AICCIP ANNUAL GROUP MEETING: 2008-09, ANGRAU, Hyderabad

Proceedings of Agronomy, Physiology & Biochemistry Panel

The Agronomy Panel Meeting of AICCIP was held in the afternoon session on 06-04-2009 and on the following day (7-04-2009) for presentation of ANNUAL REPORT and finalization of the technical programme on Agronomy, Physiology and Biochemistry trials to be conducted during 2009-10. The session was chaired by Dr. P.R. Bharambe, Head, Crop Production Division, CICR, Nagpur and convened by Dr. P.L. Nehra, Professor and PI (Agronomy), ARS, Sriganganagar. Dr.M.V.Venugopalan, Principal Scientist, CICR Nagpur and Dr.Ashok. Agronomist, RARS, Nandyal 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 (2009-10) 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 2009-10

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

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

IVb: Effect of Foliar application of KNO_3 on yield and quality of Cotton.

IVc: Management of leaf reddening in Bt cotton

IVd: Effect of organic manures and bio-pesticides on production of cotton

Agronomy V Crop canopy management

Agronomy VI: Cotton based cropping systems

Organic residue management in cotton based cropping systems

PHYSIOLOGY

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

1a: Screening genotypes for water stress tolerance under irrigated & rainfed condition

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

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

Details of Technical Programme for 2009-10

COTTON AGRONOMY

The details of Technical Program 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/Centres	Hirsutum varieties	Hirsutum Hybrids	Arboreum varieties	Arboreum hybrids
NORTH				
Ludhiana	H-1300 with LC - LH-2076	SVHH-139 with LC CSHH-198	-	-
Faridkot	-	-	FKD124 with LC HD-123/LD-694	FMDH-7 with LC CISAA- 2/ PAU626H
Bathinda	H-1300 with LC LH-2076	SVHH-139 with LC CSHH-198	-	-
Hisar	-	-	FKD124with LC HD-123/LD-694	FMDH-7 with LC CISAA-2/PAU626H
Sirsa(CCSHAU)	H-1300 with LC RS-2013	SVHH-139 with LC CSHH-198	-	-
Sriganganagar	H-1300 with LC RS-2013	SVHH-139 with LC CSHH-198	-	-

CENTRAL				
Surat	GJHV-374,GSHV-152,GTHV02/45 with Gcot 20 as check TCH-1705 ,P72-9-37 with Gcot 20 as check	-	-	-
Baruch	GSHV-01/26,NH630 ,GTHV-01/35,KH151 with LRA5166/Gcot 16 as LC	-	-	-
Junagarh	GJHV-374,GSHV-152,GTHV02/45 with Gcot 18 as check TCH-1705 ,P72-9-37 with Gcot 18 as check	GGCH-70,ARCHH-8188 with Ankur 651 as LC	-	-
Khandwa	GSHV-01/26,NH630 ,GTHV-01/35,KH151 with LRA5166/JK-4 as LC	JKCHB-214,RAHB-170 with DCH-32 as LC	-	-
Banswara	-	JKCHB-214,RAHB-170 with DCH-32 as LC	-	-
Akola	GSHV-01/26,NH630 ,GTHV-01/35,KH151 with LRA5166/AKH-8828 as LC	-	-	GGCH-81with PKVDH-1 as LC
Nanded	GSHV-01/26,NH630 ,GTHV-01/35,KH151 with LRA5166/NH615 as LC	-	-	GGCH-81with PKVDH-1 as LC
Indore	GJHV-374,GSHV-152,GTHV02/45 with JK-35 as check TCH-1705 ,P72-9-37 with JK-35 as check	JKCHB-214,RAHB-170 with DCH-32 as LC	-	-
Rahuri	GJHV-374,GSHV-152,GTHV02/45 with Phule as check TCH-1705 ,P72-9-37 with Phule as check	GGCH-70,ARCHH-8188 with Ankur 651 as LC	-	-
SOUTH				
Nandyal	-	RAHB-170,JKCHB-214 with DCH-32 as LC	-	NACH-12,NACH-81,NACH-6/DLSA-17 as LC
Dharwad	-	RAHB-170,JKCHB-214 with DCH-32 as LC	-	NACH-12,NACH-81,NACH-6/DLSA-17 as LC
Coimbatore	-	KDCHH-712 with Bunny check RAHB-170,JKCHB-214 with DCH-32 as LC	-	NACH-12,NACH-81,NACH-6/DLSA-17 as LC
Siruguppa	-	KDCHH-712 with Bunny check RAHB-170,JKCHB-214 with DCH-32 as LC	-	-
Lam	-	KDCHH-712 with Bunny check	-	-

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 from centers through monthly reports.

Agronomy II : 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 hybrid)

Sub: Plant Geometry (2): Normal spacing for the location

Higher spacing (25 %)

Sub-sub: Nutrient levels (3) : RD-NPK, 125% RD-NPK and 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 KNO_3 @ 2% at flower & boll development stages only.
- Centres: All AICCIP centres.

Agronomy III: Integrated Weed Management in cotton

The experimental details of IWM are given as follows.

T1 Unweeded Control

T2 Farmers practices (Hand weeding at 20, 40 & 60 DAS)

T3 Pendimenthalin @ 0.75 kg a.i./ha pre-emergence + HW at 30 & 60 DAS

T4 Fluchloralin @ 0.75 kg a.i./ha pre-emergence + HW at 30 & 60 DAS

T5 Pendimenthalin @ 1.00 kg a.i./ha pre-emergence + HW at 30 & 60 DAS

T6 Fluchloralin @ 1.00 kg a.i./ha pre-emergence + HW at 30 & 60 DAS

T7 Pendimenthalin @ 0.75 kg a.i./ha pre-emergence + Quizalofop-ethyl @ 0.04 kg a.i./ha at 30 & 60 DAS

T8 Fluchloralin @ 0.75 kg a.i./ha pre-emergence + Quizalofop-ethyl @ 0.04 kg a.i./ha at 30 & 60 DAS

T9 Pendimenthalin @ 1.00 kg a.i./ha pre-emergence + Quizalofop-ethyl @ 0.05 kg a.i./ha at 30 & 60 DAS

T10 Fluchloralin @ 1.00 kg a.i./ha pre-emergence + Quizalofop-ethyl @ 0.05 kg a.i./ha at 30 & 60 DAS

The centers include Surat, Rahuri, Siruguppa and Dharwad.

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

Faridkot, Ludhiana, Bathinda, Kanpur, Akola, Banswara, Nanded, Dharwad, ,Siruguppa,Srivilliputtur and Coimbatore 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 KNO_3 on yield and quality of Cotton.

The treatments include only KNO_3 & 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

Sriganganagar ,Kanpur, Nanded, Indore, Banswara, Dharwad, 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.

NEW EXPERIMENT:

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
REPLICAIONS: 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

Agronomy : IVd Effect of organic manures and bio-pesticides on crop production

The treatments include plant protection measures and organic manures**.**

Treatments

A) Plant protection (PP)
RPP (Recommended)
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

Nandyal center shall continue the experiment as per treatment details.

Action to be taken up: Data supply through monthly report-Centers mentioned above.
All the organic component must be analyzed for its nutrient content before addition.

Agronomy V : Crop canopy management

Continued at Khandwa centre

Agronomy VI: Cotton based cropping systems

Organic residue management in cotton based cropping systems
Centre: Srivilluputtur

COTTON PHYSIOLOGY

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

1a: Screening genotypes for water stress tolerance

Centres: Surat, 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

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 defoliants 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 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 cobalt chloride @ 10 ppm at 50% wilting stage
3. Foliar spray of Sodium benzoate @ 75 ppm at initial stage of Parawilt
4. Foliar spray of Sodium benzoate @ 75 ppm at 50% wilting stage
5. Foliar spray of Sodium benzoate @ 100 ppm at initial stage of Parawilt
6. Foliar spray of Sodium benzoate @ 100 ppm at 50% wilting stage
7. Foliar spray of Sodium benzoate @ 125 ppm at initial stage of Parawilt
8. Foliar spray of Sodium benzoate @ 125 ppm at 50% wilting stage
9. Control

Observations to be recorded:

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

Centre: Ludhiana

Note:

Seed for different physiology experiment is to be organized by Dr. Ratna Kumari, RRS, Lam. 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.
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. Fibre quality
11. Economics analysis

SUBMISSION OF DATA ON THE TRIALS

Zone	Date of submission of report
North	31st January
Central	15th February
South	1st March

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

Sl No.	Name	Designation and Address
1.	Dr.T.Y.Reddy	Director(Planning and monitoring)ANGRAU,Hyderabad
2.	Dr. B.C. Patil	Principal Scientist (Physiology), ARS, Dharwad
3.	Dr. A. H. Prakash	Project Coordinator's Nominee
4.	Mr. M Sabesh	Scientist (SS), CICR, Coimbatore
5.	Dr.H.M.Vamadevaiah	Principal . Scientist(Biochem), ARS, Dharwad
6.	Dr. Satyanarayan	Agronomist, RARS, Raichur
7.	Dr.M.S.Bhattoo	Sr.Agronomist, CCS HAU, CRS,Sirsa
8.	Dr.K.Ashok Kumar	Scientist (agronomy).Nandyal
9.	Dr.V.C.Raj	Res. Sci.(Surat)
10.	Dr. K.N. Pawar	Physiologist, ARS, Dharwad
11.	Dr. A. N. Gitte	Asstt. Cotton Specialist, MAU, Parbhani
12.	Dr.V. Kumar	Research Scientist (Physiology),NAU, Surat
13.	Dr. Basavanneppa, M.A.	Sci (Agronomy), ARS, Siruguppa,
14.	Dr.Kulvir singh	A.Agronomist(PAU,RS,Faridkot)
15.	Dr.G.S.Buttar	Sr.Agronomist,RS,Bathinda
16.	Dr.S.Ratnakumari	Sr.Sci.(Plant Physiology),RARS, ANGRAU, Guntur
17.	Dr.E.Narayana	Principal Scientist(Agronomy),RARS, Lam,Guntur
18.	Dr.D.K.Khargkhrate	Asst. Agronomist, CRS, Nanded
19.	Dr. Parminder Kaur	Asst. Agronomist, PAU Ludhiana
20.	Dr. R.A.Meena	Principal. Scientist (Agronomy), CICR, RS, Sirsa
21.	Dr.K.Rajendran	Prof. of Agronomy, TNAU, Coimbatore
22.	Dr.Pankaj Dharkar	T.O, Ankur seeds
23.	Dr.R.K.Patel	Asstt. Agronomist,ARS,JAU,Junagarh
24.	Dr.R.S.Sarlach	Assoc. Prof. (Botany),PAU, Ludhiana
25.	Dr. V.W.Narlabkar	Bayer biosciences,Hyderabad
26.	Dr.Thokale, J.G.	Cotton Agronomist, MPKV, Rahuri
27.	Dr.P.D.Bhalerao	Cotton Agronomist,CRU, Dr.PDKV,Akola
28.	Dr.S.K.Khamparia	Principal Scientist, RVSKVV, Khandwa
29.	Mr. Harphool Meena	Asstt. Agronomist, ARS, Bonswara (Raj)
30.	Dr.A.Solasmalai	CRS,Sri villuputtar
31.	Dr. Jagdish Kumar	Asstt. Agronomist, CSA University, Kanpur
32.	Dr.R.S.S.Tomar	Cotton Agronomist, RVSKVV ,Indore
33.	Dr.Mahantashivayayya	Asstt. Breeder,Monsanto,Dharwad
34.	Dr.A.M.Narula	ICAR,New Delhi
35.	Dr.H.Negi	T.O,Monsanto,AKOLA

Recommendations

- The plant geometry of 100x60, 100x75 , 67.5x60 and 108x60 cm has been recommended for RCH 134 Bt at Faridkot, Ludhiana, Hisar and Sri Ganganagar ,respectively with corresponding fertilizer doses of 150:30:30, 150:30:30, 150:60:30 and 150:40:0 kg NPK/ha in North Zone.
- A nutrient level of 150:30:30:20:25 of N:P:K:S:Zn kg/ha has been recommended for cotton under Cotton – Wheat system at Faridkot
- The plant geometry of 90x45 cm for Khandwa and Akola, 90x 60 cm for Indore and Nanded, , 90x90 cm for Rahuri and 120x45 cm for Surat and Junagarh has been recommended for RCH 2 Bt hybrid with corresponding fertilizer doses of 120:60:40, 50:25:25, ,188:94:74, 125:62.5:62.5, 125 :62.5:62.5 ,200:0:0 and 200:0:0 kg NPK/ha in Central Zone.
- The plant geometry of 90x45 cm for Lam, Srivilliputtur and Siruguppa, 90x90 cm for Coimbatore and Dharwad has been recommended for Bunny Bt with corresponding fertilizer doses of 120:60:60, 90:45:45, 120:60:60, 120:60:60 and 80:40:40 kg NPK/ha in South Zone
- Foliar application of 2 % KNO_3 has been recommended in all the Zones at flowering and boll development stage in addition to the above said fertilizer doses.
- Application of Pendimethalin@ 1 kg a.i /ha as Pre- emergence followed by Quizalofop- ethyl @ 0.05 kg a.i. /ha at 30 and 60 DAS + interculture has been recommended for controlling broad leaf and grassy weeds, Whereas hand weeding at 20,40 and 60 DAS + interculture has been recommended for controlling all the weeds including sedges at Lam under rainfed conditions
- Application of 45:22.5:22.5 kg NPK/ha +Biofertilizers(Azospirllum+ Phosphobacteria) has been recommended for Cotton in Maize – Cotton and Rice- Cotton cropping systems under summer irrigated conditions at Srivilliputtur of Tamilnadu.
