

# All India Coordinated Cotton Improvement Projects

## RESEARCH HIGHLIGHTS: 2006-07

### CROP IMPROVEMENT

#### National Trial

Ten National Trial with an objective of improvement of *G. hirsutum* and *desi* varieties and intra *hirsutum*, interspecific (*G. hirsutum* x *G. barbadense*) and *desi* hybrids were conducted during the year 2006-07.

- In the initial evaluation trail of *G. hirsutum* varieties under irrigated conditions, GJHV.374, CPD 812 and ARBH 813 performed better at both Central and South Zone locations. H 1300 was the best culture in North Zone.
- Under Rainfed situations, *G. hirsutum* cultures HAGH 819, TSH 2005 and PH 1024 recorded more than 1400 kg/ha of seed cotton in Central Zone. HAGH 819 and CPD 817 were better in South Zone.
- Among the conventional intra *hirsutum* hybrids under irrigated conditions, SVHH 139, VBHH 2303 and RAHH 246 were the best hybrids under North, Central and South Zone conditions, respectively.
- Among the male sterile based hybrids HHH 433 in North Zone and ARCHH 8188 in Central Zone alone were promising.
- Under Rainfed situations the conventional intra *hirsutum* hybrids NGHH 311 and KCH 707 showed consistency under both Central and South Zone. However, none of the male sterile based hybrid was found to out perform the local check.
- Several interspecific hybrids (*G. hirsutum* x *G. barbadense*) recorded better yield than the common check hybrid DCH 32. Hybrids RAHB 189 and MLCHB 6 showed consistency over both the zones.
- Among the *G. arboreum* varieties none tested showed promise in North Zone under rainfed situations in Central Zone. DLSa 101 recorded the highest yield. Similarly JLA 1799 was the best hybrid in South Zone test locations.
- In the *Desi* hybrid trial, LMDH 30 recorded the highest yield in North Zone. AAH 28 was the best hybrid in Central Zone.

### North Zone Trials

- LH 2076 and F 2006 were the promising *G.hirsutum* varieties in the *G.hirsutum* varietal trial.
- Among the hirsutum hybrids, HSHH 11, USHH 11 and FHH 136 were promising.
- In the *G. arboreum* varietal improvement programme, CISA 614 and FDK 124 hold promise.
- The *desi* hybrids FMDH 6 and AHH 20 recorded better yield over both the local and Zonal check hybrids.

### Central Zone

- P 72-9-37 and GSHV 01/1338 under irrigated conditions and NH 630, GTHV 0135 and NH 615 under rainfed conditions were the best *G. hirsutum* genotypes under evaluation.
- Under irrigated conditions several hybrids were found to be higher yielding. RATNA, ARCHH 9770 and PMCH 99 among the intra hirsutum hybrids, PSCHB 901, KDCHB 407 and USHB 25 among the interspecific hybrids were promising.
- Under rainfed situations also several hybrids outperformed the check hybrids MLCH 318 and Ajeet 177 among the intra hirsutum hybrids and GGCH 81 among *desi* hybrids were consistent.

### South Zone

- Among the *G. hirsutum* genotype tested, GSHV 97/612 and CCH 510 in the Coordinated varietal Trial and GISV 103 and NDL 762 in the Preliminary Varietal Trial were better than the zonal check. Under rainfed situations, CPD 818 and RAH 3 were better than both zonal and local checks.
- Among the intra hirsutum hybrids, Indam 178, Tulasi 27 SSB 3 under irrigated conditions, BSSCH 29 and Tulasi 9 under rainfed situations were promising.
- Among the *desi* varieties, KWA 23, GAM 93 and ARBHH 35 were better than the zonal check. *Desi* hybrid GGCH 81 was also found to out yield the checks.

## AGRONOMY

- Integrated nutrient management plays a key role in realization of sustainable yield in cotton. Suitable and judicious combination of RDF, FYM and foliar spray of desired nutrients may be recommended based on the agronomic trials taken up at the location.
- Under rainfed condition at Lam (Guntur, A.P.), FYM @ 10 t/ha along with 50% of RDF was optimum enough to sustain cotton yield and soil health.
- Boron @ 0.1% as foliar for Khandwa, MgSO<sub>4</sub> @ 1% + ZnSO<sub>4</sub> @ 0.5% for Nanded & Rahuri and 0.5% FeSO<sub>4</sub> for Coimbatore may be recommended for yield gains in cotton.
- 2% KNO<sub>3</sub> (4 sprays) may be taken up for inclusion in package of practice on cotton for Nanded and Siruguppa, while 3% KNO<sub>3</sub> (3 sprays) for Akola and Junagarh condition.
- Under rainfed conditions at Nandyal, FYM@ 10 t/ha followed by vermicompost @ 2t/ha were useful, while a combination of vermicompost @ 1.25 t/ha + Azospirillum + PSB may be suitable for Indore.
- Detopping at 65 DAS along with adoption of narrow row spacing (60 x 30 cm) may be recommended for Khandwa condition.
- Fertigation with RD-NK applied as 10% at planting and the remaining 90% in 9 splits (at 30-120 DAS) may be adopted in practice for Nandyal condition.
- Sulphur may be combined with Zn for inclusion in fertilizer recommendation for cotton in Hisar and Sriganganagar condition.
- An organic combination consisting of FYM @ 5 t/ha, green manuring of dhaincha incorporated in *situ*, Azotobacter, Azospirillum and PSB (as seed treatment) may be included in the current practice of crop husbandry for cotton –chick pea sequence for Rahuri.
- Compatible intercropping system viz., cotton + cluster bean (1:1) for Rahuri, single row of sunflower with two rows of cotton or one row of castor with three rows of cotton for Dharwad was seen beneficial.
- Osmoprotectants like mercaptoethyl amine (100 ppm), glycine betaine (0.3%), CaCl<sub>2</sub> (0.25%) and KNO<sub>3</sub> (0.5%) were seen useful for higher yield especially under rainfed conditions.
- Promising genotypes for stress tolerance based on physiological attributes like DMSI, LASI and YSI may be used in Further breeding programme.

## ENTOMOLOGY

- Cultures resistant to jassid and tolerant to bollworms were identified from breeders' material from the three cotton Zones of India.
- Jassid population was above threshold level from last week of June to mid July and again from second week of September to first week of October in Ludhiana, from mid August to first week of September and last week September to first week of October in Babswara, during November in Surat, from first week of July to last week of August in Rahuri, from mid September to mid November in Junagadh and from mid August to end of August in Khandwa.
- In South Zone it was above threshold level from third week of October to end of November in Raichur, third week of October to second week of November in Dharwad during first fortnight of October & again during the second week of January in Guntur and from fourth week of May to end of July in Srivilliputhur.
- Aphid population was above ETL from last week of July to end of August & mid November to mid January in Akola, from second week of July to end of August in Rahuri, from second week of November to end of December in Dharwad.
- Thrips population was at peak (27-35/3 leaves) from mid July to mid August in Sriganaganagar, from last week of July to first week of August & from third week of October to first week of November in Surat, during the second fortnight of August in Nanded and second week of July to last week of August in Rahuri, from last week of July to first week of November in Dharwad and from fourth week of May to third week of June in Srivilliputhur.
- Whitefly population crossed ETL from mid June to mid July in Ludhiana and during second fortnight of August in Sriganaganagar.
- Occurrence of new pest, Mirid bug on cotton was observed in epidemic form (8 to 24/25 squares) in Dharwad from September to November and in Coimbatore during November to December months. Mealy bug, a minor pest has also assumed serious proportion in some parts of all the cotton growing Zones of India.
- Heliothis bollworm was below threshold level in all the centres throughout the cropping season in North Zone. It was at above threshold level from third week of September to first week of October in Akola, from last week of July to second week of August in Rahuri and from last week of September to last week of October in Junagadh. In South Zone it was at higher level (4.8 to 9.7/ 5 plants) in Dharwad during September to November and 4.5 to 5.3 in Raichur during October to November.

- Spotted bollworm incidence was at above threshold level during first fortnight of August in Ludhiana and during second fortnight of August in Sriganaganagar. In Central Zone, it was above threshold level during November & December in Junagadh, Surat and Akola and July to August in Rahuri. It was at moderate level during October & November in Raichur and August to October in Dharwad (2.2 to 5.4 / plants).
- Pink bollworm incidence was at higher level during September and October in Ludhiana and during November to January in Banswara. In Central Zone, it was at moderate level (1.0 to 1.8 larvae) in Junagadh, Nanded and Surat, while at higher level in Rahuri (3 to 14) during July to November and during October to January in Akola. Very high level of pink bollworm incidence was observed in almost all the centres of South Zone from September to end of January.
- Relationship between incidence of major pests of cotton and weather parameters in Coimbatore: Minimum temperature was negatively correlated to *H. armigera* and pink bollworm during 2006-07. Correlation study with three years (2003-06) data on weather factors revealed that minimum temperature and RH positively correlated with aphid and jassid incidence. Maximum temperature was negatively correlated with *H. armigera* incidence, while minimum temperature and rainfall were negatively correlated with the incidence of pink bollworm.
- New insecticide RIL 042 at 400 and 500 ml/ha was effective against whitefly and recorded significantly higher yield over control by 31 and 32 % respectively.
- Seed treatment with new formulation of Cruiser 500 FS at 3g/kg of seed was effective against jassid, aphid and thrips and recorded significantly higher seed cotton yield by 11% over control.
- Foliar spray with new molecule of insecticides spinosad 45 SC at 300ml/ha, BYI 08330 150 OD at 500ml/ha and SYN 13623 at 200 & 300 ml/ha were effective against sucking pests (Jassid, aphid, thrips) and recorded significantly higher yield by 22 to 55% over control.
- RIL 042 at 500ml/ha, RIL 043 at 1000 ml/ha, E2Y45 20 SC at 30 and 40 g a.i./ha and Flubendiamide 24% + Thiocloprid 24% 480 SC were effective against bollworms damage and recorded significantly higher yield by 69 to 76% over control.
- Thiodicarb, quinalphos, lambda cyhalothrin and Deltamethrin were effective against pink bollworm and recorded significantly higher yield (21.8 to 27.4 q/ha) over control (12.7 q/ha)
- Adoption of location specific IPM resulted in reduction of 47% spray numbers and 40% plant protection cost besides increasing seed cotton yield by 22% and net

returns by Rs. 4270/ha over Farmers' practice. In addition, substantial increase in predators population was observed in IPM fields.

## PLANT PATHOLOGY

- Cotton leaf curl disease (CLCuD) is still the major disease in the farmers' field of Punjab, Haryana and Rajasthan with nearly 100 per cent of the plants showing symptoms of the disease in many places.
- CLCuD was seen on both Bt and non Bt cotton hybrids at varying intensities.
- Bacterial leaf blight, alternaria leaf spot and grey mildew were the other major diseases affected cotton in Central and South Zone states.
- Severe incidence of rust disease (35.0 – 50.0 PDI) was noticed in farmer's field in Andhra Pradesh during later half of the season.
- Eleven entries have been found to have resistance to CLCuD in the field and screen house tests conducted in the North Zone centres.
- The test fungicide, Probineb 70 WP @ 1400 g ai/ha has given good control of fungal foliar diseases and was effective as Propiconazole 0.1% spray.
- Seed treatment @ 10 g/kg seed with talc powder formulation of the bioagents *Pseudomonas fluorescens* Pfl followed by foliar spray 0.2% on 30, 40, 50, 60,70,80 and 90 DAS was found either superior or on par with the fungicide (Carbendazim 50 WP @ 0.1%) or Copper oxy chloride 0.3% + Streptocycline @ 100 ppm in the management of alternaria leaf spot, grey mildew, Myrothecium leaf spot and bacterial blight.
- Spraying of Carbendazim 50 WP (0.1%) at fortnightly intervals (four to five times) starting from 35 DAS gave effective control of grey mildew and averted an yield loss of 22 to 28 percent.
- Propiconazole 0.1% spray prevented an yield loss of up to 10.0 per cent, and gave good control of alternaria leaf spot, if proper plant protection measures were given between 35 and 95 DAS.
- Maximum control of bacterial leaf blight could be obtained if plant protection measures were undertaken with copper oxychloride (0.3%) plus Streptocycline 100 ppm between 35 and 45 DAS thereby preventing an yield loss of 27.00 percent.

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