ABSTRACT
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Study on genetic introgression in diploid cotton through interspecific hybridization and validation by RAPD

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ABSTRACT : An attempt was made to improve the fibre quality characters of an adapted cultivar by introgression of genes from a diploid wild relative *G. anomalum*. The field experiment was conducted at Agricultural Research Station, Dharwad with an objective to improve the yield related and fibre characters of diploid cotton *G. herbaceum* cultivar DDhc 11. F_2 plants (218) derived from a cross between *G. herbaceum* variety DDhc 11 and *G. anomalum* were used for this study. Based on halo length, 26 plants for yield related and 22 plants based on lint availability for fibre characters, were studied. Results revealed significant increase in number of bolls/ plant, fibre strength and significant reduction in micronaire value however, GOT per cent was significantly inferior to DDhc 11. Non significant increase for seed cotton yield and fibre length was recorded for selected F_2 plants. For genetic diversity analysis, nine plants were selected based on fibre strength ranging from 17 to 25 g/tex and screened with 12 polymorphic random primers. Dice similarity co efficient ranged from 60-82 per cent with *G. anomalum* forming a separate cluster. Out of all the polymorphic primers, OPZ 19 a random primer amplified a 300 bp fragment only in plants with fibre strength values above 23 g/tex was observed. In this study, few plants with elevated yield and fibre properties were identified which can be a potential material for further improvement.

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Identification of DNA markers for resistance to grey mildew disease in cotton

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Abstract : The grey mildew disease of cotton is caused by *Ramularia areola Atk. (Ramularia gossypii* (Speg) Ciferri). Seven germplasm lines belonging to *Gossypium arboreum* (*desi* cotton) namely, G 135-49, 30805, 30814, 30826, 30838, 30856, and EC 174092 were identified as a source of resistance and were found immune (no disease) to grey mildew. Ten genotypes including *G. arboreum and G. herbaceum* were subjected to RAPD for genetic diversity analysis with the decamer primers (OPA, OPB, OPC). Polymorphism among the immune lines and susceptible genotype AKA 8401 were identified using sixty decamer primers. Polymorphic fragment of 1700bp designated as OPC 02_{1700} was present in all the immune lines and was absent in the susceptible line (AKA 8401) which can be used as a marker for identification of resistant lines in the germplasm gene pool.

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Mechanical picking of upland cotton – Identification of suitable genotypes and intra row spacing

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ABSTRACT : The experiment was laidout with twenty five genotypes grown in split plot design with three intra row spacings during 2001 at Punjab Agricultural University, Ludhiana. Productive genotypes were identified as GSH 4, H 1226, H 1252, H 1117, LH 1993, SGNR 6 and SGNR 8, with suitable spacing of 90x10cm at which these gave maximum yield. The experiment was continued during 2002 and 2003 with seven identified genotypes having high productivity which were grown on 90x10cm spacing in a randomized complete block design with three replications. Sympodial genotypes with high productivity and suitable plant type for mechanical harvesting were identified as GSH 4, LH 1993 and H 1226 which can be grown successfully at 90x10cm spacing to get maximum yield. These genotypes gave around 90 per cent harvest on picking after 150 days of sowing.

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Drought tolerance studies in cotton genotypes

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ABSTRACT : A field experiment was conducted under rainfed and irrigated conditions at Cotton Research Station, Nanded during 2007-2008, to study the drought tolerance in 20 cotton genotypes on the basis of various stress indices for yield and yield attributes under irrigated and rainfed conditions. The mean data on performance of different genotypes showed considerable genotypic variation in drought tolerance indices for yield and yield components. The data revealed that the genotypes KH 138, NH 615, PH 1009, Sahana and CSH 7106 recorded highest yield under both irrigated and rainfed conditions. Similarly, these genotypes showed high degree of indices for dry matter stability index (DMSI), leaf area stability index (LASI) and yield stability index (YSI), with least (< 1.00) drought susceptibility index (DSI) and lower per cent reduction in yield under rainfed indicating their drought tolerance nature. These genotypes may prove useful in breeding programme aimed at drought tolerance. The other genotypes *viz.*, GSHV 99/291, HAG 811, GSHV 991 and ARB 815 performed poor in respect of drought tolerance indices and seem to be susceptible for moisture stress.

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Heterosis for yield and fibre properties in upland cotton (*Gossypium hirsutum* L.)

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Abstract : Thirty crosses with three females and ten males were studied with an objective to improve yields and fibre characters in cotton. Heterosis for yield and six fibre properties were estimated in thirty cross

combinations. Maximum heterosis for seed cotton yield/plant was observed in GSHV 155 x GSHV 112 (27.70%) followed by G.Cot. 20 x B C 68-2 (27.17%) and G.Cot. 20 x 76 IH 20 (26.90%) over standard check. For 2.5 per cent span length, the cross GSHV 01/1338 x B C 68-2 (9.35%), for fibre strength GSHV 01/1338 x BC 68-2 (10.96%) followed by G.Cot. 20 x GSHV 97/13(10.81%) and GSHV 01/1338 x LRA 5166 (9.33%), for elongation percentage GSHV 01/1338 x BC 68-2 (6.21%) followed by GSHV 01/1338 x LRA 5166 (5.08%) and G.Cot. 20 x LRA 5166 (5.08%), for uniformity ratio G.Cot. 20 x GSHV 01/26 (6.00%) and GSHV 155 x GSHV 97/612 (6.00%), for maturity ratio G.Cot. 20 x GISV 218 (2.78%) and GSHV 01/1338 x GISV 103 (2.78%) and nineteen crosses have shown negative standard heterosis for short fibre index.

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Study of fibre quality, yield and yield contributing characters in upland cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Six American cotton (*Gasspium hirsutum* L.) genotypes namely, P 56-2, P 56-4, P 56-6, C4-9-2-1-1, C4-9-2-1-2 and P 4515-1 were evaluated for seed cotton yield, important yield components and fibre quality traits during *kharif* 2003-2004 at Indian Agricultural Research Institute (IARI), New Delhi against the local check Pusa 8-6. Strain C4-9-2-1-2 showed highest mean seed cotton yield and highest lint yield with good fibre strength of 24.5g/tex. Two strains P 56-4 and P 56-6 showed higher fibre strength of 28.1 and 27.3g/tex, respectively. These strains were also promising with regard to other fibre quality traits and may be used to develop breeding material and hybrids with high fibre strength in *G. hirsutum* cottons.

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Bioassay method for the detection of cry toxin expression in transgenic cotton

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ABSTRACT: Leaf assays were performed on cotton bollworm, *Helicoverpa armigera* (Hub.). Leaves were excised from 60 days old transgenic plants. Survival bioassay on detached leafbits showed significantly larval mortality ranging from 72-76 per cent. The damange of young leaves due to larval feeding was restricted to shot holes size as compared to the wild type on which there was voracious feeding. There was siginficant increase in the final body weight of the larvae fed on negative control (111.55%). Whereas, the larvae fed on leafbits of transgenic plants showed significantly decreased body weight (56.36%). There was a voracious feeding on the negative control and the damage increased with the progress in duration of feeding. The leafbits of *Bt* positive plants showed only the pin hole size holes. The feeding inhibition was accompanied by decrease in larval weight. The larval mortality and the damaged leaf in each vial was scored and compared with the control plants after 24, 48 and 72 h.

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Heterosis for seed cotton yield and its quantitative characters of *Gossypium barbadense L.*

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ABSTRACT : A diallel crossing programme was takenup with six different *Gossypium barbadense* genotypes to estimate the extent of heterosis for yield and other quantitative traits in some crosses of *G. barbadense.* A total of 15 hybrids which were developed by using six parents during winter 2008 and raised during winter 2009 along with their parents and Suvin (check). Among the hybrids, the maximum heterosis for seed cotton yield was observed in hybrid TCB 47 x CCB 6 (184.34 %) followed by TCB 47 x CCB 5 (145.60 %) and CCB 5 x CCB 6 (106.48 %). These hybrids also showed significant heterosis for sympodia and bolls/plant, boll weight, lint index, seed index and ginning outturn. From this study, it was concluded that the hybrids TCB 45 x CCB 7, TCB 45 x CCB 5, TCB 45 x CCB 2 and CCB 7 X CCB 2 exhibited significant positive heterosis over mid parent, better parent and standard check for seed cotton yield/plant. So these hybrids may be utilized for commercial exploitation after testing their stability.

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Optimal irrigation regime and soil moisture dynamics of cotton crop in Vidarbha region of Maharashtra

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ABSTRACT : An experiment was conducted on farmer's field to observe the effects of different drip irrigation regimes on water use efficiencies (WUE) and soil moisture status for cotton variety NHH44 in Vidarbha region during 2001 and 2002. Treatments were based on open pan evaporation approach.The highest cotton yield was obtained from the least irrigation treatment (T_1). WUE ranged from 0.02 kg/ha/mm in the treatment T_5 to 0.34 kg/ha/mm in T_1. The greatest irrigation water use efficiency (IWUE) was observed in treatment T_1 (2.26 kg/ha/mm), and the smallest IWUE was in treatment T_5 (0.18 kg/ha/mm) in the experimental years, indicating saving of more than 58 per cent irrigation water. Soil moisture status was below 50 per cent of available water capacity (AWC) for 105 days in 2001 as compared to 135 days in 2002 in T_1 implying that light irrigations in place of 6 cm for the clay soils in this part would be preferable and drainage of excess rainwater could be critical to improve yields.

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Effect of different levels of nitrogen, phosphorus and potassium on growth, yield and quality of *Bt* cotton hybrid under irrigated conditions

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ABSTRACT: A field experiment was conducted at Junagadh Agricultural University, Junagadh during *kharif*

2006-2007 and 2007-2008 to evaluate the effect of different levels of nitrogen, phosphorus and potassium on growth, yield and quality of hybrid *Bt* cotton. The results indicated that significantly higher seed cotton and stalk yields, growth and yield attributes, quality parameters as well as total uptake of N, P, K were obtained with the application of N @ 240 kg/ha, P_2O_5 @ 50 kg/ha and K_2O @ 120 kg/ha. The seed cotton yield of *Bt* cotton increased to the tune of 20.51, 6.90 and 13.27 per cent with the application of 240 kg N/ha, 50 kg P_2O_5/ ha and 120 kg K_2O/ha, respectively as compared to control.

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Performance of intercrops in *Bt* (*Bacillus thuringiensis*) cotton (*Gossypium hirsutum* L.) hybrid and assessment of its refugia system

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ABSTRACT : A intercropping study involving a *Bt* hybrid MECH 162 *Bt* was carried out at CICR, Regional Station, Coimbatore during winter irrigated season (August to February) of 2003-2004 and 2004-2005 to find out the best suitable intercrop in addition to the assessment of the existing refugia system of *Bt* + 20 per cent non *Bt* cotton (4:1). The treatments comprised of intercropping of two rows of redgram, cowpea, onion and *bhendi* planted between a pair of *Bt* cotton at 105 cm row spacing. In *Bt* cotton + 20 per cent non *Bt* treatment, 20 per cent non *Bt* was planted in surrounding of the plot, in addition to that of pure *Bt* cotton and non *Bt* cotton Bunny, were tested in randomized block design with three replications. None of the above treatments influenced crop growth, seed cotton yield and quality parameters of the base crop of cotton. It further revealed that no significant yield differences were seen between sole *Bt* and refugia cropping of *Bt* + non *Bt* (4:1) as recommended for cultivation of *Bt* cotton . Economic analysis indicated that highest benefit cost ratio (1.6) and net returns (Rs. 49,718) were recorded with *Bt* cotton + *bhendi* intercropping system. Highest seed cotton equivalent yield (31.69 q/ha), crop profitability (Rs. 331/ha/day), relative production (53.0) and economic efficiency (84.2) were also evident in the above intercropping system although maximum land (1.88) and income (1.71) equivalent ratios were with *Bt* cotton + cowpea.

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Response of *desi* cotton (*Gossypium arboreum* L.) genotypes to plant geometries and nutrient levels under irrigated conditions

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ABSTRACT : A field experiment was conducted at PAU, Regional Research Station, Faridkot during *kharif* 2009 and 2010 to evaluate the performance of two *arboreum* varieties (FDK 124 and LD 694 as check) under two plant geometries (67.5 x 45 and 67.5 x 60 cm) and three nutrient levels (*i.e.* 56.25, 22.5 kg NP/ha; 75, 30 kg NP/ha and 93.75, 37.5 kg NP/ha). New variety FDK 124 yielded 24.5 per cent significantly higher seed cotton yield (2814 kg/ha) as compared to LD 694 (2260 kg/ha) due to significantly more number of bolls. Pooled data further indicated that significantly higher seed cotton yield was recorded under closer geometry of 67.5 x 45 cm (2613 kg/ha) than wider plant geometry of 67.5 x 60 cm (2460 kg/ha). Though, yield attributing parameters such as bolls/plant were statistically improved in wider as compared to closer spacing but it could not compensate yield due to significantly higher plant population in the later case. Among nutrient levels, similar seed cotton yield was recorded with application of 93.75, 37.5 kg NP/ha (2688 kg/ha) and 75, 30 Kg NP/ha (2587 kg/ha) but both were significantly better than that of 56.25, 22.5 kg NP/ha (2335 kg/ha). So, 75, 30 kg NP/ha and plant geometry of 67.5 x 45 cm seemed to be ideal for new variety FDK 124 for realizing higher productivity under the specific agro climatic conditions of Faridkot.

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Effect of synchronization of nutrients on growth and yield of *Bt* cotton

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ABSTRACT : A field study was conducted on *Bt* cotton (*Gossypium hirsutum*) during 2007-2008 to 2009-2010 at Marathwada Agriculutural Unversity, Parbhani in factorial randomized block design to study synchronization of nutrients on growth and yield of *Bt* cotton. The pooled results revealed that timings of application of nutrients had pronounced effect on seed cotton yield (SCY). Four splits of nutrients at 10, 30, 45 and 60 DAS (2409 kg/ha) and three splits of nutrients at 10, 30 and 45 DAS (2308 kg/ha) were *at par* and recorded significantly higher seed cotton yield as compared to rest of the splits at different timings. Splitting of nitrogen only at different timing of applications was found significantly superior in recording seed cotton yield (2090 kg/ha) over application of both nitrogen and potash in split doses. Similarly, the highest grossed net monetary returns and B: C ratio was recorded in treatment S_7 (*i.e.* 4 splits of nutrients at 10, 30, 45 and 60 DAS and S_3 *i.e.* (3 split of nutrients at 10, 30 and 45 DAS) which were *at par* and both proved significantly superior over rest of split application of nutrients.

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Productivity and profitability of *Bt* cotton as influenced by spacing and NPK levels in irrigated ecosystem

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Abstract: A field experiment was carried out during *kharif* 2006-2007, 2007-2008 and 2008-2009 at Agricultural Research Station, Siruguppa to study the response of *Bt* cotton to spacing and fertilizer levels under irrigated ecosystem. The results revealed that among the spacings, closer spacing of 90 x 45 cm produced significantly superior seed cotton yield (2243 kg/ha) over wider spacing of 90 x 90 cm (1867 kg/ha) and it was *at par* with 90 x 60 cm (2121 kg/ha). Among the fertilizer levels, application of 125 per cent NPK registered higher seed cotton yield over 75 per cent NPK but *at par* with application of 100 per cent NPK. On the contrary the ancillary data indicated that, higher seed cotton yield/plant (136.11 g/pl) and more bolls (40.46/pl) were observed in wider row spacing of 90 x 90 cm as compared to other spacings. In case of fertilizer levels more seed cotton yield/plant was observed in application of 125 per cent NPK (130.40 g/pl) as compared to 75 and 100 per cent fertilizer levels. Similar trend in bolls/plant, sympodia and boll weight were found as that of yield. Further, higher gross return (Rs.56774 / ha), net returns (Rs.30837 / ha) and B: C ratio (2.20) was recorded in closer spacing of 90x45 cm as compared to 90x 90 cm. Among the fertilizer levels, application of 125 per cent RDF recorded maximum gross return (Rs.55256 / ha), net returns (Rs.29415 / ha) and B: C Ratio (2.15) which was significantly superior to 75 per cent NPK but *at par* with 100 per cent NPK. From the results, it can be concluded that, *Bt* cotton responds to closer spacing of 90 x 45 cm with the application of 100 per cent NPK for realizing higher yield and monetary advantages.

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Effect of plant population and fertilizer levels on Cry 1 protein content in transgenic *Bt* cotton

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ABSTRACT: The field experiment was conducted during *kharif* 2008 and 2009 at Punjab Agricultural University, Ludhiana to study the effect of various plant populations and fertilizer levels on *Bt* toxin content in *Bt* cotton. The results showed that *Bt* toxins levels were not significantly affected by plant population at all stages of crop growth. However, *Bt* toxin level increased with increased fertilizer doses at all stages of the crop growth. Significantly higher *Bt* toxins were recorded in 150 per cent RDF as compared to RDF at 60 and 90 DAS during 2009 and 90 DAS during 2008.

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Effect of different spacing and fertility levels on *Bt* cotton hybrid under rainfed conditions

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ABSTRACT : A trial was conducted at Main Cotton Research Centre, Khandwa for two consecutive seasons of 2007-2008 and 2008-2009 to evaluate the agronomic requirements of *Bt* cotton hybrid RCH 2 under rainfed conditions. The treatments consisted of three plant spacings (S_1=90x45, S_2=90x60, S_3=90x90 cm) in main plot and three fertility levels (F_1=90:45:30, F_2=120:60:40 and F_3=150:75:50: kg NPK/ha) in sub plot with three replications in split plot design. The results revealed that closer inter plant spacing of 90x45 cm recorded highest average seed cotton yield of 2080 kg/ha which was found to be significantly superior over 90x90 cm during both the years. A reverse trend was observed for bolls/plant and boll weight. Higher dose of fertilizer by 125 per cent (150:75:50 NPK kg/ha) recorded consistent increase in seed cotton yield over 75 per cent RDF (90:45:30: NPK kg/ha) during both the years but remained *at par* with RDF (120:60:40 NPK kg/ha). On an average the increase in seed cotton yield by RDF was to the tune of 338 kg/ha over 75 per cent RDF but 25 per cent increase in RDF recorded 107kg/ha over RDF. The yield attributing characters also showed an ascending trend with the increase in the dose of fertilizers. It can be concluded that plant spacing of 90x45cm and RDF of 120:60:40 kg NPK/ ha would be quite feasible for *Bt* hybrid under rainfed conditions of Nimar tract of Madhya Pradesh.

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Organic residue management in summer irrigated cotton. I. Effect of preceding irrigated dry crops on growth and yield of *hirsutum* cotton

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ABSTRACT: Field experiment was conducted at Cotton Research Station, Srivilliputtur during 2005-2008 to study the response of summer irrigated cotton to the preceding crop, residue management and INM practices. The results revealed that maize as a preceding crop was advantageous with its stalk incorporated with the

highest seed cotton yield of 1573 kg/ha and was comparable with maize as a preceding crop with stalk removed. With regard to INM practices, application of 100 per cent RD of fertilizers + azophos registered the highest seed cotton yield and was comparable with 75 per cent RD of fertilizers + azophos, 100 per cent RD of fertilizers + FYM and 100 per cent RD of fertilizers alone indicating that 75 per cent RD of fertilizers + azophos was optimum to get economic yield.

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Caffeic acid and calcium application affects electrolyte leakage, hydrolases and cytosolute contents of heat stressed cotton seedlings

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ABSTRACT : Cotton (*Gossypium arboreum* L.) genotypes *viz.*, LD 694 and LD 327 were sown in pots. The foliar application of caffeic acid (CA) and $CaCl_2$ (Ca^{2+}) (@ 10 and 20 mg/l) was given on fifth day followed by heat stress (42±2°C) treatment to six day old seedlings for five hours. Heat stress significantly increased per cent electrolyte leakage in cotyledonary leaves of both genotypes. CA application significantly decreased electrolyte leakage under stress whereas Ca^{2+} application had non significant effect. Foliar application of Ca^{2+} and CA did not alter contents of amino acids in LD 694 and LD 327 seedlings under control. In heat stressed sets contents of free amino acids were significantly decreased by Ca^{2+} and CA application. Starch content was comparable under control and heat stressed genotypes and Ca^{2+} and CA treatments had negligible effect. Total soluble sugar accumulation was not affected by Ca^{2+} and CA application in control. The content of soluble sugar was recorded more under stress and Ca^{2+} application further increased their accumulation. The enzyme activities of both a- and b-amylase were increased after heat stress. Both Ca^{2+} and CA treatments had promotory effect on activities of these enzymes under heat stress that lead to more accumulation of cytosolutes that helped them to withstand stress.

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Effect of foliar and soil application of potash on *Bt* cotton hybrid in canal command area of north west Rajasthan

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ABSTRACT : A field experiment was conducted during *kharif* 2007 to 2009 at Agricultural Research Station, Sriganganagar to study the effect of foliar feeding of KNO_3 and basal application of potash on yield and yield attributing characters of *Bt* cotton hybrid. Application of full dose of potassium through MOP as basal dose produced higher number of bolls/plant as compared to two and three spray of KNO_3 (2 %), two and four spray of KNO_3 (3 %) and control but at *par* with MOP (four splits), four spray of KNO_3 (2 %), and three spray of KNO_3 (3 %) during the years of experimentation . Significantly higher boll weight was recorded in full dose of MOP as basal (20 K_2O kg/ha) as compared to two and three spray of KNO_3 (2 %), two and four spray of KNO_3 (3 %) and control but statistically at *par* with MOP in four splits, three spray of KNO_3 (3 %) and four spray of KNO_3 (2 %). The significantly higher seed cotton yield was recorded in full dose of MOP (20 K_2O kg/ha) as basal as compared to two and three spray of KNO_3 (2 %), two and four spray of KNO_3 (3 %) and control but it was *at par* with MOP in four splits, three sprays of KNO_3 (3 %) and four spray of KNO_3 (2 %) during the experimentation . Plant height was not influenced by different treatments.

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Effect of potash and water management techniques on productivity and moisture use efficiency of cotton

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ABSTRACT : A field experiment was conducted at Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola to study the effect of potash and water stress management techniques on productivity (kg/ha) and moisture use efficiency (kg/ha/mm) of cotton. Experiment results revealed that the number of picked bolls/plant, seed cotton yield (g/plant), seed cotton yield (kg/ha) and stalk yield (kg/ha) were recorded significantly higher in potash application @ 20 kg/ha over no potash application and furrow opening + crop residue mulch + thinning over rest of *in situ* moisture conservation practices. However, harvest index was recorded highest in crop residue mulch treatment over rest of the treatments except treatment combinations of furrow opening, crop residue mulch and thinning. Moisture use efficiency was maximum in potash application whereas it was also recorded maximum in furrow opening + crop residue mulch + thinning treatment. However, moisture use was lower in potash application as well as in treatment of furrow opening.

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Agronomic performance of transgenic cotton under rainfed conditions

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ABSTRACT : A field experiment was conducted during 2008-2009 at Agricultural Research Station, Adilabad to find out suitable plant density, nitrogen levels and scheduling of nitrogen with cotton hybrid, Bunny *Bt* under rainfed conditions of Northern Telangana Region of Andhra Pradesh. Results indicated that higher plant density (27,777plants/ha) gave maximum seed cotton yield (3071 kg/ha) than lower plant densities (18518 plants/ha) and (13888 plants/ha). However, nitrogen levels and scheduling of nitrogen in five equal splits starting from 15 days after sowing (DAS) at 15 days interval could not influence the seed cotton yield.

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Jhabua rock phosphate as a phosphorus source in maximizing yield potential of cotton

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ABSTRACT: The field experiment was taken up to elicit information on the effect of Jhabua rock phosphate (JRP) application alone and in combination with organic manures and biofertilizer (BF) on yield parameters of cotton.The yield attributes such as *kapas* yield, lint yield and seed cotton yield was recorded highest in the treatment that received 50 per cent JRP+50 per cent SSP along with phosphobacteria (PB) and compost.

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Study on seasonal abundance of *Helicoverpa armigera* (Hubner) in cotton based cropping system in Haryana

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ABSTRACT: Study on seasonal abundance of *Helicoverpa armigera* in Haryana in cotton based cropping system showed that during *kharif* season, pest started its activity from the beginning of July in groundnut and then it moved to cotton and simultaneously observed on sunflower and bajra, also. However, from September, the population moved from cotton to pigeonpea but it disappeared as the crop reached to maturity. During *rabi* seasons (2005-2006 and 2006-2007), the pest was active on chickpea and mustard showing its shift from pigeonpea to chickpea. The highest population on chickpea was recorded during February (2005-2006) and March (2006-2007) when the crop was in pod formation stage. From March onward the pest survived on summer sunflower and remained on this crop up to the beginning of June. Thus, if the host crops are available in a given ecosystem, the pest may remain active throughout the year.

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Effect of *Bt* and non *Bt* cotton hybrids, nutrient and pest management on ginning outturn, seed and lint indices

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ABSTRACT: Trash and contamination as well as variability in fibre parameter are the major constraints in availability of quality cotton fibre. Present study has highlighted the effect of *Bt* and non *Bt* cotton hybrid, nutrient and pest management in obtaining the premier quality cotton with higher G.O.T, seed and lint indices. The cotton hybrid PHH 316 non *Bt* recorded maximum mean ginning percentage (38.24) amongst the cotton hybrids, and was found significantly superior over MECH 184 *Bt* and MECH 184 non *Bt* cotton hybrids during 2004 and 2005. The value of mean seed index was higher (9.17 g) for MECH 184 *Bt* hybrid as compared to MECH 184 non *Bt* (9.14) and PHH 316 (6.60). Similarly, cotton hybrid MECH 184 *Bt* recorded significantly higher seed index (8.57 g) as compared to MECH 184 non *Bt* (H_2) and PHH 316 (H_3) cotton hybrid during 2004. While in case of lint index, MECH 184 *Bt* cotton hybrid and its non *Bt* counterpart were found significantly superior over PHH 316. The mean ginning percentage, seed and lint indices values were found numerically higher in case of insecticidal pest management than biopesticidal pest management, however, treatment differences were found non significant during both the years. The application of graded level of chemical fertilizers 80:40:40 and 100:50:50 kg NPK/ha did not influences the seed index values whereas, it has resulted in significant improvement of ginning percentage and lint index over the use of 10 t/ha FYM in cotton .

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Management of bacterial blight and leaf spot diseases of upland cotton using *Pseudomonas fluorescens*

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ABSTRACT: *Pseudomonas fluorescens* (Pf_1) was tested against foliar diseases of upland cotton. Namely the tested Pf_1, strain showed lowest per cent disease index as compared to the untreated control. Pooled data of three years revealed that the per cent disease control (PDC) due to the use of *P. fluorescens* ranged for bacterial blight (40.3 to 56.5%), Myrothecium (33.3 to 56.4%), Alternaria (41.9 to 60.2 %) and Cercospora leaf spots (34.7 to 47.7 %). Efficacy of biocontrol agent was comparable to that of chemical fungicides like copper oxychloride, 50 WP. The seed cotton yield was significantly higher (2290kg/ha) in seed treatment with *P. fluorescens* (Pf_1 strain) @ 10 g/kg seed+ foliar spray @ 0.2 per cent at 30, 40, 50, 60,70, 80 and 90 DAS) than the untreated control (1890kg/ha).

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Morphological characters and per cent inhibition of major pathogens of cotton by different effective isolates of *Trichoderma* spp and *Pseudomonas fluorescens*

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ABSTRACT: Growth rate of the seven isolates of *Trichoderma* spp varied significantly at 3 days after inoculation (DAI). Among the isolates, *T. viride* (TV 97) and *T. koningii* grew much faster *i.e.* @ 7.25 and 7.10cm, respectively. Similarly, growth rate of the isolates was also varied significantly at 6 DAI and the isolates *T. viride* (TV 97) and *T. harzianum* (TH KSD) grew faster *i.e.* @ 8.95cm. Variations were noticed among the isolates of *T. harzianum* of MARS Dharwad, *T. harzianum* (Th-P 26) and *T. harzianum* (TH KSD) produced dark green profused mycelial growth. Similarly, the sporulations of *Trichoderma* isolates also varied. The heavy sporulations was observed in almost all isolates except *T. harzianum* (TH KSD) and *T. viride* (TV 97) *i.e.* produced good sporulation. Colony characters and growth of *Pseudomonas fluorescens* isolates varied at 6 DAI. Among four isolates, *P. fluorescence i.e.* A_1, A_3, A_8, P_2 showed the colony characters, as pale yellow and thick pigment, yellow and thick pigment, yellow greenish and thick pigment and pale yellow and thick pigment, respectively. The seven isolates of *Trichoderma* spp and four isolates of *P. fluorescens* were tested for maximum mean per cent inhibition of major pathogens of cotton and it was observed that in case of *T. harzianum* (TH KSD) recorded 60.26 per cent inhibition followed by *T. harzianum* (Th-P 26), (60.01%) and *T. harzianum* of MARS, Dharwad (59.74%).

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Effect of seed borne mycoflora on cotton seed (JK 4) and their control

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ABSTRACT : Eleven fungal flora *viz., Aspergillus niger*, *A.flavus*, *Penicillium* spp, *Alternaria alternata*, *Chaetomium* spp, *Rhizopus niger, Fusarium solani, Macrophomina phaseolina, Myrothecium roridum, Trichothecium roseum* and *Curvularia lunata* were isolated from JK 4 cotton cultivar growing in the locations of Madhya Pradesh by blotter method. Among these, *A. niger*, *C. lunata* and *M. roridum* were exhibited maximum per cent association with the seed. These three highest associated seed borne fungi were evaluated for their effect on seed germination, root length, shoot length and vigour. *M. roridum* was found to record maximum inhibition of per cent seed germination, root length, shoot length and vigour of the seedlings followed by *A. niger* and *C. lunata*. All the fungicides were found to be highly effective in controlling the seed borne pathogens by exhibiting higher seed germination and their superior effect over control. Carbendazim seed treatment was found to exhibit maximum increase in per cent seed germination which was followed by Chlorothalonil and Carboxin.

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Estimation of crop losses due to grey mildew (*Ramularia areola* Atk.) disease in *Bt* cotton hybrid

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ABSTRACT: A field trial was conducted at Regional Agricultural Research Station, Guntur during three *kharif* seasons to estimate the losses due to grey mildew in cotton hybrid Bunny *Bt*. Carbendazim (0.1%) was sprayed at 15 days interval starting from 35 to 95 days after sowing. Lowest mean per cent disease intensity (PDI) of 11.41 was recorded with Carbendazim (0.1%) sprays at 35, 50, 65, 80 and 95 days after sowing. Pooled data showed reduction of disease in all treatments. Yield data from different treatments showed that protection by spraying Carbendazim (0.1%) from 50 days after sowing at 15 days interval up to 95 days resulted in avoidable losses to the tune of 38.38 per cent with or benefit cost ratio of 3.25.

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Biochemical basis of grey mildew resistance in cotton

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ABSTRACT : Fifteen *Gossypium arboreum* hybrids, twenty *Gossypium* wild species, five *G. arboreum* races and eight *Bt* cotton hybrids were screened naturally for grey mildew resistance. Among the fifteen *G. arboreum* hybrids, three were disease free, two were resistant and three were susceptible to grey mildew disease. However, from the 20 *Gossypium* species, except *G. bengalense* all were free from grey mildew disease.

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Comparative efficacy of single (BG I) and stacked *Bt* cotton hybrids (BG II) under integrated pest management practices

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ABSTRACT : An adoptable integrated pest management (IPM) module, earlier developed for Bollgard I (BG I) with little modification, was evaluated for its performance for stacked *Bt* cotton hybrids (BG II) at Agricultural Research Station, Dharwad during 2009-2010. There were no significant differences with respect to incidence of sucking pests and natural enemies in both BG I as well as BG II. Population of *Helicoverpa armigera* remained nil in BG II, against 0.29 larva/plant in BG I. The foliage damage of *Spodoptera litura* remained low in BG II (2.38%/infested leaf) as compared to BG I (16.36 %/infested leaf). The larval population and infestation of pink bollworm (PBW) was low in BG II (0.28 larvae/50 green bolls, 0.57% green boll damage and 1.62 % locule damage) as compared to BG I (2.42 larvae/50 green bolls, 3.71 % green boll damage and 4.82 % locule damage). Chemical insecticidal sprays against bollworms and *S. litura* remained nil in BG II hybrid as against three sprays in BG I hybrid which reduced the cost of plant protection with higher net return in BG II hybrid (Rs. 75, 408.00/ ha) as compared to BG I (Rs. 66153.00/ha).

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Performance of F_1 and F_2 *Bt* cotton entries for bollworm tolerance

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ABSTRACT : Field experiment was conducted at Marathwada Agricultural University, Parbhani, during *kharif,* 2005. F_1 and F_2 hybrids of 23 *Bt* and 5 non *Bt* hybrids were grown in a randomized block design with two replications. Among F_1 hybrids, open boll damage due to bollworm complex was not noticed in 4233 *Bt* and 4247 *Bt* cotton hybrids which were found significantly superior to MECH 6301 *Bt* (3.2 %) and 4255 *Bt* (3.28 %). Among F_2 hybrids minimum open boll damage (3.10 %) was noticed in Proagro 144 *Bt*, which was found significantly superior to rest of the hybrids except 4234 *Bt* (4.17 %) and 4254 *Bt* (4.98 %) which were *at par* with each other. Among F_1 hybrids loculi damage was not observed in 4225 *Bt*, 4256 *Bt*, 4253 *Bt*, 4258 *Bt*, 4233 *Bt*, 4234 *Bt*, 4247 *Bt*, 4254 *Bt*, MECH 162 *Bt* and Proagro 144 *Bt*, which were found significantly superior to rest of the hybrids except 4220 *Bt*, 4223 *Bt*, 4237 *Bt*, 4248 *Bt*, MECH 6301 *Bt* and MECH 184 *Bt*. Minimum loculi damage (0.81%) in F_2 hybrids was noticed in Proagro 144 *Bt* which was found significantly superior to rest of the hybrids except 4254 *Bt* (1.08%) and 4248 *Bt* (2.38%). In respect of seed cotton yield, among F_1 hybrids maximum yield (1551 kg/ha) was recorded in 4233 *Bt* which was found significantly superior to rest of the hybrids except 4237 *Bt* (1524 kg/ha). Among F_2 maximum yield (1544 kg/ha) was recorded in 4233 *Bt* which was found significantly superior to rest of the hybrids except 4248 *Bt* (1341 kg/ha), 4234 *Bt* (1398 kg/ha) which were *at par* with each other. Thus F_2 *Bt* cotton express *Bt* protein in segregated pattern in which bollworm attack was more as compared to F_1 which affects yield as well as quality of lint.

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Ovipositional response of *Helicoverpa armigera* (Hubner) to transgenic *Bt* and non *Bt* cotton

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ABSTRACT : Studies on ovipositional response of *Helicoverpa armigera* (Hubner) to transgenic *Bt* and non *Bt* cotton hybrids were carried out in the Department of Entomology, CCS Haryana Agricultural University, Hisar during 2006. Eleven genotypes including five *Bt* (Ankur 2534 *Bt*, Ankur 651 *Bt*, RCH 134 *Bt*, RCH 317 *Bt* and MRC 6304 *Bt*) and their corresponding non *Bt* hybrids with one local hybrid HHH 223 were taken for the study and were grown by adopting recommended package of practices. Twigs (45 cm long) of different genotypes bearing leaves, flowers, squares and bolls were brought to the laboratory at 80 days of crop stage to observe the ovipositional preference of *H. armigera* between *Bt* and non *Bt* genotypes in a choice test conditions. No significant variation was found between *Bt* and non *Bt* genotypes. The total number of eggs laid on *Bt* and non *Bt* hybrids ranged from 344 to 361 eggs/2 twigs/4 females, respectively.

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Effect of field sprayed methanolic extracts of plants on some biological traits of spotted bollworm, *Earias vittella* (Fab.) of cotton

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ABSTRACT : Methanolic extracts of *neem* (*Azadirachta indica*), *bakain* (*Melia azedarach*) and *karanj* (*Pongamia pinnata*) seeds and ginger (*Zingiber officinale*) rhizomes were sprayed on cotton field (variety H 1117) at Research Farm, CCS Haryana Agricultural University, Hisar during 2005-2006. These extracts were tested at 2.5, 5.0 and 7.5 per cent to evaluate their effects on biological traits and consumption utilization indices of larvae of spotted bollworm, *Earias vittella* (Fab.) of cotton. A total of five sprays were applied at 8 days interval and after 24 h of third spray, young to medium sized bolls were used to see their effects on post embryonic development of spotted bollworm. Consumption utilization studies were conducted with 7 day old larvae. The experiment at data revealed that 5.0 and 7.5 per cent *neem*, *bakain* and *karanj* adversely affected biological traits like survival (59-72%), duration (9.7- 13.5 days) and weight (48.09-60.34 mg) of larvae; pupal duration (9.9-11.70 days) and weight (40.65-46.07 mg); adult emergence (61.40-71.30%) and fecundity (54.70-68.07 eggs/female) and consumption utilization indices (CI, GR, AD, ECD and ECI) of the pest. Sex ratio remained unaffected. Highest concentration (7.5%) of these extracts were as effective as nimbecidine (5ml/l), a commercial *neem* formulation. Methanolic extract of ginger at 7.5 per cent was found ineffective against the bollworm.

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Seasonal dynamics of leafhopper, *Amrasca devastans* Distant on cotton

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ABSTRACT: Field investigations were carried out in DCH 32, Bunny *Bt* and non *Bt* cotton revealed that the cotton leafhopper, *Amrasca devastans* was active all throughout the season and has crossed ETL. Three peaks were observed during the season on all the three entries. Correlation studies between leafhopper population and weather parameters have shown a positive but non significant relation with both maximum and minimum temperatures and evening relative humidity while, it was negative and non significant with morning relative humidity and rainfall.

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Farmers' participation in front line demonstration (FLD) for *Bt* cotton in Saurashtra region of Gujarat

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ABSTRACT : FLD's with participation of farmers' in production technology was conducted in seven districts of Saurashtra. Thirty four, 50 and 50 farmers were selected for FLD's during 2005-2006, 2006-2007 and 2007-2008, respectively. Varietal, fertilizer, irrigation and inter cropping components were conducted in FLD's. Results indicated that 8.83 per cent average seed cotton yield was increased over improved varieties. In fertilizer components, there was no effect of DAP on seed cotton yield, however without DAP clearly showed the average saving of Rs. 1743/ha. The reduction of 3.98 per cent seed cotton yield was recorded in alternate furrow irrigation, but the cost of cultivation of Rs. 3370/ha was decreased as compared to local practices. In inter cropping practices, 10.13 per cent seed cotton yield was increased over local practices. Overall results clearly indicated that an additional net return of Rs. 5130, 3831, 1002 and 859 was recorded in improved varities, intercropping, irrigation and fertilizer components, respectively. Looking to the over all of three years average results with four improved production technologies of FLD's, recorded a increase of 4.6 per cent in seed cotton yield, reduced by 3.12 per cent in cost of cultivation and increased net return of 9.95 per cent with a net profit of 3371 Rs/ha during three years of cropping season.

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Effect of flame retardant finish on mechanical parameters of cotton fabric

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Abstract : To investigate the effect of zirconium dioxide on mechanical parameters of cotton, 100 per cent white cotton fabric having GSM 220 g, plain weave, 75 × 7.7 fabric counts, flame retardant (FR) chemical named zirconium dioxide and two binders named SLN and PVA were used. Recipe was made on the weight of the fabric for making suspension of FR finish. For applying FR finish, pad dry cure method on padding mangle was used with 1 dip 1 nip, 2 dip 1 nip and 3 dip 1 nip systems. Dimensional parameters were assessed of controlled as well as of treated fabrics. Fifteen per cent concentration of finish was found best with combination of both binders (2.5% each) for assessing mechanical parameters.