ABSTRACTS
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J. Cotton Res. Dev. **23** (2) 175-182 (July 2009)

Stability analysis for yield and its component traits in American cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Stability analysis of the material consisting of 70 genotypes grown at two locations *viz.,* Hisar and Sirsa was conducted. The crop at Sirsa was grown on two different dates, thereby creating total of three environments. The observations were recorded on 10 characters related to seed cotton yield and its components. Variance due to genotypes, environments and genotype x environment interaction was significant for all the characters studied. Major portion of G x E interaction was accounted by linear component for all the characters under study except for number of sympodia, number of bolls/plant and lint index. Out of 70 genotypes, none was found stable for all the characters studied. For seed cotton yield, only two genotypes *viz.,* CNH-13 and PIL-8-5 were found desirable with high mean, non-significant S^2di values and significant bi values indicating their adaptability to specific environmental conditions *viz.,* rich or poor.

J. Cotton Res. Dev. **23** (2) 183-187 (July 2009)

Combining ability studies for yield and quality traits in cotton (*Gossypium hirsutum*)

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ABSTRACT : The present investigation was undertaken by adopting diallel analysis involving seven diverse parents with magnitude of general combinig ability and specific combining ability effect of different genotypes. For this purpose, 21 hybrids were developed by using seven parents during *kharif* 2005. These hybrids alongwith seven parents and two checks NHH-44 and PHH-316 were planted in *kharif* 2006 at Cotton Research Scheme at Parbhani. The analysis of variance for combining ability revealed that variances due to gca and sca were highly significant for all the characters studied. The variances due to sca were larger than gca for most of the characters indicating the predominance of non-additive gene action. This was also supported by less than one ratio of σ^2 gca : σ^2 sca for most of the characters. The parents KH-120, KH-923 and PH-44-1-2 had good combining ability characters. The hybrids KH-923 x KH-113, PH-44-1-2 x KH-120 and PH-44-1-2 x KH-923 had sca effect for seed cotton yield and important yield components.

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Stability analysis of CGMS based hybrids and their parents for seed cotton yield in cotton (*Gossypium hirsutum* L.)

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ABSTRACT : The twenty-one CGMS based hybrids of hirsutum cotton alongwith three check hybrids and 13 parents (nine maintainer lines and four restorer lines) were evaluated for stability in three environments (summer 2004, summer 2005 and *kharif* 2005) at Cotton Project, MPKV, Rahuri for seed cotton yield, days to flowering and ginning outturn. The partitioning of G x E interactions indicated that substantial portion of G x E interaction was linear for seed cotton yield/plant, days to 50% flowering and ginning outturn. Both linear and non-linear components were equally important for these characters. The study of the stability parameters revealed that the hybrids MSRHH- 2019, 2027, 2031, 2036 and NHH-44 and PKVHy-4 were found stable over environments with higher seed cotton yield, regression with unity

and non-significant deviation from regression. Whereas in case of parents RHRB-2B and RHRB-10B (maintainer lines) and RHCr-054 restorer were found average stable for seed cotton yield. Based on the stability performance and fibre quality parameters, the seven hybrids found superior at Rahuri location for three crop seasons were further evaluated alongwith three hybrid checks in multilocation trials during summer 2006 for stability and confirmed that out of four CGMS hybrids two hybrids *viz*., MSRHH-2019 and 2036 also showed average stability for seed cotton yield over locations and also had good fibre parameters.

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Cytomorphological study in apomictic cotton lines

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ABSTRACT : Cytological studies in apomictic cotton lines showed variation in chromosome number within lines. At meiotic stage (Metephase-I) chromosome number ranges from 26-54 in IS 244/4/1, IS 181/7/1 and IS 376/4/1/5/19, whereas 26-78 in IS 181/7/1, respectively, were observed against normal chromosome in *G. arboreum* and *G. hirsutum*. Chromosome configuration at Metaphase-I was 8.5 I + 9.65 II + 1.95 III + 1.62 IV in IS 244/4/1, 10 I+10.15 II+2.25 III+1.55 IV in IS 244/4/2, 11.40 I+12.50 II+1.7 III+1.45 IV in IS 181/7/1 and 10.10 I+10.20 II+2.25 III+1.85 IV in IS 376/4/1/5/19, respectively. At Anaphase-I irregular separation of chromosomes was observed which led to form diads and triads. Morphological characters were reduced in plant height, leaves, floral parts, pollen fertility, pollen sterility, number of seeds per boll and 100-seed weight than check.

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Study of *Bt* and non-*Bt* cotton hybrids for yield and quality characters under normal and delay-sown condition

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ABSTRACT : A field experiment was conducted for two years during *kharif* 2006-2007 and 2007-2008 at C. R. S., Nanded to study the effect of sowing on yield and quality characters in *Bt* and non-*Bt* hybrids. Seed cotton yield recorded under normal sown crop (1130 kg/ha) was significantly more over late sown crop (1058 kg/ha). The sowing invariably influenced number of sympodia, number of bolls, yield per plant, 100-seed weight, GOT (%), number of monopodia per plant and ginning outturn. Regarding fibre quality parameters, normal sown crop showed superiority over late sown crop in staple elongation and micronaire value. The genotype Bunny *Bt* was found superior for yield and yield contributing characters, while non-*Bt* hybrids PHH-316 and Bunny were found superior to *Bt* hybrids in quality parameters in late sown condition.

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Effect of *Gossypium harknessii* cytoplasm on heterosis of economic characters in upland cotton (*Gossypium hirsutum* L.)

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ABSTRACT : The present study was undertaken to investigate the effect of cytoplasm on magnitude of heterosis for characters of economic importance in cotton. Six male sterile lines (MS 1A through MS 6A) and their respective maintainer lines (MS 1B through MS 6B) were crossed with 11 restorer lines (R) to develop A x R and B x R sets of crosses. On the basis of average of all hybrids, the male sterile cytoplasm significantly decreased number of bolls, boll weight and seed cotton yield, whereas days to maturity and fibre strength were significantly increased as compared to normal cytoplasm. The evaluation of heterosis

of individual crosses showed that male sterile cytoplasm did influence heterosis in most of the cross combinations. Among CMS based hybrids, MS 4A x TR 14 was highest yielding (55.4 g), whereas among B x R crosses, MS 2B x TR 101 (75.3 g) produced highest yield of seed cotton. The A x R crosses recorded heterosis for yield ranging from 52.4 to 95.1%, while these values ranged from 65.3 to 165.3% for B x R crosses. The hybrids MS 4A x TR 14 and MS 5B x TR 31 had significant heterosis for seed cotton yield, whereas their respective counterparts were non-heterotic. Similar effect of *G. harknessii* cytoplasm has been observed for other characters also. It is thus the interaction of particular cytoplasm with the nucleus that affects performance of hybrids in cotton.

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Heterosis in hybrids of *Gossypium arboreum* cotton

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ABSTRACT : Studies on heterosis made with 18 specific cross combinations of *G. arboreum* cotton revealed that the maximum heterosis for seed cotton yield and average boll weight were observed in cross combination JLA-794 x PA-402 in the tune of 58.74 and 21.81 per cent, respectively, for plant height JLA-1600 x PA-405 (16.32%); for number of sympodia in JLA-1600 x AKA-9628 (15.81%); for number of bolls per plant in JLA-1600 x JLA-1202 (14.34%); for halo length in AKA-5 x PA-405 (8.87%) and for ginning percentage in AKA-7 x JLA-1202 (8.55%). The cross combinations involving JLA-1600 as a female parent recorded significant positive heterosis for most of the yield contributing characters. Thus, the female parent JLA-1600 can be used for exploitation of heterosis.

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Scope of cultivating American cotton in spring season in Punjab–a preliminary study

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ABSTRACT : Eight genotypes of *Gossypium hirsutum* L. were evaluated during spring 2004 for yield and yield component characters. The objective was to assess the potential of early maturing genotypes in non-traditional environment i. e. spring season. Based on *per se* performance the genotypes Pusa-S2, Pusa-S6, GSH 4 and GSH 10 were found promising for seed cotton yield and lint yield. The genotype Pusa-S2 had high mean performance for bolls/plant and lint index. The genotype Pusa-S6 was found promising for single boll weight and seed index. Genotypes GSH 4, GSH 10, LH 1995 and RS 875 were identified as resistant to cotton leaf curl virus (CLCuV) disease. Since considerable yield was obtained with very less application of pesticides, the cultivation of cotton in spring season seems to have some promise.

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Diallel analysis for heterosis studies in upland cotton

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ABSTRACT : Heterosis studies through diallel analysis in upland cotton revealed high amount of mid parent heterosis for seed cotton yield per plant. Based on the *per se* performance and percentage of heterosis the NH-1021 x PH-1009, GJHV-374 x GBHV-148, GJHV-374 x AKH-9913 and GJHV-374 x PH-1009 were found best reciprocal crosses, while PH-1009 x GJHV-374, PH -1009 x NH-1021, GBHV-148 x GBHV-374 and ADB-320 x GJHV-374 were found best F_1 crosses among 56 hybrids evaluated.

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Diallel analysis for combining ability for seed cotton yield and its component traits in upland cotton

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ABSTRACT : Analysis of variance for combining ability revealed that both additive as well as non-additive variances were important in the inheritance of various traits as evident from the significance of characters under study. However, variances due to gca were higher in magnitude. Amongst the parents, GISV 197 and GSHV 97/13 were the best general combiners for most of the characters under study. Six combinations *viz.*, BC 68-2 x GISV 197, SD 3 x GISV 197, SD 3 x B 55-53, GSHV 97/13 x BN, G. Cot.10 x LRA 5166 and G. Cot.10 x BC 68-2 had high *per se* performance coupled with significant high sca can be exploited for hybrid vigour or to be utilized for the improvement of genotypes.

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MDLABB-1–A big bolled line of *Gossypium arboreum* L. race : *Cernuum*

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ABSTRACT : The crop was raised under rainfed conditions with all recommended practices. Pure line method of selection was practised. All the plants were selfed to obtain selfed seed. Progenies of these plants were grown. Segregation for boll weight was observed in these progenies. All the plants were selfed to obtain selfed seed. Again segregation for boll weight was observed but the range was narrowed down. These lines will be maintained by selfing and named as MDLABB-1. Other characters of this line are given in the text.

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Effect of climatic conditions of diferent months on flowering and fruiting behaviour on male sterile lines of American cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Investigation carried out at Cotton Research Unit, Dr. P. D. K. V., Akola indicated both CMS lines *viz.,* CAK-053-A, CAK-023-A and GMS lines *viz.,* GMS-70-G and GAK-32 exhibited earliness for flowering and fruiting behaviour in September than October followed by November and it might be due to varying climatic conditions during these three months. This information may be useful for properly synchronizing males and females for getting high seed yield and quality particularly in *desi* cotton hybrid seed production programme.

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Heterosis and combining ability for yield and oil content in a half diallel cotton *Gossypium hirsutum* (L.) over environments

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ABSTRACT : Eight parents of *G. hirsutum* (L.) cotton and their 28 crosses with two checks studied for heterosis and combining ability revealed that both additive and non-additive gene effects were important. However, magnitude of gca was comparatively higher than their respective sca. The crosses showing high sca effects were not always the result of G x G combining parents indicating limited utility of parental high gca effect. The crosses showing high sca effects for oil content involved atleast one good gca parent for oil content. The relative ranking on the basis of *per se* performance and heterosis differed. The magnitude of heterobeltiosis and standard heterosis were moderate to higher for seed cotton yield, whereas it was lower to moderate for oil content, seed index and ginning outturn.

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Nutrients uptake and fibre quality parameters as influenced by integrated nutrient management practices in irrigated hybrid cotton

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ABSTRACT : A field experiment was conducted for two years (2000-2001 and 2001-2002) at RARS, Raichur to study the effect of green manures, organic manures and fertilizers on major nutrients uptake and fibre quality parameters of cotton under irrigated conditions. The average data revealed the green manuring with sunnhemp and lucerne recorded significantly higher NPK uptake over no green manuring practice. Similarly, among organic manures, FYM application established its significant superiority over cotton stalks incorporation and control. Increase in fertilizer levels increased NPK uptake by cotton. Fibre quality parameters *viz.,* fibre length, fineness, strength and fibre quality index were not significantly influenced by either green manures or organic manures or chemical fertilizers application. Whereas ginning (%) and lint index were influenced significantly by the different treatments.

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Performance of *Bt* cotton based double cropping system in black cotton soils under irrigated conditions

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ABSTRACT : A field experiment was conducted during *kharif* and *rabi* seasons of 2007-2008 at Regional Agricultural Research Station, Lam to study the production potential and economics of cotton based double cropping system under irrigated conditions, but cotton has been cultivated under rainfed, whereas the subsequent second crop was taken up with irrigations. Cotton-watermelon+methi sequence gave significantly highest cotton equivalent yield (88.5 q/ha), net monetary returns (Rs. 1,05,750) and production use efficiency (30.0 kg/ha/day) followed by cotton-cucumber double cropping system which recorded 71.3 q/ha, with a net return of Rs. 91,800. However, the highest BCR of 2.8 was recorded in cotton-sesamum followed by cotton-cucumber (2.41), where sesamum and cucumber being short duration crops with low cost of cultivation attributed for higher BCR.

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Performance of *Bt* cotton hybrids at farmers' field in Haryana

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ABSTRACT : Frontline demonstrations at farmers' field during 2005-2006, 2006-2007 and 2007-2008 have proved that *Bt* cotton performed better than non-*Bt* cotton. The results indicated that pooled average of seed cotton yield of three years was to the extent of 24.06 q/ha in *Bt* cotton against 18.09 q/ha in non-*Bt* cotton. The *Bt* cotton has reduced the cost of plant protection by Rs. 2109/ha as compared to non-*Bt* cotton. An average enhancement of seed cotton yield from *Bt* cotton was 24.81% over non-*Bt* cotton. The average additional net returns from *Bt* over non-*Bt* cotton were Rs. 8959/ha. The results clearly indicated that *Bt* cotton technology was economically viable. As a result of this, the area under *Bt* cotton increased from 2.5% in 2005-2006 to 69.5% in 2008-2009 over a period of four years.

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Effect of potassium application on yield, potassium uptake and fibre quality of cotton (*Gossypium hirsutum* L.)

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ABSTRACT : A field experiment was conducted in three successive years (2003-2005) to study the effect of potassium application on yield, potassium uptake and fibre quality of cotton with the treatments : T_1–NP, T_2–NPK, T_3–NP+K foliar spray at early boll development stage, T_4–NP+K foliar spray at peak boll development stage, T_5–NP+K foliar spray at early and peak boll development stages. Effect of soil and foliar application of potassium on seed cotton yield and fibre quality of cotton was found non-significant. The potassium uptake by different plant parts of cotton was in the order : Stem > Khokri >Leaf >Seed, which was about 42.61, 34.06, 14.04 and 9.28% of the total potassium uptake by the crop (188.39 kg/ha), respectively.

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Effect of legume intercrops on pest incidence and yield of rainfed cotton in vertisols

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ABSTRACT : A field experiment was conducted for three consecutive years to study the effect of intercrops on pest incidence and yield of cotton under rainfed conditions from *kharif* 2002 to 2004. Experiment was laid out in randomized block design with three replications. Results indicate that intercropping of cotton with legumes especially soybean either in 1 : 1 or 1 : 2 is more remunerative and also effective against pests of cotton in which natural enemies build up.

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Effect of organic and inorganic sources of nutrition on yield and fibre quality of cotton (*Gossypium hirsutum*)

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ABSTRACT : A field experiment was conducted at Krishi Vigyan Kendra, Sirsa during *kharif* seasons of 2004 and 2005 to evaluate the effect of source of nutrition on yield and fibre quality of cotton. The

application of recommended dose of nitrogen (RDN) through chemical fertilizer has achieved statistically higher seed cotton yield i. e. 20.4 q/ha, maximum nitrogen cotent and uptake over rest of the combination treatments of organic and inorganic sources. Different sources of nutrition could not exert much of effect on quality parameters of cotton crop.

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Assessing relative drought tolerance in cotton (*Gossypium* spp.) using line source sprinkler technique. II. Reproductive behaviour and yield

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ABSTRACT : Fifty-two genotypes of three cotton species (*Gossupium herbaceum,G. hirsutum* and *G. arboreum*) were raised in line source technique to evaluate for drought tolerance. The data recorded on reproductive structures, total biomass and yield at harvest differed significantly among the genotypes. The genotype LRA-5166 in *G. hirsutum* had significanly higher biomass at all stress levels followed by TCH-1002. In *G. herbaceum,* DB-3-12 consistently maintained higher biomass followed by H-10, whereas in *G. arboreum,* none of the genotypes was superior to check, AK-235. However, the genotype No. 3287 performed on par with check. Seed cotton yield was also higher in all these genotypes alongwith higher number of reproductive structures and HI. Hence, based on the above parameters these genotypes can be categorised as relatively drought tolerant.

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Preparation of wormicompost by using uprooted cotton stalks

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ABSTRACT : The dried cotton stalks were uprooted during first week of February, 2008 and were made into small pieces by using local chaff cutter. A wormicompost pit was constructed using bricks, sand and cement. The small pieces were put into the pit and cow dung slurry was added. In this way the pit was completely filled. Cow dung was allowed to rot by periodically sprinkling water after 2-3 days interval. After 60 days, the stalks were completely rotten, add 2 kg of wormicompost and after 45 days perfect wormicompost was obtained.

J. Cotton Res. Dev. **23** (2) 265-269 (July 2009)

Effect of *Panchagavya* on productivity and quality of *Bt* cotton (*Gossypium hirsutum* L.) in black cotton soils of coastal Andhra Pradesh

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ABSTRACT : A field experiment was conducted under rainfed condition during *kharif* 2007 with the objective to find out the effect of *Panchagavya* on cotton yield and fiber quality. Most of the growth and yield contributing characters were significantly influenced by application of 3% *Panchagavya* at critical growth stages in addition to RDF and recorded the highest values which ultimately reflected in seed cotton yield. There is a clear indication that application of organic component alone doesn't help in achieving good yield but in combination with chemical fertilizers resulted in the best for achieving significantly higher yield with a BCR of 2.32. Application of *Panchagavya* did not exert any significant impact on fibre quality but relatively higher strength, micronaire and uniformity ratio were observed under 50% RDF+10 t FYM/ha+three sprays of *Panchagavya* 3% at critical growth stages.

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Effect of methanolic leaf extract and fractions of *Datura metel* on oviposition behaviour of spotted bollworm of cotton

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ABSTRACT : A study was carried out under laboratory conditions to test methanol extract of *Datura metel* leaves and its fractions (acetone, hexane and chloroform) on oviposition behaviour and hatchability of eggs of spotted bollworm, *Earias vittella* of cotton. Addition of extract (2.5, 5.0, 7.5 and 10.0%) and fractions (0.5, 1.0, 1.5 and 2.0%) in sugar solution diet offered to adults caused significant reduction in the number of eggs laid and their subsequent hatching. Minimum number of eggs (76.67) were laid in the treatment of hexane fraction (2%), whereas hatching of eggs was lowest (32.78%) in 10 per cent methanol extract. Number of eggs laid under choice conditions varied from 25.34 (10% methanol extract) to 58.34 eggs (0.5% acetone fraction) on the treated substrate, whereas on untreated substrate, it ranged from 40.34 (10% methanol extract) to 67.67 eggs (0.5% acetone fraction. Under no-choice condition also methanol extract 10% treatment received minimum number (34.34) of eggs. Eggs directly treated with methanol extract (10%) and hexane fraction (2%) manifested 30.83 to 34.17% egg hatchability compared to 74.17 to 83.34% hatching in acetone and water as control, respectively.

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Influence of genetically modified (*Bt*) cotton on bollworms infestation

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ABSTRACT : A field experiment was conducted at CCS Haryana Agricultural University, Hisar during *kharif* 2006. Two *Bt* genotypes RCH-134 and RCH-317 and their counterpart non-*Bt* genotypes, one non-*Bt* hybrid (HHH-223) and one variety (H-1226) were evaluated against *Helicoverpa armigera* Hubner, *Pectinophora gossypiella* Saunders and *Earias insulana* and *E. vittella* Fabrious. Bollworm incidence remained significantly high in non-*Bt* genotypes (7.53-27.64%) than their corresponding *Bt* genotypes (0.14-0.37%). Bollworms infestation remained below economic threshold throughout the crop season in green fruiting bodies on *Bt* genotypes and hybrid HHH-223 and damage variations were non-significant. Boll and locule infestation varied significantly between *Bt* (0.49-1.16 and 0.12-0.47%, respectively) and their corresponding non-*Bt* genotypes (1.04-33.37 and 0.14-13.90%, respectively). Non-significant difference was observed between *Bt* genotypes and hybrid HHH-223. The infestation of *P. gosspiella* on boll and locule basis was nil on *Bt* genotypes. However, in non-*Bt* genotypes boll infestation ranged between 0.00-37.60%. Insecticides *viz.* endosulfan (500-600 ml/acre), triazophos (600-800 ml/acre) and fenvalerate (100-125 ml/acre) were sprayed when the bollworm infestation reached to economic threshold level.

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Efficacy of some newer insecticides for control of cotton bollworms

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ABSTRACT : Field efficacy of newer insecticide molecules (i. e. indoxacarb, spinosad, emamectin benzoate, lambda cyhalothrin, polytrin-C and endosulfan) evaluated against bollworm complex in cotton was studied during *kharif* 2005 and 2006 at Cotton Research Station, Marathwada Agricultural University, Parbhani. Emamectin benzoate 5 SG @ 0.001% was found to be significantly effective with lowest damage to fruiting bodies (squares and green bolls), per cent boll infestation, locule damage, per cent bad *kapas* and resulted in higher seed cotton yield. The next best treatments were spinosad 45 SC @ 0.018% and polytrin-C 44 EC @ 0.05%.

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Evaluation of integrated pest management modules against American bollworm, *Helicoverpa armigera* Hub. in non-*Bt* cotton

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ABSTRACT : Field studies were conducted at Regional Agricultural Research Station, Guntur to demonstrate the performance of IPM module against American bollworm, *Helicoverpa armigera* Hub. in non-*Bt* cotton during the *kharif* seasons from 1999-2002.The IPM module comprising summer ploughing, FYM application, leaf hopper tolerant variety (L 604), seed treatment, stem application, intercropping, jowar as border crop, marigold and castor as trap crop, erection of bird perches, pheromone trap monitoring, release of egg parasitoid, *Trichogramma chilonis*, topping of plants, manual picking and destruction of eggs and grown up larvae, spraying of 5 per cent NSKE and need-based spraying of insecticides was tested. Due to the adoption of recommended IPM practices the incidence of American bollworm, *Helicoverpa armigera* in terms of per cent square damage and per cent green boll damage was low in IPM module when compared to farmers' method. As a result the number of insecticide sprayings was reduced from 18.33 in farmers' method to 5.33 in IPM module which resulted in higher net income and higher incremental cost : benefit ratio of 1 : 4.94 in IPM module compared to 1 : 0.8 in farmers' method.

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Evaluation of different chemicals for the management of mealy bug, *Phenacoccus solenopsis* Tinsley on *Bt* cotton

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ABSTRACT : To assess the effectiveness of new combination, spirotetramate (12%)+imidacloprid (36 %)–480 SC @ 500, 625 and 700 ml/ha *vis-a-vis* spirotetramate 150 OD, imidacloprid 200 SL, thiodicarb 75 WP and profenophos 50 EC @ 600, 900, 625 and 1250 ml/ha against the mealy bug, *Phenacoccus solenopsis* Tinsley, the experiments were conducted on *Bt* cotton during 2007 and 2008 crop seasons at farmer's field. An untreated field was kept as check. Data were recorded on mealy bug incidence on per cent reduction basis. The results indicated that spirotetramate (12%)+imidacloprid (36%)–480 SC @ 625 ml/ha was the best treatment in comparison to its other doses as it resulted in significant reduction in mealy bug population yet remained at par with the standard checks. The seed cotton yield in spirotetramate (12%)+imidacloprid (36%)–480 SC @ 625 ml/ha was at par with thiodicarb and profenophos. Spirotetramate (12%)+imidacloprid (36%)–480 SC @ 625 ml/ha proved better than the spirotetramate and imidacloprid, when tested alone for the management of mealy bug in cotton.

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Field bioefficacy of methanolic extracts of plants against bollworms in cotton

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ABSTRACT : Methanolic extracts of neem (*Azadirachta indica*), bakain (*Melia azedarach*), karanj (*Pongamia pinnata*) seeds and ginger (*Zingiber officinale*) rhizomes were sprayed in cotton field (variety H-1117) at the research farm, CCS Haryana Agricultural University, Hisar. These extracts were tested at 2.5, 5.0 and 7.5% to evaluate their bioefficacy against bollworms in cotton. Nimbecidine (300 ppm), a recommended commercial neem formulation, was sprayed @ 5 ml/l as check for comparison. A total of five sprays were applied from 16 August to 17 September, 2005 at 8-day intervals. Neem, bakain and karanj extracts at 7.5% caused significant reduction in the incidence of bollworms in green as well as open bolls and were found as effective as nimbecidine. There was significant increase in the yield of seed

cotton due to suppression of bollworm incidence at higher concentrations of extracts. However, application of ginger extract proved ineffective.

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Perspective and potential of genetically modified cotton in the management of cotton leaf curl virus disease for sustainable agriculture

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ABSTRACT : Cotton leaf curl virus disease (CLCuD) is an important factor attributing to decrease in area under cotton cultivation in Haryana. The most effective method to contain the disease and reduce yield losses is breeding for disease resistance. Resistance against disease caused by cotton leaf curl Kokhran virus-Dabwali CLCuKV-Dab in Indian cotton cv. F-846 was developed by genetical modification using the AV_2 (movement protein) gene of this virus via *Agrobacterium tumefaciens* transformation and regeneration in collaboration with Indian Institute of Science, Bangalore. This genetically modified cotton cultivar was evaluated here in the T_4 generation for CLCuV resistance and comparative studies on the morphological traits and yield parameters in GM F-846 and non-GM F-846 healthy and diseased cotton plants. The T_4 generation gave 100% resistance under high inoculum pressure by CLCuKV-Dab charged whitefly, *Bemisia tabaci* and tested negative for the presence of virus by PCR amplification. Morphologically, phenotypically and on the basis of yield parameters such as plant height, branching pattern, leaves type, lint colour, seed colour, maturity time, number of bolls/bract, number of bolls/plant, number of seeds/boll, ginning outturn, seed index and lint index, the GM cotton cv. F-846 and non-GM counterpart (healthy) were at par. However, a significant reduction in plant height and some yield parameters was recorded in the diseased non-GM F-846 cotton plants under glasshouse conditions.

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Survey of various diseases and impact of IPM technology on cotton diseases in Fatehabad

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ABSTRACT : IPM farmers were made aware about cotton diseases and their management by selection of resistant/tolerant varieties and hybrids. Positive impact had been seen and hence IPM farmers used certified seeds from authentic sources alongwith pakka bill, subsequently these farmers treated seed with streptocyclin, carbendazim and *Trichoderma viride* before sowing. It has been noticed that 60-80 per cent (average 70 per cent) of IPM farmers treated cotton seed, while it was just half in case of non-IPM farmers by the end of year 2004. Cotton leaf curl viral disease, wilt and leaf spot were comparatively lower on the field of IPM farmers.

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In vitro and *in vivo* evaluation of different fungicides against Myrothecium leaf blight of cotton incited by *Myrothecium roridum* Tode ex. Fr.

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ABSTRACT : Six fungicides *viz.,* thiophanate methyl, carbendazim, mancozeb, copper oxychloride, propineb and chlorothalonil were evaluated *in vitro* and *in vivo*. All the test fungicides were significantly effective in reducing mean radial growth and controlling the disease while simultaneously increasing the

seed cotton yield as compared to check. The minimum radial growth and minimum disease incidence and maximum seed cotton yield were recorded with thiophanate methyl and carbendazim treatments.

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Preliminary studies on field parasitization and biology of solenopsis mealybug parasitoid, *Aenasius bambawalei* Hayat (Encyrtidae : Hymenoptera)

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ABSTRACT : Preliminary studies on field parasitization and biology of *Aenasius bambawalei* Hayat (Encyrtidae : Hymenoptera), a solitary nymphal endoparasitoid of solenopsis mealybug, *Phenacoccus solenopsis* Tinsley (Pseudococcidae : Hemiptera), indicated that this parasitoid was very active against mealybug in Haryana, India. Surveys of cotton growing belt of the state showed 37.6% (13.3-53.4%) and 47.2% (5.2-90.4%) parasitization on cotton and other host plants in Hisar and Rohtak districts, respectively, during September, 2008. During April, 2009 the parasitoid activity further increased and the parasitoid spread upto Sirsa causing 72.3% (61.1-88.4%) parasitization in the cotton growing belt. The parasitoid took 12-14 days to complete its development in the host and caused transformation of parasitized mealybugs into reddish-brown mummies which could be easily identified on the plants. A female parasitized 38-163 mealybugs during its life of 11-35 days. The parasitoid had an excellent searching ability attacking mealybugs in colonies as well as those present solitarily on different host plants of mealybug. It was concluded from the studies that in view of heavy natural parasitization of mealybug by this parasitoid, it needed to be conserved and further exploited for biological control of this pest. A hyperparasitoid, *Promuscidea unfasciativentris* Girault (Hymenoptera : Aphelinidae) of *A. bambawalei* was also recorded.

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Morphological characters and effect of *Trichoderma* spp. on the growth of major pathogens of cotton

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ABSTRACT : Out of 26 *Trichoderma* isolates tested, growth rate of the isolates varied significantly at three days after inoculation (DAI). Among 26 isolates, *T. viride* (TV-97) of PDBC, Bangalore, *Trichoderma harzianum* of Ludhiana and *T. koningii* of TNAU, Coimbatore grew much faster i. e. @ 7.25, 7.15 and 7.10 cm, respectively. Similarly, growth rate of the isolates also varied significantly at 6 DAI and the isolates *T. harzianum* of TNAU, Coimbatore, *T. harzianum* of Ludhiana and *T. viride* (TV-97) of PDBC, Bangalore grew faster i. e. @ 8.95 cm. *T. reesai* of NCIM, Pune, *T. harzianum* of Ludhiana, *T. harzianum* of MARS, Dharwad, *T. harzianum* (Th-P-26) and *T. harzianum* (TH-KSD) of PDBC, Bangalore, isolates produced dark green profused mycelial growth. Similarly, the sporulations of *Trichoderma* isolates also varied, the heavy sporulations were observed in almost all isolates. Tested for maximum mean per cent inhibition of major pathogens of cotton were observed in case of *Trichoderma harzianum* of MARS, Dharwad i. e. 74.10% inhibition followed by *T. koningii* of TNAU, Coimbatore (72.55%) and *T. harzianum* of Sriganganagar (71.88%).

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Interaction studies of *Rhizoctonia bataticola* and *Verticilium albo-atrum* on cotton genotypes

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ABSTRACT : Seven (RCH-2 *Bt,* RCH-2 non-*Bt,* Bunny *Bt,* Bunny non-*Bt,* Abhadita, Jayadhar and DH-2) genotypes were used against *Rhizoctonia bataticola* and *Verticillium albo-atrum***.** These genotypes differed with respect to their resistance or susceptible. In case of *Rhizoctonia* inoculated pots, there was least germination observed in Abhadita followed by Jayadhar i. e. 40.00 and 46.67%, respectively. With respect to the maximum per cent death of seedlings was observed in DH-2 followed by Jayadhar i. e. 73.33 and 66.67%, respectively. In case of *Verticillium* inoculated pots, there was least germination observed in Bunny *Bt* and Jayadhar followed by RCH-2 *Bt* i. e. 46.67 and 60.00%, respectively With respect to the maximum per cent death of seedlings was observed in RCH-2 *Bt* followed by Bunny *Bt* and Jayadhar i. e. 66.67 and 60.00%, respectively.

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Growth, instability and decomposition of cotton production in Maharashtra

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ABSTRACT : Maharashtra is the largest cotton growing State in the country. Cotton crop is grown in the entire State except Konkan and eastern Maharashtra. In this study, the growth and instability were estimated. Also assess the relative contribution of area and yield to change in the, output of cotton in Maharashtra. For the study the secondary time series data for 45 years were collected. The results indicate that the compound growth rate of area under crop was more over one per cent for the entire district of all three regions and also the region as a whole during the overall period. It was the proof of the fact that the cotton crop was a traditional crop in the region as well as the State as a whole and also there was no alternate substitute crop in the State. Hence, there is a very big need to concentrate on this crop for policy maker and researcher. The production and productivity instability in cotton crop were observed in almost the entire district in the State. It may be because the crop largely depends on vagaries of nature and cotton production is subject to fluctuation from year to year and thus, causing heavy losses. Farmer cannot bear risk due to scare resources and small holding, A crop failure means not only the loss of farmer's income but also the loss of investment in the next crop season. This leads farmer to indebtedness. In order to maintain stability in production of cotton concerned efforts should be made in the State. In almost all the studied districts the yield effect was found to be most responsible factor for increasing production in the State. But till there is a scope to increase yield in rainfed farming by introducing new development programme and increasing the technical efficiency at farm level.

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Organic and inorganic cotton farming in Parbhani district of Maharashtra state–An economic analysis

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ABSTRACT : A survey was conducted during *kharif* season of 2006-2007 at Parbhani district of Maharashtra to find out the economics of cotton grown under organic and inorganic farming. Results revealed that per hectare production of organic cotton was 19.86 q and inorganic cotton was 22.48 q. Per hectare gross return was 54,427.08 and 51,036.07 for organic and inorganic cotton, respectively. Per hectare net profit of organic cotton farming was Rs. 6,422.95 higher than inorganic cotton. Per hectare total cost required for organic cotton production was Rs. 29,085.38, which was Rs. 3,031.94 less than inorganic cotton production. Price of organic cotton was about 20% more than inorganic cotton. Output-input ratio for organic and inorganic cotton was 1.87 and 1.58. Inorganic cotton plant protection and vermicompost were found significant, whereas in inorganic cotton bullock labour and plant protection were found significant. Hence, organic cotton production was beneficial than inorganic cotton production.