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Genetic diversity analysis of *Gossypium arboreum* (diploid cotton) cultivars revealed by PCR based molecular markers

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ABSTRACT : Genetic diversity of 16 cotton cultivars of *Gossypium arboreum* was carried out using twenty RAPD primers of OPA series and twenty four SSR primers of JESPR 307 series. Fifteen selected polymorphic RAPD primers produced a total of 178 fragments, of which 112 fragments were found to be polymorphic, resulted in 65.14 per cent polymorphism. Twenty selected polymorphic SSR primers produced a total of 64 alleles, of which 41 were found to be polymorphic, resulted in 69.50 per cent polymorphism. All the cultivars could be distinguished based on RAPD and SSR profiles. Unweighted pair group method with the arithmetic average (UPGMA) was used to construct dendrogram. The value of similarity coefficient of dendrogram calculated by RAPD and SSR markers ranged from 0.55-0.87 and 0.69-0.96, respectively. In addition, principal component analysis (PCA) was used in order to determine genetic variation among cotton cultivars. The results obtained in this study showed narrow genetic base among the cultivars and can be used in selecting divergent parents for breeding and mapping purposes.

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Studies on genetic divergence in upland cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Genetic divergence in 29 upland cotton (*G. hirsutum* L.) genotypes was studied for 19 yield attributes and quality characters. The pattern of grouping of genotypes revealled that the genetic diversity was not fully related to the geographical diversity. The inter cluster distances were found to be greater than intra cluster distances, revealing considerable amount of genetic diversity among genotypes studied. Intra-cluster distances, inter cluster distances, cluster mean for all the characters studied and cluster wise performance of all the genotypes suggested that the genotypes selected for improvement of yield and quality components were JK 54, Khandwa 2, CNH 120MB, LRA 5166, CAT 834, C 1084, CYG 2859 and JBWR 13-1. The hybridization programme with the selected genotypes by considering inter cluster distances may produce high magnitude of heterosis or desirable segregants, which would be meaningful for improvement in yield and quality attributes of cotton.

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Heterosis for seed cotton yield and other traits in GMS (Genetic male sterility) based hybrids of *Gossypium hirsutum* L cotton

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ABSTRACT : A line x tester analysis was undertaken to estimate the magnitude of heterosis in *Gossypium hirsutum* for yield, its component traits and fibre quality parameters in 50 GMS (genetic male sterility) based

cross combinations. The analysis of variance indicated that the mean squares of genotypes for all the characters were significant indicating the presence of variability among hybrids and their parents. Studies on heterosis revealed that only two cross combinations of GMS 4 x F 1861(30.4%) and GMS 4 x LH 2076 (32.1%) showed positive and significant positive heterosis over the zonal check, CSHH 198 for seed cotton yield. For bolls/plant in GMS 4 x 002 NAH (35.8%), boll weight in GMS 4 x 0238 DA (5.6%), monopods in GMS 16 x Biyani 161, GMS 20 x F 1861 (266.7%), sympods in GMS 4 x RS 810 (22.2%), seed index in GMS 27 x 002 NAH (28.1%) and ginning percentage in GMS 26 x 002 NAH (9.01%) showed the highest and significant positive heterosis over the zonal check, CSHH 198. For quality traits, 2.5 per cent span length and bundle strength the cross combinations of GMS 20 x 005 NAH (9.1%) and GMS 20 x 002 NAH (12.8%) showed the highest heterosis, whereas for maturity coefficient and micronaire value, majority of the crosses showed either non significant or negative heterosis. Thus, the cross combinations of GMS 4 x F 1861 and GMS 4 x LH 2076 can be used for exploitation of heterosis. The female parent, GMS 4 and male parent, 002 NAH recorded significant positive heterosis for most of the characters and the crosses having these parents can be used for development of pure lines.

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Effect of *Bt* biozyme on *Bt* cotton yield and its component traits under rainfed conditions

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ABSTRACT : Field experiments were conducted on *Bt* cotton to judge efficacy of *Bt* biozyme on yield and yield contributing characters under rainfed conditions during 2007-2008 and 2008-2009 at Main Cotton Research Centre, Khandwa. The result indicated that incorporation of *Bt* biozyme granules in soil at the rate of 8 kg/acre, 25 days after sowing (DAS) and two folior sprays of *Bt* biozyme (liquid formulation) at 40 and 70 DAS has a positive and significant effect on the growth and seed cotton yield of *Bt* hybrids.

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

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ABSTRACT : Twenty nine upland cotton (*G. hirsutum* L.) genotypes were studied to observe the genetic variability, heritability and genetic advance in yield, yield contributing and fibre quality characters. The analysis of variance revealed that the sufficient variability was present in the material studied for all the characters. The phenotypic coefficient of variation (PCV) was slightly higher in magnitude than genotypic coefficient of variation (GCV) for all the characters indicating the influence of environment. The highest heritability estimates in broad sense were recorded for 2.5 per cent span length. Whereas high heritability was observed for all the other characters except sympodia/plant and days to 50 per cent flowering. The high estimates of heredity coupled with high genetic advance were observed for the traits like, seed cotton yield/plant and plant height.

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Inheritance of petal length in cotton (*Gossypium arboreum* L.)

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ABSTRACT : Inheritance of petal length was examined in three crosses of *Gossypium arboreum*. Additive dominance model failed to explain differences among generation means in two crosses. Long petal length showed dominance over small petal length. Preponderance of both additive and dominance gene effects were observed with some epistatic effects.

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Screening of cotton genotypes for superior fibre quality characteristics and biotic resistance

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ABSTRACT : Five cultures have recorded significantly higher seed cotton yield as compared to check (Kandwa 2). The highest yielder was H 1250 closely followed by GSHV 7/1016, CSH 2563 and NH 594 which were *at par* among themselves but significantly superior over all the cultures and check for seed cotton yield. The highest ginning per cent was recorded from H 1242 (40 %) followed by DC 2 (36.4 %) and NH 594 (35.7 %). The observations on the fibre quality parameters were indicated that the fibre length (2.5% span length) varied between 30.1 (CSH 2545) and 24.7 mm (H 1250). The range for fibre strength was observed between 24.5 (CSH 2545) and 19.6 g/tex (LAS 6-3-3). On overall basis, the best entries in respect of fibre quality were CSH 2545 and CCH 1026. Genotypes CSH 2445, SGNR 6, DC 2, LAS 6-2, GISV 155 were found resistant to bacterial blight while RS 2361, F/2052/04, KH (HS) 153, LAS-OS 23 and NH 594 were exhibited resistant reactions against Myrothecium leaf blight diseases.

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Identification of suitable *Bt* cotton hybrids for rainfed conditions of Malwa Nimar region

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ABSTRACT : Thirty eight *Bt* cotton hybrids along with four checks *viz.* RCH 2 *Bt,* Bunny *Bt,* NHH 44 non *Bt* and JKHy 1 non *Bt* were evaluated for yield and its component characters with the objective to identify superior *Bt* hybrids for this regin. All the hybrids except RCH 118 *Bt* and RCH 2 BG II gave significantly higher seed cotton yield than the recommended *Bt* hybrid RCH 2 *Bt* whereas, Dhruv *Bt*, ACH 11-2 BG II, ACH 155-1, Tulasi 117 *Bt*, NCS 929 *Bt*, NCS 207 *Bt* and Ankur Jai *Bt* hybrids gave higher seed cotton yield than Bunny *Bt*. Maximum seed cotton yield was recorded by Dhruv *Bt* (1361.88 kg/ha) followed by ACH 11-2 BG II (1311.73 kg/ha), ACH 155-1 (1167.36 kg/ha) and Tulasi 117 *Bt* (1212.96 kg/ha). The maximum bolls/plant were recorded by ACH 155-1 (35.33) followed by Ankur Jai *Bt* (33.80) and Tulasi 117 *Bt* (33.53) which were slightly/significantly higher than *Bt* and non *Bt* checks. It can be concluded from the study that *Bt* cotton hybrids *viz.,* Dhruv *Bt*, ACH 11-2 BG II, ACH 155-1 and Tulasi 117 *Bt* have more yield potential than other *Bt* and non *Bt* hybrids.

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Evaluation of some new *Bt* cotton hybrids for seed cotton yield and fibre quality parameters under rainfed conditions

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ABSTRACT : Fifty two *Bt* Cotton hybrids including two *interspecific* (H X B) hybrids and three non *Bt* checks were evaluated for yield and fibre quality parameters under rainfed conditions at Cotton Research Station, Nanded during 2008-2009 season. Sowing was delayed due to late receipt of rainfall. The crop suffered due to moisture stress during vegetative and terminal growth stages. *Bt* cotton hybrids depicted wide range for seed cotton yield (357 – 2496 kg/ha). Out of 48 *Bt* cotton hybrids, only two hybrids namely; 195-2 *Bt* (1427 kg/ha) and KCH 14 K 59 BG II (1422 kg/ha) recorded significantly higher seed cotton yield over higher yielding *intra specific Bt* check, Bunny BG I (1100 kg/ha). Five hybrids recorded significantly higher seed cotton yield over *Bt* check, Bunny BG II (978 kg/ha). None of the hybrids out yielded higher yielding *inter specific Bt* check, MRC 6918 *Bt* (2496 kg/ha). Ginning outturn ranged from 29.96-41.97 per cent bolls/plant ranged from 9.00-57.20 and 2.5 per cent span length ranged from medium (21.21 mm) to long (31.67 mm). Fibre strength ranged between 14.5 g/tex (low) to 24.0 g/tex (strong), whereas, micronaire value ranged between very fine(2.39) to very coarse (6.54). Fibre strength to length ratio ranged between 0.63 to 0.88. Only 13 hybrids out of 52 showed desirable (>80) values. Considering yield, ginning outturn and fibre quality parameters, hybrids namely; NCS 909 *Bt*, TCH 117 BG II and ACH 1151 were found promising.

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Agronomic efficacy of *Bt* and non *Bt* cotton hybrids under irrigated conditions

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ABSTRACT : Performance of four *Bt* and non *Bt* cotton hybrids with three irrigation levels and two water saving practices were studied during summer, 2007 and 2008 on clayey soils. The application of irrigation at 75 mm CPE significantly increased the number of sympodia and green bolls/plant. However, the monopodia and plant height was found significantly more under 50 mm CPE irrigation than 100 mm CPE. Water saving practices did not show any significant effect on morphological traits and quality parameters. *Bt* and non *Bt* cotton hybrids expressed their genetical potential. The height was significantly more in Kashinath *Bt* than all other cotton hybrids owing to its genetical character, while green bolls, sympodia and boll weight were significantly more in Dhroov *Bt* than other cotton hybrids. The maximum seed cotton was obtained in Dhroov *Bt* (31.46 q/ha) than Dhroov non *Bt* (27.48 q/ha) followed by Kashinath *Bt* (20.21 q/ha) and Nathbaba non *Bt* (24.61 q/ha). Kashinath *Bt* found significantly superior in quality parameters than other cotton hybrids.

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Influence of organic and inorganic sources of nutrients on production of *desi* cotton under different plant protection measures

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ABSTRACT : A field experiment was conducted during two consecutive *kharif,* 2004-2005 and 2005-2006 at Agronomy Farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola to evaluate the productivity of *desi* cotton with organic and inorganic sources of nutrients under different plant protection measures. Results revealed that bolls, boll weight and seed cotton yield/plant were significantly affected by the different combinations of organic and inorganic sources of nutrients. Treatment combinations of FYM @ 10 t/ha+50 : 25 : 25 kg NPK/ha (O_1I_2) and vermicompost @ 2 t/ha+50 : 25 : 25 : kg NPK/ha (O_2I_2) being *at par* recorded

significantly maximum seed cotton yield (14.44 and 16.27 and 14.15 and 15.87 q/ha, respectively) over remaining treatment combinations of organic x inorganic sources of nutrients during 2004-2005 and 2005-2006, respectively. However, treatment combination of O_3I_0 during 2004-2005 (9 q/ha) and O_4I_0 during 2005-2006 (10.07 q/ha) recorded significantly lowest seed cotton yield/ha. Plant protection measures *viz.,* organics and inorganics were found to be equally comparable for increasing seed cotton yield/ha during both the years.

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Influence of kinetin application on dry matter and metabolite accumulation in water stressed cotton (*Gossypium* spp) seedlings

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ABSTRACT : In order to investigate the effect of kinetin (20 mg/l) application on water stressed seedlings, two genotypes, each of *Gossypium hirsutum* (Ankur 651 and LH 1968) and *G. arboreum* l. (LD 694 and LD327) were selected. Mild (-0.2 MPa) and severe (-0.6 MPa) water stress was induced by PEG 6000. LH 1968 seedlings accumulated dry matter more than others both under control and stress conditions. Kinetin (20 mg/l) application under stress had increased dry weight of roots in selected genotypes. A significant increase in proline and free amino acid content was recorded under stress in all genotypes. LD 694 had more protein content in control though the content was more in LD 694 under severe stress. Starch content in seedlings varied significantly after imposition of stress and kinetin application decreased it in all genotypes.

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Screening of cotton genotypes for drought tolerance in rainfed conditions

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ABSTRACT : Twenty genotypes of American cotton (*Gossypium hirsutum*) were evaluated for drought tolerance and their genetic variability, heritability and genetic advance as per cent mean and yield and yield attributing characters during *kharif*, 2008-2009. The performance of genotypes revealed that the highest relative water content was found in genotype Bihani 161 (63.26 %). Chlorophyll a, b, and total chlorophyll content in leaves was highest in genotype GTHV 02/45 (0.87, 1.33, 2.20, respectively). The highest value for chlorophyll stability index (CSI) was recorded in genotype GSHV152 (84.77) and the maximum proline content was found in genotype H1236 (35.36). The maximum leaf water potential was recorded in genotype GJHV 374 (-21.77-bar). The photosynthetic activity was maximum in genotype GJHV374 (19.43 µmol m^2/s) and the minimum stomatal conductance recorded in genotypes LRA5166 (193.47 µmol m^2/s) and the minimum transpiration rate was recorded in genotype ADB102 (5.54 µmol m^2/s). The specific leaf area was the maximum in GTHV 0/35 (210.90 cm^2/mg). Besides these, the yield attributing characters *i.e.* sympodia, boll weight/ plant and seed cotton yield were highest in DHH 0761 (19.11, 3.63 g, 2145.60kg/ha, respectively) and maximum number of monopodia was found in GJHV374 (1.78/plant).The bolls/plant was maximum in H1236 (25.44) and the dry matter content was highest recorded in GSHV 152 (121.27 g/plant). The estimates of genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were high for number of bolls and seed cotton yield (g)/plant and drought tolerance parameters *viz.,* CSI and dry matter production / plant (DMP) showed considerable variations. Heritability estimates were observed to be high for all yields and yield attributing characters and drought tolerance traits also.

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Tillage and nitrogen fertilization effects on yield and water expense efficiency of *Bt* cotton hybrid

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ABSTRACT : A field experiment was conducted at Punjab Agricultural University, Regional Research Station, Bathinda during *kharif* , 2006-2007 and 2007-2008 to study the effect of tillage on seed cotton yield and water expense efficiency under different methods of planting at varying nitrogen levels on *Bt* cotton hybrid RCH134. The results revealed that deep tillage resulted in significantly higher seed cotton yield as compared to conventional tillage with flat sowing. *Bt* cotton hybrid responded to nitrogen application and the maximum seed cotton yield was obtained with the application of 120 kg N/ha under conventional and deep tillage treatments. However, the highest water expense efficiency (53.1 kg/ha-cm) was recorded in case of conventional tillage plus ridge sowing (CTR) and the lowest (45.0 kg/ ha-cm) under conventional tillage plus flat sowing (CTF).

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Performance of cotton varieties (*Gossypium arboreum* L.) under different spacings and nitrogen levels in black cotton soils of coastal Andhra Pradesh

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ABSTRACT : A field experiment was conducted at Regional Agricultural Research Station, Guntur under rainfed condition during *kharif,* 2007 with an objective to find out the optimum spacing and nitrogen level for pre released cotton variety *viz.,* GAM 93 with check entry Aravinda. Closer row spacing with 120 kg N/ha was found to be optimum for both the varieties. Further increase or decrease of the fertilizer levels declined economic returns. Quality of the fibre was not influenced by either spacing or fertilizer application. Closer spacing and increasing N levels upto 120 kg N/ha recorded significantly higher seed index compared to wider row spacing and lower N doses. Lint index and GOT (%) showed declining trend with an increase in N doses.

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Influence of agrochemicals on growth and yield of cotton genotypes

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ABSTRACT : Cotton is one of the most important fibre crops playing a key role in the economic and social affairs of the world. A field experiment was carried out during *kharif* 2002-2003 at Agricultural Research Station, University of Agricultural Sciences, Dharwad to study the influence of agrochemicals on different growth parameters and yield components in cotton genotypes. The seed cotton yield depends on the accumulation of photo assimilates and partitioning of these in reproductive parts of the plant. The seed

cotton yield was considerably influenced by the application of different agrochemicals indicating the role of these chemicals in increasing the seed cotton yield. In the present investigation, higher yield was obtained in the treatment, sprayed with naphthalene acetic acid (NAA) 10 ppm. This increased yield was due to higher seed cotton yield/plant and more number of bolls and boll weight as compared to other treatments. Significantly higher leaf area index (LAI) and rate of photosynthesis values were recorded in naphthalene acetic acid (NAA) 10 ppm treatment and least values in cobalt chloride ($CoCl_2$). Among the genotypes significantly higher yield, photosynthetic rate and leaf area index (LAI) values were recorded in DHB 105 and least in SB (YF) 425. Application of naphthalene acetic acid (NAA) 10 ppm increased significantly all morphological parameters and least was recorded in cobalt chloride ($CoCl_2$ 1M). Among the genotypes significantly more number of branches/plant was recorded in *desi* cotton. Correlation study revealed that all parameters were positively correlated with yield.

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Response of *Bt* cotton (*Gossypium hirsutum* L) for integrated rain water and nutrient management

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ABSTRACT : A field experiment was conducted during *kharif,* 2007-2008 at Regional Agricultural Research Station, Guntur to study the effect of integrated rain water and nutrient management for improvement in productivity and fibre quality of *Bt* cotton. Opening of an alternate furrow at last inter culture (S_1) recorded the highest seed cotton yield with increased sympodia, bolls/plant, BCR (3.42) and higher seed index (11.7 g). Application of RDF based on soil test values plus two sprays of KNO_3 (2%) each at flowering and boll development stage recorded the highest seed cotton yield (4550 kg/ha) which was closely followed by 75 per cent inorganic and 25 per cent organic in the form of well decomposed FYM (4490 kg/ha). CUW increased by raising sunhemp as green manuring crop in 1:2 ratio which attributed for higher GOT (34.9%) but oil content was declined by 1 per cent. No quality parameter has been influenced by any of the treatments under rainfed condition.

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Reddening of *Bt* cotton under waterlogged conditions

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ABSTRACT : Waterlogging induced reddening of leaves in *Bt* cotton. Photosynthetic rate, stomatal conductance and transpiration rate reduced in red leaves. There was a reduction in content of N, P, K, Ca, Mg, Zn and Mn in 52.0, 38.5, 62.5, 78.1, 35.3 and 29.8 per cent respectively, with a increase in Na, Fe and Cu *i. e.* 47.0, 121.0 and 19.2 per cent, respectively.

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Quality of American cotton (*Gossypium hirsutum*) as influenced by different irrigation schedules

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ABSTRACT : A field experiment was conducted at Punjab Agricultural University, Ludhiana during *kharif*, 2004. The treatments comprised of four irrigation schedules (Irrigation application at 75, 95,115 and 135 mm of cumulative pan evaporation) and four dates of irrigation termination (10, 20, 30 September and 10, October). The treatments were replicated four times in randomized block design. Ginning outturn was not affected due to schedule of irrigation upto the last irrigation. Highest oil content (19.34%) was observed under 135 mm CPE, which was significantly higher than 75 and 95 mm CPE but was *at par* with 115 mm CPE. None of the quality characters were significantly influenced by different irrigation schedules as well as date of termination of last irrigation. Maximum seed cotton yield was recorded at 95 mm (16.23 q/ha) followed by 75 mm (16.22 q/ha) CPE and these two irrigation regimes being *at par* with one another and they were significantly superior to 115 mm (13.98 q/ha) and 135 mm (12.66 q/ha) CPE. Termination of last irrigation on October, 10 produced highest seed cotton yield (15.64 q/ha) as compared to termination on September, 10 and 20 but *at par* with September, 30.

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Bioinoculant technology for enhancing beneficial rhizospheric microflora and plant vigour in cotton

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ABSTRACT : Cage house and field studies were conducted (2001 and 2002) to find out the most suitable combination of bioinoculants like *Azospirillum* and phosphate solubilizing bacteria (PSB) with pesticides and inorganic fertilizers for enhancing beneficial microorganisms in soil and to achieve good growth of cotton plants. The studies indicated that the combination of carbendazim @ 1 g/kg seed with a mixture of *Azospirillum* + PSB culture (10^9 cfu/g) @ 20 g/kg seed is the most suitable mixture for enhancing the beneficial microflora in soil and also the yield attributes of cotton crop. The population of *Azospirillum* and PSB at 45, 90 and 135 DAS under this combination was 14460, 23680 and 30340 colonies/mg soil and 55690, 61840 and 73810 colonies/mg soil, respectively. This treatment (T_2) exhibited highest vigour index of 1941. Seed treatment with Thiram @ 4 g/kg seed in association with bioinoculants @ 20 g/kg seed was next suitable combination in terms of bacterial count and plant vigour index. Combination of Imidachloprid @ 7 g/kg seed and Pendimethalin @ 1kg a.i./ha did not prove beneficial. Under field conditions, soil enriched with different doses of inorganic fertilizers did not exert any significant effect on microbial population. Soil incorporation with a mixture of *Azospirillum* (HAU, Hisar) + PSB (TNAU, Coimbatore) and *Azospirillum* (TNAU, Coimbatore) + PSB (TNAU, Coimbatore) gave significantly higher population of *Azospirillum* and PSB colonies, respectively over uninoculated control in rhizospheric soil of cotton plants.

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Management of bacterial blight of cotton through biological control

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ABSTRACT : Among the diseases, bacterial blight is the major disease in Gujarat. Ten treatments with three frequent sprays on 30, 60 and 90 days after sowing (DAS) were carried out for management of bacterial blight. Observations were recorded from five randomly selected plants of each treatment in terms of 0-4 grade and per cent disease intensity (PDI) was worked out. The seed cotton yield was recorded from net plot

area. The three years' pooled data revealed that seed treatment with *Pseudomonas fluorescens* Pf_1 @ 10 g/kg seed+soil application @ 2.5 kg/ha; followed by seed treated with *P. fluorescens* Pf_2 (CHAO) @ 10 g/kg seed+soil application @ 2.5 kg/ha at the time of sowing; seed treated with Pf_2 @ 10 g/kg seed+foliar spray @ 0.2 per cent and seed treated with Pf_1 @ 10 g/kg seed+foliar spray @ 0.2 per cent on 30, 60 and 90 DAS were found significantly superior in reducing the disease as compared to control and other treatments. Seed cotton yield was found non significant. Highest B : C ratio was obtained in seed treatment with *P. fluorescens* Pf_1 @10 g/kg seed+soil application @ 2.5 kg/ha.

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Chemical and biological management of bacterial blight of cotton caused by *Xanthomonas axonopodis* pv. *malvacearum*

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ABSTRACT : Foliar sprays of copper oxychloride @ 0.2 per cent+streptomycin sulphate @ 100 ppm were proved effective to reduce the bacterial blight incidence (37.41%), intensity (13.08%) and with a maximum yield (1287 kg/ha), bioagent, *Pseudomonas fluorescens* Pf_1 @10 g/kg seed treatment followed by three foliar sprays 0.2% at 30, 60 and 90 days after germination were also equally effective in reducing the disease incidence (38.34%), disease intensity (14.54%) and with a higher seed cotton yield (1252 kg/ha). These treatments were equally effective for managing the disease. The incremental cost benefit ratio (ICBR) was maximum (1:3.48) in *P. fluorescens* Pf_1 treatment, whereas it was low in chemicals (1:2.08). Maximum disease incidence (57.59%), disease intensity (32.84%) and minimum seed cotton yield was recorded in untreated control. Hence, the application of seed treatment of bioagent *i.e.* talc based formulation of *P. fluorescens* Pf_1 @ 10 g/kg seed followed by three foliar sprays of @ 0.2 per cent at 30, 60 and 90 days after germination were found effective and economical for management of bacterial blight of cotton.

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Efficacy of copper hydroxide against bacterial blight of cotton caused by *Xanthomonas axonopodis* pv. *malvacearum*

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ABSTRACT : Two years pooled data generated during *kharif*, 2007-2008 and 2008-2009 revealed the significant reduction of the disease with three foliar sprays of copper hydroxide (0.3%). However, copper hydroxide (0.3%) was equally effective with recommended chemical *i.e.* copper oxychloride+streptocycline (0.3%+100 ppm) in reducing the disease. The intensity was 11.65 and 11.27 per cent and yield levels were 1221 and 1242 kg/ha in T3 and T4 treatments, respectively. Among the different concentrations of copper hydroxide (0.3%) T3 recorded 51.72 per cent disease reduction. Maximum disease intensity (24.13 %) was recorded in control.

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Effect of age of transgenic *Bt* cotton on survival of *Helicoverpa armigera* (Hubner) (Lepidoptera : Noctuidae)

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ABSTRACT : Studies on the effect of transgenic *Bt* cotton on survival of *Helicoverpa armigera* at different crop age intervals were carried out in the Laboratory, 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 they were grown by adopting recommended package of practices. The survival of first instar larvae of *H. armigera* was observed on top leaves, middle leaves, squares and bolls for five days at an interval of 60, 90, 100, 120 and 140 days of crop age at 28±1°C in BOD incubator. Significant adverse effect of *Bt* was observed at 60, 90 and 100 days of crop age in top leaves, middle leaves, squares and bolls. The minimum per cent survival of larvae in transgenic *Bt* hybrid was observed at 60 days of crop age in top leaves (16.67-20.00%), middle leaves (13.33-20.00%), squares (26.67-36.67%) and bolls (30.00-36.67%). Similar trend was followed at 90 and 100 days of crop age. The effect of *Bt* at 120 and 140 days of crop age was non-significant on larval survival in comparison to non *Bt* and local hybrid HHH 223.

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Bioefficacy of emamectin benzoate (1% ME) against bollworm complex of cotton

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ABSTRACT : Field experiments were conducted at Agriculture Research Station, Dharwad during 2005-2006 and 2006-2007 under rainfed conditions to evaluate the efficacy of a new avermectin formulation, emamectin benzoate 1 per cent ME against bollworm complex of cotton. Emamectin benzoate 1 per cent ME @ 22 g ai/ ha was found to be effective in suppressing the larval population which reflected on lowest fruiting body damage (6.19 %) and highest seed cotton yield (20.51q/ha). It was found to be *on par* with spinosad 45 SC(5.57% and 21.27 q/ha), respectively).

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Effect of methanolic extract and its fractions of garlic, *Allium sativum* L on ovipositional behaviour and egg hatching of spotted bollworm of cotton

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ABSTRACT : Laboratory studies on the effect of methanol extract and its fractions of garlic, *Allium sativum* L. on ovipositional behaviour and hatchability of eggs of *Earias vittella* (F.) revealed that number of eggs laid on untreated substrate was more than treated substrate. It varied from 21.0 (2.0% hexane fraction) to 51.0 eggs (0.5% methanol fraction) on treated substrate. In untreated substrate, it ranged from 33.33 (2.0% hexane fraction) to 63.00 eggs (0.5% methanol fraction). Under no choice conditions, it varied from 52.33 (2.0% hexane fraction) to 79.67 eggs (0.5% methanol fraction). When adult moths were fed on extract and fractions treated sucrose diet the adults laid significantly low number of eggs with poor hatching. Moths manifested reduced egg laying even when they were not in direct contact with the extract. One day old treated eggs exhibited lower hatching and it was more pronounced in 2.0 per cent hexane fraction (40.0% hatching) than other treatments.

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Bioefficacy of RIL (043 EC) : A new combi product against cotton bollworm complex

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ABSTRACT : A new combi product RIL (043 EC, indoxacarb 7.5% +l cyhalothrin 4% EC) was evaluated at Agricultural Research Station, Dharwad Farm during *kharif,* 2006-2007 for its efficacy against cotton bollworm complex in comparison with Koranda (cypermethrin5%+chlorpyriphs 50% EC @1250 ml/ha) (standard check). Among the three dosages tested namely, RIL (043 EC @1000 ml/ha) was found to be effective in reducing the bollworm infestation and proved to be equally effective as that of indoxacarb 14.5 SC and Koranda and also registered higher seed cotton yield. No phytotoxic effect with RIL (043 EC) was observed in cotton hybrid.

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Field evaluation of *Bt* cotton hybrids against major diseases

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ABSTRACT : Forty *Bt* cotton hybrids were evaluated at Regional Agricultural Research Station, Guntur during *kharif,* 2009-2010. Response of these genotypes to different diseases was recorded under natural disease pressure. Five hybrids expressed immune reactions and six hybrids recorded resistance reactions to two or more diseases including bacterial blight, grey mildew, Alternaria and Helminthosporium leaf spots and tobacco streak virus.

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Biology of mealy bug, *Phenacoccus solenopsis* (Tinsley) on cotton

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ABSTRACT : The biology of mealy bug, *Phenacoccus solenopsis* (Tinsley) was studied on cotton under laboratory conditions at Junagadh Agricultural University, Junagadh at average temperature of 23.6°C with a relative humidity of 59.2 per cent during June 2008. The average numbers of eggs laid by a female were 427.68±86.69 and these were minute, oval in shape and light yellow or whitish yellow in colour. The average incubation period was 6.62±1.71 days. There were three nymphal instars preceding the adult stage. The average durations of first, second and third instar nymphs were 4.82±1.12, 5.64±1.14 and 6.42±1.14 days, respectively with total nymphal duration of 16.88±2.11 days. The active movement of newly hetched crawlers(nymphs) was noticed. The first and second instar nymphs were pale yellow in colour and oblong shaped. Two longer caudal white filaments were present on tip of abdomen. No mealy scale presented on the body. A pair of red eye and filiform antenna was seen on head. Three pair of reddish legs were present on thorax. During third instar white waxy substance covered dorsal body surface. The adult female was oblong in shape, light to dark yellow in appearance and was wingless. Several pairs of short white waxy filaments were also seen

around the body (peripheral) with a longest pair at the posterior end. The pre oviposition, oviposition and post oviposition periods were recorded as 4.32 ± 0.80, 8.00 ± 0.82 and 2.72 ± 0.79 days, respectively. The female adult survived for 15.52 ± 1.42 days and the entire life span was 31.13 ± 3.19 days. A pair of dark spots on thorax and three pairs on abdomen forming two longitudinal stripes were noticed.

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Efficacy of various insecticides against mealy bug, *Phenacoccus solenopsis* (Tinsley) infesting cotton

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ABSTRACT : Nine insecticides namely buprofezin (0.025%), chlorpyriphos (0.05%), dimethoate (0.03%), fenobucarb (0.1%), malathion (0.1%), methyl parathion (0.05%), profenophos (0.1%), quinalphos (0.05%), and triazophos (0.06%) were evaluated for their efficacy against mealy bug, *Phenacoccus solenopsis* infesting cotton at Junagadh during 2008-2009. Two applications of all the insecticides were given when sufficient population of the pest developed on the crop at boll development stage and the mortality of mealy bug caused by each insecticide was recorded at 3 and 7 days after their application. The data revealed that two applications at 20 days interval with methyl parathion was most effective and economical against mealy bug which caused 98 to 99.9 per cent mortality of the pest. The treatment resulted in highest yield (1028 kg/ha) and net return (Rs.9279/ha) with C:B ratio of 6.8. The treatments of profenophos and dimethoat were found next effective (89% and 78% mortality of the pest).

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Effect of foliar application of KNO_3 on growth, yield attributes, yield and economics of *hirsutum* cotton

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ABSTRACT : A field experiment was conducted during *kharif,* 2007 and 2008 at C. S. Azad University of Agriculture and Technology, Kanpur to study the effect of foliar application of KNO_3 on yield of cotton and economics of *hirsutum* cotton. Data presented revealed that all the growth and yield attributing characters were improved significant with the application of KNO_3 and MOP over control. Four foliar sprays of 2 per cent KNO_3 produced significantly more seed cotton yield (1640 kg/ha) and lint yield (564 kg/ha) than control by 20 and 24.7 per cent, respectively. Significantly higher seed cotton yield (1610 kg/ha) and lint yield (542 kg/ha) were also obtained with application of four split doses of MOP (soil treatment) over control. Highest net return (Rs. 25843/ha) and B : C ratio (2.16) were achieved with the application of MOP in four split doses (soil treatment) followed by full dose of MOP as basal (Rs. 23083/ha) and (2.06), respectively, as compared to the rest of treatments.