

RESEARCH HIGHLIGHTS

Crop Improvement

National Trials

- In the initial evaluation trial of *G. hirsutum*, CA 105, GISV 272 and GJHV 398 were found to be the best in terms of seed cotton yield in north, central and south zones, respectively under irrigated condition.
- In the initial evaluation trial under rainfed situations, PH 1075 was the best culture in Central Zone,, whereas, in South Zone, no test culture outperformed the zonal check variety of Sahana.
- In the preliminary intra hirsutum hybrids trial under irrigated conditions, LHH 1411 was the best for seed cotton yield in North Zone, while TSHH 0629 was the best in both central and south zones.
- Of the sixteen intra hirsutum hybrids evaluated, DHH 1012 was the best hybrids in Central Zone, while in South Zone, RAHH 1001 was the best
- All the ten *barbadense* cultures were superior in terms of yield over the common check variety Suvin in both Central and South zones. DB 16 was the best genotype in central zone, whereas, GSB 40 was the best in south zone. However, quality wise, Suvin was the best in both the zones.
- The interspecific hybrid ARBHB1047 was found to be the best in both the Central and South zones.
- Among the *G. arboreum* varieties tested under irrigated condition in North Zone and under rainfed condition in Central Zone and South Zones, FDK 230 was the top yielder in North Zone, while in Central Zone and South Zones, the cultures CNA 39 and Das 385 recorded the highest yield, respectively. Several entries were found to have superior fibre quality attributes.
- Among the desi hybrids tested under irrigated condition in North Zone and under rainfed situation in Central Zone, the hybrid AAH 33 was the best in North Zone and CISAA 20 was the top performer in Central Zone.

Zonal Trials

NORTH ZONE

- In the *G. hirsutum* Preliminary Varietal Trial, the highest seed cotton yield was recorded in LH 2152 (2293 kg/ha).
- Ten cultures were tested in the Coordinated Varietal trial, wherein, F 2228 was the best recording 2454 kg/ha of seed cotton yield.



- In the Coordinated Hybrids trial, three hybrids performed better than the check hybrids. LHH 1350 (2274 kg/ha) was the best hybrid.
- In the Coordinated *G. arboreum* varietal trial, LD 949 was found to be the best culture recording 2248 kg/ha of seed cotton yield.
- In the Coordinated *desi* hybrid trial, FMDH 23 (2406 kg/ha) outperformed the checks and other test entries.

CENTRAL ZONE

Irrigated Trial

- In the Preliminary Varietal Trial of *G. hirsutum* genotypes, the culture RHC 0717 topped the rank with 1930 kg/ha of yield.
- In the Coordinated varietal trial, GISV 216 (1796 kg/ha) recorded the highest seed cotton yield.
- In the Coordinated intra *hirsutum* hybrid trial, the test hybrid GSHH 2729 ranked 1st with 2005 kg/ha followed by RHH 0622 with 1960 kg/ha.
- Eleven compact genotypes were tested under close spacing along with a local check variety under recommended spacing. Three genotypes recorded higher yield as compared to local check variety. The highest yield was recorded in RHC 2022 with 2331 kg/ha.
- In the preliminary varietal trial of *G. barbadense* under irrigated condition, GSB 41 recorded the highest seed cotton yield of 738 kg/ha.
- In the Coordinated interspecific (*G. hirsutum* X *G. barbadense*) hybrid trial, ARBHB 1011 recorded the highest yield of 1812 kg/ha.

Rainfed Trials

- In the Preliminary Varietal Trial of *G. hirsutum* genotypes, four cultures were better than both the check varieties. The highest seed cotton yield of 1061 kg/ha was recorded in SCS 793.
- In the Coordinated varietal trial of *G. hirsutum*, the highest yield of 1283 kg/ha was recorded in the variety BS 30.
- In the Coordinated intra *hirsutum* hybrid trial, the hybrid NHH 250 was the best with 1615 kg/ha of mean seed cotton yield.
- When 13 compact genotypes were tested under close spacing, three genotypes recorded higher yield as compared to local check variety. The highest yield was recorded in NH 615 with 1029 kg/ha.



- In the Coordinated varietal trial of *G. arboreum*, the highest seed cotton yield of 1790 kg/ha was recorded in GAM 162.
- In the Coordinated Desi hybrid trial, two test hybrids were superior to both the checks and the highest yield of 1442 kg/ha was recorded in AKDH 91.

SOUTH ZONE

Irrigated Trials

- In the Preliminary Varietal Trial of *G. hirsutum* genotypes, only one culture (GJHV 500 with 1796 kg/ha) was better than both the check varieties.
- In the Coordinated Varietal Trial, NDLH 1938 was the best entry with 2642 kg/ha of seed cotton yield.
- Among the intra *hirsutum* hybrids tested in the Coordinated hybrid trial, four test hybrids were superior to zonal check hybrid.
- Eleven compact genotypes were tested under close spacing along with a local check variety under recommended spacing. All the test genotypes recorded higher yield as compared to local check variety. The highest yield was recorded in ADB 39 with 2331 kg/ha.
- In the preliminary varietal trial of *G. barbadense* under irrigated condition, all the test entries showed yield superiority over the check variety Suvin.
- In the interspecific hybrids trial, five test hybrids were superior to the check hybrid and the highest seed cotton yield of 1867 kg/ha was recorded in the test hybrid ARBHB 1011.

Rainfed trials

- In the Preliminary *G. hirsutum* varietal trial, none of the test entries showed yield superiority over the check varieties and the highest yield was recorded in the local check variety.
- In the coordinated hybrid trial, ten test hybrids showed yield superiority over the check hybrid Bunny. The highest seed cotton yield of 2223 kg/ha was recorded in the hybrid MRC 7385.
- In the initial evaluation of compact genotypes under rainfed condition, fourteen genotypes were tested under close spacing along with a local check variety under recommended spacing. The highest yield was recorded in NH 545 with 1889 kg/ha.
- In the Coordinated *G. arboreum* varietal trial, two cultures outperformed over the check varieties and the highest seed cotton yield of 1652 kg/ha was recorded in GAM 162 followed by 1554 kg/ha in AKA 2005-3.
- In the Coordinated *desi* hybrid trial, six hybrids were better than both the check hybrids and the highest mean seed cotton yield of 2293 kg/ha was recorded in AAH 32.



Crop Production

- The promising *G. hirsutum* genotypes viz., LH2207, LH 2018 and F 2164 as well as promising *G. hirsutum* hybrid FHH 141 were evaluated for agronomic requirement in North zone. Similarly, promising *G. arboreum* variety RG 542 and two *desi* hybrids viz., FMDH -9 and FMDH -10 were also evaluated.
- In Central zone, promising pre-release cultures viz., GISV 218, AKH 9916, BS 279 and H 1316; HxH hybrid RAHH 259 and ARCHH 3028; HxB hybrid RAHB 189 were evaluated.
- Agronomic requirements of pre-release cultures like BS 279 and BS 277; H x B hybrids RAHB 301 and DHB 871; *desi* hybrids viz., FMDH -8 and RAJDH 279 were worked out in South zone centres.
- Eleven Bt hybrids were evaluated for optimization of plant geometry and nutritional requirement in North zone. Results indicated superiority of MRC 7361, Ankur 3028, RCH 134 BG I and MRC 7017 BGII at Faridkot, Ludhiana, Sirsa and Sriganaganagar, respectively.
- Eight By hybrids entries were tested at Central zone for plant geometry and optimum nutrient requirement under Central zone. Jai BG II, GK 205, Ankur 651 and Ajeet 155 BG II were the best yielders at Khandwa, Indore, Nanded and Akola, respectively.
- Similarly, four promising Bt hybrids were evaluated in South Zone and results indicated that Bunny and Mallika gave significantly higher seed cotton yield at Nandyal and Lam, respectively.
- Foliar Feeding of Micronutrients with FeSO₄ @ 0.5% at Bhatinda and MgSO₄ @ 1.0% + ZnSO₄ @ 0.5% at Faridkot, Ludhiana, Sriganaganagar, Nanded and Srivilliputtur gave significantly higher seed cotton yield.
- Three sprays of 3% KNO₃ at Nanded and four sprays of 3% KNO₃ at Rahuri gave significantly higher seed cotton yield.
- Management of leaf reddening in Bt cotton has been worked out in different centres.
- Similarly, technology for organic production has been arrived for *desi* varieties in different zones.
- Stress tolerant genotypes have been identified with drought susceptibility index in Surat. Different C:N ratios did not affect plant height, number of sympodial and monopodial branches, biomass and seed cotton yield.
- Drought resistant genotypes have been identified in Khandwa. The defoliation treatment of Ethrel @ 3000 ppm at 130 DAS had significant and beneficial effect on defoliation.
- At Nanded, drought resistance in different genotypes, physiological efficiency of different Bt hybrids were worked out.
- At Lam, screening of genotypes for drought tolerance, salinity tolerance, use of chemical defoliant were experimented.
- At Dharwad, screening of genotypes for drought tolerance was carried out.
- At Hisar, experiment was laid out for salinity tolerance and amelioration of leaf reddening/parawilt of cotton.
- Similarly, defoliant have been experimented at CICR, Sirsa, Ludhiana and at Faridkot centres.
- Experiment conducted at Surat indicated that free amino acid and proline content were higher in the leaf under rainfed condition as compared to irrigated condition except in few genotypes while reducing sugar and protein declined under rainfed condition. Also, genotypes with oil, gossypol and protein content were identified.



Entomology

- Breeding trial entries were screened and tolerant / resistant genotypes to sucking pests have been identified in north, central and south zone trials.
 - In the advance screening of promising entries to key pests, the genotypes identified in preliminary screening were test verified for reaction to pests and tolerant / resistant ones were confirmed.
 - Population dynamics of key pests in relation to climatic conditions were worked out in all the cotton growing zones.
 - In Ludhiana jassid population was above ETL from third week of June to second week of October. Faridkot centre recorded above ETL population from 28th Standard week (July) to 39th Standard week (September). The population of jassids was below ETL in Hisar.
 - The thrips population was below ETL in Hisar and Ludhiana, while Sriganaganagar recorded the highest population from July second week.
 - *Earias* sp. was found to be a dominant species especially from August, especially in Hisar.
 - Pink boll worm was found to be dominant in Sriganagnagar and Hisar while, Hisar had a severe incidence of *S. litura*.
 - In Central zone, ETL for jassids crossed at Akola, Bhawanipatna, Junagadh, Rahuri and Surat during the crop period at some point of time.
 - In most of the centres of Central Zone, the thrips population was below the ETL. The population above ETL was noticed in Rahuri and Banswara.
 - The whitefly population was at higher level in Banswara. In Rahuri, Junagadh and Khandwa, the population was always high often crossing the threshold level.
 - The *Helicoverpa* population reached above ETL in months of September and October at Khandwa.
 - The spotted bollworm population was below the ETL in all the centres except in Akola where the ETL has crossed from the second week of November and first week of December.
 - The larvae of pink bollworm were higher in Akola, Junargardh, Rahuri and Surat while other centres recorded negligible populations.
 - The jassid population crossed ETL in various centres of South Zone.
 - The population of thrips was below ETL in all the centres except Dharwad, whereas, the whitefly incidence was less in all the centres.
 - The *Helicoverpa* incidence was less in all the centres except in Dharwad where the pest crossed ETL in the second week of October until the end of November.
 - Spotted bollworm population was not observed in any of the centre, except Dharwad, where it was at moderate level of 1.91 to 5.26 / 5 plants.
 - Raichur, Coimbatore and Dharwad recorded very high population of pink boll worm in sampled green bolls.
 - Various standard insecticides used in cotton ecosystem effective against sucking pests were identified in different Bt cotton hybrids.
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Plant Pathology

- The cotton leaf curl virus disease appeared late (26th June -1st July) in the north zone and yet it did not cause significant loss due to slow progress, less incidence and less severity. District wise cotton leaf curl virus disease maps were prepared for each state.
- Alternaria, Bacterial blight and Grey mildew were the major diseases in Central zone and in addition to that Leaf rust in Karnataka and Andhra Pradesh and Tobacco streak virus in Andhra Pradesh and Tamil Nadu are gaining ground in south zone.
- Studies on the variability of cotton pathogens revealed that *Alternaria alternata* was responsible for this disease in north zone where as *A. macrospora* was predominant in central zone. However, both these species were reported from south zone in disease samples causing Alternaria blight.
- The entries received under National and zonal trials were screened against important diseases and their reaction was reported. Under Path. 2(b) ie confirmation and maintenance of disease resistant lines, resistant lines were identified against diseases at Akola, Surat, Guntur and Rahuri after artificial inoculations.
- Based on pooled data of seven locations minimum PDI of Fungal foliar spots was observed in Kresoxim methyl (Ergon 44.3 %) @ 500 ml/ha followed by Propiconazole (0.1%) and Kresoxim methyl (Ergon 44.3 %) @ 400 ml/ha.
- In another experiment, fungal foliar spots, grey mildew and bacterial blight showed minimum PDI with Kresoxym methyl 15% WG treatment followed by Acephate 60% WP + Kresoxym methyl 15% WG when tested at seven locations.
- At Rahuri, seed treatment and soil application with *T viride* followed by foliar sprays of ergon (0.1%) at 60 and Taquat (0.15%) at 90 & 120 days showed maximum reduction of Alternaria blight and recorded the highest seed cotton yield. At Coimbatore, module 2 (ST – *Bacillus subtilis* (BSC5-TNAU1) + SA @ 2.5 Kg/ha + Foliar spray with *B. subtilis* @ 1% on 60, 90 and 120 DAS and module 1 (ST – *Trichoderma viride* (TV-TNAU1) + SA @ 2.5 Kg/ha + Foliar spray with *T. Viride* @ 1% on 60,90 and 120 DAS) were highly effective in controlling both the foliar and soil borne diseases of cotton under field conditions.
- Pooled data over three years (2010-12) of yield loss experiments indicated that five sprays of copper oxy chloride and streptomycin at 35, 50, 65, 80 and 95 days after sowing showed reduction of bacterial blight PDI from 28.8 to 12.0 and reduction of yield loss upto 22.0%.
- Pooled data at Dharwad and Guntur showed that four sprays of Propiconazole (0.1%) at 15 days interval from 75 days after sowing reduced leaf rust PDI from 32.8 to 7.73 and from 29.0 to 10.72 and reduction of yield loss up to 21.7% and 34.05%, respectively .
- Out of 244 diploid cotton genotypes tested against *Fusarium* wilt for seedling resistance, 10 cotton genotypes exhibited 1-5 per cent (R) and 17 cotton genotypes exhibited 6-15 % (MR) incidence in Seedling Resistant Test. Out of above twenty seven genotypes, twenty five genotypes (R) showed > 50% hyaline reaction (vascular discoloration) and remaining two entries (S) showed <50% hyaline reaction in Adult Plant Resistance Test.

