**ABSTRACTS**
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## Study on nucleic acids and protein in dedifferentiated and differentiated tissues in cotton

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**ABSTRACT :** The regeneration of plants from callus or cell suspension culture in cotton is most difficult and problematic as somatic embryogenesis in cotton is more specific to genotypes. The biochemical changes during different stages of callus and suspension culture were compared in the present investigation with different plant growth stages in cotton. The changes of plant intact cells into dedifferantiated condition resulted in increase in the quantity of DNA and RNA. But in course of culture, the quantity of nucleic acids decreased. The content of RNA in callus tissue was more than two times that of plants, but protein was two and a half times less in callus than in plant stem. The content of nucleic acids and protein was increased at an early stage (10th day) of dedifferentiation of plant cells, at 30th day, there was decrease in content of nucleic acids and protein and then attained a stationary value and which was further maintained. Content of nucleic acids and protein was more intensive in cell suspension culture than in callus. The study indicated that there is a lot of variation in content of nucleic acids and protein in differentiated and dedifferentiated tissues.

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## Comparative study of nuclear, chloroplast and mitochondrial DNA in callus, stem and leaves of cotton

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**ABSTRACT :** The DNA from nucleus and cell organells was extracted and compared their molecular mass, physical and chemical properties in callus as well as in plant parts of cotton genotypes. The study showed differential level of biosynthesis and accumulation of DNA and specificity of its content in differentiated and dedifferentiated (callus) cell nucleus and cell organells. The content of DNA in cell organells of parental forms and derivative form was not significant.

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## Genetical analysis of quantitative traits in $F_2$ and backcross populations on upland cotton (*Gossypium hirsutum* L.)

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**ABSTRACT :** The Triple test cross analysis was used to detect and estimate the additive, dominance and epistatic components of genetic variation for seed cotton yield, boll number, boll weight, plant height, ginning outturn, seed index, lint index and halo length in $F_2$ and $BC_1$ generations of a cross F 414 x HC 6393 in upland cotton. Epistasis was important for seed cotton yield, boll number and lint index in $F_2$

generation, whereas it was non-significant for all the characters in $BC_1$ generation. Additive gene effects were significant for all the characters in $F_2$ generation while they were significant for seed cotton yield, boll number, ginning outturn, lint index and halo length in $BC_1$ generation. Dominance gene effects were important for seed cotton yield, boll number, boll weight and lint index in $F_2$ generation and only for ginning outturn in $BC_1$ generation. due to the predominance of additive gene effects, conventional breeding procedures are suggested for the genetic improvement of most of the traits.

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## Breeding for resistance to biotic stresses in cotton

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**ABSTRACT :** Insects and diseases are the major causes of biotic stresses. In India, jassids and bollworms among the insects; and bacterial blight, Fusarium wilt, root rot, grey mildew, *Myrothecium* and alternaria leaf spot among the diseases are the major causes of biotic stresses in cotton. Biotic stresses hamper both yield and quality by stunting plant growth, damaging vegetative and reproductive plant parts, causing premature defoliation and wilting of plants. Various morphological and biochemical factors of host plant are associated with resistance to biotic stresses. Two host plant characters viz., earliness for pink bollworm escape and hairiness for jassid resistance have been successfully used in practical cotton breeding. Some varieties resistant to jassid (B 1007, SRT 1, Khandwa 2, DHY 286, PAV 081, PKV Hy 2, etc.) and tolerant to bollworms (G 27, Lohit, DS 1, LD 327, MCU 7, H 777, LH 900, Sharada, Abadhita, LRK 516, etc.), wbitefly (Kanchana, Supriya, LK 861), *Fusarium* wilt (Sujay, Raichur 21, G.Cot. 13, etc.) and *Verticillium* wilt (MCU 8VT) have been released for commerical cultivation in India. Mechanism, basis, genetics and sources of resistance to biotic stresses have been discussed. Breeding approaches, practical achievements, limitations and areas for further research on biotic stresses are also presented.

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## Heterosis, combining ability and parent-offspring relationships in upland cotton (*Gossypium hirsutum* L.)

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**ABSTRACT :** Nine diverse genotypes of american cotton alongwith their possible 36 $F_i$s (excluding reciprocals) were raised in a randomized block design and evaluated for seed cotton yield per plant, bolls per plant, halo length and ginning outturn. Combining ability analyses revealed the presence of both additive and non-additive gene action for all the traits, except ginning outturn, where only non-additive gene action was observed. Three parents, F 414, F 505 and F 846 were observed as good general combiners for seed cotton yield per plant. Cross combinations, F 414 x 081 and F 414 x F 505 having high and avarage sca effects, respectively and involving one good general combiner as a parent exhibited significantly positive economic heterosis for seed cotton yield per plant. Other two cross combinations, F 505 x CHN 142 and F 286 x 081 also exhibited significant positive economic heterosis for seed cotton yield per plant.

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## Effects of spacings and nitrogen on cotton hybrids

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**ABSTRACT :** Field experiments were conducted during *kharif* seasons of 1989 and 1990 which revealed that the closer spacings of 90 x 30 cm produces significantly the highest seed-cotton yield as compared to wider spacings, despite a decrease in number of bolls per plant and yield per plant. Hybrids responded upto 120 kg N/ha during both the years, for seed cotton yield and attributing characters. Amongst the hybrids JKHy-1 was found statistically superior (22.05 and 15.32 q/ha in respective years) over NHB-12 (17.20 and 12.29 q/ha) and DCH-32 (15.50 and 7.27 q/ha).

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## Effect of defoliants on seed cotton yield and yield parameters on American cotton (*Gossypium hirsutum* L.)

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**ABSTRACT :** A field experiment was conducted for three seasons during *kharif* 1990 to 1992 at Agricultural Research Farm, Sriganganagar the optimum dose and time of application of an ideal defoliant for enhancing cotton maturity. Results have conclusively shown that Dropp @ 200 g/ha in 600 l/ha of water at 60 per cent boll opening increased seed cotton yield by 16.7 per cent over control (waterspray).

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## Performance of *arboreum* cotton varieties under different sowing dates and nitrogen levels

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**ABSTRACT :** The experiment was conducted for three seasons, to study the different sowing dates and levels of nitrogen on new varieties of *G. arboreum*. Nitrogen enhanced seed cotton yield in all the three seasons. Three dates of sowing were not found to be significant. Among the two varieties RG-8 has given consistently higher mean yield producing 3.29 q/ha over RG-10.

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## Growth and yield behaviour of American cotton genotypes under different dates of sowing and nitrogen levels

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**ABSTRACT :** The studies conducted on the effect of date of sowing and nitrogen levels on American cotton genotypes revealed that early sown crop (Mid May) produced better plant height, more yield attributes and higher seed cotton yield than late sown crop (Mid June). Increasing levels of nitrogen improved all growth and yield attributes and finally the seed cotton yield. None of the genotypes except H-

842 was found better than recommended popular variety H-777 in respect of growth, yield attributes and yield.

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## Relative efficacy and persistence of different insecticides on cotton (*Gossypium hirsutum* L.) for the control of cotton leaf Hopper, *Amrasca biguttula biguttula* (ISHIDA)

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**ABSTRACT :** Relative efficacy and persistence of dimethoate, monocrotophos, quinalphos and fenvalerate on cotton (*Gossypium hirsutum* L.) for the control of cotton leaf hopper *Amrasca biguttula biguttula* (Ishida) was studied in the laboratory. The insecticides were sprayed on cotton crop in the field. Leaves from treated plots, at different times after spray, were taken in the battery jars and on them were released the leaf hopper nymphs collected from unsprayed cotton fields. Leaf hopper mortality was recorded after 48 hrs. of release. The results have revealed that monocrotophos and dimethoate were more effective than quinalphos and fenvalerate. Mortality recorded at 5, 8, 11, 14 and 17 days after spray indicated that monocrotophos and dimethoate remained effective upto 17 days whereas fenvalerate and quinalphos lasted upto 11 days.

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## Changing pest status of cotton in relation to changes in crop production and protection technologies in Punjab

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**ABSTRACT :** Among the sucking pests of cotton, cotton jassid, *Amrasca biguttula* (Ishida) is a regular and serious pest. Cotton whitefly, *Bemisia tabaci* (Genn.) is gaining its pest status. Aphids, *Aphis gossypii* Glover and thrips, *Thrips tabaci* Lind. are minor pests, whereas attack of mites, *Tetranychus cinnabarinus* (Boisd.) is of rare occurrence. Among the leaf feeding insects, green semilooper, *Anomis flava* (Fab.) and leaf roller, *Sylepta derogata* (Fab.) are sporadic pests, while black semilooper, *Tarache notabilis* (Walker), bud moth, *Phycita infusella* Meyr, cotton grey weevil, *Myllocerus undeoim pustulatus* var. *maculosus* Desb. are of minor importance. Similarly, Bihar hairy caterpillar spilosoma abliqua Walker and tobacco caterpillar, *spodoptera litura* (Fab.) sometimes appear as monor pests in some localities. Among the bollworms species, pink bollworm, *Pectinophora gossypiella* (Saund.) which has been most serious and regular pest of cotton upto mid 1970's is now comparatively less serious, whereas spotted bollworms, *Earias vittella* (Fab.) and *E. lnsulana* (Boisd.) have now become more dominant than pink bollworm. Gram pod borer also popularly known as American bollworm, *Helicoverpa armigera* (Hubner) has been the latest addition to the insect pests of cotton, which, since 1985's has become more or less a regular and serious pest of American cotton. The cotton stainers, red cotton bug, *Dysdercus koenigli* (Fab.) and dusky cotton bug. *Oxycarenus laetus* (Kirby) are now not pests. Two major factors i. e. susceptible varieties and indiscriminate use of insecticides have been considered responsible for the change in pest status. After mid 1970's cultivation of medium duration and tolerant varieties of *hirsutum* cotton (F 414, F 286, LH 900, F 505) and *arboreum* cotton (LD 230) varieties and higher bioefficacy of synthetic pyrethroids have led to the reduction of population of pink bollworm, but at the same time, these have added to the population build up of spotted bollworms because of early formation of floral bodies. Similarly, large scale cultivation of unrecommended long duration *hirsutum* cotton variety, locally called as *Zhurar* has helped in the build up and spread of American bollworm to almost entire cotton belt of Punjab, besides helping in the build up of whitefly.

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## Bionomics of a predatory pentatomid bug (*Cantheconidia furcellata* Wolff) on a cotton pest

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**ABSTRACT :** Studies on the bionomics of a predatory Pentatomid bug *Cantheconidia urcellata* Wolff (Pentatomidae : Asopinae) were carried out on spotted boll worm (*Earias insulana* Boisd). The incubation period of the eggs of *C. furcellata* ranged between 5-6 days with an average of 5.38 + 0.48 days and egg hatchability was 98.5 per cent. Five nymphal instars were noticed with an average total nymphal duration as 12.38±0.78 days. The I, II, III, IV and V instar periods were 2, 2-3, 2-4, 2-4 and 2-3 days while pre-ovipositional, ovipositional and post-ovipositional periods were recorded as 3-6, 2-4 and 4-7 days. The fecundity per female ranged between 37-135 eggs. The average longevity and sex ratio of male and female adult bugs were 5 and 9.20±3.73 days and 1 : 1.3, respectively.

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## Sample size to estimate bollworm incidence in cotton

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**ABSTRACT :** Sample size has been worked out to estimate the incidence of bollworm (*Pectinophora gossypiella* Saund, *Earias* spp.) in cotton (*Gossypium hirsutum*) allowing a specified permissible margin of error (5 to 25%). On an average 35 to 49 per cent bolls and 13 to 32 per cent loculi were damaged by these pests during 1991 and 1992 respectively. On the basis of two years studies, allowing 15 per cent margin of error sample size of 15 plants for estimating boll damage and 13 plants for estimating locule damage is suggested.

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## Boll rot of cotton as influenced by plant spacing and fertilizer application

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**ABSTRACT :** Boll rot complex of cotton is of worlwide importance and in certain warm and humid areas becomes a limiting factor of production. Minimum incidence of boll rot on all paramters was recorded in normal plant spacing (60 x 30 cm) followed by 90 x 15 cm spacing. Close spacing (60 x 15 cm) had drastically more boll rot incidence. Boll rot incidence was quite high in H 777 than G 27. Locule infection on dry boll was more than green boll basis. Locule infection (green boll) during 1989, like boll infection $N_{80}$ application had more incidence followed by $N_{80}+P_{30}$). In general, N application had more incidence followed by N+P+K on both dry and green boll basis and minimum was recorded by P+K followed by K application. Recommended package ($N_{80}+P_{30}+K_{30}$) gave maximum yield followed by N and K in both the years in H 777.

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# Evaluation of antimicrobial properties of some indigenous plant species against cotton pathogens

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**ABSTRACT :** Evaluation of 12 plant species extracts prepared in 5 solvents showed that petroleum spirit and chloroform solvents were not efficient whereas acetone, ethanol of water extracts of *Lawsonia alba* and *Punica granatum* were highly effective in completely inhibiting spore germination of *Myrothecium roridum.* Ethanol extracts (1 : 1) of 30 plant species were evaluated *in vitro* against *M. roridum, Alternaria macrospora* and *Xanthomonas compestris* pv. *malvacearum.* Against *M. roridum,* five plant species namely *Xanthium strumarium, Sesamum indicum, Lagerstromia parviflora, Mimosa hamtata* and *Annona squamosa* were found effective. Against *A. macrospora,* three plant species namely. *Kydia calycina, Leucas aspera* and *Punica granatum* were effective. For *X. c.* pv. *malvacearum,* the six plant species found effective were *Sesamum indicum, Dioscorea pentaphylla, Lagerstroemia parviflora, Leueas aspera, Aegle marmelos* and *Punica granatum.*