

PROCEEDINGS OF AICCIP ANNUAL GROUP MEETING: 2010-11
Proceedings of Agronomy, Physiology & Biochemistry Panel
MPUAT, Udaipur

The Agronomy Panel Meeting of AICCIP was held in the afternoon session on 08-04-2010 and on the following day (09-04-2010) for presentation of ANNUAL REPORT and finalization of the technical programme on Agronomy, Physiology and Biochemistry trials to be conducted during 2010-11. The session was chaired by Dr. P.R. Bharambe, Head, Crop Production Division, CICR, Nagpur, and co-chaired by Dr G.S Ameta Prof.& ZDR ARS, Banswara and Dr G.S.Chauhan HOD, Agronomy RCA Udaipur and convened by Dr. P. L. Nehra, Professor and PI (Agronomy), ARS, Sriganaganagar. Dr. M. V. Venugopalan, Principal Scientist, CICR Nagpur and Dr. G. Srinivasan. Agronomist, CRS, Srivilliputtur acted as rapporteurs for all the sessions under the panel. Research experiments have to be carried out in Agronomy, Physiology and Biochemistry on the coming season (2010-11) 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 weed management
- Integrated nutrient management
- Management of leaf reddening in Bt cotton
- Crop canopy modification for higher productivity
- Cotton based cropping systems
- Physiological and biochemical aspects in cotton production

TECHNICAL PROGRAMME FOR 2010-11

AGRONOMY

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

Agronomy II : Optimization of nutrient requirement and plant geometry for Bt cotton

Agronomy III: Integrated weed Management in Cotton

Agronomy IV: Integrated Nutrient management in cotton

IVa: Foliar application of micronutrients on growth and yield of Cotton.

IVb: Effect of Foliar application of KNO₃ on yield and quality of Cotton.

IVc: Management of leaf reddening in *Bt* cotton

Agronomy V: Technology for organic cotton Production.

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 defoliants in cotton

Phy. 4: Control of Parawilt in cotton

Phy. 5: Optimization of plant C: N ratio for yield maximization in *Bt* cotton

BIOCHEMISTRY

Biochem 1: Studies on biochemical parameters for tolerance to drought and salinity stress.

Biochem 2: Biochemical evaluation of cotton genotypes for tolerance to bollworms and sap sucking pests.

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

Biochem.4: Evaluation of Biochemical parameters in leaf reddening

Technical Programme for 2010-11

COTTON AGRONOMY

The details of Technical Programme formulated under Agronomy 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/Centers	Hirsutum Varieties	Hirsutum hybrids	Arboreum Varieties
North Zone			
Faridkot	-	CSHG-1862	-
Bathinda	-	CSHG-1862	-
Sirsa (CCSHAU)	-	CSHG-1862	-
Sriganganagar	-	CSHG-1862	-
Central Zone			
Bharuch	-	NHH-206, JKCH-1305	-
khandwa	-	-	-
Akola	-	NHH-206, JKCH-1305	-
Nanded	-	NHH-206, JKCH-1305	-
Indore	-	NHH-206, JKCH-1305	-
Southern Zone			
Nandyal	-	NHH-59	CNA1003, AKA 0110
Dharwad	-	NHH-59	CNA1003, AKA 0110
Coimbatore	ARBH813	MLCHB-6, JKCHB-216	-
Siruguppa	ARBH813	MLCHB-6, JKCHB-216	-
Lam	ARBH813	MLCHB-6, JKCHB-216	-
Aruppukkotai	-	NHH-59	-
Srivilliputtur	ARBH813	-	-
Raichur	-	-	CNA1003,AKA 010

Action to be taken:

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

Agronomy IIa : Optimization of nutrient requirement and plant geometry for Bt cotton

Treatments: Main (2):

- Bt hybrid recommended for the Zone
- Non Bt hybrid of the same Bt hybrid recommended for the Zone

Sub: Plant Geometry (2): 1) Normal spacing for the location 2) Higher spacing (25 %)

Sub-sub: Nutrient levels (3): 1) RD-NPK, 2) 125% RD-NPK and 3) 150% RD-NPK

Design: Split-split

Replication: Three

Observations:

- Yield and yield traits
- Nutrient availability including micronutrients at planting and harvest
- Nutrient removal at 50 % boll opening stage
- Nutrient use efficiency, water use efficiency and water productivity
- Fibre quality and oil yield
- Analysis of Bt toxin at 60, 90 & 120 DAS as influenced by agronomic treatments
- The crop is to be sprayed with KNO₃ @ 2% at flower & boll development stages only.

Centres: All AICCIP centres.

Agronomy II b : Optimization of nutrient requirement and plant geometry for Bt cotton

Treatments: Main (3): Any three Bt hybrids recommended by GEAC for the respective zone.

Sub : Plant Geometry (2): 1) Normal spacing for the location, 2) Higher/Closer Spacing (25 %)

Sub-sub : Nutrient levels (3): 1) RD-NPK, 2) 125% RD-NPK and 3) 150% RD-NPK

Design : Split-split

Replication : Three

Observations:

- Yield and yield traits
- Nutrient availability including micronutrients at planting and harvest
- Nutrient use efficiency, water use efficiency and water productivity
- Fiber quality and oil yield

Centers: All AICCIP centres

Agronomy IVa: Foliar application of nutrients on growth and yield of Bt Cotton.

The following nutrients and their combination will be tried at different centers.

Treatments

• Control
• Boron-0.1%
• ZnSO ₄ -0.5%
• MnSO ₄ -1.0%
• MgSO ₄ -1.0%
• MgSO ₄ -1.0% + ZnSO ₄ -0.5%
• FeSO ₄ -0.5%
• FeSO ₄ -0.5% + ZnSO ₄ -0.5%
• Urea 2% at flowering and DAP 2% at boll development stage

Centers : Faridkot, Ludhiana, Bathinda, Nanded, Siruguppa, Srivilliputtur and Aruppukkotai centers shall continue the experiments.

All the nutrients have to be applied at flowering and boll development stages. New centre may start with Bt hybrid earmarked for their zone.

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

Agronomy IVb: Effect of Foliar application of KNO₃ on yield and quality of Cotton.

The treatments include only KNO₃ & its different combination, and are as under :

Treatments

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

Centers: Kanpur, Nanded, Siruguppa and Rahuri centers shall continue the experiments as per treatments details listed here.

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

Agronomy IV c Management of leaf reddening in Bt cotton

T1:	RDF alone
T2:	RDF based on soil test values
T3:	T2+ 5 /10t/ha FYM
T4:	T3+ 2 Foliar spray of 2 % urea at peak flowering stage to boll development stage
T5:	T3+2 sprays of 2 % DAP after flowering stage
T6:	T3+2 Foliar spray of 19:19:19 at peak flowering stage to boll development stage
T7:	T4+2 sprays of 2 % DAP (Alternatively) starting from flowering to boll development stage
T8:	T3+2 sprays of 2 % KNO ₃ + 2 % DAP during flowering to boll development stage
T9:	T3+1 spray of 2 % Urea and 1 spray of 1 % Urea +1 % MgSO ₄ during flowering to boll development stage
T10:	T4+ 0.5 % ZnSO ₄ (21 %) during flowering to boll development stage

Design: RBD

Replication: 3

Under Irrigated condition: FYM 10 t/ha and under Rainfed condition: FYM 5 t/ha

Observation: N content in leaf at flowering and anthocyanin pigment (subject to availability of physiologist)

Centers: Central and South Zone centers
RCH- 2 / Bunny Bt Central and South Zone

NEW EXPERIMENT:

Agronomy V: Technology for organic cotton (*Arboreum/ herbaceum* varieties) Production

T1: 5 t/ha FYM /Compost + seed treatment with Azotobactor + PSB @25 g each /kg seed
T2: 2.5 t/ha Vermicompost+ seed treatment with Azotobactor + PSB @25 g each /kg seed
T3: 10t/ha FYM /Compost + seed treatment with Azotobactor + PSB @25 g each /kg seed
T4: 5 t/ha Vermicompost+ seed treatment with Azotobactor + PSB @25 g each /kg seed
T5: Insitu Green manuring of sesbania/sunhemp+ seed treatment with Azotobactor + PSB @25 g each /kg seed
T6: Castor Cake @ 500 Kg/ha+ seed treatment with Azotobactor + PSB @25 g each /kg seed
T7: RD of Nutrient through organic based on P equivalent basis+ green manuring with sesbania/sunhemp 50kg seed /ha and it should be incorporated at 30 -45 DAS.
T8 : Control

Note: This project is to be conducted on the fixed site and during 1st year start with treatment no.7 only. Initial Soil Analysis of the field is essential. Plant protection by organic pesticides.

Centers: Central and South Zone centers

COTTON PHYSIOLOGY

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

1a: Screening genotypes for water stress tolerance

Centres: Surat, Akola, Khandwa, Nanded, Lam and Dharwad

Genotypes: 18+NC (LRA 5166) +LC .

Action: Data supply through monthly report-Centres

Seed requirement: 100gX8 =800g (delinted seeds)

Observations:

1. Seed cotton yield and ancillary data
2. Phenology
3. RWC, Chlorophyll stability index, Proline content, SLW, nutrient uptake
4. Stress indices (PHSI, DMSI, YSI and S etc.)
5. Monitoring of Periodic soil moisture profile.

1b: Screening genotypes for salinity stress tolerance

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

Genotypes: 8 + 1(Lakshmi)

Action: Data supply through monthly report-Centres

Seed requirement: 150X2 =300g (delinted seeds)

Observations:

1. Seed cotton yield and ancillary data
2. Phenology
3. RWC, Chlorophyll stability index, Proline content, SLW, nutrient uptake
4. Stress indices (PHSI, DMSI, YSI and S etc.)
5. Monitoring of soil salinity at initial and final stages.
6. Leaf Na and K content at peak flowering stage.

Action: Data supply through monthly report-Centres

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

Treatments : 5Bt +5 Non Bt entries (of different events)

Design: RBD

Centres: Surat, Khandwa, Nanded, Lam and Dharwad

Action: Data supply through monthly report-Centres

Observations:

1. Seed cotton yield and ancillary data
2. Phenology
3. Growth analysis at periodical intervals 50, 80, 110 and 140 DAS
4. GDD for various growth phases
5. Endotoxin content at 80 and 120 DAS
6. Observations of leaf reddening and parawilt, if any.

Phy. 3 Effect of defoliant on cotton

Treatments

1. Ethrel 1500 ppm at 130 DAS
2. Ethrel 1500ppm at 145 DAS
3. Ethrel 2000 ppm at 130 DAS
4. Ethrel 2000 ppm at 145 DAS
5. Ethrel 2500 ppm at 130 DAS
6. Ethrel 2500 ppm at 145 DAS
7. Ethrel 3000 ppm at 130 DAS
8. Ethrel 3000 ppm at 145 DAS
9. Control

Centre: Ludhiana, Bathinda, and CICR, Sirsa with RCH 134 Bt.
Lam, Surat, Khandwa, Akola and Dharwad with Bunny Bt

Observations:

1. Opened and unopened bolls at harvest
2. Percent defoliation at 5 and 10 days after spray
(50 leaves in five plants, each will be marked before spray and monitored)
3. Earliness index

Action: Data supply through monthly report-Centre

Phy 4: Control of Parawilt in cotton

Experimental details:

1. Foliar spray of cobalt chloride @ 10 ppm at initial stage of Parawilt
2. Foliar spray of Sodium benzoate @ 50 ppm at initial stage of Parawilt
3. Foliar spray of Sodium benzoate @ 75 ppm at initial stage of Parawilt
4. Foliar spray of Sodium benzoate @ 100 ppm at initial stage of Parawilt
5. Foliar spray of Sodium benzoate @ 125 ppm at initial stage of Parawilt
6. Control

Observations to be recorded:

1. Morphological characters, yield contributing parameters and Seed cotton yield.
2. Fibre quality parameters.

Centre: Ludhiana

Phy5: Optimization of plant C:N ratio for yield maximization in Bt cotton

Main treatments

- 1 Without FYM
2. With 10t/ha FYM

Sub treatments :

1. 25% less than RDN
2. RDN
3. 25% more than RDN

Sub –Sub treatments

1. Nitrogen at 30,60 and 90 DAS in 3 equal splits
2. Nitrogen at 30,60,90and 105 DAS in 4 splits i.e. 20%,25%, 30% and 25%

Observations to be recorded:

1. Biometric observation
2. Leaf Nitrogen and carbon content (4&6th leaf on main stem from top) 15 days interval from 30 days onwards
3. Number of fruiting bodies
4. Dry matter production
5. Seed cotton yield
6. Harvest index
7. Fiber quality parameter
8. Centre Surat, Lam, Dharward, Nanded , Khandwa and Ludhiana

Phy 6: Role of osmoprotectants in elevation of seed cotton yield in *Bt* cotton

Centre : Hisar

Note: Seed for different physiology experiment is to be organized by Dr V.K umar Cotton Scientist All concerned selected cooperate by sending required seed.

COTTON BIOCHEMISTRY**Biochem.1: Studies on biochemical parameters for tolerance to drought and salinity stress.**

Centre: Dharwad and Surat shall continue this experiment as per modified technical programme including evaluation of enzymes and metabolic intermediates.

Action: Data supply through monthly report-Centre

Biochem. 2: Biochemical evaluation of cotton genotypes for tolerance to bollworms and sap sucking pests.

Centre: Dharwad centre shall continue this experiment as per modified technical programme-

Observation:

1. Peroxidase and nitrate reductase activity
2. Plant secondary metabolites

Action: Data supply through monthly report-Centre

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

Centre: Dharwad and Surat centres shall continue this experiment as per previous technical programme. Promising genotypes will be taken up for this trial.

Action: Data supply through monthly report-Centre

Source of materials: Br02a for irrigated centre (Surat); Br02b for rainfed centre (Dharwad)

Biochem.4: Evaluation of biochemical parameters in leaf reddening

Centre: Surat, and Dharwad centers shall conduct the experiment.

Observation: Biochemical evaluation like chlorophyll, anthocyanin, nitrate reductase, peroxidase, temporal distribution of secondary metabolites needs to be done during critical crop phenological stages from Agronomic leaf reddening experiment.

Action: Data supply through monthly report-Centre

SCHEDULE OF OBSERVATIONS TO BE TAKEN UP

1. Soil type (Depth of soil/soil texture)
2. Irrigated/rainfed condition)
3. Soil fertility status (initial)
4. Periodic determination of soil moisture profile (0-15, 15-30, 30-60 cm) up to harvest
5. Dry matter production at 50 % boll bursting stage
6. Nutrient uptake at 50 % boll bursting stage
7. Water productivity (based on yield & consumptive use of water)
8. Nutrient/Fertilizer use efficiency (based on total uptake and yield)
9. Seed cotton yield, boll no., boll weight, plant population /ha, seed yield and oil content
10. Fiber quality
11. Economics analysis

SUBMISSION OF REPORT ALONG WITH DATA ON THE TRIALS

North Zone: 31st January 2011

Central Zone: 15th February 2011

South Zone: 1st March 2011

The following personnel of various coordinating centers participated in the deliberations and finalization of technical programme in the coming season (2009-10).

S No.	Name Designation and Address	Mobile No.
1.	Dr.P.R.Bharambe Head Crop Production,CICR, Nagpur	09422862216
2.	Dr G.S. Chauhan HOD, RCA Udaipur	09414926597
3.	Dr G.S. Ameta Prof. &ZDR ARS, Banswara	09414169707
4.	Dr P.L.Nehra Prof. Agronomy ARS, Srigangangar	09413714828
5.	Dr M.V.Venugopalan Principal Scientist ,CICR, Nagpur	09970361057
6.	Dr G.Srinivasan Assoc. Prof. Agronomy CRS, Srivilliputtun	09344881183
7.	Dr Sivaprasad upputuri Pioneer overseas Company	09000733018
8.	Dr H.M.Vamadevaiah UAS, Dharwad	09449793098
9.	Mr Baljinder Singh Nandra, Monsanto India Ltd.	09987531556
10.	Dr S.S Hallikeri UAS,Dharward	09449801645
11.	Dr K.N.Pawar UAS, Dharward	09449891616
12.	Prof.K.M.Patel NAU, Surat	09898225083
13.	RAUT V.K Mahyco Seeds	09823273332
14.	Dr Kulvir Singh Agronomist PAU,RS, Faridkot	09417783052
15.	Dr Harman Deep Singh PAU,RS, Faridkot	09465609961
16.	Dr Rashpal Singh Sarlach PAU, Ludhiana	09465666535
17.	Dr Sudeep Singh Agronomist PAU, RS, Bathinda	09417732999
18.	Dr P.D Bhalerao PDKV Akola	09822393395
19.	Dr T.H.Rathod PDKV Akola	09922324600
20.	Dr Ajay Kumar M.Y. ARS Siruguppa	09880398690
21.	Dr. Satyanarayan Agronomist, RARS, Raichur	09480696320
22.	Dr. Jagdish Kumar Asstt. Agronomist, CSA University, Kanpur	09450131189
23.	Dr.K.Rajendran Prof. of Agronomy, TNAU, Coimbatore	09865560307
24.	Mr. Harphool Meena Asstt. Agronomist, ARS, Bonswara (Raj)	09460246043
25.	Dr.R.K.Patel Asstt. Agronomist,ARS,JAU,Junagarh	09426990070
26.	Dr.R.S.S.Tomar Cotton Agronomist, RVSKVV ,Indore	09302123610
27.	Dr.S.Ratnakumari Principal Sci.(Plant Physiology),RARS, ANGRAU, Guntur	09491610843
28.	Ms. S Bharathi Scientist Agronomy Lam Guntur	09490723412
29.	Dr B.R. Baraiya RVSKVV, Gwaliior	09229492095
30.	Dr I.R.Sisodia Agronomist RSKVV Khandwa	09981031090
31.	Dr Shishir Golhar PHI, Hyderabad	09000711047
32.	Dr (Mrs) Promilla Gaba CCSHAU, Hisar	09416397591
33.	Dr.M.S.Bhattoo Sr.Agronomist, CCS HAU, CRS,Sirsa	09416193867
34.	Dr R.Durai Singh Prof. Agronomy RRS,TNAU, Aruppukottai	09486363036
35.	Dr E.Aruna Scientist Agronomy, Nandyal	09441580276
36.	Dr.V.K.Khargkhrate Cotton Agronomist, CRS, Nanded	09423444238
37.	Dr S.M.Wasnik Principal Scientist Ext. Nagpur	09423680707
38.	Dr.Thokale, J.G. Cotton Agronomist, MPKV, Rahuri	-
39.	Dr. B.C. Patil Principal Scientist (Physiology), ARS, Dharwad	
40.	Dr.V. Kumar Research Scientist (Physiology),NAU, Surat	
41.	Dr.Pankaj Dharkar T.O, Ankur seeds	
42.	Dr Chabbra NSL Hyderabad	

Recommendations

- 1. 20 kg K₂O /ha at sowing should be given as basal for RCH-134 Bt at Srigangangar**
- 2. Foliar application of urea at flowering (2%) and DAP (2%) during boll development stage recorded maximum net monetary return (Rs 14, 924/ha) with benefit cost ratio of 2.33 in Bunny Bt at Coimbatore during winter irrigated season.**
- 3. Three sprays of 3% KNO₃ and Four sprays of 3% KNO₃ at Flowering initiation and boll development stage was beneficial in respect of yield and net return at Banswara & Indore. The soil application of MOP in four equal splits was also found equally good over other treatments (Indore)**
- 4. 2 sprays of 3% KNO₃ at square formation and boll initiation stage increase the seed cotton yield and net income under assured rainfall condition of Dharward.**
- 5. The spacing of 60x30 cm was found to be optimum and detopping at 55 DAS was found to be suitable from yield point of view in *desi* cotton var. Jawahar tapti at Khandwa**
- 6. Foliar application of Ethrel @1500ppm at 130 DAS significantly improved the seed cotton yield with uniform bursting without affecting the seed cotton fiber quality at Lam, Guntur**
- 7. Two spray of MgSo₄@1.0% + ZnSo₄@0.5% pre flowering and at boll formation stage should be recommended for Banswara for getting higher yield from NCS-138 Bt.**
