

ABSTRACTS

Journal of Cotton Research and Development 15(2) July, 2001

J. Cotton Res. Dev. 15(2) 127-136 (July, 2001)

Induced mutations for genetic improvement of cotton-A review

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ABSTRACT : Mutations are the potential source of creating genetic variability in the plant breeding material. Since the spontaneous mutations occur at extremely low frequency, the induced mutation provides tool for the rapid creation of variability in crop species. In cotton breeding, while hybridization and selection has stood the test of times, of late mutation breeding techniques has come in handy for improvement of specific characters. Of the various mutagens used, gamma ray irradiation was found to be the most effective in achieving practical results. Induced mutations in cotton have played significant role in the development of lines with earliness, dwarf and compact types, large bolls, high ginning out turn and fibre length, high seed oil content, higher seed yields, insect and disease resistance, drought and salinity resistance, besides induction of male sterility and creating vast genetic variability for various economic and morphological characters. Though mutation breeding suffers from some drawbacks, still some mutants of potential value for cotton improvement have been developed and released for commercial cultivation. Mutation techniques with emerging technologies like molecular genetics and tissue culture will aid in the development of molecular maps, understanding the gene expression, gene tagging, deletion and insertional mutagenesis in the years to come.

J. Cotton Res. Dev. 15(2) 137-141 (July, 2001)

Studies on genetic divergence in American cotton

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ABSTRACT : Nature and magnitude of genetic divergence were assessed in 44 genotypes of American Cotton using D^2 statistic under two locations i. e. Hisar and Sirsa. The genetic material exhibited wide genetic diversity. With the help of multivariate analysis the genotypes were grouped into 12 clusters at both the locations. Cluster I was found to be the largest consisting of 15 genotypes in E_1 (Sirsa location) while at E_2 (Hisar location), Cluster II consisted by 10 genotypes was the largest. Inter-cluster D^2 values between Cluster XI and XII in E_1 and IX and XII in E_2 were maximum. These clusters also exhibited high genetic distances from other clusters. The assessment of genetic diversity is likely to be more fruitful in elite materials. From this point of view HS 6, H 777, Deltapine 6226, M 8, IQ 4 and Okra were found to be the most promising material and should be used in further crossing programme in American cotton.

J. Cotton Res. Dev. 15(2) 142-146 (July, 2001)

Field studies on malformation and its impact on plant growth and yield of American cotton

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ABSTRACT : Amongst eleven treatments viz., delinted seed, fertilizer, insecticide each contaminated with 2, 4-D ethyl ester 34 EC for one and two weeks period, spray of 2, 4-D ethyl ester @ 40 g per ha in 500

litres of water just before sowing of cotton, first fresh insecticide [dimethoate (Rogor) 30 EC] spray with 2, 4-D ethyl ester contaminated spray pump, outdated insecticide (dimethoate 30 EC)* spray @ 1 ml per litre of water, black and white polyethylene sheet used as mulching material selected for inducing malformation in *Gossypium hirsutum* cotton, insecticide contaminated with 2, 4-D ethyl ester for one and two weeks period and 2, 4-D ethyl ester contaminated spray pump treatments exhibited symptoms of malformation. The maximum epinastic response, swelling of stem, percentage of affected leaves, branches and reduction in total dry matter production per plant, total number of bolls per plant, seed cotton yield per plant and per ha were observed under 2, 4-D contaminated spray pump treatment followed by insecticide contaminated with 2, 4-D for two weeks and one week in sequence, respectively. The deformity in leaves decreased naturally with the advancement in the age of the plants.

J. Cotton Res. Dev. **15**(2) 147-150 (July, 2001)

Performance of *hirsutum* cotton under different sowing dates and spacing

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ABSTRACT : A field experiment was conducted during two crop season of 1997 and 1998 at Agricultural Research Station, Sri Ganganagar with the objective to find out the optimum date of sowing and plant spacing for new genotype of *hirsutum* cotton. The result shows that sowing of *hirsutum* cotton on 1st May recorded the highest mean seed cotton yield 2081 kg/ha and it was significantly superior to 15th May and 30th May sowings during both the years. Among the varieties, RS-810 gave significantly higher seed cotton yield (1723 kg/ha) than RST-9 (1433 kg/ha) and RS-875 (1364 kg/ha). As regards spacing 67.5 x 30 cm gave significantly higher mean seed cotton yield (1600 kg/ha) than 67.5 x 45 cm (1398 kg/ha) spacing where as it was found statistically at par with 67.5 x 15 cm spacing. Early sown crops (1st May) was qualitatively better in comparison with late sown crop (15th and 30th May). Variety RS-875 was found significantly superior in fibre quality to RST-9 and RS-810. As regards to spacing the effect was non significant. Qualitative parameters were not influenced by different spacings.

J. Cotton Res. Dev. **15**(2) 151-153 (July, 2001)

Effect of spacings and fertility levels on growth and yield of *hirsutum* genotypes

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ABSTRACT : A field experiment was conducted during *kharif* season of 1992, 1993 and 1994 at JNKVV Main cotton research station Khandwa (M. P.). It was laid in split plot design with two varieties and three spacings in Main plot where as three fertility levels were kept in sub plots. All the treatments were replicated three times. The variety KH-2160 recorded higher number of opened bolls, seed cotton yield per plant and seed cotton yield per hectare as compared to variety Khandwa-2. Significant decreased in number of opened bolls and seed cotton yield per plant were observed under narrow plant spacing, while seed cotton yield per hectare increased. Increasing levels of nitrogen, phosphorus and potash increased the number of opened bolls, boll weight, plant height, seed cotton yield per plant and finally seed cotton yield per hectare.

J. Cotton Res. Dev. **15**(2) 154-155 (July, 2001)

Effect of levels of irrigation on the productivity of American cotton (*Gossypium hirsutum* L.)

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ABSTRACT : A field experiment was conducted with seven irrigation levels was conducted to study the effect of various irrigation levels on production potential, water use and economics of American cotton (*Gossypium hirsutum* L.) variety RST 9 in randomised block design during *khari* seasons of 1993-95 on sandy loam soil at Sri Ganganagar. The seed cotton yield (25.26 q/ha), number of sympodial branches per plant (8.5-9), number of bolls per plant (31-32), monetary net returns per hectare (Rs. 35,000/ha) and benefit : cost ratio (3.1) recorded under irrigation treatments containing first post sowing irrigation at 30, 40 and 50 DAS (days after sowing) were at par and significantly superior over irrigation treatment of only one irrigation applied at 40 DAS. Thus, the irrigation treatment of 50 DAS+square stage+late boll formation stage gave higher water use efficiency of 5.74 kg/ha^{mm} with maintaining the equivalent higher productivity level and subsequently saving of one irrigation water.

J. Cotton Res. Dev. **15**(2) 156-161 (July, 2001)

Studies on insecticidal properties of *Melia azedarach* seeds on *Earias vittella*

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ABSTRACT : Methanolic extract of *Melia azedarach* seeds was tested at 2.5, 5.0, 7.5 and 10.0 per cent concentrations and the fractions in hexane, benzene and acetone were tried at 0.5 and 1.0 per cent concentrations against *Earias vittella*. When 10 per cent of the methanolic extract was used, it gave the best results regarding the larval mortality, larval period (prolongation), per cent pupation (reduction), less fecundity, less survival and entrance of the larvae to the treated food, maximum antifeedant values, maximum ovipositional deterrence under choice, no-choice and without actual contact conditions, and minimum hatching of the eggs. Amongst the fractions, 1 per cent acetone showed the best results. Nimbecidene at 0.03 per cent concentration was found to be at par with the methanolic extract at 7.5 per cent concentration.

J. Cotton Res. Dev. **15**(2) 162-164 (July, 2001)

Effect of date of sowing and plant densities on the new wilt of cotton

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ABSTRACT : Both in 1989 and 1990 seasons maximum incidence was observed on 7 week old crop when it was in peak flowering stage. This stage was found to be most susceptible for New Wilt in cotton. Closer spacing increased the disease appreciably.

J. Cotton Res. Dev. **15**(2) 165-167 (July, 2001)

Yield loss due to important foliar diseases of cotton

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ABSTRACT : The major foliar disease viz., Alternaria blight (*Alternaria macrospora*), grey mildew (*Ramularia areola*) and bacterial blight (*Xanthomonas axonopodis* pv. *malvacearum*) are more severe on cotton and their severities result in considerable reduction in yield. The results indicated that, Alternaria blight was more severe on leaves, bolls and twigs and caused 25.65 per cent reduction in yield. In the another experiment of yield loss due to grey mildew in Jayadhar (*G. herbaceum*) was 49.34 per cent. The two years studies on yield loss due to foliar diseases in LAR-5166 (*G. hirsutum*) indicated 26.99 per cent.

J. Cotton Res. Dev. **15**(2) 168-170 (July, 2001)

Demonstration of integrated pest management in cotton on farmer's field

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ABSTRACT : In order to demonstrate the Integrated Pest Management practices incotton on farmer's field, one acre demonstration was conducted during 1996-97 at Kumaragiri and 1998-99 at Kalugasalpuram village of Kovilpatti block in coordination with Agricultural Department staff. The observations on the incidence of leafhopper revealed that the IPM plot recorded less number of leafhoppers as compared to farmer practice. Similarly, bollworm incidence in squares and bolls was also less in IPM plot (6.9 to 10.8%) than the farmer method (12.5 to 16.4%) where four application of insecticides were made. The predator, *Chrysopa* population was more in IPM plot as compared to farmers' field. The IPM block registered high seed cotton yield than the farmers method during both years. The IPM recorded the cost benefit ratio of 1 : 2.21 and 1 : 2.35 during 1996-97 and 1998-99 respectively which was higher than farmers method recording 1 : 1.50 and 1 : 1.30 during 1996-97 and 1998-99, respectively.

J. Cotton Res. Dev. **15**(2) 171-175 (July, 2001)

Evaluation of *Bacillus thuringiensis* (Berliner) from different sources against *Helicoverpa armigera* (Hubner) on cotton and their cross infectivity to silkworm, *Bombyx mori* (L.)

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ABSTRACT : Field study was conducted for two years to evaluate the *Bacillus thuringiensis* commercial products viz., BTK-1, BTK-II, Dipel, Delfin and BARC strain against bollworm. *Helicoverpa armigera* (Hubner) on cotton. The *B. thuringiensis* products were applied four times based on ETL of pest population. Among the various *B. thuringiensis* products, BTK-II recorded lowest bollworm damage highest GOB, lowest BOB and maximum cotton yield which was on par with Dipel 8 L. *Bacillus thuringiensis* products are detrimental to all stages of mulberry silkworm, *Bombyx mori* and mortality was recorded upto 40 days when treated mulberry leaves are fed to worms. Mortality of silkworm was observed in Dipel spray drift at 5 m and 20 m distance with knapsack and power sprayer respectively.

J. Cotton Res. Dev. **15**(2) 176-180 (July, 2001)

Evaluation of cypermethrin in combination with ethion for the management of cotton bollworms during flowering phase

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ABSTRACT : Colphos 405 - a ready mix combination containing 5 per cent cypermethrin and 40 per cent ethion was evaluated against bollworm complex, [spotted bollworms, *Earias vittella* Fab and *E. insulana* (Boisd.) and American bollworm, *Helicoverpa armigera* (Hubner)] in different experiments during 1998-99 crop seasons. Colphos 405 @ 1.20 l/ha containing 60 g of cypermethrin and 480 g a. i./ha of ethion was significantly more effective against bollworm complex and in increasing the seed cotton yield than ethion and cypermethrin alone.

J. Cotton Res. Dev. **15**(2) 181-185 (July, 2001)

Methods for *Chrysoperla carnea* release in cotton ecosystem

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ABSTRACT : An experiment conducted to evaluate *Chrysoperla carnea* release methods viz. larval brushing, larval dusting, larval tapping, egg dusting, egg brushing and egg stapling over cotton plants under field conditions have revealed that larval brushing was the best for recording higher predatory recovery. The larval dusting, larval tapping and egg stapling were equally effective. The aphid population, bollworm eggs and bad opened bolls were significantly low in larval brushing method followed by larval dusting, tapping and egg stapling methods.

J. Cotton Res. Dev. **15**(2) 186-190 (July, 2001)

Studies on host plant resistance in cotton to serpentine leaf miner, *Liriomyza trifolii* (Burgess)

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ABSTRACT : Thirty one cotton genotypes belonging to four species of *Gossypium* i. e. *G. arboreum*, *G. herbaceum*, *G. hirsutum*, *G. barbadense* and four hybrids which were varying in morphological and biochemical characters were selected for screening against serpentine leaf miner infestation. The data were recorded on per cent incidence and maggot population of serpentine leaf miner for four seasons during 1997 to 1999. The *G. arboreum* and *G. herbaceum* genotypes were found promising ones by recording lower incidence and maggot population of leaf miner when compared to other genotypes. Less preference of these genotypes was because of the presence of thin leaves containing higher number of trichomes, less amount of protein and reducing sugar. Among the *G. hirsutum* genotypes, Tinyboll and FRBN recorded lowest incidence.

J. Cotton Res. Dev. **15**(2) 191-195 (July, 2001)

Survival and development of cotton leafhopper, *Amrasca biguttula biguttula* (Ishida) in relation to some biochemical and morphological characteristics of host plants

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ABSTRACT : Cotton leafhopper, *Amrasca biguttula biguttula* (Ishida) (Homoptera : Cicadellidae) development and survival were studied on 12 plant species in relation to leaf pubescence and

biochemicals at the CCS Haryana Agricultural University, Hisar. Leaf pubescence, which included trichome density, length and orientation on both surfaces of leaf-lamina, manifested negative correlation with leafhopper survival and positive correlation with development period. But overall impact of leaf pubescence was non-significant. Leaf phytochemicals viz. total phenol, tannin, potassium, calcium, moisture, silica and epicuticular wax collectively influenced 59.7 per cent of nymph survival and 56.2 per cent nymphal duration but none of the chemicals individually showed significant relationship with biological parameters of the leafhopper. Hence there is a need to identify and combine both morphological and biochemical potential sources for breeding resistance in commercial cultivars against leafhopper.

J. Cotton Res. Dev. **15**(2) 196-198 (July, 2001)

Evaluation of insecticide mixtures against cotton bollworms

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ABSTRACT : Efficacy of two insecticide mixtures (Polytrin C, Spark) and five conventional insecticides (endosulfan, profenophos, quinalphos, monocrotophos, decamethrin) was assessed against cotton bollworms during *khariif* 1998 and 1999. Polytric C 700 g a.i./ha (profenophos 40%+cypermethrin 4%) proved to be most effective by recording lowest bollworm infestation and highest seed cotton yield with maximum profit. Quinalphos was found to be least effective against the bollworms.

J. Cotton Res. Dev. **15**(2) 199-201 (July, 2001)

Adoption of integrated pest management technology in cotton production in Raichur district, Karnataka state

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ABSTRACT : The study was conducted in four selected villages of Raichur district involving 80 farmers (40 demonstrated farmers and 40 farmers practicing conventional method of pest management). It was observed that the extent of adoption of IPM schedule by the IPM farmers during second year (1998-99) was found to be lower as compared to that demonstrated during 1997-98, except in the use of plant products wherein cent per cent adoption was observed. The extent of adoption of other components was far lower in 1998-99 over 1997-98. The recommended dose of plant protection chemicals was adopted by about 77.50 per cent of the farmers followed by use of pheromone traps (35%), NPV (30%) and *Trichogramma* cards (27%). Non-availability of IPM materials (70%) formed the major reason for the non-adoption of IPM. The lack of supply of IPM components by University of Agricultural Sciences (UAS) or Karnataka State Department of Agriculture (KSDA) formed second major reason (63%) for non-adoption/partial adoption. About 67.50 per cent of the farmers expressed that the non-adoption of IPM was mainly due to non-adoption of IPM by their neighbouring farmers. Similarly, lack of provision of regular technical know-how from UAS/KSDA was the other reason (47%) for non-adoption of IPM technology. About 10 per cent of the farmers were not convinced with the effectiveness of IPM while 5 per cent of them were of the opinion that there was reduction in yield due to practice of IPM technology. Hence, there is need to develop appropriate strategies for adoption of IPM on large scale so that farmers can reap higher benefits.