

ABSTRACTS

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Karyotypic variations in the varieties of asiatic *Gossypium arboreum* L. cotton

S. V. SONJE, N. D. JAMBHALE AND S. S. MEHETRE

Department of Botany, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, M. S., India, Pin-413 722

ABSTRACT : Studies on the chromosome number and karyotypic variations in the ten *G. arboreum* varieties indicated all varieties had 2n-26 chromosomes. However, wider range of karyotype variation was observed. Variety SM-133 having largest chromosome was considered more primitive than that of others, while G-27 was more advanced on the basis of presence of large subterminal chromosomes. Based on other parameters like F%, G-27 was classified as karyotypically asymmetric, TF% indicated asymmetric karyotype in No. 877 while on the basis of range of relative length and relative length of shortest chromosome LD-327 was asymmetric one. The variation observed for both qualitative and quantitative characters is attributed to the karyotypic differences observed in these varieties.

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Genetic analysis of seed and fibre characters in upland cotton (*Gossypium hirsutum* L.)

A. S. MEHLA AND B. R. MOR

Haryana Agricultural University, Regional Research Station, Uchani (Karnal)

ABSTRACT : Seven basic (Parental, F₁, F₂, F₃ and back crosses) generations of two crosses (H 655 x Super Okra and H 777 x Coker 417) were field evaluated at two locations for halo length, ginning percent, seed and lint index. The generation means analysis revealed complex inheritance for fibre and seed characters as digenic or higher order genic interactions were prevalent. Invariably the additive effects were significant for all the characters in both the crosses across locations. However, the significance and magnitude of dominance effects varied greatly from cross to cross and location to location. Duplicate type of epistasis seemed to play a key role in the expression of these traits.

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Heterosis and combining ability studies in asiatic cotton for ribbon width

Y. SUBRAHMANYAM AND M. C. BHALOD

Q. E. Unit of CIRCOT and Plant Breeding Department Main Cotton Research Station, GAU, Surat-395 007

ABSTRACT : Heterosis and combining ability was studied for ribbon width in *Desi* cottons using diallel mating design. Combining ability analysis revealed that mean sum of squares of gca and sca were significant for ribbon width. Parents 3652, AKH 4 and NA 39 were indentified as desirable combiners for ribbon width. Crosses *viz.*, 2340/58 x AKH-4 and G. 27 x LD. 210

registered significant magnitude for heterosis as well as specific combining ability in desired direction. Both general and specific combining ability variances were significant for this trait indicating the importance of additive as well as non-additive genetic factor. Reciprocal recurrent selecting procedure was suggested to be the most appropriate breeding method to exploit both additive and non-additive genetic variance for effective genetic improvement.

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Inheritance studies for yield characteristics and earliness of pink bollworm-Resistant arboreum cotton

V. S. MALIK AND S. S. NEHRA

Department of Plant Breeding, CCS Haryana Agricultural University, Hisar-125 004 (Haryana), India

ABSTRACT : Some germplasm lines of cotton, *Gossypium arboreum* L., that show resistance to pink bollworm (*Pectinophora gossypiella*) also carry agronomic properties, were crossed or combined to enhance derived germplasm lines. The objective of this study were to determine (1) the agronomic performance of two pink bollworm resistance lines (HD 136 and HD 167) and two pink bollworm susceptible line (RG 8 and H 481), (2) gene effects for seed cotton yield, yield components and earliness index, and (3) heterosis over better parent and over check variety (HD 167). Generation mean analysis of four parents and their three crosses grown at Hisar during 1990-91 revealed that HD 167 is the best source of resistance but late in maturity. Another line RG 8 (146.96 g/plant) had a very high yield potential than that of HD 167 (80 g/plant). It was observed from 3-parameter analysis of pink bollworm damage that dominance component (h) was higher in magnitude than additive component whereas in case of earliness index additive component was more important. Duplicate type of epistasis was observed for seed cotton yield and number of bolls per plant. Desirable heterosis over better parent and over check variety was observed for bollworm damage, bolls per plant (HD 167 x H 481).

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Short duration varieties of cotton for judicious use of agricultural inputs

I. P. SINGH, P. P. JAIN, K. S. NIRANIA AND AMIT SINGH

CCS Haryana Agricultural University, Cotton Research Station, Sirsa-125 055

ABSTRACT : An early maturing strain, HS (CP)-23 developed at Cotton Research Station HAU, Sirsa when planted with proper practices, offer opportunities for reduction in the input cost. The data collected on HS (CP)-23 in comparison with the check H 777 revealed that it has short stature, fruiting branch at a low node, first flower opens 10 days earlier, faster flowering rate, shorter boll period, maturity 30 days earlier so as to give almost the same yield as full season S 777. Under late sown conditions, this variety has given 20% higher seed cotton yield and 27% higher lint yield as compared to H 777. The earliness provides escape from late season insect damage particularly from pink bollworm. By adopting a short duration strain, HS (CP)-23 there is a saving of 33, 17 and 20 per cent in interculture, insecticide and irrigation, respectively over the H 777. The combined reduction in cost of these agricultural inputs thus increases the producer profits.

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Emergence, growth and yield of cotton as affected by soil crusting

R. P. AGRAWAL

Department of Soil Science, CCS HAU, Hisar-125 004

ABSTRACT : About five folds increase in crust strength/soil impedance reduced the seedling emergence to 25 and 67 per cent under one and two seeds per hole respectively, but ten folds increase reduced the emergence to zero. A micro plot experiment in a Hisar sandy loam soil (typic ustochrepts, fine loamy) showed inverse linear relationship ($r=0.89$; $p=0.01$) between crust strength and soil moisture in 0-50 mm layer. The crust strength increased with time after crust forming shower ($r=0.91$; $p=0.01$) and seedling emergence was negatively correlated with crust strength ($r=0.66$, $p=0.05$). Root and shoot growth was delayed under crusted conditions as compared to uncrusted conditions. Seedling mulch either with F. Y. M. or rice husk @ 3 and 2 tons/ha respectively increased the seedling emergence by 5 to 6 folds after crust formation over crusted control even higher than uncrusted control. Increased seedling emergence under seedline mulch was due to the lower crust strength, favourable soil temperature (about 2°C decrease in maximum temp.) and moisture regimes (about 2 per cent higher) in the seed zone. Cotton yield increased by 15-75 per cent by F. Y. M. seedline mulch in different years over the yield under crusted conditions. Even in absence of crust formation, FYM seedline mulch increased the yield by 13-21 per cent by favourable soil temperature and soil moisture in the seed zone during emergence and early growth season.

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Extractable micronutrient status of cotton growing soil of Sirsa District

KULDEEP SINGH

Department of Soil, CCS HAU, Hisar-125 004

ABSTRACT : The importance of micronutrients in limiting crop production in several parts of Haryana is well recognised. Cultivation of cotton on a large area in Sirsa district, necessitated a critical approach judging from the angle of soil fertility. There fore, two hundred and twenty surface soil samples representing cotton growing areas were analysed for available micronutrient contents using DTPA as extractant and other soil properties. The soils were alkaline in reaction and low in organic carbon content. Average values of available Zn, Cu, Mn and Fe were 0.27, 0.86, 13.79 and 6.81 ppm, respectively. Majority of the soils were deficient in Zn, marginal in Fe and sufficient in Mn and Cu. Multiple regression analysis indicated that about 21, 40, 38 and 41 per cent of the Zn, Cu, Mn and Fe content variability, respectively was accountable to the simultaneous influence of various soil parameters studied. Organic carbon content was the main soil factor which affected the status of micronutrients in cotton growing soils.

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Quality of American cotton varieties as affected by plant spacing and nitrogen levels

K. L. CHHABRA, K. C. BISHNOI AND V. K. MADAN
CCS HAU, Hisar-125 004, Cotton Research Station, Sirsa

ABSTRACT : A field experiment consisting of two varieties (H-777 and HS-50), three plant spacings (60 x 30, 60 x 22.5 and 60 x 15 cm) and five nitrogen levels (50, 75, 100, 125 and 150 per cent of the recommended dose on the basis of soil test) was conducted at Cotton Research Station, Sirsa of Haryana Agricultural University, Hisar during the *kharif* seasons. It was laid out in split plot design with combinations of varieties and plant spacings as main plots and nitrogen levels as subplot treatments, replicated thrice. Variety HS-50 was superior to H-777 in respect of lint index, seed index, maturity coefficient, 2.5% span length and oil content. The superiority of variety H-777 in ginning out-turn, fibre fineness and oil yield was observed over HS-50. Ginning out-turn, lint index, fibre fineness, maturity coefficient and 2.5% span length were not influenced by the plant spacings and nitrogen application. Significantly higher oil yield was obtained with closer plant spacing and increased nitrogen levels.

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Effect of various causes of malformation and remedial measures on the fibre quality of cotton (*Gossypium hirsutum* L.)

O. P. NEHRA, S. S. PAHUJA AND V. K. MADAN
Department of Plant Breeding, CCS HAU, Hisar-125 004

ABSTRACT : Two years fields study during 1989 and 1990 was conducted to find out the impact of various causes of malformation and remedial measure treatments on main fibre quality characters. Expiry-date monocrotophos (Exp. D. Mono.) and expirydate dimethoate (Exp. D. Dim.) induced the maximum adverse effect on maturity coefficient, intrinsic fibre fineness and fibre strength, respectively. None of the treatments under study significantly affected 2.5% span length. Clipping followed by foliar spray of $ZnSO_4$ (0.5%+0.25% CaO) brought about the maximum improvement in fibre fineness, maturity coefficient, intrinsic fibre fineness and fibre strength.

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Studies on cotton based cropping systems, economics of crop sequences and their effect on crop productivity

HANUMAN PRASAD
Agricultural Research Station, Rajasthan Agricultural University, Sriganaganar-335 001

ABSTRACT : A field experiment was conducted at Agricultural Research Station, Sriganaganagar with the objective to find out the most remunerative crop sequence under irrigated condition of North-West Rajasthan and see the effect on cotton crop of different succeeding rabi crops in crop sequence studies during two seasons of 1990-91 and 1991-92. It revealed that *Desi* cotton (RG-8) has given higher seed cotton yield than American cotton (RST-9) during both the *kharif* seasons. The highest productivity per unit area per unit time was recorded under *Desi* cotton-wheat crop sequence (71.14 q/ha/year). However, when the net profit were considered over per unit area then *Desi* cotton followed by *Gobhi sarson* transplanted was found most profitable and maximum

mean net returns Rs.33505/ha/year was recorded under this sequence followed by *Desi* cotton-Mustard (Rs.31736/ha/year). The lowest mean net return (Rs. 20172/ha/year) from American cotton-Lentil crop sequence.

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Effect of antitranspirants and growth regulators on productivity of upland cotton

A. M. DHOPTA AND S. L. JAMDAR

Department of Botany, Punjabrao Krishi Vidyapeeth, Akola-444 104 (M. S.)

ABSTRACT : A field experiment was conducted during 1986 and 1987 to study the effect of various antitranspirants (Kaoline, PMA, Atonic and Hico-110 R and growth regulator, Ascorbic acid) on growth and yield of *hirsutum* cotton (AKH-081 and AHH-468) singly and in combinations. Two years data revealed 23 per cent maximum increase in seed cotton yield due to spray of Atonik Kaoline (1.25%) under rainfed conditions. The yield increase of 9.4 per cent was evident in *hirsutum* hybrid, AHH-468 due to Hico-110 R sprays during flowering. This response was attributed to reduction in stomatal conductance and transpiration. Thus, Kaoline and Hico 110-R can be used to improve yields under dryland farming.

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Changes in physical and chemical properties of cotton fibre of *G. hirsutum* cotton during its development

A. D. TANEJA, V. K. MADAN, A. P. SHARMA AND J. C. SHARMA

Department of Plant Breeding, CCS HAU, Hisar

ABSTRACT : Fibre separated from the dried bolls collected from different *hirsutum* genotypes viz., H 777, H 999, H 912, HS 45, HS 83-5 and HS 83-1 at the interval of 5 days from 20 days old to 45 days from the date of flowering, were studied for the changes in certain chemical and physical properties for two years 1984-85 and 1985-86 during its development. Cellulose, ash, water soluble matter, phenol, tannin, N, P, K, S, Ca, Mg and micronutrients viz., (Zn, Fe, Mn & Cu) contents were estimated in these varieties. Fibre maturity, fineness, bundle strength and 2.5% span length were also determined. Cellulose content showed a steady increase during fibre development and reaches to a maximum in 45 days old fibre, Ash, water soluble matter, phenol, tannin, N, P, K, S, Ca, Mg and Fe decrease linearly during fibre development and were higher in the fibre of early ages than fully developed fibres. Micronutrients (Zn, Mn and Cu) decreased in the early stages of fibre development and then there is slight increase slightly subsequently. Fibre weight per unit length (micronaire value), maturity coefficient and tenacity at O" gauge increased with the boll development but the rate of change varied from season to season. The inter-relation between physico-chemical properties of developing fibres indicated that 20 to 30 days old bolls contained lower percentage of cellulosic matter and higher percentage of non-cellulosic matters. Such fibres were immature with poor strength. Fully developed fibres viz., 45 days of age were showing high percentage of cellulosic matter and lower percentage of various non-cellulosic substances and good maturity and strength with the increase in fibre weight per unit length.

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Comparative efficacy of plant protection methods for the control of important foliar diseases of cotton in Haryana

V. K. RATHEE AND M. S. CHAUHAN

H. P. K. V. Regional Research Station, Bajaura (H. P.)

ABSTRACT : Three foliar diseases namely, bacterial blight, Alternaria leaf spot and Myrothecium leaf spot play a vital role in cotton production. The incidence of these diseases generally vary from 10-30 per cent depending upon the environmental conditions and the susceptible host. The incidence due to Alternaria leaf spot and Myrothecium leaf spot was found maximum i. e. 21.1 and 22.2 per cent respectively. The minimum disease incidence due to all the foliar pathogens was recorded when full package was followed. Minimum yield of damaged seed cotton and highest yields of total seed cotton were also observed under this treatment.

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Role of infected seed of cotton and their effect after seed treatment with fungitoxicants on germination and seedling mortality

V. K. RATHEE, M. S. CHAUHAN AND M. S. PANWAR

H. P. K. V. Regional Research Station, Bajaura-175 125 (H. P.)

ABSTRACT : Diseased cotton bolls infected with six major pathogens namely *A. macrospora*, *C. gossypii*, *D. gossypina*, *F. moniliforme*, *M. roridum* and *X. C. malyacearum* and several internally and externally seed borne were collected and ginned. Divided in two lots i. e. delinted and underlinted. Treated with different fungitoxicants viz. Carbendazim, Captafol, MEMC, Captan, Streptomycin sulphate, Thiophanate-M, MEMC+Streptomycin sulphate. All the treatments gave significantly better germination than control in both the varieties when delinted and undelinted seeds were used. The seed treatment with Captafol (83.4%) and Thiophanate-M (83.0%) gave significantly better germination than standard check (82.6%). All fungicidal treatments significantly reduced the seedling mortality. Seed treatments with Carbendazim, Captafol, Thiophanate-M were at par with standard check in reducing seedling mortality during both the years.

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Distribution patterns and sequential sampling of American bollworm *Helicoverpa armigera* (HUBNER) in cotton, *Gossypium hirsutum* (L.)

P. RAJA SEKHAR, M. VENKATAIAH AND N. VENUGOPAL RAO

A. P. Agricultural University, Regional Agril. Res. Station, Lam, Guntur-522 034, Andhra Pradesh

ABSTRACT : Economic injury level of American bollworm *Helicoverpa armigera* (Hubner) on cotton was worked out as 0.6 eggs and 0.3 larvae per plant. The measure of dispersion 'K' and other indices conformed to negative binomial distribution. A sequential sampling plan based on negative binomial distribution, using a common 'K' of 1.1309 for eggs and 4.1179 for larvae and economic injury level was evolved as 0.3 larvae and 0.6 eggs per plant. The decision equation for *Helicoverpa* eggs and larvae were $An/Rn=0.1901n\pm 2.6391$ and $0.428n\pm 2.4999$, respectively.

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Habitat ecology of sucking pests in cotton

KRISHNA NAIK, L. LINGAPPA, S. AND B. V. PATIL

Department of Agricultural Entomology, College of Agricultural, Raichur

ABSTRACT : Interaction between leafhopper aphid and whitefly for sharing the habitat on cotton plant was studied by creating differential population in the experiment at two locations in Karnataka. Varied frequencies and dosages of selective insecticides on Laxmi cotton (*Gossypium hirsutum* L.) raised under irrigated conditions, enabled prevalence of different population of all three, sucking pests. However, the correlation and regression analysis yielded negative and non-significant relationship. The leafhopper population per leaf ranged from 1.47 to 7.97 at Raichur and 2.43 to 9.67 at Sirguppa. Aphid population was non-significant at both the test locations throughout the period of observations.

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Effect of nitrogen and spacing on bollworm incidence in arboreum cotton

JAI SINGH, R. K. SHARMA AND B. S. SANDHU

Punjab Agricultural University, Ludhiana-141 004

ABSTRACT : The effect of different levels of nitrogen and spacing on bollworm incidence under unprotected conditions was studied in *arboreum* cotton from 1988 to 1990. Nitrogen application was found to be positively correlated with bollworm infestation vis-a-vis staining of seed cotton and the number of diapausing pink bollworm larvae. Wider spacings (60 x 30 and 67.5 x 30 cm) recorded low bollworm infestation, less stained seed-cotton and more of diapausing larvae in left over green bolls as well as seed cotton.

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Studies on the influence of azotobacter on biomass prouduction in rainfed cotton, useful for paper industries

JAGVIR SINGH

Central Institute for Cotton Research, Post Bag No. 225, G. P. O., Nagpur-440 001

ABSTRACT : Azotobacter, a free living bacteria (non symbiotic) helps in transformation of atmospheric nitrogen into ammonical form for utilization by the crop plant. Due to nitrogen transformation through biological process by this bacteria (seed treatment), a beneficial effect of biofertilizer on growth and yield of rice, wheat and cotton were observed by Singh and Pundarikakshudu (1984) and Nehra *et al.* (1990). Bio-fertilizer is used as a biological agent in cotton for increasing biomass and yield (Subba Rao, 1977). Most of the cotton stalk produced at present is treated as agricultural waste and burnt in the field itself or used for fuel by the farmers. Utilization of cotton plant stalk, for making papers and boards, in paper industry has been reported by Pandey and Shaikh (1987), Sundaram *et al.* (1988) and Gurjar and Bhatt (1988) etc. A field trial was laid out a Panjari Farm CICR, Nagpur from 1980-81 to 1982-83 during *kharif* season in randomised block design with three replications. Treatments consisted of five levels of nitrogen (viz. 0, 20, 40, 60 and 80 kg/ha) with or without azotobacter culture C₂ (using 200 gms/6 kg of cotton seed) on Cv. SRT 1 (*G. hirsutum*). Recommended dose of P & K at 30 kg/ha each was given to the rainfed cotton. The soil was medium black, having pH 8.0-8.2 and available N, P and K in the range of 220-255, 10-15 and 495-535 kg/ha respectively. Plant sample at three physiological stages of crop growth at square, flowering and maturity stage were collected for recording biomass and seed cotton yield for three years.