
RESEARCH HIGHLIGHTS

CROP IMPROVEMENT

National Trials

- Nine National Trials (conducted in all the three zones), five North Zone trials, nine Central Zone trials and seven South Zone trials were conducted during the year over 228 locations.
- In irrigated national trials, *G. hirsutum* cultures viz., GSHV 155 and CCH 2623 were promising in North and Central zone, respectively.
- In the preliminary intra *hirsutum* hybrids trial, the hybrids LHH 1350, RAJHH 743 and SHH 463 ranked first respectively in North, Central and South Zone.
- All the ten *barbadense* cultures recorded higher seed cotton yield over the common check variety Suvin in both Central and South zone locations. The entry GSB 41 occupied first rank in both the zones.
- In the preliminary interspecific hybrids (*G. hirsutum* x *G. barbadense*) trial, the hybrids DHB 872 and JKCHB 217 were promising in Central and South Zone, respectively.
- Some promising *G. arboreum* genotypes have been identified for promotion in each zone which were found better than the check varieties in terms of seed cotton yield and fibre quality.
- Similarly few desi hybrids showed promise in each zone.
- In both Central and South zone locations, the genotype H 1353 was promising and occupied the top rank under rainfed situations.
- In the preliminary intra *hirsutum* hybrids trial under rainfed conditions, the hybrids RAHH 307 and ARBHH 2062 were promising occupying the top rank in Central and South Zone locations, respectively.
- The *G. arboreum* cultures JLA 802 and ARBa 08-34 showed superior performance over the zonal and local check varieties under rainfed conditions in Central and South zone locations, respectively.
- Among the desi hybrids tested, the hybrid CISAA 14 recorded the highest yield of 1976 kg/ha in Central Zone and FMDH recorded the highest yield of 2239 kg/ha in South Zone.
- Two *G. herbaceum* cultures were found to perform better than zonal check variety in central zone and none found superior to the local check variety Jayadhar in south zone.



Zonal Trials

North Zone

- In the *G. hirsutum* Preliminary Varietal Trial, cultures LH 2108 and LH 2107 were showing promise and in Coordinated Varietal Trial, H 1300 was promising.
- In the Coordinated hybrid trial, SVHH 139 and FHH 141 were promising in intra-hirsutum category and in desi hybrids group FMDH 8 was good.
- *G. arboreum* genotypes viz., FKD 124 and LD 937 were promising.

Central Zone

- In irrigated trial, culture BS 279 was the best in the Preliminary Varietal Trial and the genotypes GJHV 374 and GSHV 152 were superior in the Coordinated varietal trial. In rainfed trials, AKH 9916 and CPD 817 were promising.
- In the Coordinated hybrid trial, the hybrid NSPL 423 was superior in intra hirsutum category and RAHB 189 was the best in interspecific (*G. hirsutum* X *G. barbadense*) hybrid category.
- In the Coordinated intra hirsutum hybrid trial, the hybrid VBCH 2213 was the best and JKCDH 505 was the best in desi hybrid group under rainfed situations.
- GAM 141 was the best performing genotype in the coordinated varietal trial of *G. arboreum*.

South Zone

- The *G. hirsutum* genotype, BS 279 and the hybrid KDCHH 712 was the best entry under irrigated conditions.
- In interspecific hybrid category, the highest seed cotton yield was recorded in RAHB 170.
- Under rainfed situation, the *G. hirsutum* genotype TSH 9975 and the hybrid NHH 59 were superior.
- In desi category, *G. arboreum* variety AKA 0110 and the hybrid NACH 12 were the best performing entries.



CROP PRODUCTION

- The plant geometry of 100 x 60, 100 x 75, 67.5 x 60 and 108 x 60 cm seems to be optimum for RCH-134 Bt at Faridkot, Ludhiana, Hisar and Sriganaganagar, respectively. As regards fertilizer levels, 100% RDF seems to be optimum at all the locations except Ludhiana, wherein 75% RDF was found better.
- The plant geometry of 90x60 cm for Khandwa and Indore, 90 x 45 cm for Nanded, Akola & Banswara, 90 x 90 cm for Rahuri and 120 x 45 cm for Surat & Junagarh was found optimum for RCH-2 Bt hybrid in Central Zone. As regards fertilizer application, 100% RDF seems to be optimum at Khandwa, Surat, Akola and Banswara, where as 125% RDF gave significantly higher seed cotton yield at Indore, Nanded, Junagargh and Rahuri
- The plant geometry of 90x 45 cm for Lam, 90x 60 cm for Siruguppa and 90 x 90 cm for Coimbatore and Dharwad was found optimum for Bunny Bt in South zone. As regards fertilizer levels, 125% RDF gave significantly higher seed cotton yield at all the locations except at Lam where 100% RDF seems to be optimum
- Highest seed cotton yield was obtained under weed free condition (Rahuri and Dharwad) and lowest in control at all the locations. Among the herbicidal treatments, significantly higher seed cotton yield was obtained with Pendimethalin @ 1 kg/ha pre-emergence + hand weeding at 30 & 60 DAS closely followed by Pendimethalin @ 0.750 kg/ha pre-emergence + Hand weeding at 30 & 60 DAS and Fluchloralin @ 1 kg/ha pre-emergence + Quizalofop-ethyl @ 0.050 kg/ha at 30 & 60 DAS at Surat.
- At Lam, highest seed cotton yield was recorded in Farmers' practices (Hand weeding at 20, 40 & 60 DAS + Interculture), closely followed by Pendimethalin @ 1.00 kg a.i./ha pre-emergence + Quizalofop-ethyl @ 0.05 kg a.i./ha at 30 & 60 DAS + interculture).
- Foliar Feeding of MgSO₄@ 1.0%+ZnSO₄@ 0.5% gave highest seed cotton yield at all the locations except at Akola where at par result has been observed and lowest was recorded under control
- Full recommended dose of MOP as basal application in Sriganaganagar, and four sprays of 2% KNO₃ at Ludhiana and Kanpur gave significantly higher seed cotton yield and lowest in control at all the locations.
- Three sprays of 3% KNO₃ gave significantly higher seed cotton yield at Surat, Junagarh and Banswara, whereas application of four sprays of 2% KNO₃ and four sprays of 3% KNO₃ shows its superiority at Nanded and Indore, respectively and no response was noticed at Akola. Four sprays & three sprays of 3% KNO₃ gave significantly higher seed cotton yield at Dharwad and Siruguppa, respectively over control.
- At Srivilliputtur, pooled data (three years) analysis revealed that 3 foliar spraying of 3% KNO₃ at 60, 75, 90 DAS was sufficient to get higher yield which was comparable to the application of MOP in four splits.
- The biopesticides were not found effective in isolation but found good when applied in combination with recommended plant protection practices. The recommended dose of fertilizer recorded the highest seed cotton yield than all other treatments in which organic manure were used as a source of nutrients and lowest was recorded in control



- An integrated nutrient management with 100% RDF (60:30:30 kg of NPK / ha) plus FYM @ 12.5 t/ha had resulted in better morphophysiological attributes and higher seed cotton yield
- Genotypes Bihani 161, GJHV-374 and GTHV 0/35 performed better under stress and gave yield of >90g/plant. Amongst different drought screening indices, PHSI, DMSI and YSI showed a positive significant correlation with yield, under stress.
- Early sowing of bt hybrids led to 3.0 %, 7.9 % and 31.1 % more number of bolls/plant, boll weight and seed cotton yield, respectively as compared to 20 days late sowing at Dharwad.
- At Hisar, the assimilation rate was seen higher in both the Bt genotypes (RCH 134 and MRC 6301). Increasing salinity of irrigation water generally above 2.5 dSm⁻¹ led to a gradual decrease in cotton productivity. An irrigation water E.C. of 7.5 dSm⁻¹ led to a 60% decrease in cotton production.
- G. Cot. Hy-8 recorded significantly higher oil, protein and nitrate reductase with least content of gossypol.
- Significant variations in nitrate reductase and peroxidase have been found amongst the genotypes tested at Dharwad. Higher levels of phenolics like tannins and total phenols were observed in select genotypes that exhibited tolerance to insect pests.

ENTOMOLOGY

- Cultures tolerant to Jassid and bollworms were identified from the genotypes of breeding trials of the three cotton growing zones of India
- **North Zone:** In Bt cotton, the infestation of Jassid was at higher level (6.6 to 9.2 / 3 leaves) in Ludhiana, Thrips population was at higher level (30.5 to 40.4 / 3 leaves) in Sriganaganagar, whitefly also at higher level (30 to 34/3 leaves) in Sriganaganagar and mealy bug infestation ranged from 28 to 96 per cent in Faridkot. In other centres the sucking pests were below threshold level. Almost similar trend was observed with non Bt cotton also.
- In RCH 134 Bt cotton, moderate level of Pink bollworm (2.1 to 2.3 / 20 green bolls) was recorded in Sriganaganagar, while in non Bt cotton moderate level of Earias bollworm was recorded. Faridkot recorded very high level of Pink bollworm (13 larvae)
- **Central Zone:** In Bt cotton, aphid and Jassid population were higher in Junagadh while Jassid alone was higher at Surat, Banswara, Akola and Nanded. More or less similar trend was observed in non Bt cotton also.
- In Bt cotton, Pink bollworm was low level, 0.3 to 1.0 / 20 green bolls in Junagadh and higher level in Banswara and Akola. Moderate level incidence of *S. litura* observed in Junagadh
- In non Bt cotton, moderate level incidence of *H. Armigera* observed in Khandwa, Bhawanipatna, Rahuri and Surat. Earias bollworm at moderate level in Rahuri, Akola, Surat and Khandwa. It was at higher level in Bhawanipatna. Very high population of Pink bollworm (2 to 44 larvae/ 20 green bolls) observed in Akola and moderate level in Bhawanipatna, Rahuri, Surat, Junagadh and Khandwa. *Spodoptera litura* at moderate level recorded in Khandwa, Rahuri, Bhawanipatna and Surat and higher level at Junagadh (3.0 to 11.5 larvae / 5 plants)
- **South Zone:** In Bt cotton, Jassid was above threshold level (6.2 to 18.2 / 3 leaves) in LAM and Dharwad. Thrips were at higher level (31 – 50/ 3 leaves) in Dharwad, while mirid bug infestation higher at Dharwad (8.2 to 22/ 25 squares) and Raichur. Mealy bug infestation at moderate level in Raichur and Coimbatore.
- In non Bt cotton (DHB 105, Bunny and Narasimha) Jassid population was at higher level (6.1 to 21.1 / 3 leaves) in LAM and Dharwad while aphid population was higher at Coimbatore. Dharwad recorded higher population of thrips also. Mirid bug infestation was at moderate level in Dharwad (7.2 to 21.3 / 25 squares) and Raichur (2 to 9).
- In Bt cotton Pink bollworm was at higher level in Dharwad, Moderate level in LAM form while it was absent in Raichur and Coimbatore. In non Bt cotton *Heliothis* bollworm at higher level (3.5 to 9.9/ 5 plants) in Dharwad and at moderate level in Raichur, while it was absent in LAM and Coimbatore. Higher level of Earias bollworm was recorded in Dharwad and Raichur. Pink bollworm also at higher level (4 to 11 larvae) in Dharwad, LAM and Raichur.
- Spirotetramat @ 90 g a.i./ha was effective against mealy bug and recorded higher yield (30.5 q/ha) over control in Faridkot and Hisar centres.
- Profenophos @750 gm followed by Chlorpyrifos (500 & 1000 gm) and Buprofezin 312.5 g were effective against mealy bug and recorded higher yield in order.
- Fipronil @ 40 g a.i. / ha was effective against Jassid, thrips, aphids and whitefly almost in all locations and recorded significantly higher yield over control.
- In on farm trial at Srivilliputtur, Chlorpyrifos was the most effective treatment for mealy bug control while stem drenching with Chlorpyrifos 2.5 ml/ lit + Carbendazim 1 g/lit was the most effective treatment for the control of stem weevil infestation.



PLANT PATHOLOGY

- The cotton leaf curl virus disease (CLCuD) incidence started late and remained very low in the entire north zone. The incidence was observed in traces to 5% on Bt cotton as well as on varieties in farmer's field in Rajasthan, whereas, in Haryana, it was observed only in traces.
- There was very good precipitation during the vegetative phase (growth stage) of the crop at regular interval prevented the whitefly population build up at the susceptible stage of the crop and inhibited the inoculation of virus by the vector whitefly.
- Bacterial blight was reported as important disease in central zone in Gujarat (Bharuch 0-43.5%) and Maharashtra (Vidarbha- 9.0-28.3%, Rahuri-26.6%, Nanded 3-12%) and Karnataka in south zone (5-15%).
- Alternaria blight was serious in Gujarat's Saurashtra area (4.5-15.5%), and Maharashtra's Rahuri (4.5-30.17%) and Nanded (5.0-20.4%) and in south zone Karnataka (5-15%) and Tamil Nadu (7.7-29.4%). *Myrothecium* was severe in Madhya Pradesh (48%).
- Grey mildew occurred in Maharashtra in the irrigated areas of Vidarbha region (4.0-32.5%). In south zone, it was severe in three states i.e., Karnataka (5-30%), Tamil Nadu (7.2-28.3%) and Andhra Pradesh (37.5%).
- Rust appeared severe in Tamil Nadu (5.3-48.4%) and Andhra Pradesh (30.0%). Tobacco Streak Virus incidence upto 15.7% was also observed in Andhra Pradesh in September.
- The reaction of various entries against CLCuD in different trials showed that in north zone, there were 18, 9, 8, 22 and 10 entries out of a total of 91 entries respectively, in Br02a, Br03a, Br04a, Br05aI PHT and Br05A-1CHT in Resistant and Moderately Resistant category.
- The test fungicide Taqat 75WP (M/S. Rallis India Ltd.) at two concentrations i.e., 500 g/ha and 750 g/ha significantly reduced fungal foliar leaf spots and bacterial blight at all five test locations (TNAU Coimbatore, Junagadh, Faridkot, Guntur and Dharwad). Highest seed cotton yield was observed in case of Taqat spray at 750 g/ha followed by its spray at 500g/ha and propiconazole at 0.1%.
- The test fungicide copper hydroxide at three concentrations ie 1000, 1250 and 1500 g /ha led to significant reduction of bacterial blight and Alternaria leaf spot at all the six centers (Dhadwad, Surat, Khandwa, Akola, Nanded and Rahuri). Maximum reduction was noted at highest test concentration. Significantly higher seed cotton yield was observed at all the centres except Surat as compared to check.
- Seed treatment with the talc formulation of *Pseudomonas fluorescens* Pf 1 @ 10 g/Kg seed followed by foliar spray of the same on 30, 40, 50, 60, 70, 80 and 90 DAS proved effective in reducing the incidences of bacterial blight and fungal foliar spots.
- Four sparys of Carbendazim@ 0.1% at 50, 65, 80 and 95 DAS reduced PDI from 15.5% to 10.1% and reduced 28.3% losses due to grey mildew at Dharwad , Guntur and Nanded.
- Four sparys of propiconazole @0.1% at 50, 65, 80 and 95DAS at Dharwad, Guntur and Rahuri reduced Alternaria blight PDI from 30.8 to 14.6% and reduced losses by 22.0%.
- Four sprays of copper oxychloride (0.3%) and 500ppm streptomycin at Dharwad at 50, 65, 80 and 95 DAS reduced bacterial blight PDI from 32.3 to 19.0% and reduced 30.2% loss due to disease.
- Five sprays of Propiconazole @ 0.1% at 35, 50, 65, 80, 95 DAS at Khandwa reduced *Myrothecium* leaf spots PDI from 19.4 to 7.3% and reduced loss by 24.1%.

