

ABSTRACTS

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Polyploidy in cotton (*Gossypium* spp.) : A review

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ABSTRACT : From the upto-date review of the literature on the aspect of polyploidy and its application in cotton breeding, it is concluded that the polyploidy resulting from chromosome doubling in natural diploid and amphidiploid species, both cultivated and wild, are generally sterile. Further, chromosome doubling in the sterile allotriploid hybrids of cultivated New World and cultivated Asiatic cottons results in fairly hexaploids which though not economically useful by themselves, can be of great indirect value for the synthesis of an allotetraploid of the genomic constitution of the New World cotton. The species relationship in *Gossypium* is such that in the building of an artificial allotetraploid of the genomic constitution of the New World cottons, one of the species has necessarily to be wild one which introduces many undesirable characters in the polyploid. This can however, be remedied by crossing with cultivated New World cottons. The fact that such a synthesis is possible opens up wider fields for research, by bridging up the gap between the various species. It also extends the scope for studying the interaction between their genomes, for judging their relationship, and for combining the desirable characters to economic ends.

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Seed quality in cultivars and pickings in cotton

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ABSTRACT : The seed quality was assessed in ten genotypes each of four cultivated species of cotton viz. *Gossypium hirsutum*, *G. barbadense*, *G. arboreum* and *G. herbaceum* during 1992 and 1993. A wide range of variability for all the parameters was recorded among genotypes of all the four species and pickings. Quality of seed as judged by seed index, germination percentage and vigour index was in general significantly better in bolls of initial four weeks than later periods.

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Variability and association analysis for chemical components imparting resistance in *Gossypium hirsutum* cotton

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ABSTRACT : Leaves, stem and square sample were used for analysis of chemical components viz. nitrogen, phosphorus and potassium contents in diverse morphological strains of *G. hirsutum* cotton. Nitrogen, phosphorus and potassium content were highest in leaves followed by squares and stem. Association of bollworms infestation per cent with nitrogen was positive in leaves, stem and squares revealing that higher nitrogen account for higher bollworm infestation. Negative association of phosphorus in leaves, stem and squares and potassium with leaves showed that higher amount of these chemical components impart tolerance against bollworm damage. Non significant positive association of seed cotton yield was obtained with nitrogen and phosphorus in the three morphological diverse strains having okra leaves and nectrilessness had high potassium and phosphorus in leaves, stem and squares.

High heritability coupled with high genetic gain was obtained for seed cotton yield, per cent bollworm damage and chemical components studies in three plant parts.

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Genetics of gossypol and fibre characters in American cotton (*G. hirsutum* L.)

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ABSTRACT : Cross combination of American glandless x HG 625 was evaluated through generation mean analysis for gossypol and fibre properties. The result revealed that both additive and dominance type of gene effects control size of glands in petals, leaves, and seed gossypol. Whereas for number of glands in petals, sepals and leaves, size of glands in sepals, flowerbud gossypol (%), leaves gossypol (%), seed cotton yield per plant, lint (%), 2.5% span length, uniformity ratio, micronaire value, maturity coefficient and fibre strength were governed by all the three type of gene effects i. e. additive (d), dominance (h) and epistatic (i, j and l). These findings have suggested the use of recurrent selection for exploitation of the gene effects involved in the material.

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Comparative performance of cotton genotypes in relations to soil depth

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ABSTRACT : An experiment was conducted on shallow, medium deep and deep black soil with two varieties each *G. arboreum*, *G. hirsutum* and intra hirsutum hybrids during *kharif* season of 1994-95 to 1996-97. The recommended package of practices were adopted to each cotton genotypes for cultivation. Results revealed that *arboreum* varieties (PA-183 and PA-141) performed better in all type of soils as compared to *hirsutum* varieties. On black soil (vertisol), variety PA-183 (1354 kg/ha) and hybrid NHH-44 recorded significantly higher seed cotton yield over LRA-5166 and they were at par with NH-452, PA-141 and hybrid NHH-302. The reduction in seed cotton yield of PA-183 on shallow soils compared to medium and heavy black soil was to the extent of 61.6 per cent and 141.8 per cent, respectively. Similar trend was observed in case of NH-452 and NHH-44.

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Response of upland cotton varieties (*Gossypium hirsutum*) to plant densities and nitrogen levels on vertisol under rainfed condition

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ABSTRACT : A field experiment was conducted during rainy seasons of 1992-94 on heavy black cotton soil at Cotton Research Station, Nanded with three cotton varieties ('LRA-5166', 'PH-93' and 'NH-452') to study the effect of three plant densities (60 x 15 cm, 60 x 30 cm and 60 x 60 cm) and three levels of nitrogen 25, 50 and 75 kg N/ha. The results revealed that spacing of 60 x 30 cm recorded significantly higher seed cotton yield (1184 kg/ha) than 60 x 15 cm and 60 x 60 cm. Application of 75 kg N/ha produced the highest seed cotton yield in all the varieties, however, it was at par with 50 kg N/ha which was supported by yield attributing characters. Among the varieties, NH-452 produced significantly higher seed cotton yield (1220 kg/ha) than LRA-5166 (954 kg/ha) and PH-93 (918 kg/ha).

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Effect of nitrogen and spacing on productivity of *desi* cotton (*Gossypium arboreum* L.)

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ABSTRACT : A field experiment was conducted for four years at PAU Regional Research Station, Bathinda during the *kharif* seasons of 1989 to 1992, to study the effect of nitrogen and plant spacing on the productivity of *desi* cotton. Application of nitrogen @ 80 kg/ha significantly increased the seed cotton yield by 62.7 per cent over control treatment. Further increase in nitrogen dose upto 120 kg N/ha did not significantly influence the yield and yield attributes of *desi* cotton. The spacing of 67.5 x 15 cm resulted in significantly higher seed cotton yield as compared to the recommended spacing of 60 x 30 cm.

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Association of gossypol glands and biochemical constituents in relation to bollworm incidence in American cotton (*G. hirsutum* L.)

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ABSTRACT : The effect of gland density and biochemical contents of different plant parts on bollworm incidence was studied by using ten bollworm tolerant donor lines and their 45 F₁'s crossed in diallel (without reciprocals) fashion. The reaction of the lines towards bollworm was recorded by creating *Helicoverpa armigera* Hub infestation artificially. The study revealed that the parents and hybrids responded differently in character association for the different traits. Low sugar in squares was found to be associated with less bollworm incidence in hybrids. Seed cotton yield was found to be negatively correlated with bollworm damage both in parents and hybrids. High gland density in different plant parts was found useful to reduce the bollworm damage indicating a significant role of resistant varieties in IPM. Therefore to develop pest resistant varieties without sacrificing yield and fibre quality, recurrent selections have to be made based on desirable trait combinations.

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Metabolic changes in senescing cotyledonary leaves of cotton induced with gibberellic acid under salt stress

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ABSTRACT : Physiological studies were conducted for some of the biochemical parameters like DNA, RNA, protein and amino acid in cotyledonary leaves of American cotton with two levels of gibberellic acid (5 and 50 ppm), three levels of NaCl (0, 3 and 9 dSm⁻¹) and interactions of NaCl and GA₃ at four phases of seedling growth (0, 7, 14 and 21 days after emergence). The objective was to determine the phase sensitivity of cotyledonary leaves senescence and abscission to NaCl and GA₃ induced by changes in biochemicals. Variation was observed at four phases for decrease in DNA and RNA with NaCl. However, maximum reduction in DNA (28.7%) was observed at phase-I with higher salinity level but maximum decrease in RNA (42.8%) was at phase IV. A perusal of data on amino acid and protein content of cotyledonary leaves revealed that both the level of NaCl (3 and 9 dSm⁻¹) further increased free amino acid at Phase-I and Phase-II but decreased proteins at all the phases. Both the levels of GA₃ alone as well as its interaction with either level of NaCl alleviated NaCl effect and increased DNA, RNA, protein and amino

acid as compared to control. The magnitude of increase, however, varied at four phases. It was concluded that GA₃ under stress conditions maintained the higher levels of proteins and nucleic acids in cotyledonary leaves when applied at 14 and 21 days after emergence and thus delayed the process of senescence that reduced abscission.

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Effect of soil moisture regimes and defoliant on yield, maturity and quality of cotton (*Gossypium hirsutum* L.)

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ABSTRACT : A field experiment was conducted during *kharif* seasons of 1994 and 1995 to study the effect of soil moisture regimes and the defoliant on yield, maturity and quality of cotton. Different soil moisture regimes showed a non-significant effect on seed cotton yield, maturity and quality of cotton during both the years. The use of defoliant thiadiazuron, lowered the leaf water potential (6.3 and 16.9 bars), decreased the moisture content of bolls and increased the canopy temperature of the crop by 2.6 to 4.8°C as compared to water sprayed control. Thiadiazuron 75 g/ha caused 92.1 to 99.6 per cent shedding of leaves, enhanced 17.0 to 18.6 per cent boll opening and increased the mean seed cotton yield by 6.5 to 7.4 per cent as compared to untreated control. Different levels of thiadiazuron significantly enhanced the crop maturity by 19 to 22 days as compared to water sprayed control. The use of defoliant had no adverse effect on fibre properties.

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Effect of nutrient spray on the seed yield of aged and nonaged seeds of cotton cv. MCU 5

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ABSTRACT : The study conducted on tracing the influence of nutrient spray on the yield and yield components of cotton cv. MCU 5 revealed the foliar spray with 2 per cent DAP at 75 and 90 days after sowing enhanced the phenotypic yield characters and also the seed cotton yield both in artificially aged and nonaged (fresh) seeds. This performance was followed by sprays with MgSO₄ 2 per cent and Borax 0.5 per cent. In total, performance of the aged seeds with and without spray was poorer than nonaged seeds. The enhancement of yield characters due to the DAP spray in aged seed was lesser than that of the nonaged seed.

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Response of cotton to applied phosphorus over different soil P-gertility gradients in rainfed vertisol

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ABSTRACT : Field studies were conducted from 1986 to 1990 to determine soil test-crop response relationship with special reference to P in rainfed cotton (*kharif*) grown on medium deep black soil (vertisol). In the first year of experiment different 'P' gradients were created by applying phosphorus @ 0, 50, 100, 200 and 400 kg P₂O₅/ha with an exhaustive crop of sorghum. Three levels of phosphorus 0, 40 and 80 kg P₂O₅/ha were superimposed over created gradients. Results indicated that applied phosphorus (from 0-400 kg P₂O₅/ha as gradient) had little influence on soil test values of P which was increased from

7.2 to 7.9 kg P/ha. Therefore, P gradients were not found significant with respect to seed cotton and total P uptake. Application of 40 kg P₂O₅/ha each year superimposed over created gradients resulted in significant increase in number of burst bolls per plant, seed cotton and P uptake. Increase in seed cotton by 21.0 per cent and total P uptake 22.0 per cent was observed at 40 kg P₂O₅/ha applied every year over no phosphorus.

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Interaction of *Meloidogyne incognita* and *Rhizoctonia solani* on disease intensity on cotton

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ABSTRACT : The severity of root-knot and root-rot diseases increased when *Meloidogyne incognita* and *Rhizoctonia solani* occurred concomitantly. Inoculation of root-knot nematode (*M. incognita*) one week prior to fungus predisposed the plants to *Rhizoctonia solani* attack and caused maximum and early root-rot of cotton plants.

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Comparative performance of antagonists against *Rhizoctonia solani*, the causal organism of root rot of cotton

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ABSTRACT : Among the various soil mycoflora isolated *T. harzianum*, *T. viride* and *G. virens* were found most effective soil antagonists to *R. solani*. Application of WBSD biomass, mycelial suspension and conidia were found effective in controlling root rot under glasshouse conditions. Soil application of biomass of *T. harzianum* was found more effective than conidial seed coating.

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Survival of antagonist of *Rhizoctonia solani*, the causal organism of root rot of cotton

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ABSTRACT : Studies on the population of *Trichoderma harzianum*, an antagonist of *Rhizoctonia solani* indicate that the population of *T. harzianum* was increased with the increase in temperature from 20 to 30°C, highest being at 30°C and lowest at 40°C. The population of *T. harzianum* increased in fertilizers amended soil as compared to unamended soil irrespective of the soil type. Maximum antagonist population was recorded after one month and survived in soil actively upto 4-5 months. The nutritional status and type of soil did not influence much on survival of *T. harzianum* propagules.

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Early season sucking pest control effects on cotton fruiting and bollworm infestation

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ABSTRACT : Early season sucking pest control with chemicals has been found to influence the crop phenology and plants' susceptibility to bollworms in a definite way. Increased vegetative growth, higher square production, higher incidence of *H. armigera* and lower yields were the characteristics of the treatments involving early sucking pest control. The bollworm control treatment, without sucking pest control had less vegetativeness, significantly lower square production and *H. armigera* incidence but higher yield. Continuous use of pyrethroids was observed to delay crop maturity. Studies further revealed the induced effects of insecticides on the plant-pest interactions and emphasised the need for judicious use of systemic insecticidal during early stages of cotton growth.

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Efficacy of biopesticide (Nimbicidine) on bollworm complex incidence in upland cotton in the Punjab

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ABSTRACT : To evaluate the bio-efficacy of biopesticide Nimbicidine (Azadirachtin 0.03%) and their alternate use with recommended insecticides, in spray schedule for the management of bollworm on *hirsutum* cotton varieties F 846 and F 1378, field trials were conducted at PAU, RRS, Faridkot, during 1996 and 1997 crop seasons. The impact of insecticide sprays on bollworms infestation was observed after termination of sprays. Application of nimbicidine alone and in combination with other insecticides was significantly better than untreated control. Treatment of nimbicidine alongwith quinalphos significantly increased the seed cotton yield (12.8 and 14.0 q/ha) as compared to untreated control (6.3 and 5.6 q/ha) during 1996 and 1997 crop seasons. The bollworms' infestation observed was 28.7 and 21.3; 15.5 and 7.4 percentage on boll and locule basis in both the seasons respectively. In addition to this the use of biopesticides reduce the environment hazards and enhance the population of bioagents.

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Availability and use-value of farm implements and machinery in Haryana

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ABSTRACT : Agricultural mechanisation is an integral part of agricultural development. The use of farm implement and machinery is not upto the mark so the present study was conducted in the belt of Hisar district of Haryana where cotton-wheat and rice-wheat crop rotations are followed so as to ascertain the availability, acquisition period, source of purchase and use-value of farm implements and machinery. The results indicate that majority of the farmers have found the farm implements and machinery easily and locally available on hire basis as per their choice and that too in time, but the price was reported to be very high. Tractor, cultivator and disc harrow were used frequently by majority of the farmers. The seed-cum-fertilizer drill was used least by farmers but majority did not use paddy transplanter, combine harvester and potato planter. Bullock-drawn seed sowing plough, manually operated sickles, sprayers and hand hoes were frequently and commonly used by majority of the farmers.