

ABSTRACTS

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Studies on cotton genetic resources in relation to current breeding needs and for the 21st century

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ABSTRACT : India is the third richest country in its total holding of cotton genetic resources with about 7000 accessions of cultivated and introgressed material besides species of *Gossypium*. Investigations on about 70 characters of significance in breeding were undertaken for three years during 1986-1988. For current needs of cotton breeding for the nineties aimed at lint production target of 120 lakh bales, requirements of higher load of boll productivity and quality cotton for new end uses were assigned priority. Around 750 accessions in the four cultivated species were identified for heterosis breeding and over 60 for varietal improvement. These types were selected for imparting higher boll load, big bolls, highly synchronised bursting with reduced duration of 150-160 days, naked seed, high oil, tolerance to white fly, escape to bollworms and technological properties for suitability for open-end spinning and mill demands. The production targets for the beginning decade of 21st century is estimated at about 15-16 m balles of lint and 12-16 lakh tonnes of edible cotton seed oil. The breeding emphasis for meeting the target will be through higher fruiting coefficients on compact frame with higher genetic resistance to various pests and diseases like white fly, bollworms and wilts, revolutionizing plant and population geometry, genetic potential for higher seed oil with superior oil quality and special qualities of fibre for facing stiff competition with synthetics. Over 3600 accessions are assessed to have the potential to provide the basic material and skillful manipulation of around 34 characters could lead to cotton production revolution to meet the challenge of the 21st century.

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Heterosis, in relation to genetic divergence, for ginning out-turn and related characters in cotton

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ABSTRACT : heterobeltiosis estimated in 36 crosses effected in a partial diallel utilizing nine genetically diverse parents of cotton (*G. hirsutum* L.) evaluated at three locations, was to the extent of 12.84 and 42.91 per cent for ginning out-turn and lint index, respectively by the cross, Kop-557 x Kop-495, at Jalgaon and 31.94 per cent (Laxmi x AC-738) for seed index at padegaon. The highest mean heterosis over environments, for the respective characters was however to the tune of 5.66, 30.70 and 21.68 per cent indicating varying magnitude of heterosis in different environments suggesting the necessity of assessing the hybrids for their heterotic responses in multiple environments. The cross, Kop-557 x Kop-495 appeared most heterotic for the traits studied. The hybrids with high diversity among the parents did not always result in high amount of desirable heterosis.

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Correlation and path analysis for seed characters in asiatic and american cottons

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ABSTRACT : The contribution of different components of seed in increasing the seed yield per plant is of a paramount importance to the seed researchers. Correlation and path analyses studies were made with genotypes each of *Gossypium arboreum* and *Gossypium hirsutum* for five seed characters viz., seed index, fuzz percentage, hull percentage, kernel percentage and seed oil percentage. Significant negative association was observed between hull percentage and kernel percentage in both the species at both phenotypic and genotypic level. The high kernel percentage, low hull percentage and high seed index were found useful parameters for increasing seed yield per plant in cotton.

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Heterosis and inbreeding depression in upland cotton

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ABSTRACT : A diallel cross involving 10 varieties of upland cotton was studied for heterosis and inbreeding depression. Out of 45 crosses, heterosis for yield of seed cotton was detected in five combinations. The highest heterosis effects were recorded in the hybrid. Albar 49 X K 3499 with 54.9 and 25.09 per cent increase over better parent and over standard variety, respectively. Increase in boll weight was partially responsible for the increase in productivity of the hybrids. The significant inbreeding depression in yield of seed cotton was detected in eight cross combinations, ranging from 42.64 to 18.33 per cent. The heterosis for characters was 15.31, 17.04 and 1.96 per cent for yield, boll number and boll weight, respectively, while inbreeding depression was 14.58, 12.14 and 2.75 per cent for the same characters, respectively.

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Correlation and path coefficient analysis in hybrid cotton (*Gossypium hirsutum* L.)

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ABSTRACT : The correlation studies in cotton hybrids revealed that seed cotton yield was positively and significantly associated with number of sympodia/plant, picked bolls/plant and dry matter production/plant and mainly it was depended on these characters. Similarly, the other characters viz., boll weight/plant, leaf area/plant, ginning percentage and seed index showed positive correlation with seed cotton yield. Picked bolls/plant, number of sympodia/plant and leaf area/plant were positively and significantly correlated with dry matter accumulation. Path analysis indicated that the number of picked bolls/plant, boll weight and ginning percentage had the maximum positive direct effect on seed cotton yield. Whereas, leaf area/plant had positive indirect effect via. boll weight, ginning percentage and seed index.

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Generation mean analysis in an inter-varietal cross of upland cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Gene effects were estimated by generation mean analysis for nine agronomic traits in a varietal cross of Upland cotton. Epistasis were detected for all traits except boll size, ginning outturn and days to flowering. Possibility of higher order interaction was evident for halo length. Additive and dominance gene effects were important for number of bolls per plant, boll size, lint index, halo length and plant height. Additive gene effects were involved in the expression of seed cotton yield, seed index, ginning outturn and days to flowering.

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Inheritance of yield and its components in *G. hirsutum* L. cotton

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ABSTRACT : The analysis of genetic components of variation indicated preponderance of dominance gene action though both, additive and dominance gene effects were involved in the control of yield and its components. Positive 'F' values suggested high frequency of dominant alleles among the parents and over-dominance with low heritability estimates were observed for the characters studied. The KD/KR ratio higher than unity for boll number/plant and boll weight suggested excess proportion of dominance genes in the parents for these traits.

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Energy and monetary economics of various weed management systems in cotton

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ABSTRACT : Three hand hoeing, one interculture with bullocks at nine weeks after sowing, three intercultural, fluchloralin alone and fluchloralin in combination with one hand weeding were evaluated in field experiments for finding the comparative energy and monetary economics in cotton. Three intercultural with bullocks gave highest cost benefit ratio even though it provided significantly lower weed control than three hand weeding. Maximum energy consumption was recorded when nitrogen and fluchloralin were applied sequentially on the same day at sowing for improving the crop growth and weed control. The energy requirement per kg seed cotton and cost per unit energy utilized or given was maximum with three hand hoeings. Seed cotton yield was maximum when fluchloralin was supplemented with one hoeing at nine weeks after sowing. Three hand hoeings and fluchloralin + one hand weeding were most effective in reducing the population of carpetweed and barnyardgrass.

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Efficacy of growth hormones on cotton under low and high fertility levels

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ABSTRACT : Field experiment were conducted during 1985-86 and 1986-87 at the JNKVV College Campus, Khandwa (M.P.) to evaluate the efficacy of growth hormones under different fertility levels and frequency of spray. Fertility levels and growth hormones did not affect the ancillary characters significantly. High fertility ($N_{60}P_{40}K_{20}$) over low fertility ($N_{30}P_{20}K_{10}$) and two sprays of hormones over one spray, proved beneficial for production of seed-cotton. Miraculan and Triacontunal exhibited stimulatory action only under high fertility level and two spray conditions.

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Studies on performance of cotton in relation to different cropping systems under dryland conditions

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ABSTRACT : A field experiment was conducted during **kharif** 1987-88 and 1988-89 at Dryland Agriculture Research Centre, Parbhni to study the performance of cotton in relation to different cropping systems under dryland conditions. Results revealed that cotton + blackgram intercropping had recorded the highest total monetary returns of Rs. 12507/ha and it was significantly superior over all other monocropping, intercropping & double cropping systems. The second highest position was acquired by monocropping of cotton followed by sole crop of redgram. The highest moisture use was recorded by sorghum + redgram intercropping followed by double cropping of pearl millet followed by safflower. The highest moisture use efficiency was recorded by cotton + blackgram intercropping system followed by sole crop of cotton on monetary returns basis, where as the highest moisture use efficiency was recorded by sole crop of sorghum followed by intercropping of cotton + blackgram on grain yield basis.

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Effect of nitrogen and azotobacter on yield of seed cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Studies conducted at Haryana Agricultural University Hisar indicate that seed inoculation of cotton seed with C_2 , M_4 and Azo sp. supplied with 2/3 of recommended dose N (53 kg N/ha) resulted into yield attributes and seed cotton yield at par with recommended dose of N (80 kg N/ha). An increase of about 43 per cent, 37 per cent, 38 per cent and 63 per cent in the seed cotton yield was recorded from full dose of N, 2/3 N+ C_2 , 2/3 N+ M_4 and 2/3 + Azo. sp. over no nitrogen, respectively. Treatment of seed by nitrogen fixing bacteria resulted into saving of about 30 kg N/ha without any significant loss in seed cotton yield.

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Role of contaminated seed and infected plant debris on the development of myrothecium leaf spot in cotton

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ABSTRACT : Cotton seed when soaked for different durations in conidial suspension of *Myrothecium roridum* resulted in the reduction of germination and 12 h soaking completely inhibited seed germination. Sowing seeds in the infect plant debris-soil mixture resulted in reduced emergence of seedling (78%) and showed cotyledonary infection (25%) on the emerged seedlings as compared to control with 96 per cent germination and no cotyledonary infection.

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Chemical control of *Macrophomina phaseolina* by systemic and non-systemic fungitoxicants in upland cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Efficacy of seven commonly recommended fungitoxicants, viz., quintozen (Brassicol, 75 W. P.) MEMC (Emisan, 6 Hg). Captafol (Difolatan, 80 W. P.); Thiram (Thiride, 75 W. P.); carbendazim (Bavistin, 50 W. P.) thiophanate-M (Cercobin, 70 W. P.) caryboxin (Vitavax, 75 W. P.) was tested as seed treatment, pre-and-post sowing soil drench and seed treatment plus pre-sowing soil drench against root rot of cotton due to *Macrophomina phaseolina* (Tassi.) Gold (*Rhizoctonia bataticola* (Taub.) Butler) either singly or jointly of two fungitoxicants under screen house conditions. Carbendazim and q2uintozene proved to be the most effective, whereas thiram and captafol accounted for less disease control when used individually as seed treatment and as soil drench, against *M. phaseolina* causing root rot. However, pre-sowing-soil drench of fungitoxicants was more effective in controlling root rot as compared to post-sowing soil drench. Among different combinations of fungitoxicants tested as seed treatment the combination of quintozene and carbendazim provided maximum disease control. However, the efficacy of fungitoxicants when used as joint seed dressings was relatively less as compared to the performance of individual chemicals.

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Relative toxicity of some insecticides to the cotton leafhopper *Amrasca biguttula biguttula* (Ishida)

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ABSTRACT : Eighteen insecticides of different chemical groups viz., organophosphates, organochlorines and carbamates were bioassayed under laboratory conditions of LC 50 against cotton leafhopper *A. biguttula biguttula* (Ishida). Out of 18 insecticides tested, fenthion proved the most effective. Aldrin and

DDT were the least effective. Carbaryl was superior to DDT and aldrin. Among organophosphates, fenthion, quinaldhos and chlorpyrifos were highly toxic whereas fenitrothion, diasinon, phenthorate and dichlorvos were less toxic to the pest. Among the organochlorines BHC and aldrin were superior to DDT, the only carbamate (carbaryl) tested was found to be less toxic than all other organophosphates.

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Impact of different insecticides on target and non target pests and productivity of cotton in different varieties of asiatic cotton *Gossypium arboreum* L.

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ABSTRACT : Observations were made on the impact of insecticides belonging to synthetic pyrethroid (deltamethrin), organophosphatic (monocrotophos) and carbamate (carbaryl) groups on target (bollworms) and non-target pests (jassid and whitefly), predators and productivity in 3 cultivars of Asiatic cotton (G 27, LD 133 and LD 230). Deltamethrin was found to be most effective for bollworms, and monocrotophos for jassid and whitefly control. All the insecticides were toxic to predators, deltamethrin was comparatively safe. All the insecticides increased the boll weight and number but this increase was more in deltamethrin. There was no adverse effect of insecticides on fibre quality. The population of target and non target pests and predators did not differ significantly among different varieties. The total boll number was higher in G 27 and LD 230. The boll weight was also more in LD 230. The overall productivity of seed cotton was high in LD 230.

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Moth catches in pheromone traps in relation to meteorological conditions

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ABSTRACT : Observation of pheromone traps were recorded from September 3, 1986 to March 4, 1987 on three bollworm pests viz., American bollworm (*Heliothis armigera* Hubner), spotted bollworm (*Earias vittella* Fabricious) and Pink bollworm (*Pectinophora gossypiella* Saunders), *armigera* and *vittella* were found active throughout the course of observations. Whereas, *gossypiella* had quite low incidence and irregular activity. The moth catches of *armigera* showed positive significant correlation with minimum temperature and the relative humidity. The moth catches of *vittella* had positive and significant correlation with maximum temperature, whereas moth catches of *gossypiella* did show significant correlation with any of environmental factor under study.

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Evaluation of *Arboreum* populations for resistance to cotton bollworms and wilt

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ABSTRACT : Segregating population from 15 diverse crosses of *Gossypium arboreum* L were screened for resistance to bollworms and *Fusarium* wilt from 1983 to 1985 in a wilt infested field under unsprayed conditions. The wilt free plants recording low bollworms infestation were advanced for further testing. Three F₇ progenies viz., 2, 5 and 13 were identified to be comparatively resistant to bollworms and wilt than the standard varieties. These are being used as donors for resistance breeding.

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Incidence and losses to some cotton hybrids by the pest complex

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ABSTRACT : The incidence and losses to cotton by insect pest complex were quite striking. The overall yield losses of 8.19 times in Hybrid-4, 3.59 times in JKHY-1, 3.82 times in Hybrid-6 and 7.07 times in Varalaxmi were recorded in untreated plots as compared to plots having plant protection treatments.