Research Highlights

Crop Improvement

National Trials

- Eleven National Trials (conducted in all the three zones), six north zone trials, thirteen central zone trials and eleven south zone trials were conducted during the current year.
- In irrigated national trials, *G. hirsutum* cultures *viz*., SCS 1211 (2397 kg/ha), TCH 1777 (2150 kg/ha) and HS 292 (2596 kg/ha) were found to be the best in terms of seed cotton yield in north, central and south zones, respectively.
- In the initial evaluation trial under rainfed situations, IH 11 was found to be the best culture in both central (1525 kg/ha) and south zones (2489 kg/ha).
- In the preliminary intra *hirsutum* hybrids trial, the hybrid FHH 234 (2489 kg/ha) was found to be the best for seed cotton yield in the north zone, while RHH 1014 (2926 kg/ha) and SHH 818 (2842) were found to be the best in central and south zones, respectively.
- Thirteen intra *hirsutum* hybrids were evaluated in central zone and in south zone under rainfed conditions. In the central zone SHH 808 (2239 kg/ha) was found to be the best hybrid, while in the south zone, NHH 715 (1973 kg/ha) was the best.
- In the initial evaluation trial of compact genotypes in irrigated conditions with closer spacing, H 1465 was found to be the best in the north zone (2575 kg/ha), whereas in central zone and south zone, ARBC 3010 (3010 kg/ha) and F 2617 (4648 kg/ha) were the best, respectively.
- In initial evaluation trial of compact genotypes under closer spacing in rainfed situations, DSC 1352 was the best in central zone (1165 kg/ha), whereas, in south zone NH 635 (2274 kg/ha) was the best.
- Six *barbadense* cultures were evaluated in central and south zones. DB 1301 was the best genotype in central zone (1424 kg/ha), whereas, ARB 1302 was the best in south zone (1902 kg/ha). Quality-wise, Suvin was the best in both the zones.
- In the preliminary interspecific hybrids *(G. hirsutum x G. barbadense*) trial, DHB 1301 (2513 kg/ha) was the best hybrid in central zone and RHB-1014 (2645 kg/ha) was the best in south zone.
- Promising *G. arboreum* genotypes like LD 1026 (2601 kg/ha) in north zone and JLA 0603 (1730 kg/ha) in south zone have been identified for promotion which were found better than the check varieties in terms of seed cotton yield.
- Similarly *Desi* hybrid FMDH 36 (2897 kg/ha) was the best in north zone and NACH 433 (1808 kg/ha) was the top performer in central zone.

Zonal Trials – North zone

- In the *G. hirsutum* Preliminary Varietal Trial, LH 2306 (2123 kg/ha) recorded the highest yield.
- In the Coordinated Varietal Trial, LH 2256 was the best recording 1907 kg/ha of seed cotton yield.
- In the Coordinated Varietal Trial of compact genotypes, LH 2298 was found to be the best recording 2373 kg/ha of seed cotton yield.
- In the Coordinated Hybrids Trial, two hybrids performed better than both the check hybrids. FHH 209 (2362 kg/ha) was the best hybrid for seed cotton yield.
- *G. arboreum* genotype, LD 949 was found to be the best culture recording 2575 kg/ha.

Zonal Trials – Central zone

- Under irrigated situation, culture GISV-267 (2134 kg/ha) was the best in the Preliminary Varietal Trial and the genotype GISV 272 (2152 kg/ha) was superior in the Coordinated Varietal Trial. Similarly, in rainfed trials, GBHV 180 (1402 kg/ha) and GBHV 170 (1268 kg/ha) were promising in various trials.
- In the Coordinated Varietal Trial of compact genotypes, LH 2298 was found to be the best recording 2552 kg/ha of seed cotton yield.
- In the Coordinated Hybrid Trial, the hybrid GSHH 2646 (2422 kg/ha) was superior in intra-*hirsutum* category while DB 40 (1252 kg/ha) was the best in interspecific (*G. hirsutum X G. barbadense*) hybrid category under irrigated conditions.
- In the preliminary varietal trial of *G. barbadense* under irrigated condition, DB 40 recorded the highest seed cotton yield of 1252 kg/ha. In the Coordinated Varietal Trial, GSB 21 (1243 kg/ha) recorded the highest seed cotton yield.
- In the Coordinated Varietal Trial of *G. arboreum*, the highest seed cotton yield of 1400 kg/ha was recorded in JLA 0614.

- Under rainfed situations, the hybrid GSHH 2646 (1549 kg/ha) was the best in the intra-*hirsutum* hybrid category, and AKDH 96 (1455 kg/ha) was the best in *Desi* hybrid group.

Zonal Trials – South zone

- The *G. hirsutum* genotype, SCS 1062 (2673 kg/ha) was the best in Preliminary Varietal Trial and GSHV 159 (2393 kg/ha) was superior in Coordinated Varietal Trial under irrigated situations.
- In the Coordinated Varietal Trial of compact genotypes, LH 2298 was found to be the best recording 3763 kg/ha of seed cotton yield.
- Among the intra-*hirsutum* hybrids tested, the highest yield of 2377 kg/ha was recorded in TSHH 0629, while in interspecific hybrid category, the highest seed cotton yield was recorded in RHB-0812 (2996 kg/ha).
- In the preliminary varietal trial of *G. barbadense* under irrigated condition, DB 40 was the best recording 1833 kg/ha of seed cotton yield. In the Coordinated Varietal Trial, GSB 21 was the best entry with 1873 kg/ha of seed cotton yield.
- Under rainfed situation, SCS 1062 (2293 kg/ha) was the best in the Preliminary *G. hirsutum* varietal trial. In the Coordinated Varietal Trial of compact genotypes, ARBC 64 was found to be the best recording 1552 kg/ha of seed cotton yield.
- In the coordinated hybrid trial under rainfed situation, the highest seed cotton yield of 2350 kg/ha was recorded in RAHH 455.
- In *Desi* category, *G. arboreum* variety CNA 1016 (1434 kg/ha) was the best performing entry.

Crop Production

- Agronomic requirements of promising Pre release *hirsutum* / *arboreum* genotypes/ hybrids of cotton has been worked out in all the three zones under both irrigated and rainfed production system.
- Experiments for developing suitable Agronomy for ruling Bt hybrids of the region indicated that different spacing were at par at Sriganganagar, whereas, 67.5 x 75 cm at Faridkot and Bhatinda and 67.5 X 45 cm at Sirsa gave significantly higher seed cotton yield. 100 % RDF seems to be optimum at all the locations in north zone.
- In central zone, 90 x 45 cm (at Nanded, Akola and Banswara) 120 x 30 cm (Junagarh) and 60 X 60 cm (Indore) gave significantly higher seed cotton yield in Bt hybrids. Among the fertilizer levels, 75% RDF at Surat, 125% RDF at Banswara and Junagadh and 150 % RDF was optimum at Nanded, Akola and Indore.
- In south zone, 90 X 45 cm (at Lam and Nandyal) or 90 X 60 cm at (Raichur and Srivilliputtur) gave significantly higher seed cotton yield in Bt hybrids where as all the spacing had no impact on yield at Coimbatore and Dharwad. Among the fertilizer levels, 100% RDF (at Nandyal and Lam) or 125 % RDF (at Coimbatore, Raichur, Srivilliputtur and Dharwad) was optimum.
- Herbicides like Pendimethalin, Trifluralin, Quizalofop ethyl, Pyrithiobac Sodium, Glyphosate were evaluated in different combinations among themselves and with hoeing and the results are presented.
- Drip irrigation schedule at 0.6 ET gave significantly higher seed cotton yield at Lam and Banswara, whereas, all the irrigation schedules were at par at Rahuri, Dharwad and Indore. 100% RDN & K gave significantly higher seed cotton yield at Rahuri, Dharwad and Banswara, whereas, 75% and 50% RDN & K gave better yield at Lam and Indore respectively.
- Moisture conservation techniques of ET based Drip irrigation in Bt cotton showed that drip +poly mulch gave significantly higher seed cotton yield at all locations.
- Experiments for optimizing organic cotton (*G. arboreum* / *G. herbaceum* varieties) production was conducted in both central and south zone centres.
- Foliar spray of planofix at flowering and boll development stage significantly enhanced number of bolls and substantially improved boll weight and in turn the seed cotton yield.
- Nutrient consortia (CICR, Coimbatore) spray at 15 days interval from flowering gave significantly higher seed cotton yield.
- Field experiments were conducted with defoliants in different locations.

Crop Protection

Entomology

- Genotypes from zonal breeding trials were screened against insect pests and identified as resistant/ tolerant in all the three zones.
- In Faridkot, CSH 3129, FHH 200, Pusa 5760 and in Hisar CA 105, Pusa 5760, LH 2152, F 2276, LHH 1403, LH 1411 and FHH 200 were found to be tolerant to leaf hopper.
- In Surat, eight and seven entries were found to be promising against leafhopper population under field, field cage and morphological studies.

- In Akola, BS-30, BS-79 and P-1251 were found tolerant against spotted bollworm and BS-40 and P-2151 were found tolerant against pink bollworm with minimum open boll and loculi damage.
- In Khandwa, minimum numbers of leafhopper were found in genotypes GSHH-2729 and GSHV-162.
- In Rahuri, four genotypes GISH-272, TSHH-0629, RHH-707 and GJHV-445 were observed to be consistently resistance to leaf hopper.
- In Dharwad, Raichur and Srivilliputtur entry TSHH 0629 recorded consistently tolerant to leaf hopper and the entries GSHV 159 and TSH 0250 were also showed tolerance to leaf hopper in LAM Guntur and Srivilliputtur, respectively.
- Population dynamics of key pests of cotton in relation to climatic conditions were recorded at weekly intervals for both sucking pests and bollworms in various participating centers during 2013-14.
- Neem formulation namely Neemazal-T/S 1% EC and Neemazal 5% WSC were evaluated against sucking pests.
- For the revalidation of existing recommendation of insecticides, they were compared with label claim doses against sucking pests in cotton ecosystems.
- Integrated cotton crop management options with emphasis on biotic stress management were evaluated in all the participating centers of the three zones.

Plant Pathology

- Cotton leaf curl virus disease (CLCuD) appeared in 24-26 meteorogical week in North Zone and the incidence and severity of CLCuD and the whitefly was very high. The flare up of whitefly population in the entire north zone might be due to less rainfall received during June and July.
- *Alternaria*, Bacterial blight and Grey mildew were the major diseases in Central and South zone. In addition, Leaf rust in Karnataka and Andhra Pradesh and Tobacco Streak Virus in Andhra Pradesh and Tamil Nadu are gaining ground in South zone. The presence of TSV was confirmed through sequence analysis and Dot Blot Immuno Binding Assay and its local lesion hosts were identified.
- Based on two year field screening and one year artificial inoculation studies, lines *viz.*, MR 786 and Bihani 251 were found tolerant against CLCuD, whereas, lines like LH 2132, NDLH 1938, TCH 1707 were resistant against *Alternaria* blight and lines like BGDS 801, BGDS 802, BS 47 and GSHV 159 were resistant against bacterial blight. The entries *viz*., Digvijay, GBav-229, GBav-251, GBhv-253, GBhv-255, GBhv-270, GBhv -677, and GVhv-637 showed consistent resistance against *Fusarium* wilt for the last three years.
- Monitoring of breakdown of resistance against CLCuD in cotton revealed break down of resistance in earlier identified resistant / tolerant cultures.
- Seedling mortality was reduced significantly due to seed dressing with chemicals at all four test locations i.e., Junagarh, Dharwad, Guntur and Coimbatore at all tested concentrations except for Thiram and Carboxin @ 2 g at Junagarh and Carboxin @ 1 g at Dharwad.
- Significant reduction in mortality due to root rot pathogens (*Rhizoctonia spp)* was noted at Sirsa by seed treatment @ 10 & 5 g/kg seed with TrichoCASH either alone or in combination with Thiram. TrichoCASH @10 g/kg seed +Thiram @ 3 g/kg showed the maximum (18.67%) disease control due to *Fusarium* wilt at Pune.
- Seed treatment of bioagent (PF TNAU1 @ 10 g/kg of seed), soil application (*T. viride* @ 2.5 kg/ha) and chemical sprays (Ergon @ 1 ml/litre at 60 DAS and Taqat @ 1.5 g/Litre at 90 & 120 DAS) were found to be more effective in minimizing the *Alternaria* blight disease intensity by 66.40 in Bt hybrid-2 (module 3) and 63.28 per cent in Bt hybrid-1 (module 3) at Rahuri. Module 1 and 2 significantly reduced *Alternaria* leaf spot in Jadoo BG II while all three modules significantly reduced *Alternaria* leaf spot in RCH 2 BG II at Guntur. Seed treatment with *B. subtilis* (BSC5 – TNAU) @ 10 g/kg on either RCH 2 Bt or Bunny Bt along with soil application of *Bacillus subtilis* (BSC5-TNAU1) combined with foliar spray of *B. subtilis* @ 1 % on 60, 90 and 120 days after sowing was effective in controlling root rot, *Alternaria* leaf blight and TSV at Coimbatore.
- Reduction in boll number (ranging from 11.4 - 38.1%) and seed cotton yield (from 15.7- 46.3 %) was observed in different Bt cotton hybrids due to cotton leaf curl virus disease at Faridkot, Hisar and Sriganganagar.
- Pooled results (2010-12) of management of foliar diseases through application of Systemic Acquired Resistance (SAR) inducing chemicals at Dharwad, Guntur, Coimbatore suggest that SAR chemicals like Salicylic Acid (SA) and Iso Nicotinic Acid (INA) at 100 ppm protect cotton from fungal (*Alternaria* blight, grey mildew and rust) as well as bacterial (bacterial blight) diseases with good yields and cost benefit ratios.

Notification of Cotton Genotypes for Cultivation

During the year 2013-14, five cotton cultivars (five varieties and one hybrid) have been notified for commercial cultivation in the country for various agro-climatic zones.

Registration of Cotton varieties under PPV & FRA

List of registered cotton varieties during 2013-14 under PPV&FRA, 2001

Institute	Name of the Variety	Species	Variety/Hybrid	Remarks
CICR	CCH 510 -4	*G. hirsutum* L.	Variety	As New
CICR	CNHO 12	*G. hirsutum* L.	Variety	As extant
ANGRAU	NARASIMHA	*G. hirsutum* L.	Variety	As Extant
CICR	CSHH 243	*G. hirsutum* L.	Hybrid	As new

Tribal Sub-Plan A sum of Rs.15 lakhs was utilised to conduct exclusive training programme and dissemination of cotton production technologies to the tribal cotton farmers to improve their economic status

S.No	Centre Name	Amount earmarked (Rs.)
1	MAU, PARBHANI (Nanded Centre)	2,00,000/-
2	UAS, DHARWAR (Dharwar Centre)	2,00,000/-
3	TNAU, Coimbatore (Coimbatore Centre)	2,00,000/-
4	USA, Raichur (Raichur Centre)	2,00,000/-
5	MPUAT, UDAIPUR (Banswara Centre)	3,00,000/-
6	NAU, NAVSARI (Surat Centre)	1,00,000/-
7	CICR,RS, Coimbatore (PC Cell Unit)	3,00,000/-
	Total	**15,00,000/-**

Shri Ashish Bahuguna, Agriculture Secretary and Shri Sanjeev Gupta, Joint Secretary, Extension, DAC, MoA, GOI, New Delhi visited CICR, Nagpur

Sh. J. S. Saharia, Chief Secretary and Dr. Sudhir Kumar Goel, Additional Chief Secretary (Agriculture), Government of Maharashtra visited CICR, Nagpur