins. transgenic-plants. trypsin-inhibitors

Effect of a terminated cover crop and aldicarb on cotton yield and Meloidogyne incognita population density

Journal of Nematology. 2008. 40 (2). 147-151

Author(s): Wheeler-T-A. Leser-J-F. Keeling-J-W. Mullinix-B

Author Affiliation: Texas AgriLife Research, Lubbock, TX 79403, USA

Abstract:

Terminated small grain cover crops are valuable in light textured soils to reduce wind and rain erosion and for protection of young cotton seedlings. A three-year study was conducted to determine the impact of terminated small grain winter cover crops, which are hosts for Meloidogyne incognita, on cotton yield, root galling and nematode midseason population density. The small plot test consisted of the cover treatment as the main plots (winter fallow, oats, rye and wheat) and rate of aldicarb applied in-furrow at-plant (0, 0.59 and 0.84 kg a.i./ha) as subplots in a split-plot design with eight replications, arranged in a randomized complete block design. Roots of 10 cotton plants per plot were examined at approximately 35 days after planting. Root galling was affected by aldicarb rate (9.1, 3.8 and 3.4 galls/root system for 0, 0.59 and 0.84 kg aldicarb/ha), but not by cover crop. Soil samples were collected in mid-July and assayed for nematodes. The winter fallow plots had a lower density of M. incognita second-stage juveniles (J2) (transformed to Log10 (J2+1)/500 cm3 soil) than any of the cover crops (0.88, 1.58, 1.67 and 1.75 Log10(J2+1)/500 cm3 soil for winter fallow, oats, rye and wheat, respectively). There were also fewer M. incognita eggs at midseason in

the winter fallow (3,512, 7,953, 8,262 and 11,392 eggs/500 cm3 soil for winter fallow, oats, rye and wheat, respectively). Yield (kg lint per ha) was increased by application of aldicarb (1,544, 1,710 and 1,697 for 0, 0.59 and 0.84 kg aldicarb/ha), but not by any cover crop treatments. These results were consistent over three years. The soil temperature at 15 cm depth, from when soils reached 18 deg C to termination of the grass cover crop, averaged 9,588, 7,274 and 1,639 centigrade hours (with a minimum threshold of 10 deg C), in 2005, 2006 and 2007, respectively. Under these conditions, potential reproduction of M. incognita on the cover crop did not result in a yield penalty

Descriptors: aldicarb. cotton. cover-crops. effects. erosion. fallow. hosts. oats. ova. pesticides. plant-parasitic-nematodes. population-density. roots. rye. seedlings. soil. soil-temperature. wheat. wind

AGRICULTURAL ENGINEERING (2 jdl)

100 Years of cotton production, harvesting, and ginning systems engineering: 1907-2007

Transactions of the ASABE. 2008. 51 (4). 1187-1198

Author(s): Hughs-S-E. Valco-T-D. Williford-J-R

Author Affiliation: USDA-ARS Southwestern Cotton Ginning Research Laboratory, 5530 Remington Rd., las Cruces, NM 88011-2501, USA

Abstract:

The American Society of Agricultural and Biological Engineers (ASABE) celebrated its centennial year during 2007. As part of the ASABE centennial, the authors were asked to describe agricultural engineering accomplishments in US cotton production, harvesting, and ginning over the past 100 years. The US cotton industry has not existed in a vacuum but has always been influenced by social, political, and economic forces as well as engineering developments throughout its history. However, for the purpose of this article, the authors concentrated solely on describing engineering developments and practices in cotton production, harvesting, and ginning and their influence on each other. In order to describe engineering developments from 1907 forward, it was necessary to lay some basic groundwork on what occurred prior to the last 100 years in the US cotton industry

Descriptors: agricultural-engineering. agricultural-production. cotton. cotton-ginning. cotton-industry. harvesting

Development and testing of engine operated pneumatic cotton picker
AMA, Agricultural Mechanization in Asia, Africa and Latin America. 2008. 39 (4). 37-38
Author(s): Tajuddin-A
Author Affiliation: Agricultural Engineering College and Research Institute, Tamil Nadu Agricultural University, Kumulr 621712, India
Abstract:
A pneumatic cotton picker operated by 3.3 kW, 3000 rev/min petrol start kerosene run engine coupled with a centrifugal blower was developed and tested. The pneumatic cotton picker developed an air suction force of 334 g. The machine could pick cotton at the rate of 3 kg/h. The machine-picked cotton required additional cleaning for removing the trash content. The break-even capacity of the machine was determined to be 7.2 kg/h

Use of a rotor spray system for moisture addition to cotton lint
Applied Engineering in Agriculture. 2008. 24 (4). 491-495
Author(s): Baker-K-D. Hughs-E. Chun-D-T-W
Author Affiliation: USDA, ARS, Southwestern Cotton Ginning Research Laboratory, P.O. Box 578, Mesilla Fark, NM 88047, USA
Abstract:
Tests were conducted using a rotor spray system to apply moisture in the form of fine water droplets to cotton lint at the lint slide just before bale packaging. Two studies were conducted, one in which bales were stored for 6 months and another in which bales were stored for 15 months. For the first study, initial cotton lint moisture content averaged 5.1% and ranged from 4.4% to 5.7%, wet basis, and for the second study the initial moisture content averaged 5.5% and ranged from 5.1% to 5.9%. For the 6-month storage test, five levels of moisture addition were studied, including average moisture levels of 6.3%, 6.5%, 7.0%, 7.7%, and 7.9% moisture (just after rewetting), in addition to bales with no additional moisture added. For the 15-month storage test, three levels of moisture addition were studied, including 8.0%, 8.4%, and 10.0% moisture (just after rewetting). In both studies, cotton quality degradation was determined after each of the respective storage periods. No significant changes were found in HVI micronaire, strength, length, or uniformity or any properties measured with the Advanced Fiber Information System. At moistures of 7.5% and greater, the color +b value decreased slightly and the decrease was statistically significant. When considering the moisture range used in this study, results are consistent with earlier studies using atomizing spray nozzles, therefore recommendations for using a rotor spray system for adding moisture to cotton fiber at the lint slide should be the same as those for using an atomizing spray nozzle system. Thus, in order to minimize color degradation during storage, cotton lint moisture should be less than 7.5% wet basis (8.0% dry basis) when the bale is formed
Descriptors: bales. cotton. crop-quality. farm-equipment. lint. moisture-content. nozzles. Sprayers. Gossypium. Gossypium-hirsutum

PROCESSING OA AGRICULTURAL PRODUCTS (7 jdl)

Improving the Removal of Printing Paste Thickener and Excess Dye by Enzymatic Washing of Printed Cotton Fabrics

Journal of Natural Fibers. 2008. 5 (1). 1-18

Author(s): Salem-A-A. Nassar-S-H. Rekaby-M-M

Author Affiliation: Department of Textile Printing, Dyeing, and Finishing, Faculty of Applied Arts, Helwan University, Egypt

Abstract:

In textile printing, it is common to use a printing paste containing a dye, a thickener, Other additives. Thickeners and excess dye must be removed by washing with water after the fixation of the print. This removal is made much more efficient by washing the printed textile in the presence of a suitable enzyme. The present study relates to the removal of CMC thickener by enzymatic washing of cotton fabrics printed using reactive dyes. This enzymatic washing not only improves the quality of the printed cotton fabrics but also decreases the harmful effects of waste water and environmental pollution with thickeners. Also, the enzymatic breakdown of thickener decreases the process time, as well as the amount of energy and water needed to achieve a satisfactory quality of the printed fabrics

Descriptors: cotton; enzyme; thickener; removal; washing

Improving the Environmental Aspects of Sulphur Dyeing of Cotton Knitted Fabrics

Journal of Natural Fibers. 2008. 5 (3). 238-250

Author(s): Ibrahim-N-A. El-Gamal-A-R. Mahrous-F

Author Affiliation: Textile Research Division, National Research Center, Dokki, Cairo, Egypt

Abstract:

An attempt has been made to search for an eco-friendly reductants and oxidants for complete substitution of the hazardous ones along with finding out proper conditions for attaining better knitted sulphur dyeings. The results detailed in this article indicate that a) the extent of coloration is governed by both the type of reductant as well as dye/reductant ratio, i.e. liquid glucose (LG, ratio 1/1) > glucose (G, ratio, 1/1) > molaas (M, ratio 1/4), as well as the knitted fabric structure i.e. Pique > Rib > Milton; (b) the depth of shade can be improved by raising the dyeing temperature up to 80°C for 45 min., at a material-to-liquor ratio 1/10, in presence of 30g/l common salt; (c) the extent of sulphur dyeing is determined by the nature of oxidant, i.e. (NH4)2S2O8 > H2O2 > None; (d) after treatment with cationic softener results in higher softness along with better washing and rubbing fastness; and (e) the dyeing as well as fastness properties of the obtained sulphur dyeings depend on the sulphur dye category

Descriptors: cotton; dyeing; eco-friendly; knitted-fabrics; sulphur-dye

Optimization of Mixing Ratio and Mixing Cost for the Production of Ring-Spun Cotton Yarn

Journal of Natural Fibers. 2008. 5 (3). 227-237

Author(s): Bhattacharyya-S. Sur-D. Chatterjee-S-M

Author Affiliation: Controller of Exam, Jadavpur University, Arabinda Bhaban (1st floor), Kol-32, West Bengal, India

Abstract:

As the cotton fiber properties are closely interrelated to the yarn properties, the correlation between the cotton fiber and yarn properties will help a mill to set the certain standard yarn properties. The purpose of this work is to produce the yarn of desired quality at minimum cost by mixing of various types of cotton fibers at the optimum-mixing ratio. The Linear Programming Technique has been suitably applied to determine the optimum mixing ratio to produce desired yarn quality at minimum cost. The solution of optimum mixing ratio obtained from the Linear Programming Equation has been solved by a computer program developed in Visual Basic software

Descriptors: cotton-yarn; optimum-mixing-ratio; linear-programming; Visual-Basic

Finishing of Cotton by Polyacrylic Rubber in Presence of NaH2PO4 as Catalyst Under Thermal Treatment

Journal of Natural Fibers. 2008. 5 (4). 383-395

Author(s): Das-D. Munshi-R

Author Affiliation: National Institute of Fashion Technology, Government of India, Block-LA, Plot 3B, Sector III, Salt Lake City, Calcutta–700 098, India

Abstract:

Cotton fabric was modified using polyacrylic rubber as a finishing agent in the presence of ammonium chloride, magnesium chloride, and sodium salts of phosphoric acid as catalysts, employing a pad-dry-cure technique. Treatment with 8% polyacrylic rubber in presence of 1.2% NaH2PO4, followed by drying of the padded fabric at 95° C for 5 min. and curing of the dried fabric at 140° C for 5 min., produced balanced improvements in properties such as tear strength, flexibility, tensile strength elongation at break, moisture regain, abrasion resistance, and wrinkle recovery. Functional group analysis and IR spectroscopy indicated that the NaH2PO4 catalyst allowed esterification of carboxyl groups of polyacrylic rubber with the cellulose constituents of cotton and the process ultimately led to some degree of crosslinking of the chain polymers of cotton

Descriptors: polyacrylic-rubber; finishes-on-cotton-cellulose; crosslinking-of-cellulose; esterification

Multispectral sensor for in-situ cotton fiber quality measurement
Transactions of the ASABE. 2008. 51 (6). 2201-2208
Author(s): Sui-R. Thomasson-J-A. Ge-Y. Morgan-C
Author Affiliation: Department of Biological and Agricultural Engineering, Texas A&M University, 2117 TAMU, College Station, TX 77843-2117, USA
Abstract:

Reflectance spectra of cotton fibre samples having different fibre quality levels were measured with a high-resolution spectrophotometer, processed with waveband averaging and wavelet analysis, and then related to micronaire with multiple linear regression. Regression models indicated that micronaire had a close relationship (R2=0.89) with reflectance at seven 100 nm wavebands (1120, 1296, 1550, 1664, 1852, 2020, and 2340 nm). In the wavelet-based analysis, six wavelet-coefficient regressors were identified and entered into a regression model. This model also indicated a very close relationship between micronaire and reflectance spectra (R2=0.97). A prototype cotton fibre quality sensor was developed based on the characteristics of the cotton fibre reflectance spectrum and the wavelet-based multiple-regression analyses. The sensor consists of a VisGaAs camera, optical bandpass filters, a halogen light source, and an image collection and processing system. Images of lint samples at three near-infrared (NIR) wavebands (1450, 1550, and 1600 nm) were acquired and analysed with two methods to determine the relationship between image pixel values and cotton fibre micronaire. One method involved ROI (region-of-interest) pixel-value data, while the other involved histogram-based pixel-value data. Results showed that the sensor was capable of accurately estimating the fibre micronaire (R2=0.99 for ROI data, and R2=0.99 for histogram-based data). This sensor could potentially be used for measuring cotton fibre quality along with spatial data from a GPS receiver as the cotton is harvested in the field, making it possible to generate cotton fibre quality maps. The sensor also has the potential to be used for segregating cotton at harvest based on fibre quality
Descriptors: accuracy. cotton. fibre-quality. image-analysis. image-processing. lint. multispectral-imagery. plant-fibres. reflectance. regression-analysis. sensors. spectrophotometers

Tracking seed coat fragments in cotton ginning
Transactions of the ASABE. 2008. 51 (2). 365-377
Author(s): Boykin-J-C
Author Affiliation: U.S. Cotton Ginning Laboratory, P.O. Box 256, Stoneville, MS 38776, USA
Abstract:

Seed coat fragments (SCF) in lint cause problems in textile mills during spinning and dyeing, so it is important to prevent or remove them during ginning. The objective of this study was to quantify SCF as they were formed and removed during ginning so that future studies can focus on preventing SCF formation. Samples of cotton, seed, and trash were collected throughout a gin to analyse SCF, motes, seed meats, and seed. The lint cleaner did not change the number of SCF in lint, but it reduced the weight of

SCF by 56% as it removed larger SCF or broke them into smaller SCF. Seed meats in the ginned seed and small seed missing after the gin stand were estimated to be 0.8 and 2.3%, respectively, of all seed ginned, accounting for 32 and 15% of SCF formed in the gin stand, so a significant portion of SCF was attributed to seed damage not revealed by simply observing damaged seed in the seed roll. Damaged seed observed in the seed roll was 7% higher than in seed cotton, and these were thought to be a major source of SCF found in lint. The SCF mass entering the gin stand was 24% of the SCF mass exiting the gin stand, so a small but significant portion of SCF were formed before the gin stand. Seed meats found in the seed cotton cleaner waste were estimated to account for 22% of SCF found entering the gin stand. Seed damage occurred in the field, in seed cotton cleaners, and in the gin stand, so there are opportunities at each of these steps to prevent SCF in lint

Descriptors: cotton-gin-trash. cotton-ginning. cotton-gins. lint. seeds. testas. textile-mills

Influence of fiber fineness, fiber maturity, and Nep content on the properties of natural fiber reinforced cotton-epoxy composites

Journal of Natural Fibers. 2008. 5 (4). 289-314

Author(s): Graupner-N. Endres-H-J. Mussig-J

Author Affiliation: Faserinstitut Bremen e. V. (-FIBRE-), Department Biological Materials, Sustainability and Fibre Development, Biomimetics, Am Biologischen Garten 2, D-28359 Bremen, Germany

Abstract:

This article reports a systematic study of the effects of two different kinds of cotton fibers on properties of composites. Both cotton fibers exhibit similar mechanical properties. However, they vary in fineness and maturity. The intention of this study is to investigate the influence of these fiber properties on the characteristics of composites. In the present work composites with a thermosetting epoxy matrix with fiber mass proportions of 0 to 60% were produced by compression molding and tested for stiffness and impact strength. Contrary to expectations, the best mechanical values could be obtained from the composites with coarser fibers. This phenomenon was ascribed to the lower maturity and higher feasibility of nep formation of the finer fibers

Descriptors: cotton. crop-quality. fibre-quality. fineness. impact-strength. maturity. mechanical-properties. plant-fibres

PROCESSING OF AGRICULTURAL WASTES (1 jdl)

Conversion of cotton wastes to bioenergy and value-added products
Transactions of the ASABE. 2008. 51 (6). 2239-2246
Author(s): Sharma-Shivappa-R-R. Chen-Y
Author Affiliation: Department of Biological and Agricultural Engineering, Campus Box 7625, North Carolina State University, Raleigh, NC 27695-7625, USA
Abstract:
Cotton accounts for nearly 40% of global fibre production. While approximately 80 countries worldwide produce cotton, the USA, China, and India together provide over half the world's cotton. High cotton production is accompanied by generation of tons of cotton waste each year. Large amounts of residue from the field and gins results in not only environmental problems due to disposal issues and cotton diseases and pests, but also difficulties in cultivation due to slow decomposition in the soil. Development of economical and efficient methods for utilizing and/or disposing of cotton waste have been investigated for years, but scale-up and marketing issues need to be resolved. Cotton waste can be used as an energy source through briquetting, pyrolysis, and anaerobic digestion. Studies suggest that composition of cotton waste is similar to other lignocellulosic feedstocks, and it has the potential to be used for bioethanol production. However, proper pretreatment strategies need to be developed to reduce lignin (comprising approximately 30%). Cotton waste can also be processed into industrial products such as animal feed and bedding, soil amendment, and substrate for vegetative growth through various treatments. Enzyme production through utilization of cotton waste as a carbon source is another potential application. A review of the various conversion processes suggests that although cotton waste is suitable for the production of a variety of products, in-depth investigation at the pilot scale is essential to determine process efficacy and economic feasibility
Descriptors: bioenergy. biofuels. conversion. cotton. cotton-waste. economic-analysis. lignocellulosic-wastes. plant-fibres. renewable-energy. waste-utilization Identifiers: plant fibers

POLLUTION (1 jdl)

Estimating FRM PM10 sampler performance characteristics using particle size analysis and collocated TSP and PM10 samplers: cotton gins
Source: ***Transactions of the ASABE.*** 2008. 51 (2). 695-702
Author(s): Buser-M-D. Wanjura-J-D. Whitelock-D-R. Capareda-S-C. Shaw-B-W. Lacey-R-E
Author Affiliation: USDA-ARS Cotton Production Processing Research Unit, Lubbock, Texas, USA

Abstract:

In the USA, regional air quality compliance with national ambient air quality standards (NAAQS) for particulate matter (PM) is based on concentration measurements taken by federal reference method (FRM) samplers. The EPA specifies the performance criteria for the FRM samplers. These criteria for the FRM PM10 samplers are defined as a cutpoint and slope of 10 plus or minus 0.5 micro m and 1.5 plus or minus 0.1, respectively. It is commonly assumed that the performance characteristics of the FRM PM10 sampler do not vary and are independent of the PM characteristics. Several sources have observed errors in the concentrations measured by the FRM PM10 samplers and have suggested that shifts in the sampler performance characteristics may lead to the observed concentration measurement errors. Limited work has been conducted on quantifying the shift in the performance characteristics of the FRM PM10 sampler operating under field conditions. Recent work at a south Texas cotton gin showed that true PM10 concentrations were 55% of the concentrations measured by the FRM PM10 sampler. If the FRM PM10 sampler were operating within the performance criteria range specified by the EPA, then the true concentrations would be within approximately 12% of the concentrations measured by the FRM PM10 sampler. The focus of this work was to quantify the shifts in the cutpoint and slope of the penetration curve of the FRM PM10 sampler. Results show that the cutpoint and slope of the FRM PM10 sampler shifted substantially and ranged from 13.8 to 34.5 micro m and from 1.7 to 5.6, respectively, when exposed to large PM as is characteristic of agricultural sources. These shifts in the cutpoint and slope of the FRM PM10 sampler resulted in overestimation of true PM10 concentrations by 145 to 287%

Descriptors: aerosols. air-pollutants. air-pollution. air-quality. atmosphere. cotton-gins. equipment-performance. estimation. particle-size. particle-size-analysis. samplers. standards

Particulate emission profile of a cotton gin

Applied Engineering in Agriculture. 2008. 24 (2). 145-151

Author(s): Hughs-S-E. Armijo-C-B. Whitelock-D-P. Buser-M-D

Author Affiliation: USDA-ARS, Southwestern Cotton Ginning Research Laboratory, P.O. Box 578, 300 E. College Dr., Mesilla Park, NM 88047, USA

Abstract:

Particulate matter (PM) is one of six criteria pollutants regulated by the Environmental Protection Agency (EPA) with National Ambient Air Quality Standards (NAAQS). In general, PM is the only air pollutant of concern emitted from cotton gins. The EPA has NAAQS for PM10 (particles with an aerodynamic diameter less than or equal to a nominal 10 micro m) and PM2.5 (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micro m). The objective of this study was to monitor boundary line concentrations from a specific cotton gin during the ginning season in an effort to determine that gins are in compliance with federal and state standards. A monitoring protocol was developed that sampled PM concentrations and on-site meteorology at periodic intervals through the entire 2004 ginning season. Results showed that average 24 h PM10 and PM2.5 downwind boundary concentrations ranged

from 4.9 to 39.7 micro g/m3 and 0.02 to 0.92 micro g/m3, respectively. These levels are well below the Clean Air Act 24-h PM10 and PM2.5 standard of 150 and 35 micro g/m3 respectively

Descriptors: aerodynamics. air-pollutants. air-pollution. air-quality. atmosphere. cotton-gins. emission. particle-size

SURVEYING METHODS (1 jdl)

Remote sensing of cotton nitrogen status using the canopy chlorophyll content index (CCCI)

Transactions of the ASABE. 2008. 51 (1). 73-82

Author(s): El-Shikha-D-M. Barnes-E-M. Clarke-T-R. Hunsaker-D-J. Haberland-J-A. Pinter-R-J-Jr. Waller-R-M. Thompson-T-L

Author Affiliation: USDA-ARS U.S. Arid Land Agricultural Research Center, 21881 N. Cardon Lane, Maricopa, AZ 85238, USA

Abstract:

Various remote sensing indices have been used to infer crop nitrogen (N) status for field-scale nutrient management. However, such indices may indicate erroneous N status if there is a decrease in crop canopy density influenced by other factors, such as water stress. The canopy chlorophyll content index (CCCI) is a 2-dimensional remote sensing index that has been proposed for inferring cotton N status. The CCCI uses reflectances in the near-infrared (NIR) and red spectral regions to account for seasonal changes in canopy density, while reflectances in the NIR and far-red regions are used to detect relative changes in canopy chlorophyll, a surrogate for N content. The primary objective of this study was to evaluate the CCCI and several other remote sensing indices for detecting the N status for cotton during the growing season. A secondary objective was to evaluate the ability of the indices to appropriately detect N in the presence of variable water status. Remote sensing data were collected during the 1998 (day of year or DOY 114 to 310) and 1999 (DOY 106 to 316) cotton seasons in Arizona, in which treatments of optimal and low levels of N and water were imposed. In the 1998 season, water treatments were not imposed until late in the season (DOY 261), well after full cover. Following an early season N application in 1998 for the optimal (DOY 154) but not the low N treatment, the CCCI detected significant differences in crop N status between the N treatments starting on DOY 173, when canopy cover was about 30%. A common vegetation index, the ratio of NIR to red (RVI), also detected significant separation between N treatments, but RVI detection occurred 16 days after the CCCI response. After an equal amount of N was applied to both optimal and low N treatments on DOY 190 in 1998, the CCCI indicated comparable N status for the N treatments on DOY 198, a trend not detected by RVI. In the 1999 season, both N and water treatments were imposed early and frequently during the season. The N status was poorly described by both the CCCI and RVI under partial canopy conditions when water status differed among treatments. However, once full canopy was obtained in 1999, the CCCI provided reliable N status information regardless of water status. At full cotton cover, the CCCI was significantly correlated with measured parameters of N status,

including petiole NO3-N (r=0.74), SPAD chlorophyll (r=0.65), and total leaf N contents (r=0.86). For well-watered cotton, the CCCI shows promise as a useful indicator of cotton N status after the canopy reaches about 30% cover. However, further study is needed to develop the CCCI as a robust N detection tool independent of water stress
Descriptors: canopy. chlorophyll. cotton. nitrogen-content. nitrogen-fertilizers. plant-nutrition. plant-water-relations. reflectance. remote-sensing. water-stress Identifiers: leaf canopy