



beforehand. He called upon the industry to develop various staple length quality classes of Bt cotton catering to the needs of specific textile requirements. The susceptibility of Bt cotton to foliar diseases and sucking pests are other areas of concern which required urgent attention of the Scientists. The genetic base needs diversification and in this regard, he urged the scientists, both from the public sector and the private industry, to use the material generated at CICR, Nagpur. This, he said, will go a long way in achieving the target of 320 lakh bales by 2010. The Chairman desired a major revamp on the overall working of the AICCIP system so that it is vibrant and purposeful in the emerging scenario in the country.

This was followed by presentation of Project Coordinator's report for 2005-06. Dr. K.N.Gururajan, while presenting the results of male-sterility based trials, expressed that the yield levels of MS based hybrids were low and wanted thorough rethink on strengthening MS based work. He also suggested combining the trial on MS hybrids with conventional hybrids in a single trial, thus increasing the precision of experimental trials. Quality aspects like strength needed to be combined with high yield, he commented, after presenting the results of all AICCIP trials. He also wanted a rethink on the practice of detopping at 65 DAS. For better management, especially on the disease and pest front, models for forecasting the incidences were needed to be developed and test validated.

Dr Pramod Pundhir presented the results of breeding trials. Entries with higher fibre strength and yield have been identified and accordingly promoted in the zonal trials. Besides, desi genotypes and desi hybrids have also been noticed to possess fibre strength of 21 g/tex in North zone. In the Central zone, eight hybrids were seen better yielding than check under irrigated conditions, while five hybrids yielded around 1900 kg/ha as compared to 1417 kg/ha by check under rainfed conditions. Similarly, in South zone also, several entries in varietal and hybrid trials, exhibited superior performance than checks and point to the continued breeding efforts in development of superior varieties/hybrids.

Dr P.L.Nehra, Principal Investigator (Agronomy) presented the Agronomy results. Achievements made in the integrated nutrient management, weed management and water management were highlighted. Combined application of 50% of recommended dose of fertilizer along with 5 to 10 tons of FYM per hectare led to higher seed cotton yield at many locations. The utility of drip irrigation and fertigation, soil cover management techniques, novel intercropping systems were also presented. Intercropping with sunflower and sesamum was found to be beneficial. Cotton genotypes with improved physiological and bio chemical attributes have been identified with better adaptability to stress conditions.

Dr. Surulivelu, Principal Investigator (Entomology) presented the results of Entomology trials. Cultures tolerant to jassids and moderately tolerant bollworms have been identified from breeding materials in the three cotton growing zones of India. The population dynamics of different insect pest have been worked out. New insecticide like Polo 50 SC, Thiamethoxan were found effective against white fly and aphids and jassids. Spinosad, new A:D, RIL 042, NNI 001, E2Y 45, S1812, E237 were found effective against bollworms and helped in realizing higher seed cotton yield.

Dr. P. Chidambaram, Principal Investigator (Pathology) presented the highlights of results of Pathology trials. Cotton leaf curl virus disease continued to be the predominant disease in North zone, while grey mildew and alternaria leaf spot disease dominated in other zones. Early onset of CLCuV disease resulted in yield loss of 57%. Seed treatment with Vitavax 200 WP (3.0g/kg of seed) was found beneficial in controlling root rot, while

seed treatment with *Trichoderma viride* @ 10g/kg of seed plus soil amendment @ 2.5 kg/ha was also equally effective.

Dr V.V. Singh gave a detailed account of the germplasm being maintained at CICR, Nagpur. Several germplasm accessions having useful biometric characters were listed. Bollworm tolerant germplasm lines with favourable biochemical attributes were also listed. He informed the house about the need for exchange of germplasm following proper procedures and to share the germplasm provided the request of the scientists came through the respective Heads of Research Institutes.

Dr. Makwana presented the results of fibre quality tests. He wanted the samples to be sent by February end so that the results could be presented in time in the AICCIP annual group meeting every year.

Dr. Raveendran, Co-Chairman, wished the public institutions to concentrate on development of Bt cotton varieties and indigenize the genes as it can help save forex reserves for the country. He emphasized the need for supply of quality seeds by the private industry as many complaints are being received from the farmers in this regard. He also said that yields of long staple cottons had gone down considerably and it needed urgent attention of the researchers.

The Chairman, to a query from Dr. Anupam Barik about varietal trials, stressed the continued need for varietal development since the varieties form the base for hybrid development. He insisted upon the intensification of quality improvement work in desi cotton. Regarding the male sterility system, diversification can help in improving the yields, he said. He stressed upon the development of heterotic pools for productivity and quality traits. He stated categorically that the good conduct of trials, proper and timely data collection and statistical analysis form the basis for scientific evaluation and desired all AICCIP trials to be conducted as per plan properly. The Chairman wanted the production technologies for Bt cotton to be fine tuned and drought screening should form an essential part of the testing procedures.

**The general recommendations of group meeting are:**

- 1) Application of pendimethalin @ 1 kg a.i. /ha supplemented with one hoeing at 35 DAS was the best weed control practice recommended for Sriganaganagar.
- 2) 10 t FYM along with half of RD-NP (@ 15 and 6 kg respectively) and foliar spray of 2% KNO<sub>3</sub> was optimum both for Ludhiana and Faridkot.
- 3) Combined application of N,P, K, S & Zn was best under Hisar and Sriganaganagar condition while N,P,K & S was best under Kanpur.
- 4) At Kanpur, RD-NPK along with 10 t FYM /ha was optimum.
- 5) For Arboreum hybrid AKDH 5, a spacing of 60 x 45 cm with a NPK dose of 50:25:25 kg/ha is optimum for Akola under rainfed condition.
- 6) Integrated Nutrient application with farm yard manure @ 5 t/ha and a NPK dose of 50:25:25 is optimum for Akola under rainfed condition.

- 7) Under summer irrigated condition, application of 50% RD-NPK along with line sowing of sunnhemp @15kg/ha on one side of the ridge and green manuring at 45 DAS in cotton crop is recommended for Deccan Canal Tract of Western Maharashtra (Rahuri) and Coimbatore.
- 8) Combined application of RD-NPK with FYM @ 5 t/ha was optimum both for Indore and Siruguppa condition (RD-NPK is 60:30:15 kg/ha for Indore and 150:75:75 kg/ha for Siruguppa).
- 9) Cotton + Sesamum (3:1) was the best intercropping system recommended for Siruguppa region (irrigated condition).
- 10) For Cotton, 150:75:75 kg/ha as NPK + FYM @ 5 t/ha + vermicompost @ 1.25 t/ha, for Maize, 150:75:37.5 kg/ha as NPK + cotton crop residue @5 t/ha), and for Bengal Gram 25:12.5 kg/ha as NP were optimum nutrient combination for sustainable Cotton-Maize-Gram system under irrigated condition of Siruguppa.
- 11) Foliar application of 1% MgSO<sub>4</sub> or 0.2 % MnSO<sub>4</sub>, ZnSO<sub>4</sub> or FeSO<sub>4</sub> at 75 & 85 DAS was optimum for higher yield and profit under rainfed condition of Andhra Pradesh.
- 12) Soil cover viz., farm waste @ 5 t/ha was recommended for cotton for higher yield and profit under Coimbatore condition.
- 13) For root rot management, seed treatment with Carboxin (Vitavax) 200 WP @ 3 g/kg seed or *Trichoderma viride* talc formulation (seed treatment @ 10 g/kg seed + soil amendment @ 2.5 kg/ha) is recommended.

## Breeding Panel

The technical programme of the breeding trials, both national as well as zonal, were formulated for the year 2006-07 on 7<sup>th</sup> and 8<sup>th</sup> April, 2006 in the combined session of breeding panel under the chairmanship of Dr. T. S. Raveendran, Director, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore and Shri. K. N. Gururajan, Project Coordinator & Head i/c, Central Institute for Cotton Research, Regional Station, Coimbatore was the co-chairman. The rapporteurs were Dr. Pramod Pundir, Principal Investigator, Plant Breeding, AICCIP and Dr. S. Manickam, Scientist – Senior Scale, Central Institute for Cotton Research, Regional Station, Coimbatore. Dr. B. M. Khadi, Director, CICR, Nagpur also joined the panel in formulating the various trials.

On 8<sup>th</sup> April 2006, Honourable Deputy Director General (Crop Sciences and Horticulture), ICAR, New Delhi and Dr. S. A. Patil, Honourable Vice Chancellor, University of Agricultural Sciences, Dharwad also joined the panel and gave useful suggestions. The DDG emphasized the need for inclusion of more number of quality genotypes in both national as well as zonal testing. He also noted that the number of entries in interspecific hybrids (h x b) trial was less and suggested that efforts are to be taken to include more number of entries in future trials, with active participation of Private R & Ds. He was concerned about narrow genetic base in most of the hybrids and also about the promotion of very few entries in some of the zonal trials. Also, there should be

some mechanism for more active Private – Public cooperation in cotton research. The basic materials need to be developed in the Public system for utilization by both Public – Private R & Ds. Dr. S. S. Narayanan representing JK seeds suggested that some of the germplasm accessions which are having superior characters should be made available to private R & Ds also to widen the genetic base of their hybrids.

The breeders are requested to submit four pockets of seeds (in case of varieties) and two pockets (in case of hybrids) in addition to the number of locations finalized in the panel. Two pockets of seeds will be utilized for pathological screening and two pockets will be submitted to the Director, CICR, Nagpur as per the directives of NBPGR for long term storage of elite breeding materials.

Last date for submission of seeds at CICR, Coimbatore: 22-04-2006, at 5 PM

Date of issue of coded seeds for North Zone centres: 25-04-2006 after 4 PM

Date of issue of coded seeds for others: 28-04-2006 10 AM onwards

**Private R & Ds** – Please note that the testing fee for each entry shall be Rs. 30,000/- and the fee should be paid in the form of **Demand Draft drawn from any Nationalized Bank** drawn in favour of **Project Coordinator (Cotton Improvement) & Head** payable at Coimbatore while submitting the seeds. No entry shall be entertained without the submission of testing fee and R & D recognition by DST. The companies which have not updated the R & D recognition shall update and submit a copy at the time of depositing the seeds without which the entry shall not be included in the trial.

### GENERAL POINTS TO BE NOTED

- ❖ All the concerned persons (both AICCIP centres and Private R &Ds), who are conducting the breeding trials, are requested to operate an e-mail id and communicate the same to the Project Coordinator (Cotton Improvement) with the details of their email id, name of the contact person, their telephone nos. (both office & residence, preferably mobile no.) and fax no.
- ❖ The trials should be conducted strictly as per the technical programme **and no other entry should be included** in the trial (including the check varieties).
- ❖ All the trials should have at least one border row.
- ❖ All those who are conducting the breeding trials are requested to furnish both the mean data as well as the replicated data analyzed statistically in respect of seed cotton yield (kg/ha), lint yield (kg/ha), ginning outturn (%), number of bolls/ plant at maturity and boll weight (g/boll).
- ❖ All the data sheets should have Name of the agency conducting trial, location of the trial (and not the location of the company) and the name of the trial.
- ❖ The data should be submitted separately in different sheets for each trial, and the data of different trials are not to be combined in a single sheet.
- ❖ The incomplete and insufficient data will not be included in report preparation, and shall be reported to the higher official for non compliance.

- ❖ The lint samples pooled over replications should be prepared for all the entries, cleaned neatly and labeled properly (mentioning the name of the agency conducting the trial, location of the trial, and code number in each packet of the lint sample) and sent to concerned CIRCOT centre (North Zone – CIRCOT unit at Sirsa; Central Zone - CIRCOT unit at Nagpur; South Zone - CIRCOT unit at Coimbatore) for fibre quality evaluation in time.
- ❖ The data should be submitted in both hard copy (containing mean as well as replicated data) and soft copy (only in the form of Excel spread sheet in a CD). For data sheet model, PC's office may be contacted at the time of report preparation by e-mail at [circbe@rediffmail.com](mailto:circbe@rediffmail.com).
- ❖ Kindly note that the last date for the receipt of the data is 30-01-2007 (for north zone locations), 15-02-2007 (for central zone locations) and 28-02-2007 (for south zone locations). Data (both hard copy as well as soft copy) received after the due date shall not be included in the report.

## Formulation of ICAR Bt cotton trials

The Director based on his experience as GEAC member explained about the need to make certain changes in the conduct of ICAR Bt cotton trials. He mentioned about the need to increase the number of locations and conduct Bt cotton trials both under irrigated and rainfed situations in central and south zone. Certain changes in the screening of genotypes for pests and diseases were also required, he said. Based on the discussions the group recommended the following changes.

### 1. Evaluation of Bt cotton hybrids under plant protection.

Plant protection will be taken up based on ETL (Economic Threshold Level) values for both sucking pests and bollworms

**Number of rows:** 6 rows of 6 meters length

**Number of replications:** 3 / 4

The observations to be recorded will be as per the data sheets already supplied by the Principal Investigator (Entomology).

### 2. Evaluation of Bt cotton hybrids under unprotected condition

All the Bt cotton hybrids and the controls would be evaluated against key pests of cotton. Each entry would be sown in three rows of two replications. One row of okra is to be sown after each three rows an infestor rows. Known susceptible checks may be sown around the field. Single plant per hill will be maintained.

### 3. Pathological evaluations of Bt cotton hybrids

Each entry would be sown in three rows of two replications with a minimum population of 40 plants. Every fourth row, a susceptible check should be planted. For CLCuV screening trials, variety RS 921 is recommended. Standard check F 1861 should also be added as an entry for comparison. Susceptible check may also be sown all around the field. The observations for disease reaction should be taken from all plants. Single plant per hill will be maintained.

**Trial Details - North zone**

Irrigated: (6 locations): Ludhiana, Faridkot, Bhatinda, Hisar, Sirsa (CICR), Sriganaganagar

**Checks:** RCH 134 Bt and CSHH 198 / LHH 144

**Cut off date for harvesting:** 15<sup>th</sup> November

**Spacing:** Haryana and Rajasthan - 67.5 x 60 cm  
Punjab - 67.5 x 75 cm

**Central zone****Locations**

Irrigated: (5) -Khandwa, Surat, Junagadh, Talod and Banswara

Rainfed : (9) – Akola, Achalpur, Nanded, Parbhani, Nagpur (CICR)  
Bharuch, Rajkot (JAU),  
Indore and Bawanipatna

**Spacing:**

Irrigated: Gujarat - 120 x 45 cm  
Madhya Pradesh - 90 x 60 cm  
Rajasthan - 90 x 45 cm

Rainfed: Madhya Pradesh - 90 x 60 cm  
Maharashtra - 90 x 60 cm  
Gujarat - 120 x 45 cm  
Orissa - 90 x 45 cm

**Checks:** RCH 2 Bt, NHH 44 and Local Hybrid Check

**Cut off Date:** 28<sup>th</sup> February

**South zone****Locations**

Irrigated : (6) Warangal, Siruguppa, Raichur, B'gudi, Coimbatore and  
Srivilliputtur

Rainfed : (5) Lam (Guntur), Nandyal, Adilabad, Dharwad and  
Aruppukottai

**Spacing :**

**Irrigated:** Andhra Pradesh - 90 x 90 cm  
Karnataka - 90 x 60 cm  
Tamil Nadu - 90 x 60 cm  
**Rainfed:** Lam - 120 x 60 cm  
Nandyal - 90 x 60 cm  
Adilabad - 90 x 90 cm  
Dharwad - 90 x 60 cm  
Aruppukottai - 75 x 45 cm

**Checks:** RCH 2 Bt, Bunny and Local Hybrid Check

**Cut off date for harvest**

Irrigated - February-28

Rain fed – March- 15

**Interspecific (H x B) hybrid trial (Irrigated)****Locations (6) :** **South Zone** : Amravathi (Lam), Coimbatore, Dharwad, B'gudi,**Central Zone:** Indore and Banswara**Spacing:** Amravathi (Lam), Coimbatore, Dharwad and B'gudi –120 x 60 cm  
Indore and Banswara – 90 x 60 cm**Checks:** MRC 6918 Bt, DCH 32 and Local Interspecific Hybrid Check

From first year trials, 200 gm lint of each entry to be sent to CIRCOT, Mumbai for micro spinning. Acid delinted seeds of 100 gm in each entry to be sent to Director, CICR, Nagpur for oil analysis

**Agronomy, Physiology & Biochemistry Panel**

The Agronomy Panel Meeting of AICCIP was held in the afternoon session on 07-04-2006 and on the following day (08-04-2006) for finalizing the technical programme on Agronomy, Soil sciences, Physiology and Biochemistry trials to be conducted during 2006-07. The sessions were chaired by Dr. M.R.K. Rao, Head, Crop Production Division, CICR, Nagpur and co-chaired by Dr. P.L. Nehra, Principal Scientist and P.I, (Agronomy), ARS, Sriganaganagar. Dr.N Gopalakrishnan, Principal Scientist (Biochemistry), CICR, RS, Coimbatore and Dr. C.S.Praharaj, Senior Scientist (Agronomy), CICR, RS, Coimbatore acted as rapporteurs for all the sessions under the panel.

The following personnel of various coordinating centers took active participation in the deliberations and finalization of technical programme in the coming season (2006-07).

Sl No.	Name	Designation and Address
1.	Dr.Y.R.Aladakatti	Senior scientist, ARS, Dharwad
2.	Mr.S.S.Hallikeri	Asst. Agronomist, ARS, Dharwad
3.	Dr.B.C.Patil	Cotton Physiologist,ARS, Dharwad
4.	Dr.H.M.Vamadevaiah	Sr. Scientist, ARS, Dharwad
5.	Dr. Jagdish Kumar	Agronomist, CSAU,Kanpur
6.	Dr.K.L.Chhabra	Sr.Agronomist, CCS HAU, CRS,Sirsa
7.	Dr.L.K. Bishnoi	Sr.Agronomist (Cotton),CCS HAU,Hisar
8.	Dr.Gurmeet Talwar	Asst. Biochemist, CCS HAU,Hisar
9.	Dr.Promila Kumari	Sr.Scientist (Plant Physiology),CCS HAU,Hisar
10.	Dr.Kulvir Singh	Asst.Agronomist, PAU,RS, Faridkot
11.	Dr.V. Kumar	Research Scientist(Physiology),NAU, Surat
12.	Mr.J.G.Patel	Asst. Res. Sci.,NAU, Surat
13.	Mr.R.G.Vashi	Asst. Res.Sci.,Chemistry,NAU,Surat
14.	Dr.B.Sahadeva Reddy	Scientist (Agronomy),RARS,Nandyal
15.	Dr.S.Ratnakumari	Sr.Sci.(Plant Physiology),RARS, ANGRAU, Guntur
16.	Dr.E.Narayana	Senior Scientist(Agronomy),RARS,Lam,Guntur
17.	Mr.M.A.Basavanneppa	Asst. Agronomist,ARS, Siruguppa
18.	Dr.A.L.Kushwaha	ARS,Indore
19.	Mr.V.K.Khargakharate	Asst. Agronomist, CRS, Nanded



20.	Dr.K.Rajendran	Senior Agronomist, TNAU, Coimbatore
21.	Dr.G.Srinivasan	Associate Professor(Agron),TNAU, Srivilliputtur
22.	Dr.R.K.Patel	ARS,IAU,Junagarh
23.	Dr.D.R.Shivran	Asst. Prof. (Agronomy),MPUAT, Banswara
24.	Mr.Dhiraj Pant	Technology Development Lead, Monsanto India Ltd, Mumbai
25.	Dr.Thokale, J.G.	Cotton Agronomist,MPKV,Rahuri
26.	Dr.P.D.Bhalerao	Cotton Agronomist,Dr.PDKV,Akola

Research works will be carried out on Agronomy, Soil science, Physiology and Biochemistry on the coming season (2006-07) on the following important thematic areas:

- ❖ Agronomic requirements of promising pre-release/recently released Hirsutum/arboreum genotypes/hybrids of cotton
- ❖ Agronomic evaluation of Bt hybrids
- ❖ Integrated nutrient management
- ❖ Crop canopy modification for higher productivity
- ❖ Drip irrigation and fertigation
- ❖ Cropping system research
- ❖ Physiological and biochemical aspects of kapas production

#### RECOMMENDATIONS

- ✓ Application of pendimethalin @ 1 kg a.i. /ha supplemented with one hoeing at 35 DAS was the best weed control practice recommended for Sriganaganagar.
- ✓ 10 t FYM along with half of RD-NP (@ 15 and 6 kg respectively) and foliar spray of 2% KNO<sub>3</sub> was optimum both for Ludhiana and Faridkot.
- ✓ Combined application of N,P, K, S & Zn was best under Hisar and Sriganaganagar condition while N,P,K & S was best under Kanpur.
- ✓ At Kanpur, RD-NPK along with 10 t FYM /ha was optimum.
- ✓ For Arboreum hybrid AKDH 5, a spacing of 60 x 45 cm with a NPK dose of 50:25:25 kg/ha is optimum for Akola under rainfed condition.
- ✓ Integrated Nutrient application with farm yard manure @ 5 t/ha and a NPK dose of 50:25:25 is optimum for Akola under rainfed condition.
- ✓ Under summer irrigated condition, application of 50% RD-NPK along with line sowing of sunhemp @15kg/ha on one side of the ridge and green manuring at 45 DAS in cotton crop is recommended for Deccan Canal Tract of Western Maharashtra (Rahuri) and Coimbatore.
- ✓ Combined application of RD-NPK with FYM @ 5 t/ha was optimum both for Indore and Siruguppa condition (RD-NPK is 60:30:15 kg/ha for Indore and 150:75:75 kg/ha for Siruguppa).
- ✓ Cotton + Sesamum (3:1) was the best intercropping system recommended for Siruguppa region (irrigated condition).
- ✓ For Cotton, 150:75:75 kg/ha as NPK + FYM @ 5 t/ha + vermicompost @ 1.25 t/ha, for Maize, 150:75:37.5 kg/ha as NPK + cotton crop residue @5 t/ha), and for

Bengal Gram 25:12.5 kg/ha as NP were optimum nutrient combination for sustainable Cotton-Maize-Gram system under irrigated condition of Siruguppa.

- ✓ Foliar application of 1% MgSO<sub>4</sub> or 0.2 % MnSO<sub>4</sub>, ZnSO<sub>4</sub> or FeSO<sub>4</sub> at 75 & 85 DAS was optimum for higher yield and profit under rainfed condition of Andhra Pradesh.
- ✓ Soil cover viz., farm waste @ 5 t/ha was recommended for cotton for higher yield and profit under Coimbatore condition.

### Technical Programme for 2006-07

#### AGRONOMY AND SOILS

- Agronomy I: Agronomic requirements of promising pre-release/ recently released hirsutum / arboreum genotypes/ hybrids of Cotton
- Agronomy II. Agronomic evaluation of Bt cotton hybrids under varied crop geometries and NPK levels
- Agronomy IIIa Integrated Nutrient Management in Cotton
- IIIb: Foliar feeding of nutrients on growth and yield of Cotton.
- IIIc: Impact of Foliar application of KNO<sub>3</sub> on yield and quality of Cotton.
- IIId. Effect of inorganic and organic fertilizers on yield and yield attributing characters of Cotton
- IIIe. Effect of organic manures and bio-pesticides on production of cotton
- Agronomy IV: Crop canopy management
- Agronomy V: Studies on planting techniques and fertigation under drip irrigation on yield and quality of cotton
- Agronomy VI : Cotton based cropping systems
- a. Effect of Macro & micronutrients on fibre productivity and quality in cotton under cotton-wheat system in North zone
  - b. Organic residue management in cotton based cropping systems
  - c. Integrated nutrient management in cotton under cotton-chickpea crop sequence
  - d. Integrated nutrient management practices for sustainable production in Cotton-Maize-Chickpea / Cotton-Groundnut-Jowar.
  - e. Intercropping of Oilseeds in Cotton : Crop compatibility studies

#### PHYSIOLOGY

- Phy. 1: Screening of Cotton genotypes for abiotic stress tolerance
- 1a: Screening genotypes for water stress tolerance
  - 1b: Screening genotypes for salinity stress tolerance
- Phy. 2: Investigations on physiological efficiency in Bt cotton hybrids
- Phy. 3: Studies on amelioration of water stress through use of Osmoprotectants
- Phy. 4: Studies on photothermal regimes in G. arboretum/herbaceum genotypes

#### BIOCHEMISTRY

- Biochem 1: Biochemical evaluation of cotton genotypes for tolerance to bollworms and sap sucking pests.
- Biochem.2: Studies on biochemical parameters for tolerance to drought and salinity stress.
- Biochem.3: Evaluation of cotton genotypes for seed oil, gossypol and protein.

Biochem.4: Molecular characterization for varietal identification.

Biochem.5: Biochemical evaluation of Bt cotton hybrids vis-à-vis productivity.

Biochem.6: Influence of organic and chemical fertilizers on biochemical parameters in cotton.

## COTTON AGRONOMY

The details of Technical Programme formulated under Agronomy and Soils are presented as under:

### Agronomy I: Agronomic requirements of promising pre-release/ recently released hirsutum / arboreum genotypes/ hybrids of Cotton

Under this project, the pre-released varieties/hybrids developed and suggested by the breeding panel under irrigated/rainfed conditions shall be tested at respective centers in the zone for their response to optimum fertilizer levels and crop geometry requirements (applicable to both public & private sector varieties/hybrids).

All the coordinating participating centers shall invariably conduct these trials incorporating the new genotypes /hybrids against the local check for determining the optimum spacing and fertilizer requirements. In addition, centers can take up agronomic requirements of any promising entry as per local requirements/needs after obtaining prior approval from the Project Coordinator, CICR, Coimbatore.

Zone/Centres	Hirsutum vars	Hybrids (hxx, hxx)	Arboreum vars	Arboreum hybrids
<b>NORTH</b>				
Ludhiana	LH 1968	CSHH 243, HHH 270		
Faridkot			LD 805	FMDH 3
Hisar	LH 1968	CSHH 243, HHH 270		
Sriganganagar	LH 1968	CSHH 243, HHH 270		
<b>CENTRAL</b>				
Surat		KDCHH 51, RAHH 125 and VBCH 2204		
Junagarh		KDCHH 51, RAHH 125 and VBCH 2204		
Indore		VBCH 2204, DHH 354, ARBHH 351, BSSCHH 489	JLA 794, Khandwa 23, CINA 316	
Khandwa	KDCHH 51, RAHH 125 & VBCH 2204	JKCHB 212, RAHB 37 (hxx);		
Akola		VBCH 2204, DHH 354, ARBHH 351, BSSCHH 489		
Nanded		VBCH 2204, DHH 354, ARBHH 351, BSSCHH 489	JLA 794, Khandwa 23, CINA 316	
Rahuri	KDCHH 51, RAHH 125 & VBCH 2204	JKCHB 212, RAHB 37 (hxx);		
<b>SOUTH</b>				
Guntur	RAHH 98			
Dharwad	RAHH 98			
Siruguppa		JKCHB 212 RAHB 25; VBCH 2204		
Coimbatore		JKCHB 212 RAHB 25 VBCH 2204		

Action to be taken:

1. These varieties/hybrids have been recommended by the Breeding panel after ascertaining their performance only.
2. Concerned Breeders shall send the required Seeds directly to the Agronomists of respective Centres without delay for taking up experiments.
3. Data supply centers through monthly reports.

### **Agronomy II. Agronomic evaluation of Bt cotton hybrids under varied crop geometries and NPK levels**

Bt hybrids (3) : RCH 134 for North zone; RCH 2 Bt for Central zone; Bunny Bt for South zone

Spacing (3) : 90x90cm; 90 x 60 cm & 90 x 45 cm (Central and South zone) and 100 x 60; 100 x 45 cm & 67.5 x 60 cm for North zone

NPK levels (3): 75% RDF, RDF & 125 %RDF

Design: split plot (main- spacing , sub- NPK levels)

The crop is to be sprayed 2 times with  $KNO_3$  @ 2% at flowering and boll development stages only.

Centres : All AICCIP centres except Kanpur

### **Agronomy III a: Integrated Nutrient Management in Cotton**

Faridkot, Ludhiana, Kanpur, Khandwa, Guntur, Nandyal and Siruguppa centers shall continue the experiments as per the treatments listed as under.

#### **Treatments**

T1:Absolute control
T2:FYM @ 10 t/ha
T3:RD of fertilizers alone
T4:RD of N alone
T5:RD of N & P alone
T6:RD of NPK + 5 t FYM
T7:50% RD of NPK + 10 t FYM
T8:50% RD of NPK + 10 t FYM +foliar spray
T9:RD of NPK + 10 t FYM
T10:50% RD of NPK + Sun hemp IGM

Action to be taken up: Data supply through monthly report - Centers mentioned above.

### **Agronomy III b: Foliar feeding of nutrients on growth and yield of Cotton.**

Rahuri, Khandwa, Banswara, Nanded and Coimbatore centers shall continue the experiments.

Action to be taken up: Data supply through monthly report-Centers mentioned above.

#### **Treatments**

Control
Boron-0.1%

ZnSO <sub>4</sub> -0.5%
MnSO <sub>4</sub> -1.0%
MgSO <sub>4</sub> -1.0%
MgSO <sub>4</sub> -1.0%+ZnSO <sub>4</sub> -0.5%
FeSO <sub>4</sub> -0.5%
Urea 2% at flowering and DAP 2% at boll development stage

### **Agronomy III c: Impact of Foliar application of KNO<sub>3</sub> on yield and quality of Cotton.**

Ludhiana, Surat, Junagarh, Nanded, Akola, Dharwad, Siruguppa and Srivilliputtur centers shall continue the experiments as per treatments details listed here.

Action to be taken up: Data supply through monthly report-Centers mentioned above.

#### **Treatments**

Control
Two sprays of 2% KNO <sub>3</sub>
Three sprays of 2% KNO <sub>3</sub>
Four sprays of 2% KNO <sub>3</sub>
Two sprays of 3% KNO <sub>3</sub>
Three sprays of 3% KNO <sub>3</sub>
Four sprays of 3% KNO <sub>3</sub>
MOP in four splits (soil application) RD-K
Full dose of MOP at sowing

### **Agronomy III d: Effect of inorganic and organic fertilizers on yield and yield attributing characters of cotton**

Indore center shall continue the experiment as per technical specification given as under.

Action to be taken up: Data supply through monthly report-Center mentioned above.

#### **Treatments**

Nitrogen levels
50% N (40 kg/ha)
75% N (60 kg/ha)
100% N (80 kg/ha)
Sulphur levels
0 kg /ha
20 kg /ha
40 kg /ha
Organic Fertilizers
FYM @ 10 tones /ha
FYM @ 10 tones /ha + Azospirillum + PSB
Vermicompost @ 1.25 t/ha + Azospirillum + PSB

**Agronomy IIIe Effect of organic manures and bio-pesticides on crop production**

Rahuri, Khandwa, Indore, Nanded, Akola and Nandyal centers shall continue the experiment as per treatment details.

Action to be taken up: Data supply through monthly report-Centers mentioned above.

A) Plant protection
RPP
PP with Biopesticides
B) Organic manures
FYM @ 10 t/ha
VC @ 2.5 t/ha
CR @ 5.0 t/ha
FYM @ 5 t/ha + VC @ 1.25 t/ha
FYM @ 5 t/ha + CR @ 2.5 t/ha
VC @ 1.25 t/ha + CR @ 2.5 t/ha
FYM @ 3.3 t/ha + VC @ 0.8 t/ha + CR @ 1.6 t/ha
RDF
Control

**Agronomy IV: Crop canopy management**

This experiment shall be taken up at Khandwa as per previous year's technical programme.

**Agronomy V: Studies on planting techniques and fertigation under drip irrigation on yield and quality of cotton.**

Nandyal center shall continue the experiments as per previous programme..

Action to be taken up: Data supply through monthly report-Centers mentioned above.

**Agronomy VI : Cotton based cropping systems****Effect of Macro & micronutrients on fibre productivity and quality in cotton under cotton-wheat system in North zone**

Faridkot, Sriganaganar and Kanpur centers shall continue the experiments.

**Organic residue management in cotton based cropping systems**

Srivilliputtur shall continue the experiment.

**Integrated nutrient management in cotton under cotton-chickpea crop sequence**

Rahuri center shall continue the experiments.

**Integrated nutrient management in cotton under cotton-maize-chickpea/cotton-groundnut-rabi jowar crop sequence**

Siruguppa/ Dharwad centers shall continue the experiments as per previous programme.

**Crop compatibility of intercrops in cotton under summer irrigated condition: Intercropping of Oilseeds in Cotton**

Rahuri and Dharwad centers shall continue the experiments.

Action to be taken up: Data supply through monthly report-Centers mentioned above.

## **COTTON PHYSIOLOGY**

### **Phy. 1: Screening of Cotton genotypes for abiotic stress tolerance**

#### **1a: Screening genotypes for water stress tolerance**

Centres: Surat, Khandwa, Parbhani, Lam and Dharwad

Genotypes=18+2 checks as per 2005-06 programme.

Action: Data supply through monthly report-Centres

#### **1b: Screening genotypes for salinity stress tolerance**

Continuing experiment as per last year's protocol.

Centres: Hisar, CICR, RS, Sirsa, Lam and Dharwad (Pot/Microplot experiment)

Genotypes=10+2 checks as per 2005-06 programme.

Action: Data supply through monthly report-Centres

### **Phy. 2: Investigations on physiological efficiency in Bt cotton hybrids**

2 Bt + 2 Non Bt + 1 Zonal check

RCH 134 Bt and MRC 6301 Bt for North zone and

RCH 2 Bt and Bunny Bt for Central and South Zone.

Centres: Hisar, Khandwa, Surat, Parbhani, Lam and Dharwad

Action: Data supply through monthly report-Centres

Treatments (Design split plot)

Main: (2) Date of sowing – Normal sowing / 15 days delayed sowing

Sub : (5) Genotypes and Replications: (4)

### **Phy. 3: Studies on amelioration of water stress through use of Osmoprotectants**

Centres: Hisar, Khandwa, Surat, Parbhani, Lam and Dharwad shall continue as per previous year programme.

Action: Data supply through monthly report-Centres

### **Phy. 4: Studies on photothermal regimes in G. arboretum/herbaceum genotypes**

Centre: Dharwad centre shall continue this experiment as per previous technical programme.

Action: Data supply through monthly report-Centre

Note: Seeds of the Bt trials will be arranged by Dr.V.Kumar and the seeds of the rest of the trials by Dr. B.C.Patil, UAS, Dharwad.

## **COTTON BIOCHEMISTRY**

### **Biochem. 1: Biochemical evaluation of cotton genotypes for tolerance to bollworms and sap sucking pests.**

Centre: Dharwad and Hisar centres shall continue this experiment as per modified technical programme-

Plant secondary metabolite and metabolically important Enzymes to be evaluated

Action: Data supply through monthly report-Centre

**Biochem. 2: Studies on biochemical parameters for tolerance to drought and salinity stress.**

Centre: Hisar, Dharwad, Surat and CICR, RS, Coimbatore centres shall continue this experiment as per modified technical programme including evaluation of enzymes and metabolic intermediates.

Action: Data supply through monthly report-Centre

**Biochem. 3: Evaluation of cotton genotypes for seed oil, gossypol and protein.**

Centre: Hisar, Dharwad and Surat centres shall continue this experiment as per previous technical programme.

Action: Data supply through monthly report-Centre

Source of materials: Br04a for irrigated centres (Hisar & Surat) ; Br04b for rainfed centre (Dharwad)

**Biochem. 4: Molecular characterization for varietal identification**

Centre: Dharwad centre shall continue this experiment as per previous technical programme.

Action: Data supply through monthly report-Centre

**Biochem.5: Biochemical evaluation of Bt cotton hybrids vis-à-vis productivity**

Centre: Surat, Dharwad and CICR, RS, Coimbatore centres shall conduct the experiment. Biochemical evaluation like Nitrate Reductase, peroxidase, temporal distribution of secondary metabolites needs to be done during critical crop phenological stages.

Action: Data supply through monthly report-Centre

**Biochem.6: Influence of organic and chemical fertilizers on biochemical parameters in cotton.**

Centre: Hisar centre shall conduct the experiment as per previous technical programme.

Action: Data supply through monthly report-Centre

## Entomology panel

The Entomology panel meeting was held on 7<sup>th</sup> and 8<sup>th</sup> April, 2006 under the Chairmanship of Dr.B.V.Patil, DI (Agri.), College of Agriculture, Raichur and Co-chaired by Dr.J.S.Awaknavar, Head, Dept. of Agricultural Entomology, University of Agricultural Sciences, Dharwad. Dr.T.Surulivelu, Principal Investigator (Entomology) was the convener. Dr. B. Dhara Jothi and Dr.S.S.Udikeri acted as rapporteurs. A total number of 27 Entomologists and 21 representatives from pesticide industry actively participated in the discussion and formulation of technical programme for the year 2006-07. All the participating Entomologists of AICCIP programme presented the results of various of experiments conducted during 2005-06 and thoroughly discussed. Suggestions were given for improving the research programme in the coming year.



### The salient finding of various experiments conducted during 2005-06 are as under

- Cultures tolerant to jassid and moderately tolerant to bollworms were identified from breeders' materials from the three cotton growing zones of India
- Jassid population crossed ETL during 1<sup>st</sup> week of June to mid July in Ludhiana and on the last week of September of Hisar. It crossed ETL during 3<sup>rd</sup> week of September to 2<sup>nd</sup> week of October in Akola and from 4<sup>th</sup> week of August to last week of September in Khandwa. Peak activity was observed during September to December in Guntur, August to October in Dharwad, October to December in Raichur and October in Nandyal
- Whitefly was low level in all the centers of South and North zone except at Sriganaganagar where crossed ETL during 1<sup>st</sup> to 3<sup>rd</sup> week of September. In Junagadh, it was above ETL level (31 to 37 per plant) through out November
- High population of thrips (28 to 64 per plant was recorded in Junagadh from mid August to mid September and through out September in Surat ( 29 to 87 per plant)
- Aphid population was at above ETL during 2<sup>nd</sup> week of October to 1<sup>st</sup> week of November at Faridkot, during August and November to end of January in Akola, October to November in Junagadh, through out November in Khandwa, mid September to early December in Guntur, October to January in Dharwad and October in Raichur
- Predators were at higher level in Faridkot and Dharwad (October to December), moderate level at Sriganaganagar and low level at Hisar.
- *Earias* bollworm was a peak (5 to 19.5 larvae /5 plants) during mid July to 1<sup>st</sup> week of October in Ludhiana, from mid November to 1<sup>st</sup> week of January in Akola (5 to 10/5 plants) and in Khandwa (5 to 7 / 5 plants)
- *Heliothis* bollworm crossed ETL during 2<sup>nd</sup> fortnight of August ( 4-6 larvae per 5 plants) at Ludhiana, from last week of August to mid September and October in Akola, September –October in Junagadh & Surat and October-November in Khandwa. It was at higher level during October in Dharwad & Nandyal and at moderate level in Lam –Guntur and Raichur
- Peak Activity of pink bollworm was observed during December - January in Lam-Guntur, Dharwad and Raichur while it was at low level in all the centers of North zone, Nagpur and Nandyal.
- *Spodoptera litura* was at high level (7 to 17 larvae / 5 plants) during mid August to mid September in Sriganaganagar, during October – November in Nandyal and August, November and February in Lam., Guntur.
- One new insecticide, Polo 50 SC at 400 and 500 gai/ha was found effective against whitefly and recorded significantly higher yield over control at Sriganaganagar, Khandwa and Junagadh.
- One new seed treatment chemical Thiomethoxam (Cruiser 500FS) was found effective against aphids and jassids up to 63 DAS in Khandwa and Surat. However it recorded significantly higher yield over control at Khandwa only
- Spinosad new A:D (at 50, 75, 100 g), RIL 042 (at 500, 750, 1000 ml), NNI 001 (at 48, 60 g), E2Y 45, S1812 and E237 were found effective against bollworms and recorded significantly higher yield over control.
- Against pink bollworm, thiodicarb followed by pyrethroids (Lamda cyhalothrin, Beta cyfluthrin , Deltamethrin) were effective in reducing the larval infestation and locule damage. Quinalphos, Chlorpyrifos and Profenophos were moderately effective. Besides offering good protection against pink bollworm, Thiodicarb recorded

significantly higher seed cotton yield over control in several centers viz., Guntur, Nandyal, Raichur, Sriviliputtur, Surat and Khandwa.

- Location specific IPM modules were tested with Bt-hybrid, conventional hybrid and variety in all the centers and were found effective in reducing the pest infestation, plant protection cost and in increasing the seed cotton yield. IPM fields has more natural enemies and showed high cost: benefit ratio.

### Highlights of discussion

- In North Zone in the IPM trials with Bt hybrids, in addition to seed treatments other IPM components are to be included. Bt hybrids should be compared with only the respective NBt versions.
- For bollworm screening percentage of boll damage, locule damage, number of retained bolls and yield per plant have to be recorded.
- Previous three years and the current year pest incidence data have to be correlated with the weather data.
- For evaluation of the chemicals, only the high intensity period of the pest has to be considered (at least two peak incidence observations to be reported).
- The varieties / germplasm accessions showing resistance / tolerances continuously for three years or more have to be listed for the utility of breeders.
- As the number of sprays for sucking pests in Bt cotton in Surat center was high a strategy has to be drawn for sucking pest management through IPM components for reducing insecticide load in Bt cotton.
- Studies on the level of Bt toxin up to 110 days and quantification of Bt toxin in the boll rind have to be taken up in main centres of AICCIP if facilities are available

### Conclusion :

Polo 50 SC (Diafenthiuron) at 400 g.a.i /ha was found effective against white fly and recorded significantly higher yield over control

## Technical programme 2006-07

**Ent1:** Screening of breeding materials for their reaction to key pests of cotton

### Ent1a: Preliminary field screening of breeding materials

All the entries under breeding projects will be evaluated against key pests of cotton

### Methodology:

Each entry is to be sown in two rows of ten dibbles in each line and replicated twice. One row of okra as to be sown after each two entries as a infestor rows. Further a known susceptible check may be sown around the field. The concerned breeder should make available sufficient quantity of seeds to the entomologists to lay down the trial (at least 100 seeds per entry). After 60 days the okra crop should be removed

**Observations:**

The data should be recorded two times for key sucking pests *viz.*, Jassids and Whiteflies. Jassid injury grade and population should be recorded twice before 60 days and peak incidence should be included in the report. After 60 days one systemic insecticide spray shall be applied to protect the crop from sucking pests. During peak whitefly incidence, population per 3 leaves and percent of CL CV infected plants should also be recorded in north zone.

As regards to bollworms percent open boll damage, locule damage and number of bolls retained and yield per plant basis shall be reported.

**Centers :** All centers of North, Central and South zone

**Action:** 1. Centres to follow protocol in *toto*  
2. Data supply – Monthly report- Centres

**Ent 1b. Epizootics screening of promising entries.**

Carry forward only consistently tolerant entries, which are found promising in I a trial. The Epizootic conditions may be created in control condition in cages and the mechanism of resistance should also be investigated. The study should be carried on to the key pests like jassids, whitefly, spotted bollworm and American bollworm .

**Centers :** All centers of North, Central and South zone

**Action:** 1. Centres – Prepare plan of work  
2. Data supply – Monthly report- Centres

**Ent 2: Population dynamics of key pests of cotton in relation to climatic conditions to develop suitable forecasting models.**

The experiment with popular variety/ hybrid of local importance (to be spelt out by centers in first monthly report) should be conducted under unprotected condition. Weekly (standard week) incidence data of various insect pests and natural enemies should be reported to the PI, Entomology at the end of each month (based on standard week observations). Specimens of new natural enemies shall be collected and preserved. These shall be sent to PI for identifications. Attention should be given on key pests and peak incidence should be correlated with weather parameters using suitable computer statistical package. The graphical mapping of progression of species – wise insect pests through the season shall be undertaken to provide a clear pictures about the dynamics of individual pest species in each centers. Regression analysis data should be provided with minimum of 3 years data.

**Centers :** All centers of North, Central and South zone

**Action:** 1. Data supply – Monthly report report – Centres

**ENT 3: Chemical control of cotton insect pests**

The following information need to be furnished for all the trials under ENT 3 (a, b, c, d and e)

**Example :** Trial 3d chemical control of bollworms

Location	Variety/ hybrid	Date of sowing	Spray dates (DAS)	Spray volume (HVS) L/ha
Nandyal	NHH-44	16.08.2006	48 DAS	350

**Ent 3 a : Chemical Control of Whitefly**

Polo 50 SC after 2 years of testing has been concluded and at 400 g.a.i / ha it was found to be effective. The trial will be continued with new molecules.

Treatments: 6, Replications: 4

Treatment	Name of the insecticides	dose	centers
T-1	RIL 042	300 ml/ha	Hisar, Sirsa Sriganganagar Raichur, Khandwa
T-2	RIL 042	400 ml/ha	
T-3	RIL 042	500 ml/ha	
T-4	Polo 50 SC (Std. Check)	400 g/ha	
T-5	Triazophos 40 EC (Std. Check)	1500 ml/ha	
T-6	Control	--	

**Ent 3 b : Seed treatment for control of sucking pests**

Treatments: 5, Replications : 4

Treatment	Name of the insecticides	dose	Center
T-1	Cruiser 500 FS	5ml/ kg seed	Ludhiana, Sriganganagar, Hisar, Khandawa, Junagarh, Dharwad, Coimbatore (CICR)
T-2	Cruiser 500 FS	7.5ml/ kg seed	
T-3	Cruiser 70 Ws	5g/kg seed	
T-4	Imidacloprid 70 WS	7g/ kg seed	
T-5	Untreated control		

**Ent 3. c : Chemical control of sucking pest through foliar spray**

Treatments: 10, Replications : 3

Treatment	Name of the insecticides	Dose	Center
T-1	BYI 08330 150 OD	400 ml/ha	CICR Nagpur CICR, coimbatore, Hisar, Sriganganagar, Surat, Khandwa, Nandyal, Dharwad
T-2	BYI 08330 150 OD	500 ml/ha	
T-3	Spinosad 45 SC W/W (Spinosin A MIN 50% and Spinosin D MAX 50%)	150 ml/ha	CICR Nagpur CICR, Coimbatore, Hisar, Sriganganagar, Surat, Khandwa, Nandyal, Dharwad, Lam Guntur, Srivilliputtur
T-4	Spinosad 45 SC W/W (Spinosin A MIN 50% and Spinosin D MAX 50%)	187.5 ml/ha	
T-5	SYN 13623	100 ml/ha	CICR Nagpur CICR Coimbatore, Hisar, Sriganganagar, Surat, Khandwa, Dharwad, Akola, Raichur, Guntur
T-6	SYN 13623	200ml/ha	
T-7	SYN 13623	300 ml/ha	
T-8	Accetamiprid 20 SP (STD Check)	40g/ha	
T-9	Triazophos 40 EC (STD Check)	1500ml/ha	
T-10	Control		

Observation: Thrips, Aphids and Whiteflies

### Ent 3. d: Chemical control of bollworms

Treatments: 11, Replications : 3

Treatment	Name of the insecticides	Dose	Center
T-1	RIL 042	400 ml/ha	Hisar, Faridkot, Sriganganagar,
T-2	RIL 042	500 ml/ha	Akola, Khandwa, Dharwad, Guntur
T-3	E2Y 45 20 SC	30 g/ha	Sriganganagar, Hisar, Sirsa, Faridkot, Surat, Khandwa, CICR Nagpur, Dharwad, Guntur, CICR Coimbatore, Raichur
T-4	E2Y 45 20 SC	40 g/ha	
T-5	Flubendiamide 24% + Thiacloprid 24% - 480 SC	200 ml/ha	CICR Nagpur CICR Coimbatore, Hisar,
T-6	Flubendiamide 24% + Thiacloprid 24% - 480 SC	250 ml/ha	Sriganganagar, Surat, Khandwa, Dharwad, Nandyal
T-7	RIL 043	600ml/ha	Sirsa, Faridkot, Sriganganagar, Akola, Surat, Rahuri, Khandwa, Dharwad, Guntur, Raichur, Nandyal
T-8	RIL 043	800ml/ha	
T-9	RIL 043	1000ml/ha	
T-10	Spinosad 45 SC (Check)	187 ml/ha	
T-11	Control		

Observation : American bollworm, Erias species, Pink bollworm

Application : Sprays based on ETL only

### Ent 3 e: Chemical control of pink bollworm

Treatments: 7 Replications-3

Treatment	Name of the treatment	Dose
T1	Profenophos 50 EC	500 gai/ha
T2	Chlorpyriphos 20 EC	500 gai/ha
T3	Quinalphos 25 EC	500 gai/ha
T4	Thiodicarb 75 SP	750 gai/ha
T5	Lambda Cyhalothrin 5 EC	25 gai/ha
T6	Deltamethrin 2.8 EC	15gai/ha
T7	Un treated control	

Incidence of PBW will be assessed from 80 days after sowing and based on ETL (2larvae/10 bolls- even in one replication) treatment will be given at 10 days interval. Incidence will be assessed at weekly interval and damage at harvest on open boll and locule damage basis

**Centers:** All centers of Central, South and North Zones

- Thiodicarb and  $\beta$  Cyfluthrin will be supplied by Bayer Crop Science Ltd.
- Lamda cyalothrin and profenophos will be supplied by Syngenta India Ltd./Nagarjuna

Action : 1. Data supply – monthly report – centers

### Ent 4: Integrated Pest Management

The best location specific IPM module will be evaluated for it's suitability for Bt cotton. Here Bt and non-Bt versions of same hybrid should be used.

Details on number of times crossing of ETL for bollworms and sucking pests under both Bt and non-Bt cultivar has to be included in the report in addition to other parameters.

**Centers:** All center in North, Central and South Zone

It is informed to all the centres to strictly adhere to the dates for submission of reports

1. **North zone – Feb 1<sup>st</sup>**
2. **Central zone – Feb 15<sup>th</sup>**
3. **South zone - March 1<sup>st</sup> (Raichur and Guntur March 7<sup>th</sup>)**

### **List of participants**

1. Dr. B.V. Patil, DI (Agril.) & Prof of Entomology, College of Agriculture, PB No. 329, Raichur
2. Dr. J.S. Awaknavar, Prof. And Head (Entomology), Agril. College, Dharwad – 580 005.
3. Dr. T. Surulivelu, Principal Investigator (Entomology), CICR, Regional Center, Coimbatore-641 003. (TN)
4. Dr. Dhara Jothi, Sr. Scientist (Entomology), CICR, Regional Center, Coimbatore-641 003. (TN)
5. Dr. S.S. Udikeri, Entomologist (Cotton), Agril. Research Station, Dharwad Farm, Dharwad-
6. Dr. Vichitra Singh, Entomologist cotton, Agril. Research Station, Srianganagar (Rajasthan)
7. Dr. N.V.V.S. Durga Prasad, Scientist (Entomology), RARS, Lam Guntur-34. (AP)
8. Dr. R.K. Choudhary, Sr. Scientist (Entomology), B.M. College of Agriculture, Khandawa (MP)
9. Dr. M.P. Vadodaria, Research Scientist (Entomology), Main Cotton Research Station, Navasari Agriculture University, SURAT (Gujarath)
10. Dr. N.H.P. Rao, Principal Scientists (Entomology), RARS, Lam-Guntur-34. (AP),
11. Dr. S. Mohan, Professor (Entomology), Cotton Section, TNAU, Coimbatore-641 003. (TN)
12. Dr. M. Bheemanna, Entomologist (Cotton), PB No. 329, RARS, Raichur-584 102.
13. Dr. H.N. Vyas, Co-ordinator (Tech. & PD) , PI Industries Ltd. , B-209, Himalaya arcade, Opp. Vastrapur lake, Vastrapur, Ahemadabad-380 015.(Gujarath)
14. Dr. G. Shankar, DGM (Product development) , Rallis India Ltd., KSCMF Building, Bangalore-560 052.
15. Dr. Jayaraj Padhi, Entomologist , AICCIP, RRTTS, Bhawanipatna, Dist:Kalahandi-766 001.
16. Dr. A.V. Kolhe, Asstt. Cotton Entomologist , Dr. P.D.K.V, Akola (Maharashtra)
17. Dr.H.G. Dandale , Entomologist, Dr. PDKV, Akola (Maharashtra)
18. Mr. M.C. Ranganatha, Syngenta India Ltd., C/o T. Stanes and Company Ltd. # 1589, 1<sup>st</sup> 'A' Cross, 1<sup>st</sup> Stage, 2<sup>nd</sup> Phase Chandra Layout, Bangalore-560 040. (Karnataka)
19. Mr. Venkatesh. H.M. E I Dupont India Ltd, #147, First Floor 15<sup>th</sup> Cross, 2<sup>nd</sup> Stage 2<sup>nd</sup> Phase, Mahalaxmipuram, Bangalore – 560 086.(Karnataka)
20. Dr. V.G. Mathirajan, Teaching Assistant, Regional Research station, TNAU, Aruppukottai (TN)
21. Dr. B. V. Sureja, Cotton Entomologist, Cotton Research station, J.A.U., Junagadh, (Gujarath)
22. Mr. Maisuria. I.M. Asstt. Research Scientist, Main Cotton Research Station, Navasari Agriculture University, SURAT (Gujarath)
23. Mr. D.G. More, Research Associate, TMC, Cotton Research Station, Nanded (Maharashtra)
24. Dr. S.B. Kharbade, Cotton Entomologist, MPKV, Rahuri (Maharashtra),
25. Mr. P.J. Suresh, Technical manager (Cotton), Monsanto India Ltd., MUMBAI-400 093. (Maharashtra)

26. Mr. Baljinder Singh, Regional Manager Tech Division, (South East India Ltd.), Monsanto India Ltd. Hyderabad-500 020. (AP)
27. Dr. Gururaj Kulkarni, Manager Registration, Bayer crop Science, Mumbai-76 (Maharashtra)
28. Dr. D. Kubendran, Sr. Zonal Development Manager, Bayer Crop Science, Hyderabad (AP)
29. Dr. S.S. Ravikumar, Field Development Manager, Bayer Crop Science Ltd.,#8,Opp. V.G. Hospital , Mettuppalayam Road, Thudiyalur Post, Coimbatore (TN)
30. Mr. Yogesh Mohite, Bayer Crop Science Ltd., Bangalore (Karnataka),
31. Mr. R.K. Kalyan, Asst. Professor (Entomology), ARS, Banswara-327 001. (Rajasthan)
32. Dr. B.V. Niranjana Kumar, Product Tech. Specialist, Dow Agro Science India Pvt. Ltd., Hyderabad (AP)
33. Dr. Sushanth Tiwari, United Phosphorous Ltd., Khar (W) Mumbai (Maharashtra)
34. Dr. Vishwanath Gade, Sr. Manager Technical, P.I. Industries Ltd. Gurgaon. (Haryana)
35. Mis. Vidya Hegade, FMC India Private Ltd., 17/2, Palace Road, Bangalore-52 (Karnataka)
36. Mr. K.SRIDARAN, T-STANES Pvt. Ltd., 23-Rattelkoose Road, Coimbatore-641 018.
37. Dr. S.B. Patil, Sr. Scientist (Entomology), ARS, Dharwad farm, Dharwad-580 007.(Karnataka)
38. Dr. P. Jeyakumar, Scientist (Ent), CICR, Regional Station, Sirsa-125 055.(Haryana)
39. Dr. P.S. P.V. Vidyasagar, Director (T), Vikki's Agro Tech Pvt. Ltd., 8-3-960/6/2, Main Road, Srinagar colony ,Hyderabad-73. (AP)
40. Dr. G. P. Gupta, Prof. & Head, Division of Entomology, IARI, New Delhi-110 012.
41. Dr. Vikas Jindal, Asst. Entomologist, PAV, Regional Station, Faridkot-151 203. (Punjab)
42. Dr. Ganesh Bhat, U, Rallies India Ltd., #8, KSCMF Building, Block III, Bangalore-52.
43. Mr. Ramkumar, Mahyco Monsanto India, B-15, Disha Nabhanyan CIDCO N-2, Aurangabad – 431 003. (Maharashtra)
44. Dr.N. Balakrishnan, Teaching Assistant, Cotton Research Station, Srivilliputtur-626 125. (TN)
45. Dr. P. Radhika, Scientist (Entomology), RARS, Nandyal (AP),
46. Dr. K.K.Dahiya, Entomologist, Dept. of Entomology, CCSHAU, Hissar (Haryana)

## Plant Pathology Panel

The Plant Pathology Panel meeting was held on 7<sup>th</sup> and 8<sup>th</sup> April, 2006 in the Department of Plant Pathology, University of Agricultural Sciences, Dharwad under the Chairmanship of Dr. Srikant Kulkarni, Professor and Head of the Department of Plant Pathology and Co chaired by Dr. P. Chidambaram, Principal Investigator (Plant Pathology) and Principal Scientist, CICR, Coimbatore. The following scientists from different AICCIP Centers attended the meeting and presented the results of 2005-06 trials. The technical programme for the year 2006-07 was finalized.

1. Dr. P. S. Sekhon, PAU, Ludhiana
  2. Dr. D. Monga, CICR, RS, Sirsa
  3. Dr. Jagadish Beniwal, HAU, Hisar
  4. Dr. B. D. Ajmera, ARS (RAU), Sriganaganagar
  5. Dr. K. G. More, CRS, MAU, Nanded
  6. Dr. P. V. Patil, ARS, NAU, Surat
  7. Dr. H. J. Kapadia, JAU, Junagadh
  8. Dr. O. V. Ingole, PDKV, Akola
  9. Dr. R. R. Perane, MPKV, Rahuri
  10. Dr. P. D. Mahajan, COA, MPKV, Pune
  11. Dr. S. N. Chattannavar, ARS, UAS, Dharwad
  12. Dr. M. P. Prasada Rao, RARS, ANGRAU, Lam, Guntur
- Dr. B. D. Ajmera and Dr. S. N. Chattannavar were the rapporteurs.

### Technical Programme 2006-07

#### Path. 1: Epidemiological studies on cotton diseases

##### 1 (a): Observations on the occurrence of the diseases (in farmer's field and research farms)

(At all centers except Pune and CICR Sirsa)

- i) All information regarding major / minor / new (e.g. Tobacco streak virus disease, *Helminthosporium* leaf spot, *Phoma* leaf spot) should be reported.
- ii) For Development of disease map, studies should be initiated for the identification of disease occurrence, area of spread, hot spots and disease free areas.

##### 1 (b): Disease progress in relation to weather factors

(All centers except Pune)

As per the procedure suggested during 2005-06. The following centers will carry out spore traps studies against the diseases mentioned.

- 1) *Myrothecium* leaf spot : Khandwa
- 2) *Alternaria* leaf spot : Rahuri
- 3) *Alternaria* leaf spot and *Helminthosporium* leaf spot: Lam
- 4) Grey mildew, bacterial blight and *Alternaria* leaf spot: Dharwad and Nanded

Both Bt and non Bt hybrids / varieties should also be included for the study. Based on few years study on spore load, disease incidence and weather parameters, the prediction models can be formulated.



**2 (a): Screening of breeding lines for disease resistance (all centers)**

North Zone centres	: Both National and Zonal entries
Central and South zones centres	: Only zonal entries
No. of replications	: Two
No. of Plants	: Minimum 40 plants/entry
Row length	: As per local recommendation
Spacing	: Closure spacing between plants in each row may be followed

After every fourth row, a susceptible check should be planted. Each replicate should be in a block surrounded by susceptible check. For cotton leaf curl disease the new formate suggested by the committee will be followed (copy of proceeding enclosed Annexure-I).

In addition to screening under natural conditions, the following centres will evaluate the entries by artificial inoculation by developing screening nurseries. The necessary field facilities like sprinkler systems for field screening for Bacterial blight and fungal foliar diseases will be developed at the centers mentioned below. For screening against *Rhizoctonia* root rot, the sick plot available at CICR, RS, Sirsa can be utilized by the breeders.

- (a) The following experiment will be conducted at Ludhiana and Faridkot to further refinement of mass inoculum technique for *Rhizoctonia* spp. Soil application through
- Inoculum raised on grains (application in soil)
  - Stick inoculum (stem tape inoculation)
  - Root inoculation using liquid medium

Disease	Centers
CLCuV	Ludhiana (Net house), Faridkot, Sriganganagar, Sirsa and Hisar (Screening nurseries)
Bacterial blight	Khandwa, Surat, Lam and Dharwad
<i>Myrothecium</i> leaf spot	Khandwa
<i>Alternaria</i> leaf spot	Rahuri, Dharwad and Lam
Grey mildew	Akola, CICR-Coimbatore, Dharwad and Nanded
<i>Fusarium</i> wilt	Pune and Ludhiana
Root rot	Sirsa

- CICR, Sirsa centre will take up screening of national trials only. Pune centre will work only on *Fusarium* wilt.
- While presenting report the disease incidence on the susceptible check should also be included.

- For taking observations on CLCuD incidence, the infection on all plants should be taken in to consideration. For calculating the mean infection (disease severity), only the grades 1-4 should be taken. The highest disease index will be taken as final score for the entry concerned. The disease index of the test entry should not be 20.

**Action:** Entries Seed Supply – PI

Data supply through Monthly report – Centres

## 2 (b) Screening of breeding lines for CLCuV resistance

The Pathologists of ARS (RAU), Sriganaganagar and other North zone centres have identified several lines resistant to CLCuD through station trials. They may continue the work now under AICCIP in collaboration with the breeders of the station for further development. The pathologist should also give details of the reaction to CLCuD lines developed by the respective centers

**Action:** B D Ajmera

## Path. 3: Management of Diseases

### 3 (a): Management of fungal foliar diseases through chemicals

Fungicide	: Antracol (Propineb) 70 WP (M/s Bayer Crop Science)
Doses:	Two i. 1050 g a.i./ha (1500 g/ha product) ii. 1400 g a.i./ha (2000 g/ha product)
Treatments	: 4 T <sub>1</sub> – Propineb 70 WP @ 1500g/ha T <sub>2</sub> - Propineb 70 WP @ 2000g/ha T <sub>3</sub> – Propiconazole 0.1% T <sub>4</sub> – Check (water spray)
Replications	: 5
Variety	: Local susceptible cultivar
Centres	: CICR, Nagpur, CICR, Coimbatore, Hisar (Trial to be laid out at CCShAU, Sirsa), Khandwa, Nanded, Rahuri, Lam and Dharwad.

**Observations to be taken:** Against all fungal foliar diseases occurring in the respective centers. Three sprays at fortnightly intervals with first spray immediately after the appearance of disease.

### 3 (b) Biological control of foliar diseases

Since spraying with bio-fungicide, *Pseudomonas fluorescens* Pf-1 has been found effective in the management of various foliar diseases (excluding CLCuD), it has been decided to formulate spray schedule for arriving at correct frequency of spraying the following are the schedule of the treatments.

- i) Seed treatment with *P. fluorescens* Pf-1 @ 10 g/kg seed plus foliar spray @ 0.2% on 30, 40, 50, 60, 70, 80 and 90 DAS.
- ii) Seed treatment with *P. fluorescens* Pf-1 @ 10 g/kg seed plus foliar spray @ 0.2% on 30, 50, 70 and 90 DAS.

- iii) Seed treatment with *P. fluorescens* Pf-1 @ 10 g/kg seed plus foliar spray @ 0.2% on 30, 60 and 90 DAS.
- iv) Spraying of Copperoxychloride 0.3% + Streptocycline 100 ppm / Carbendazim 50 WP @ 0.1% (for grey mildew only) 30, 60 and 90 DAS.
- v) Check (water spray)
  - Replication : Four
  - Centres : Hisar, Faridkot, Khandwa, Akola, Rahuri, Nanded, Surat, Junagadh, Dharwad, Lam, Coimbatore and CICR-Coimbatore.

#### Path 4. Crop loss estimation:

##### 4a. Grey Mildew: (To be carried out at Dharwad, CICR, Coimbatore and Nanded).

Spray inoculum of *Ramularia areola* extracted from infected leaves should be applied at 25-35 days after sowing. At least three days continuous water sprays should be given to establish infection. The following will be the treatments.

- i) Carbendazim (0.1%) spray at 35 DAS
- ii) Carbendazim (0.1%) spray at 35 and 50DAS
- iii) Carbendazim (0.1%) spray at 35, 50 and 65 DAS
- iv) Carbendazim (0.1%) spray at 35, 50, 65 and 80 DAS
- v) Carbendazim (0.1%) spray at 35, 50, 65, 80 and 95 DAS
- vi) Carbendazim (0.1%) spray at 50, 65, 80 and 95 DAS
- vii) Carbendazim (0.1%) spray at 65, 80 and 95 DAS
- viii) Carbendazim (0.1%) spray at 80 and 95 DAS
- ix) Carbendazim (0.1%) spray at 95 DAS
- x) Water spray

**Design:** RBD with Three replications

**Variety:** LRA-5166

Epiphytotic conditions should be created through sprinkler system.

#### Observations to be taken:

1. Disease intensity (will be recorded at least five times)
2. Seed cotton yield
3. Fibre quality

**Action:** Data supply through Monthly report - Centres

##### 4b. Alternaria Leaf spot (LAM, Dharwad and Rahuri)

(Procedure similar to Grey mildew)

**Variety:** LRA-5166

**Fungicide:** Propiconazole @ 0.1%

Same observations as mentioned above.

**Action:** Data supply through Monthly report - Centres

**4c. Bacterial blight** (to be carried out at Dharwad)

(Procedure similar to Grey mildew)

Variety : **Local susceptible**

**Fungicide** : Copper oxychloride 0.3% + Streptocycline 100 ppm

**Path.5: Observations on the occurrence of the diseases on Bt cotton**

- 1(a) For CLCuD, the details and layout of the trials will be given by the Project Coordinator. The susceptible check (RS 921) and standard resistant check (F 1861) should be included in the trial.
  - (b): Artificial screening for CLCuD in insect cages will be taken up with Bt cotton trial during current year. Ten plants of each entry will be raised in two pots and 20 (Twenty) viruliferous white flies will be used for each pot at 2-4 leaf stage (Sirsa and Ludhiana).
  - (c): In addition, the entries will also be screened in the screening nursery (Sirsa). For the above (1b) & (1c) screening trails, additional quantity of seeds of Bt entries may be supplied by the Project Coordinator.
2. Fortnightly observations on the incidence of other foliar diseases will be recorded at centers, wherever Bt cotton hybrid trails are being tested. For these trials also, a susceptible check should be raised along with the entries.
  3. Observation various of diseases on Bt cotton in farmers' field should also be recorded.

**Path. 6: *Fusarium* wilt of cotton (Pune Centre)**

1. Seeds of *G. arboreum* and *G. herbaceum* varieties and diploid hybrids entered in the AICCIP trials from different centres should be sent to the Pune centre for screening against *Fusarium* wilt.
2. Lines found resistant against *Fusarium* wilt at Ludhiana centre should also be sent to Pune centre for further testing.
3. The concerned scientist may tour to all centres for collecting samples (wilted plants and soil) from all locations where ever *Fusarium* wilt is present.

**Action:** Provide survey plan to PI for each zone; Data supply through Monthly report - Centres

4. All centers should send 50 g seeds of released varieties, hybrids and wild species of diploid cottons to Pune centre for fixing differentials for racial studies of FOV.

**Action:** Centres – a) Seed supply; b) Infected plant parts/ soil  
Data supply through Monthly report – Centres

**Suggestions:** 1) Isolates of North Zone Centres should be tested separately.  
2) For maintenance of resistant and susceptible pure lines, the seeds may be sent to the pathologist of ARS, Dharwad.

**Recommendation:** For root rot management, seed treatment with Carboxin (Vitavax) 200 WP @ 3 g/kg seed or *Trichoderma viride* talc formulation (seed treatment @ 10 g/kg seed + soil amendment @ 2.5 kg/ha) is recommended.

## TECHNOLOGY TRANSFER AND BREDED SEED PRODUCTION

The Session was chaired by Dr. Anupam Barik, Director, DOCD, Mumbai and Co-chaired by Shri. K.N. Gururajan, Project Co-ordinator & Head, CICR, Regional Station, Coimbatore.

Dr. Barik, Director, DOCD, Mumbai, in his opening remarks mentioned that the Govt. of India has spent nearly Rs. 5 crores on Frontline Demonstrations through both ICAR and State Departments of Agriculture. The Project is almost running for more than five years under Technology Mission on Cotton (TMC MM II). Hence, it is felt necessary at this juncture to quantify the impact of these FLD's in the farmers' fields. The impact of newer technologies on yield improvement alone has been reported. It is now necessary to comprehensively quantify the net gains and related economic advantages to farmers through new technologies besides looking into environmental aspects. Similarly, he wanted the Scientists to demonstrate the post harvest technologies like clean picking, processing and storage to the farmers so that quality improvement also gains importance in these demonstrations. He also emphasized the importance of demonstrating the newer implements purchased under FLD on Implement demonstrations. The quantification of fuel efficiency, energy savings, area coverage under plant protection per unit time, cost of operation, reduction in drudgery etc. assume importance in the Implement demonstration under FLD.

It is felt necessary that the workable technologies need to be disseminated to the state department officials so that further spread of technologies to farmers will be carried out in speedier fashion. Dr. Barik also stressed on aspects like information display, gender budgeting and weaker section upliftment through transfer of farm technologies. Dr. Narula, Principal Scientist, ICAR, New Delhi, mentioned about the need to demonstrate only proven technologies. He further stressed about the need to demonstrate full package of technologies rather than individual technologies in farmers' fields. He mentioned about the need to popularize Bt cotton technologies in farmers' fields, for which he suggested proper tie-up with Private sector.

Dr. Monga, Head, CICR, Regional Station, Sirsa wanted minimum and accurate data to be collected in the IPM demonstrations on the basis of proforma already devised by NCIPM, New Delhi.



For further information Contact:  
**Project Coordinator and Head**  
**All India Coordinated Cotton Improvement Project**  
 Central Institute for Cotton Research  
 Regional Station, Coimbatore 641003, India  
 Email: [cicrcbe@rediffmail.com](mailto:cicrcbe@rediffmail.com)

Source : proceedings of the AICCIP 2005-06

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