

8. AICRP ON COTTON

Notification of Cotton varieties and hybrids

Fourteen cotton varieties/hybrids have been notified for various agro-climatic zones

Name	Species	Average yield (q/ha)	State/Zone
DHB 915	H x B	17.00	Karnataka
MRC 7377	H x H	20.07	South Zone
CSH 3129	G. hirsutum	23.00	North Zone
CSH 3075	G. hirsutum	24.67	North Zone
LD 949	G. arboreum	24.79	North Zone
RHH 0917 (Phule Asmita)	H X H	25.09	Central Zone
GAM 162	G. arboreum	15.14	Central Zone
RHB 0812 (Phule Prabha)	H X B	24.71	Central & South Zone
Central Cotton NHH 250	H x H	14.00	Central Zone
MR 68	G. hirsutum	22.65	North Zone
DHB 1071	H x B	17.00	Karnataka
GN Cot Hy 14 (GSHH 2729)	H x H	25.52	Gujarat
K 12	G. arboreum	11.93	Tamil Nadu
GJ COT 111 (GAM 162)	G. arboreum	15.14	Central Zone

Bt Varieties released (*G. hirsutum*):

Eight Bt varieties with deregulated event MON 513 were approved for cultivation during 2017.

Varieties/ Hybrids	Average Yield (kg/ha)	Area of adaptability
CICR Bt-6 (RS 2013)	2234	Irrigated Conditions of North Zone States of Haryana & Punjab under HDPS
ICAR-CICR GJHV 374 Bt	2525	Maharashtra
ICAR-CICR PKV 081 Bt	2476	Maharashtra
ICAR-CICR Rajat Bt	2283	Maharashtra & South Rajasthan
ICAR-CICR Suraj Bt	2149	Maharashtra, Gujarat, Madhya Pradesh
ICAR-CICR Bt 9	2934	Maharashtra
ICAR-CICR Bt 14 (CPT 2)	2699	Maharashtra
PAU Bt 1	2752	Punjab & Rajasthan

Breeder Seed Production

The Breeder seed production, as per the indent of Department of Agriculture, Cooperation and Farmers Welfare for the year 2017-18, was taken up at different centres of AICRP on Cotton and at ICAR-CICR, Regional Station, Coimbatore. The breeder seed production was 115.64 quintals as against indent of 79 quintals.

Front Line Demonstrations (FLD) under NFSM-Commercial Crops

During the year 2017-18, under NFSM - Commercial Crops, a total of 448 Front Line Demonstrations on Integrated Crop Management on cotton, 170 Front Line Demonstrations on Desi / ELS cotton / ELS cotton seed production and 138 Front Line Demonstrations on intercropping with cotton were conducted by fifteen centers with a budget outlay of 54.62 lakh rupees.

Significant Research Findings

Crop Improvement

- Under irrigated conditions, the genotypes viz., PBH 116, Phule Yamuna, and PBH 116 were the best for yield, whereas for fibre quality, TCH 1828, SHJ 23 and RAH 0603, were the best under normal spacing. Similarly, in rainfed situation, CPD 1751 and GSHV 191 were the best for yield and CPD-1751 showed promise for bundle strength.
- The compact genotypes- PBH 115, RHC HD 1420 and CSH 1613 were the best for yield in irrigated situation and RAHC 1039 was showing promise for fibre quality under closer spacing. In rainfed conditions, ARBC 1651 and DSC 1651 were the best for seed cotton yield.
- ELS *G. barbadense* cultures like DB-1701 and CCB 143B were promising for yield. ELS interspecific hybrid RHB 1002 was the best in both Central and south Zone.
- In North Zone, the *G. hirsutum* genotype F 2462 showed promise for yield (2663 kg/ha) under normal spacing while RS 2814 (2869 kg/ha) was promising in closer spacing trial.
- In Central Zone, RHC 1217 (yield of 2319 kg/ha) was the best in preliminary variety trial and GSHV172 (yield of 2251 kg/ha) was the best in coordinated variety trial under irrigated conditions with normal spacing. Under rainfed conditions, CPD 1652 and ARBH 1551 were the top yielders. For closer spacing, ARBC-1601 (yield of 1931 kg/ha) was the best in central zone in irrigated situation and GISV 272 (yield of 1704 kg/ha) was the best in rainfed condition.
- In Central zone, ELS *G. barbadense* cultures like DB 1602 and ARBB 1502 were the best yielders. Similarly, ELS interspecific hybrid RHB 1008 was the best in central zone for yield.
- Among desi varieties, CNA 1031 was the best for yield and PAIG 373 was the best for quality. Desi hybrid BDAA 011 was showing promise in central zone under rainfed condition.
- In South zone, under irrigated condition, HS 298 (yield of 2024 kg/ha) and BGDS 1033 (yield of 1887 kg/ha) were promising hirsutum cultures in different trial under normal spacing and LHDP 1 (yield of 1571 kg/ha) was the best under closer

spacing. In rainfed conditions, CPD 1652 (yield of 1080 kg/ha) and ARBH 1551 (yield of 1357 kg/ha) were promising for yield in normal spacing and ARBC 1651 (yield of 1133 kg/ha) was promising in closer spacing.

- Among ELS cultures, RHcb 1014 was promising for yield and interspecific hybrid ARBHB1602 was promising for yield.
- Among desi cultures, JLA 110 was showing promise for yield and PA 812 and PA 808 were promising for fibre quality.
- The naturally coloured cotton genotypes were evaluated in AICRP for the first time belonging to both hirsutum and arboreum. The culture 16301 DB was promising for yield in hirsutum and DDCC1 was promising in arboreum.

Crop Production

- Agronomic requirements of HS294 in North Zone; GJHV497, SCS 1061, ARBB 1401, RHB 1122 and PA 785 in Central Zone; GSHV 177, CCH 14-1, DHB 1009, RHB 1122 and AKA 2008-7 in South Zone were worked out.
- Nutrient and geometry requirements were worked out for RS2727, GTHV 13/32, GISV 272, RAHC 1011, ANGC 1451, ANGC 1452, GTHV 13/32 and RAHC 1012 under High Density Planting System (HDPS).
- Research on reducing nitrogen dose and enhancing of nitrogen use efficiency in Bt cotton were worked out at Faridkot, Bathinda, Junagarh and LAM. There are possibilities of reducing 25 % N for Bt cotton by making Spot application in four splits of 75 % RDF + Foliar application of 1% urea at three times. In Hisar, Rahuri, Khandwa, Banswara, Raichur and Dharwad, it is reported that there is saving of 25 % of N by applying 75 % of RDN in spot application of four splits and raising of Sun hemp between rows incorporated before flowering.
- Organic nutrient management packages including seed treatment, soil application of recommended bio fertilizers, foliar application of Pink Pigmented Facultative Methylootrops (PPFM) at flowering, soil application of Neem cake @ 250 kg/ha and raising and incorporation of Sunhemp/fodder cowpea between rows registered significantly higher seed cotton yield at Akola (1543 kg/ha), Banswara (2279

kg/ha), Bhawanipatna (1434 kg/ha), Rahuri (1406 kg/ha), Dharwad (2010 kg/ha), Coimbatore (1067 kg/ha) and Srivilliputtur (1701 kg/ha).

- Labour saving package including land shaping by machine, pre and post emergence application of weed control, interculturation by animal and boom / other sprayer for spraying registered the least labour requirement of 26.7, 113.2, 86, 70, 115 and 70 respectively at Bhawanipatna, Nanded, Kanpur, Akola, LAM and Nandyal respectively, which was 34.7, 27.9, 40.3, 19.5, 50.4 and 48.9 per cent less for one hectare of cotton cultivation as compared to control.
- Canopy management in HDPS cotton cultivation using growth retardant found that mepiquat chloride application @ 20 g a.i. / ha. at 60 and 75 DAS reduced sympodial length by 28.3, 22.2 and 16.2 per cent respectively at Faridkot, Bathinda and Hisar.
- Spraying of human hair product could not offer any significant impact on seed cotton yield at Faridkot, Bathinda, Sriganaganagar, Bhawanipatna, Coimbatore and LAM, Guntur. However, spraying @ 9 ml/l of human hair product at two times on 65-70 and 80-90 DAS showed increased seed cotton yield at Khandwa and Banswara.
- Significantly higher seed cotton yield was recorded with Super absorbent application @ 18 kg/ha than control at Akola (1504 kg/ha), Nanded (2033 kg/ha) and Khandwa (1104 kg/ha).
- The Genotypes viz., CPD 1602, GSHV 520, GSHV-523, PH-071, SIMA-5 and TCH-327 at Guntur, CPD-1652, Sahana, CPD-1651, GJHV-523, RAH-1071, L-1060, CNH-7012 and NDLH-2027 at Dharwad were identified for drought tolerance. The genotypes, H 1489, H 1524 and H 1506 were known for drought tolerance at Hisar. Chlorophyll stability index was found significantly high in CPD-1702, RHC-1346 and GSHV-199 at Surat. Genotypes TCH-1199 at Khandwa was known for drought tolerance.
- The genotypes viz., PA 255, PA 528, L 1060, GSHV 497 and LHDP 2 identified as saline tolerant at Guntur. High K/Na ratio was found with ARBB-1401 and GJHV-497 at Surat. H 1518 and H 1523 were screened for salinity tolerance at Hisar.
- The management of climate change was attempted by using genetic variability associated with cotton. The results found that *arboreum* genotypes recorded

significantly higher yield at different environments than *hirsutum* and Bt cotton hybrid at Guntur (Phule Dhanwanthari), Surat (G.Cot-15 and G.Cot-19), Hisar (HD432) and LAM (AKA 2004, AKA 7 & Srinandi). At Dharwad, *hirsutum* genotypes (Sahana and ARBH-813) showed least reduction in yield under less suitable environment.

Entomology

- Pest dynamics was recorded in all the three zones under experimental field conditions. In north zone leafhopper was above ETL during 25th to 32nd SW in all centres, except in Sriganaganagar. Whitefly and Thrips were above ETL during few standard weeks in all the centres. Boll worm infestation was negligible and adult moth catches of all the boll worms in pheromone traps were recorded in north zone centres.
- In central zone, among the sucking pests, leaf hopper was the major pest which was observed above ETL and occurred throughout the cropping season in Surat. Infestation of whitefly was above ETL in Nanded and Banswara for a short period during the crop season. Thrips were below ETL, however in Nanded, Rahuri and Surat the population crossed ETL during mid-August to mid-September. Activity of natural enemies namely Spiders, *Chrysopa*, *Chryptolaemus*, Syrphids and Coccinellids were observed at all centres. Among the bollworms, pink bollworm *Pectinophora gossypiella* was the prominent pest in all the centres except Banswara and Bhawanipatna. The pest was recorded on Bt hybrids in Akola, Nanded, and Junagadh. Adult moth catches of all the bollworms were observed.
- In south zone, leaf hopper was the major sucking pest in all the centres, infestation of whitefly and Thrips was below ETL. However, in Dharwad Thrips crossed ETL during mid-August to mid-October. Mirid bug infestation was noticed at moderate level at Dharwad and Chamarajanagar. Peak infestation of flower bud maggot was observed during November only in Dharwad. Among the bollworms, *P. gossypiella* was the prominent pest and it occurred in DCH 32, in Andhra Pradesh and Karnataka, which remained below ETL in Tamil Nadu. Pheromone trap catches of adult boll worms was also recorded.



- New formulation Pyriproxyfen (RIL - 125/F (20%WG) @ 75 and 100 g a.i /ha) tested against sucking pests in north and central zones were comparable in terms of efficacy with the standard insecticides. Population reduction of natural enemies was recorded in the chemical treatments when compared to biopesticides and control.
- New combination insecticide molecules viz., Spinetoram + Sulfaxaflor 40% WG @120 and 140 g a.i., / ha and Pyriproxyfen 5% EC + Fenprothrin 15% EC@ 37.5 +112.5 g a.i., / ha and its individual molecules were effective in reducing the sucking pest population in all the three zones.
- Among the different pheromone traps evaluated, higher number of moth catches with lower larval infestation and locule damage with maximum good opened bolls were recorded in Phero-sensor TM-SP and TM-BB sleeve traps at densities 20 and 8 followed by PCI delta traps with replacement of sticky liner (season long).
- Percentage reduction of whitefly population in the whitefly adult suction trap operated plots was comparable with the insecticide treated plots.
- Phero-sensor TM-SP Sleeve trap performed better in reduction of larval population of pink bollworm, damage to green boll and locule and yielded higher compared to PCI-Delta Trap fitted with Pectino-lure SL in all the centres.
- Infestation of pink bollworm, boll and locule damage were significantly low in insecticides treated plots which was on par with *Trichogramma bactrae* released plots.

Plant Pathology

- Cotton leaf curl virus in north zone, *Alternaria* leaf blight, bacterial blight and tobacco streak virus in central zone and *Alternaria* leaf blight, bacterial blight, grey mildew and rust in south zone were the major diseases reported during 2017-18 crop season.
- The maximum leaf curl disease was noted in Punjab followed by Rajasthan and Haryana during the 2017 season. In Punjab, maximum CLCuD was noted in Fazilka district followed by Muktsar and Faridkot. The Minimum PDI was observed in Bhatinda district. In Rajasthan, Sriganganagar district showed maximum CLCuD followed by Hanumangarh. In Haryana the maximum CLCuD was recorded in Fatehabad followed by Sirsa and Hisar.
- The occurrence of Tobacco streak virus (TSV) was observed from second fortnight of July on most of the Bt cotton hybrids sown on farmers fields in Rahuri, Maharashtra up to a maximum incidence of 23 per cent. Tobacco Streak Virus disease incidence was very low in Andhra Pradesh (< 1% only). The incidence of TSV was found in Tamil Nadu only in TNAU Coimbatore (5-10%).
- In trials on IDM, Module 6 (ST - PF CICR @ 10 g/ kg of seed + Soil Application of *Trichoderma viride* @ 2.5 kg/ ha *Trichoderma viride* (TNAU1) in 250 kg of Compostor FYM and foliar spray with Kresoxim methyl @ 1 ml/ litre followed by Captan +Hexaconazole @ 1.5 g/ litre for fungal diseases or COC (0.3 %) + Streptocycline(0.01 %) for BLB) showed lowest incidence of Bacterial blight, *Alternaria*, Grey mildew and Wilt with higher seed cotton yield at Nanded. At Surat also this module showed the best results against Bacterial blight and ALB.
- Pooled results of five sprays of different interventions showed lowest CLCuD PDI in Cow urine + Calcium nitrate treatment followed by Cow urine, Buttermilk and Neem oil treatments at Hisar, Sirsa, Bhatinda, Faridkot and Sriganganagar. Highest seed cotton yield was observed in treatment Cow urine + Calcium nitrate followed by Calcium Nitrate, Digitalis and Buttermilk treatments.
- Two sprays of Copper oxychloride 50WP @ 2.5g/L & Mancozeb 50WP @ 2.0g/L in poly house experiment of sooty mould control at Sirsa, showed maximum reduction of sooty mould followed by Copper oxychloride 50WP @ 1.25g/L & Propiconazole 25EC @ 1ml/L. In field trial at Hisar, Faridkot and Coimbatore, the maximum reduction was observed at Copper oxychloride 50WP @ 2.5g/L followed by Propiconazole 25EC @ 1ml/L & Copper oxychloride 50 WP @ 1.75g/L.
- Pooled data obtained from Hisar, Faridkot and Rajasthan showed that seed cotton yield reduction (Grade wise from 1-6) due to CLCuD in different Bt hybrids varied from 10.97 to 72.46, 7.30 to 69.72, 9.89 to 57.72 and 7.94 to 71.02 percent in Bt hybrids Bioseed 6588 BG II, RCH 650 BG II, Ankur 3028 BG II and MRC 7017 BG II, respectively.