**ABSTRACTS**
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## Breeding of *Herbaceum* cotton in India

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**ABSTRACT :** *Gossypium herbaceum* Linn. is an old world diploid (2n=26) cotton which has wide adaptability and high degree of resistance to biotic (insects and diseases) and abiotic (drought) stresses and is grown in scattered parts of South East Asia as a dry land crop. Exploitable genetic variability for yield and its components, fibre length and seed oil content is available in the gene pool of this species maintained at CICR, Nagpur. Both additive and non-additive genetic variances were found important for seed cotton yield, bolls per plant, seed index, ginning outturn and fibre length. Magnitude of heterosis indicated ample scope for evolving commercial hybrids at interspecific level and limited scope at intraspecific level. Boll number was found as major component of heterosis in yield. Development of more productive cultivars (G. Cot. 11, G. Cot. 13 and DB 3-12) and high yielding interspecific hybrids (DH 7, DH 9 and DDH 2) involving *G. herbaceum* are the significant milestones in the diploid cotton improvement in India. Future areas of research in this species are also given.

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## Improvement in productivity and oil content of cotton (*Gossypium hirsutum* L.) cultivars through induced polygenic mutations

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**ABSTRACT :** Cotton cultivars SRT-1, L-147, Laxmi, Buri-1007 and DHY-286 were subjected to 7 doses of gamma radiation. SRT-1 and L-147 were treated also with 7 concentrations of Ethyl Methane Sulphonate (EMS). Lower doses, especially 5 KR gamma and 0.05 per cent EMS resulted in a higher proportion of superior mutant progenies. A few among the M4 and M5 progenies gave more than 100 per cent increase in seed cotton yield over control under rainfed conditions. Three gamma progenies of cv. Laxmi and 4 EMS progenies of cv. L-147 were superior in M4, M5 and M6. EMS progenies 18/38 of L-147 gave consistent higher yields in M4 and M5. Several gamma progenies of Laxmi also showed early boll maturity and substantial improvement in boll weight. Gamma progenies 6/20 of Laxmi had higher yield and seed-oil content in M4 and M5. Single plant/progeny selection (Pedigree system) proved to be advantageous as compared to bulk population selection. The results support the possibility of improvement in older cultivars by way of induced mutagenesis.

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## Genotype x environment interactions and stability for seed-oil content in cotton (*Gossypium arboreum* L.)

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**ABSTRACT :** Performance of 11 entries of *G. arboreum* for oil content and seed index was compared over three locations and for three years. Effects of entries, harvest times and most of the two and three-factor interactions for oil were significant. The effects of harvest times, followed by years were found to be more important for seed index. The entries showed a decline in oil content at third harvest. Stability analysis revealed that many of the cultivars and elite selections had better adaptation to relatively poor environments for oil content and average adaptation for seed index trait over the environments.

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## Combining ability analysis of a full diallel in *Gossypium hirsutum* L.

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**ABSTRACT :** A full diallel of 7 x 7 was attempted in *Gossypium hirsutum* L. using 7 promising strains of diverse geopraphic origin and the data were subjected to combining ability analysis. Significant gca and sca variances were observed for all characters studied. In general gca variances were higher for all the characters except for number of seeds/boll indicating the pre-dominance of additive, additive x additive type of gene action for them and dominance and epistatic effects for number of seeds per boll. Positive gca effects shown by certain parents for seed cotton yield/plant were also reflected in high $F_1$ means wherever these parents were involved in the cross. Although a direct hybrid combination could not be identified for release, there appears to be a scope for improving simultaneously yield and its components and other important characters like ginning percentage and halo length by simple selection on the basis of yield per se.

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## Genetic analysis of some economic traits in Asiatic cotton

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**ABSTRACT :** The nature and magnitude of genetic components of variance were studied in 10 x 10 diallel cross experiment in Asiatic cotton (*Gossypium arboreum* L.). Non-additive gene action was significant for all the characters studied. Whereas additive gene action was significant for yield/plant, boll weight, seed index, ginning outturn and halo length. High frequency of dominant alleles was predominant for seeds/locule. Overdominance was observed for all the traits. There was unequal distribution of negative and positive alleles in the parents for all the traits. Presence of more number of dominant alleles in comparision to recessives was observed for seed cotton yield, seeds/locule, boll weight, seed index and ginning outturn, whereas it was reverse for number of bolls and halo length. At least one group of dominant genes was found operative for all the traits except number of bolls and seeds/locule. Heritability estimates were high for all the traits except seeds/locule. Presence of dominance type of gene action for yield and its components suggested development of hybrids.

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## Partial diallel analysis for combining ability in cotton

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**ABSTRACT :** Eight genotypes were crossed in partial diallel. Combining ability analysis showed that mean squares due to both general combining ability (gca) and specific combining ability (sca) were significant for number of fruiting branches per plant and seed cotton yield per plant. The former being smaller in magnitude than the latter. The mean squares due to sca for number of picked bolls per plant was found significant. However, the higher estimates of non-additive component ($6^2$D) than additive component ($6^2$A) and lower and negative estimates of gca/sca ($6^2$g/$6^2$s) than unity for all the characters indicated the predominant role of non-additive gene action in the expression of all the characters. The parent Suman was found good general combiner for seed cotton yield per plant whereas, parent Sharda was poor general combiner for yield.

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## Nature of associations among different quantitative characters in cotton (*Gossypium arboreum* L.)

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**ABSTRACT :** These female and 11 male parents with their 33 $F_1$s were used for computing correlations and path coefficients among eight different quantitative characters in cotton (*Gossypium arboreum* L.). Boll/plant, boll weight, plant height, seed index and lint index showed significant positive association with seed-cotton yield. Significant positive correlation of bolls/plant was also observed with plant height and lint index. Boll weight showed significant positive association with seed index and lint index. Ginning outturn and seed index had positive association with lint index, whereas halo length showed negative association with ginning outturn, path analysis revealed that bolls/plant followed by boll weight had the largest direct contribution towards yield, whereas plant height contributed to yield *via* boll/plant.

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## Genetic analysis of yield and fibre characters in cotton (*Gossypium arboreum* L.)

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**ABSTRACT :** The nature and magnitude of genetic components of variance were studied in 10 x 10 diallel cross experiment in *Gossypium arboreum* L. Additive component of variance was significant for all the traits under study while non-additive type of gene action was more important for seed cotton yield, boll number, boll weight, seeds/locule and lint index. A higher frequency of dominant alleles was predominant in seeds/locule. Over dominance was recorded for seed cotton yield, boll number, boll weight, seeds/locule, ginning outturn and lint index. For lint index there was equal distribution of positive and negative alleles among the parents. Seed cotton yield, boll number, seeds/locule, ginning outturn and seed index were having more number of dominant alleles than recessive in the parents. At least one group of dominant genes was involved for the control of all the characters and heritability (narrow sense) estimates were recorded high for halo length, ginning outturn and seed index. Considering the major role of dominance type of gene action for yield and its important components, the production of hybrid appears to be quite useful.

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## Genotypic variability in cotton for 2, 4-D induced leaf-deformities

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**ABSTRACT :** Various genotypes of *desi*, American and its hybrid were screened for 2, 4 dichlorophenoxy acetic acid resistance under pot culture conditions. Initiation of leaf-deformities with 2, 4-D (1µg/ml) was early in hybrid and 10 days after spray leaf-deformities were observed in each genotype. Recovery from leaf-deformation was very rapid in *desi* genotypes. Average total number of flowers in each group of cotton was not significantly affected with 2, 4-D. Periodicity of flowering was altred in response to 2, 4-D. Thus flowering peak was early by one week. Intergenotypic flowering and yield differences in response to 2, 4-D were significant. Shymall, H-474 and HHH-11 were relatively more 2, 4-D resistant, whereas HD-107, H-1101 and HHH-81 were highly susceptible genotypes.

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## Effect of nitrogen doses and specings on *Arboreum* cotton

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**ABSTRACT :** An experiment to study the effect of nitrogen fertilization and spacing on the productivity of newly evolved high yielding *arboreum* variety LD 327, was conducted at Punjab Agricultural University, Ludhiana and its Regional Research Stations, Jalandhar and Kheri during *Kharif,* 1988, 1989 abd 1990. LD 327 responded to nitrogen fertilization upto 120 kg N/ha at Ludhiana and 100 kg N/ha at Jalandhar and Kheri. The closer plant-to-plant spacing of 15 cm yielded significantly higher seed cotton as compared to 30 cm at all the locations. Increase in row-to-row spacing from 60 cm to 67.5 cm did not affect the yield. Interactions between nitrogen doses and spacings were not significant with respect to yield other characters. Different spacings and nitrogen doses did not exhibit significant differences with respect to bollworms incidence in the opened bolls and carryover of pink bollworm.

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## Effect of defoliants on yield and maturity of *Gossypium hirsutum* cotton under ummer irrigated condition

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**ABSTRACT :** Two chemical deflollants *viz.,* Ethrel (Ethephon-39%) and Thiadizuron (Dropp) in their two concentrations 2500 ppm, 5000 ppm and 100 and 200 q/ha respectively were tested to study their effect on seed cotton yield, forced maturity and fibre quality of *Gossypium hirsutum* L. Cotton Var. Kop-498 under summer irrigated conditions during the years 1989-92. The defoliants were sprayed at 40 and 60 per cent boll bursting stages. On the basis of pooled averages, the defoliants gave significantly higher yield (1495 kg/ha) when sprayed at 40 per cent boll bursting stage over 60 per cent boll bursting stage (1409 kg/ha). The treatments, Ethrel 2500 and 5000 ppm and Dropp 200 gms/ha gave significantly higher seed cotton yield over control (1362 kg/ha). However, Dropp 100 g/ha was at par with control. Both the defoliants induced early maturity by 13 days (Ethrel, 5000 ppm) to 8 days (200 q/ha) over control, causing thereby pickings of more than 80 per cent produce in first two pickings as against less than 70 per cent in control. However, stages of spraying did not show any effect on inducing early maturity. Ethrel was found effective in early and complete leaf shedding as compared to Dropp. Forced maturity did not effect any fibre quality characters adversely.

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## Effect of various causes of malformation on fibre quality of *hirsutum* cotton

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**ABSTRACT :** Eleven treatment combinations salected for inducing malformation in *hirsutum* cotton variety H-777 *viz.* delinted seed, fertilizer, insecticide each contaminated with 2, 4-D ethyl ester 34 EC, spray of 2, 4-D ethyl ester just before sowing of cotton, insecticide [domethoate (Rogor) 30 EC] spray with 2, 4-D ethyl ester contaminated spray pump, outdated insecticide (dimethoate 30 EC) spray, black and white polyethylene sheets used as mulching material were evaluated for finding out their impact on main fibre quality characters. 2.5% span length and uniformity ratio were not significantly affected due to these treatments. 2, 4-D ethyl ester contaminated spray pump used for spraying fresh sample of dimethoate (Rogor) 30 EC had maxium adverse effect on micronaire value, maturity coefficient, intrinsic fibre fineness and fibre strength. Black polyethylene sheet used as mulching material improved micronaire value, intrinsic fibre fineness and fibre strength.

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## Chemical composition of healthy and drying cotton plant

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**ABSTRACT :** Soil and plant samples from healthy, start drying and fully dried plots of cotton H-777 were collected from four different locations in Hisar district during kharif 1991. Physicochemical properties of soils did not show any variation w.r. to healthy and affected plants at all locations. All soils were deficient in DTPA extractable Zn. Significant difference wre recorded in N, P and K contents in different parts in between healthy and drying plants at all locations. Micronutrient composition in all parts of the plant was also affected. The seed cotton yield depends on number of plants per unit area, number of bolls per plant and boll weight. If this problem of sudden drying of cotton plant persist during the September month then there would be a great reduction in the seed cotton yield in near future. Keeping all this point in view the present study was undertaken to know whether any nutritional aspect associated with the sudden drying of cotton plant. this type of problem was first reported by Mandloi (1979) (Personal Communication) in JK HY-1 hybrid of Madhya Pradesh.

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## Response of american cotton varieties to plant spacings and nitrogen levels on growth characters

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**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 the Cotton Research Station, Sirsa of Haryana Agricultural University, Hisar during the *kharif* seasons of 1983 and 1984. It was laid out in split plot design with combinations of varieties and plant spacings as main treatment and nitrogen levels as sub-plot treatment and replicated three times. Variety HS-50 was found to be comparatively better in plant height, leaf area index, dry matter accumulation in stem, leaves and finally total dry matter, particularly at the initial stages of crop growth. Narrow plant spacing, resulted in reduced dry matter

accumulation in stem, leaves and reproductive parts at all the crop growth stages, whereas an increase in leaf area index (LAI) was observed. Number of monopodial branches decreased significantly with the decrease in plant spacing, but had no effect on sympodial branches. Application of nitrogen increased the plant height, leaf area-index (LAI) and dry matter accumulation in stem, leaves and reproductive parts.

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## Effect of different insecticides and spray intervals on the yield contributing factors in *hirsutum* cotton

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**ABSTRACT :** Large number of insect-pests cause serious damage to yield and quality of cotton. For the control of these insect pests and to achieve high yields, application of several insecticides have been recommended from time to time but their effects on yield contributing factors have not been evaluated. Studies on the effect of different insecticides and spray intervals on seed cotton yield and its components *viz.,* number of bolls, boll weight, seed index and ginning outturn, conducted during 1987 and 1988, revealed that all the insecticidal treatments increased yield of seed cotton, number of bolls, boll weight and seed index as compared to control. The order of efficacy was observed to be fenvalerate-decamethrin triazophos>monocrotophos>quinalphos>diflubenzuron. However, ginning outturn was better in all these insecticidal treatments except diflubenzuron, than control. Amongst the spray intervals more bolls and higher yield, boll weight, seed index and ginning outturn were recorded in 10 day spray intervals, followed by need based and 15 day spray intervals. While low boll number and lower yield less boll weight, seed index and ginning outturn were obtained in 29 days spray intervals.

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## Field evaluation of alphamethrin for the control of bollworms on cotton in Punjab

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**ABSTRACT :** Efficacy of alphamethrin (Fastac/Alphaguard 10 EC) @ 25 g ai/ha was compared with fenvalerate, cypermethrin (both at 50 g ai/ha), deltamethrin 10 g ai/ha) and fluvalinate (75 g ai/ha) under field conditions in two experiments on *Gossypium hirsutum* variety LH 900 during 1989. It was found that alphamethrin was as effective as other synthetic pyrethroids in reducing bollworm incidence in open bolls. It was significantly better than fluvalinate in reducing the shedding due to spotted bollworms (in buds and bolls), bollworm incidence in green bolls and unopen bolls, and pink bollworm carryover both in open and unopen bolls. The yield of seed cotton in alphamethrin and other insecticide treated plots was at par and better than control.

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# Comparative bioefficacy of some insecticides against sucking pests of cotton

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**ABSTRACT :** Comparative bioefficacy of carbaryl, carbaryl+molasses, chlorpyrifos, DDT, DDT+BHC, endosulfan, fenitrothion, leptophos, monocrotophos, phosalone, quinalphos, RH-218, toxaphene and toxaphene+DDT (Heliotox) against jassid and whitefly infesting cotton was tested. Spraying was started twelve weeks after sowing. Five sprayings were given in the crop. Population of jassid and whitefly was recorded 2, 7 and 14 days after each spray. Monocrotophos was found to be the most effective insecticide in suppressing jassid population upto 14 days after spray, whereas in carbaryl, leptophos and carbaryl+Molasses (Sevimol) the population build up observed after 7 days of spray. Fenitrothion, quinalphos, RH-218 and toxaphene treated plots showed greater reduction in jassid population after 2 days of spray but fairly high population of jassid nymphs was observed after seven days of spray. Significantly low popualtion of whitefly was observed in monocrotophos and quinalphos treated plots upto seven days after spray as compared to the rest of the treatments. The population of thrips was very low throughout the crop season.

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# Effect of seed treatments on dry boll rot of cotton

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**ABSTRACT :** Among many cardinal factors responsible for low yield, diseases particularly the boll rots play an important role. Boll rots not only reduces the quantity of produce but also affect the quality. A large number of bacterial and fungal organisms have been found to be associated with boll rot. During 1988, in general, more germination, less seedling mortality and boll rot, both on boll as well as locule basis, was recorded as compared to 1989. Among six fungitoxicants tested as seed treatment on carry over effects of these fungitoxicants on boll rot, carbendazim, captafol and thiophanate-M were at par in reducing the boll rot while the effectiveness of captan was least. No fungicidal treatment was found more effective than the standard check or the recommended seed treatment (MFMC+Streptomycine sulphate).