

ABSTRACTS

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Colchicine and its use in cotton breeding : an overview

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ABSTRACT : Since colchicine has made significant achievement in many crop plants and become a boon to achieve significant improvement by chromosome doubling either of the variety/haploids for interspecific hybrid. Its technique is effective in induction of polyploidy in *Gossypium*. Synthesis of all polyploids is often needed in interspecific gene transfer. Considering fibre properties of hexaploid, it would be stronger because of more uniform thickening and fewer convolutions than the tetraploid.

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Genetics of yield, its component and quality characters in cotton- a review

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ABSTRACT : Literature on genetics of yield its component and quality characters in cotton were reviewed critically. All the characters studied, except days to 50 per cent flowering, were under control of epistatic component of genetic variance also in addition to additive and dominance components. Hence, intermating should be given due weightage in cotton breeding programmes coupled with pedigree and heterosis breeding, so as to exploit the variability in cotton to full extent.

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Association and path analysis in American cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Thirty-seven genotypes of American cotton were evaluated at Agricultural Research Station-Sriganganagar during *kharif* 2001. Randomized block design was followed with replicated twice. Significant positive association was observed for number of bolls per plant, sympodial branches per plant, plant height and monopodium branches per plant with seed cotton yield per plant. Besides, these components had positive inter-relationships among themselves. Path-coefficient analysis at genotypic level revealed that sympodia per plant, monopodia per plant and boll weight (g) and positive direct effect on seed cotton yield. Selection based on these characters may contribute considerably to improvement in seed yield.

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Heterosis for seed cotton yield and fibre quality characters in *intra Gossypium hirsutum* hybrids

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ABSTRACT : Heterosis for fibre properties was estimated in 44 crosses of four genetically male sterile line and 11 male parents developed in line x tester manner. The maximum heterosis for seed cotton yield was observed in the cross B 59 x HS 6 (27.73%), for GOT B-59 x H-1180 (3.12%), for 2.5 span length in cross Gregg x J2P7 (8.24%), fibre fineness in cross Gregg x H-1117 (-10.37%), B 59 x RS 810 (4.43%) for maturity coefficient and for bundle strength in cross Gregg x H 1117 (7.79%). The breeder has to compromise at a striking balance between GOT and span length as these are negatively correlated. Hence, it is suggested that those crosses which had acceptable values for seed cotton yield alongwith quality traits should be tested over the years and locations before their commercially utilization.

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Effect of foliar nutrition on productivity of American cotton (*Gossypium hirsutum*)

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ABSTRACT : A field experiment on sandy loam soil to study the effect of foliar nutrition on cotton (*Gossypium hirsutum*) productivity was conducted at Agricultural Research Station, Sriganaganagar during the *kharif* season of 2000-2001 and 2001-2002. The number of bolls/plant, boll weight and seed cotton yield increased significantly by foliar spraying of urea, DAP, KNO₃ and KCL @ 2 per cent and reflected 20.8, 18.1, 16.8 and 13.1 per cent higher seed cotton yield over water spray, respectively. The crop was found more responsive to urea 2 per cent spray followed by 2 per cent DAP spray.

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Spectral monitoring of growth and development of cotton (*Gossypium* species)

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ABSTRACT : Remote sensing technology is an important tool for monitoring crop growth and development. In order to study the spectral monitoring of growth and development of cotton, the field experiment was conducted on cotton crop during 1997-98 *kharif* season on a sandy loam soil at the Punjab Agricultural University, Ludhiana. Spectral reflectance and agronomic measurements were recorded for cotton species (American and *desi* cotton) sown on two dates (May 1 and May 29) under five nitrogen levels (0, 40, 80, 120 and 160 kg/ha). The results showed that red and IR reflectance percentages were minimum and maximum, respectively at 110 DAS. These reflectances were lower and higher, respectively under *desi* cotton than American cotton throughout crop growth periods. May 1 sown crop showed higher red reflectance and lower IR reflectance percentages than May 29 sown crop. Comparatively higher red reflectance and IR reflectance were observed for the nitrogen deficient (control) as compared to fertilized crop. The plotting of spectral (RR and NDVI) and agronomic parameters v/s time during crop life cycle revealed that LAI and above ground dry matter accumulation can be estimated with spectral parameters. Both the cotton species can be distinguished spectrally from grand growth period on wards under normal and late sown conditions. But, within same cotton species, the crop under normal

and late sowing can be remotely identified separately before and after the grand growth period of the crop. These parameters are useful for distinguishing nitrogen stressed and fertilized cotton crop. So, spectral parameters (RR and NDVI) can be used to monitor growth and development of both cotton species.

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Response of *hirsutum* cotton varieties to spacings and nitrogen levels

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ABSTRACT : A field experiment was conducted with two cotton varieties (RS-2013 and RST-9) under two plant spacings (67.5 x 30 cm and 67.5 x 45 cm) and three levels of nitrogen (60, 80 and 100 kg/ha) on sandy loam soil, alkaline in reaction (pH 8.1), low in available nitrogen, medium in available phosphorus and high in available potassium during the *kharif* season of 2000-2001 and 2001-2002 at Agricultural Research Station Sriganaganagar. The cotton crop was sown in the second fortnight of May during both the crop seasons. The results indicated that *hirsutum* cotton variety RS-2013 produced significantly higher seed cotton yield (mean 20.66 q/ha) over RST-9 (mean 16.94 q/ha) in both the years. It gave 21.95 per cent higher mean seed cotton yield over RST-9. Plant spacing did not influence seed cotton yield significantly. Application of 80 kg N/ha significantly increased boll weight, bolls/plant, plant height and seed cotton yield (mean 19.59 q/ha) over RST-9 (mean 16.23 q/ha), however, it was *at par* with 100 kg N/ha (mean 20.57 q/ha). It gave 20.70 per cent height mean seed cotton yield over 60 kg N/ha.

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Response of cotton varieties to different fertility regimes

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ABSTRACT : Soil test crop response correlation studies on cotton, based on targeted yield approach with fertilizer prescription equation were conducted in vertisol at Cotton Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri during 1997-98 to 2001-02. The soil was alkaline in reaction (pH 8.2), low in available N, medium in P and high in K content, *G. hirsutum* genotype RHC-1190 was found to be superior over check JLH-168 in respect of seed cotton yield. The seed cotton yield obtained due to recommended dose (16.48 q/ha), as per soil test (17.87 q/ha) and yield targets of 15 q/ha, 20 q/ha and 30 q/ha was 199, 109 and 80 per cent, respectively higher over recommended doses. Yield targets upto 20 q/ha were achieved. The gross monetary returns net monetary returns and B : C ratio increased with increase in fertilizer dose. Application of higher doses of fertilizers on the basis of yield targeting equations resulted to achieve targeted seed cotton yields. Based on the results it is recommended that, for cultivation of improved varieties of American cotton under summer irrigated condition in Deccan canal tract of Western Maharashtra in vertisols, fertilizers be applied using following fertilizer prescription equations : FN, kg/ha = (13.10 x target yield, q/ha) - (0.75 x soil N kg/ha); FP_2O_5 kg/ha = (6.83 x target yield, q/ha) - 2.84 x soil kg/ha and FK_2O kg/ha = (8.57 x target yield, q/ha) - 0.18 x soil K kg/ha

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Assessment of avoidable yield losses caused by bacterial blight in *G. Cot. hy-10* cotton and its parents

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ABSTRACT : A field experiment to estimate avoidable field losses caused due to bacterial blight (*Xanthomonas axonopodis* pv. *malvacearum*) disease in G. Cot. Hy-10 cotton and its male parent (LRA-5166) and female parent (BC-68-2) was conducted for three successive crop seasons (1996-97 to 1998-99) in FRBD with two infection levels i.e. protected (1-1) and unprotected (1-2). The year wise and pooled results revealed that LRA-5166 a known susceptible cultivar exhibited maximum yield loss of 10.72, 12.74 and 12.33 per cent during 1996-97, 1997-98 and 1998-99, respectively with an average loss of 11.95 per cent whereas G. Cot. Hy-10 indicated 10.71, 12.39 and 10.62 per cent with an average loss of 11.14 per cent and BC-68-2 exhibited 9.07, 11.10 and 8.13 per cent with an average loss of 9.26 per cent respectively. Thus by protecting the crop from the disease, the losses can be avoided to the tune of 9.26 to 11.95 per cent under South Gujarat conditions.

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Effect of organic soil amendments on the incidence of root rot of cotton

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ABSTRACT : Effect of some organic soil amendments were tested against root rot disease of cotton for six crop seasons (1992 to 1998). All the soil amendment treatments were significantly effective in reducing root rot incidence and increasing yield of seed cotton. However, only soil amendment with farm yard manure @ 20 t/ha, pressmud and poultry manure @ 2 t/ha treatments found economical, while neem cake, cator cake and mahuva cake by virtue of their higher cost were uneconomical. Inter cropping with either soybean on sorghum and also crbofuran treatment were not effective.

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Studies on the relationship between weather parameters and bacterial blight of cotton

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ABSTRACT : Bacterial blight of cotton caused by *Xanthomonas axonopodis* pv. *malvacearum* (Smith). Dye is a major disease prevalent throughout the cotton growing areas of the Punjab. Keeping in view the importance of the malady study was conducted in *kharif* 2000 and 2001 at PAU, Regional Research Station, Faridkot. During *kharif* 2000 a field experiment was conducted at PAU, Regional Research Station, Faridkot with the objective to study the relationship between weather parameters (Temperature, Relative humidity and Rainfall with the severity of the bacterial blight during cropping season. For this purpose a susceptible variety F 846 was planted with spacing of 67.5 x 30 cm with plot size of 180 m² during 2nd and 3rd week of May 2000 and 2001. All the recommended agronomic practices were followed for raising the crop. The correlation of bacterial blight severity with different weather parameters have been determined. The simple correlation of bacterial blight severity with different weather parameters were non significant in both the years. The multiple correlation of bacterial blight severity with maximum, minimum, mean temperature; maximum, minimum, mean relative humidity and rainfall was non significant in *kharif* 2000. But there was significant multiple correlation between bacterial blight severity and maximum, minimum, mean temperature; maximum, minimum, mean relative humidity and rainfall in *kharif* 2001.

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Screening of American cotton varieties against leaf curl and bacterial blight

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ABSTRACT : Experiment was conducted at PAU, Regional Station, Faridkot, to find the resistant entries against leaf curl and bacterial blight under natural epiphytotic conditions. The pooled data of two years (2000 and 2001) showed that out of 426 entries from different state and co-ordinated trials, and 654 germplasm lines, 48 entries germplasm lines namely AC 114, Acala 5625, Alber 7-MB-65, Auburn, B 55-12 B 61-2128, Brown lint CBS, CBS, CBR 1, CBR 2, CBR 3, CCH 727, CNH 13, CNH 36, CNH 120, CNH 120, CBR 123, CBR 152, CPD 473, CSH 1071. F 231, F 523, F 1254, F 1830, FHH 94, FHH 99, G. Cot. 10, H 1123, H 1226, JK 205, Lafendu 56, LH 1587, LHH 144, LHH 899, LR 1007, M 18 Pay Mactor, PIL 3 Pusa 101, Raj HH 552, RR 1007, SA 21 Texas 34, Texas 79, Texas D-337, TH 46 WC 181, 66-11-BH-51, 12 ES were free from leaf curl and categorized as highly resistant 8 entries/germplasm lines viz., F 1861, FHH 95, LIC 629, Navkar 5 RS 875, RS 2095, RS 2098 were found resistant with first grade of disease symptoms. Against bacterial blight 17 cultivars/germplasm lines namely Acala 5673, Alber 7-M-65, B 52-NC-63, Brown lint CBS, Cobar Delta Tupe, El 173, F 444, F 523, F 534, F 1203, F 1254, I 1915, May Acale, RAC 3194, Reba B 50, 334, 100 F Parbani showed resistant reaction. So these resistant cultivars/germplasm lines can be further used in breeding programme.

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Development of sick field for the screening against root rot of cotton

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ABSTRACT : The root rot caused by *Rhizoctonia bataticola* (Taub.) Butter and *R. solani* kuhn affects both the *hirsutum* and *arboreum* cotton species being more serious on desi cottons grown in the region. Cultivation of susceptible desi cotton variety, Incorporation of inoculam (diseased roots) in the field during and after the cotton season, addition of inoculum of root rot pathogens (*R. bataticola* and *R. solani*) raised under laboratory conditions and cultivations of a root rot susceptible crop during the off season helped in maintaining the incidence of root rot in the field. In present studies, an attempt has been made to develop a sick field for conducting screening against root rot of cotton.

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Bioefficacy of HaNPV and adjuvants against bollworm, *Helicoverpa armigera* (Hubner) on cotton

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ABSTRACT : Observations on per cent bollworm incidence, good opened, bad opened bolls and seed cotton yield were recorded. Bollworm damage revealed the superiority of HaNPV 500 LE+edosulfan 35EC 1050 g a.i. application which recorded minimum pest damage and was on par with reduced dose of 250 LE+1050 g a.i. per ha treatment but superior to sole application of HaNPV and untreated control. Maximum number of good opened bolls was registered in HaNPV 500 LE+edosulfan 35 EC 1050 g a.i. per ha which was on par with all combinations except lowest dosage of HaNPV 250 LE+endosulfan 35 EC 525 g. a.i. per

ha. Among the adjuvant screened teepol, jaggery and boric acid at 0.1 per cent proved better for HaNPV as they recorded significant control and higher seed cotton yield.

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Crop phenology, pink bollworm (*Pectinophora gossypiella*, Saunders) damage and yield of cotton hybrids in relation to sowing dates

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ABSTRACT : The crop phenological estimates did not differ between hybrids, sowing dates and protected treatments with the exceptions of PKV HY 2 having higher number of vegetative branches than NHH 44, and higher physiological and entomological shedding under protected and unprotected situations, respectively besides higher number of harvestable bolls in unprotected than protected situation. The occurrence of other bollworms being minimal, the number of bad bolls, open boll damage and loculi damage by *P. gossypiella* was 55.5, 54.1 and 61 per cent lower in early than normal date of sowing, respectively. PKV HY 2 had 27 per cent higher *P. gossypiella* damage and 12 per cent reduced yield than NHH 44. However, the interaction effects of the hybrids with planting dates for *P. gossypiella* damage revealed 39 per cent increased damage to PKV HY 2 than NHH 44 only during the normal sowing date. The hybrid x sowing date x protection treatment interactions indicated yield gain to the extent of 30 per cent by early sowing due to the escape from *P. gossypiella*. The phenology of open bolls revealed that the delay in crop maturity associated with PKV HY 2, normal sowing date and unprotected situation had led to greater damage by the late season *P. gossypiella*. The paper also discusses the mechanism of plant compensation as understood based on the growth and development of hybrids under sowing dates and protection treatments.

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Field toxicity of fipronil against *Apis* species foragers in cotton

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ABSTRACT : Field toxicity of fipronil (Fipronil) 50 SC against *Apis dorsata*, *A. mellifera* and *A. florea* was evaluated in cotton (*Gossypium hirsutum* L.) during *kharif* season 2002. Fipronil @ 300, 400 g.a.i./ac in cotton caused 100 per cent mortality of all the three *Apis* species within one hour of application. The respective values of mortality following lowest dose of fipronil (100 g.a.i./ac) were 33.3, 61.6 and 85 per cent with one hour of application. Irrespective of the doses, maximum mortality occurred in *Apis florea* (96.25%) foragers followed by *A. mellifera* (89.16%) and *A. dorsata* (80.85%) indicating thereby the sensitivity of the species. Residual toxicity was highest to *A. dorsata* (71.24%) and lowest to *A. florea* (49.99%). Mortality was maximum after one hour of spray, which decreased drastically after 24 and 48 hours of spray. Dosewise, fipronil residues @ 400 g a.i./ac was more deleterious to *Apis* foragers as compared to other doses.

Inter-relationship and variability analysis on area, production and yield in major cotton producing countries of the world

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ABSTRACT : A study has been made for variability and association analysis on area, production and yield of the eight countries viz., Brazil, China India, Pakistan, Turkey, Sudan, Egypt and USA for the period 1989 to 2000. Average area of India was the highest 8096.25 thousand hectares followed by USA (5104.83) and China (4725.58) it ranged from 204.08 (Sudan) to 8096.25 (India) thousand hectares. Average production in metric tones varied from 4333.82 (China) to 99.73 (Sudan). The countries which had higher production than India were, China and USA. Percentage proportion of India against World's average production was 11.09 per cent, whereas that of China and USA was 23.53 and 19.60 per cent respectively, though percent area proportion was 24.60, 15.60 and 15.51 indicating that China and USA contributed for production higher than the percent area proportion. Area (8.64) and production (8.65) proportion against World's figures for Pakistan was almost similar. Egypt and Turkey also contributed higher percent proportion in productivity than area due to higher yield than world's average. The average cotton yield of India (261.67 kg/ha) was the lowest among the eight countries. Yield ranged from 261.67 (India) to 1167.25 (Egypt). The countries which had higher yield than World's average were China, Mexico, Pakistan, Turkey, Egypt and USA. Average yield of Brazil, China, Pakistan, Sudan, Turkey, Egypt and USA 175.00, 311.22, 299.63, 211.28, 159.02, 372.90, 331.55 and 264.73 per cent of India's yield. For area Brazil with China, India with Pakistan and Turkey and significant positive association indicating similar trend in increase or decrease during 1989 to 1999. However, China with India and Turkey had significant negative association for area. For production, Brazil with Turkey, Pakistan with USA had significant association and Sudan showed positive association with Turkey. For yield; Turkey showed significant and positive association with Brazil and China, Sudan had significant and negative association with Brazil, China and Turkey. There was positive association between area and production for all the countries except Pakistan. However, there was negative association between area and yield for all the countries except India and Turkey. Production and yield showed negative association for the countries Brazil, China and USA and was positive for remaining countries.