

PROCEEDINGS OF AICCIP ANNUAL GROUP MEETING: 2013-14
PLANT PATHOLOGY PANEL: PROGRAMME FOR 2014-15

Chairman: Dr P. K. Chakrabarty, ADG (PP), ICAR, New Delhi

Co-Chairman: Dr J S Dhiman, ADR (NRM), PAU, Ludhiana

Convener: Dr (Smt) Sreelakshmi, Professor (Pathology), ANGRAU, Guntur

Rapporteurs: P S Sekhon, Professor, PAU, Ludhiana

Dr Aman Sharma, Scientist, PAU, Ludhiana

Dr. Chakrabarty, in his opening remarks, emphasized the importance of recombination within Cotton leaf curl virus (CLCuV) species and isolates in breakdown of resistance. He also advised scientists to exploit techniques like RT-PCR to assess inoculum threshold in the surviving weeds, alternate hosts of CLCuV and other potential sources of inoculum to predict the spread of disease during the season. He also stressed the need to identify molecular markers for CLCuV resistance for MAS. He advised caution against TSV, thrips transmitted ilar virus that has spread not only on cotton during recent years in the states of AP, TN and MS but also on many other crops in the country. He advised that timely measure should be taken to contain before it could assume epidemic proportion. He also expressed concerns about the increasing trend in development of rust of cotton mainly in Karnataka region. He advised to document shift in virulence pattern of this disease if any in recent years, as a result of climate change or otherwise. Dr Chakrabarty expressed serious concerns on the incidence of root knot nematode and potential losses in cotton in large patches of Haryana, as documented by the scientists under AICRP of nematodes. This also opens up concerns to explore the predisposing role of nematode if any, on root rot disease caused by *Rhizoctonia solani*. Collaboration of scientists of AICCIP and AICRP nematodes may be thought of to explore this association. Besides, reniform nematode, *Rotylenchulus reniformis* has also been found associated with new wilt like symptoms afflicted cotton in Maharashtra. Dr Chakrabarty advised that for effective documentation of the precise geographical regions from where a particular disease/observation are recorded and Good agricultural practice (GAP) compliance of the research data each center should possess GPS gadget and equipment. Dr. P. S. Sekhon remarked that increased dose of urea in early stages of crop growth increased cotton leaf curl virus disease (CLCuD). Dr. Dhiman supported that buildup of white fly also takes place due to excess application of urea. It was contended that probably rationing of nitrogen and /or splitting the initial dose of nitrogen might help curb the development and spread of CLCuV. Dr. Beniwal stressed on increased incidence of CLCuD when paddy crop preceded or is grown adjacent to cotton crop. The following scientists from different AICCIP Centers attended the meeting and presented the results of 2013-14 trials. The technical programme for the year 2014-15 was finalized.

1. Dr. Jagdish Beniwal, CCSHAU, Hisar.
2. Dr. O. V. Ingole, PDKV, Akola.
3. Dr. B. Sree Lakshmi, ANGRAU, Lam, Guntur.
4. Dr. S. Nakkeeran, TNAU, Coimbatore.
5. Dr. M. S. L. Rao, UAS, Dharwad.
6. Dr. N. B. Pawar, MPKV, Rahuri.
7. Dr. P. K. Dhoke, CRS, MAU, Nanded.
8. Dr. Rupesh Kumar Arora, PAU, RS, Bhatinda.
9. Dr. Aman Sharma, PAU, RS, Faridkot.
10. Dr. V. V. Rajani, JAU, Junagarh.
11. Dr. M. S. Chauhan, Sr. Plant Pathologist, CCSHAU (Rtd).
12. Dr. J. S. Brar, Sr. Plant Pathologist, PAU, RS, Faridkot, (Rtd).
13. Mr. Vipin Kumar, Product Development Officer, US Agriseeds.
14. Mr. Bimal Gopinath, Market Development Manager, US Agriseeds (Seed Works Pvt Ltd), Hyderabad.

Technical Programme: 2014 – 15.

Path.1: Epidemiological studies on cotton diseases-(cont.....)

1(a): Observations on the occurrence of the diseases (in farmer's field and research farms) - (All centers* except Pune and CICR Sirsa). (Long term)

All Information regarding major / minor / new (e.g. Tobacco streak virus disease, *Helminthosporium* Leaf spot, *Cercospora* leaf spot etc) diseases have to be reported. The participating centers were informed to record the data in per cent disease index in 10 locations in farmer's field and research farm during early, mid and late season as per the earlier finalized AICCIP standardized protocols. The disease occurrence in organic cotton and high density planting trials conducted at different centers should also be recorded and reported by the concerned Pathologists. In representative areas the names of varieties or hybrids raised under farmers holdings need also be recorded. As advised efforts will be made to purchase GPS under AICCIP budget, for use in the survey. Information on various nematode diseases causing losses in cotton may also be recorded in association with experts of AICRP on nematodes or other university scientists during surveys.

(PAU, Faridkot; PAU, Bhatinda; CCSHAU, Hisar; ARS (SKRAU), Sriganaganagar; ARS (MPU AT), Banswara; NAU, Surat; CRS (JAU), Junagarh; Dr PDKV, Akola; CRS, Nanded; MPKV, Rahuri; MPKV, Pune; BM College of Agriculture (RVSKVV), Khandwa; TNAU, Coimbatore; TNAU, Srivalliputhur; ANGRAU, Guntur; RARS, Nandyal; UAS, Dharwad; OUAT, Bhavanipathan)

Note: Name of district surveyed and the approximate cotton area in that district may be added in the table.

1(b): Disease progress in relation to weather factors (All centers* except Pune) (Long term)

The experiment will continue as per the earlier procedure suggested. Each center will focus on most important disease on a susceptible variety/hybrid or Bt hybrid for correlation. Further it was decided that:

The regression equations developed by few centres based on long term data for example-

1. CLCuD by Sirsa and Faridkot centre
2. Alternaria blight by Rauhri centre
3. Grey mildew and Alternaria blight at Dharwad center

will be validated in the respective zones by other centers during 2014-15 where the diseases are prevalent, with their existing data. Following centers were requested to develop prediction model based on the collection and collation of the existing and current data

1. North Zone - Pool the existing data on CLCUV and develop prediction models for the region. (Action Dr Jagdish Beniwal CCS HAU Hisar with the help of Statistician of the University.)
2. Central Zone – 1. Nanded centre will collect grey mildew data from central zone, pool it and develop prediction models for Grey Mildew.(Action Dr Pavan Dhoke)
2. Akola centre will collect bacterial blight data from central zone, pool it and develop prediction models for the disease.(Action Dr O V Ingole)
3. South Zone - 1. Guntur centre will collect leaf rust data from south zone and develop prediction model (Action Dr Sree Lakshmi)

1(c): Studies on the variability of *Alternaria* leaf spot(All centers*) (DOS 2010-11)

- Association of *Alternaria dianthi* and *A. chlamydospora* needs to be re-confirmed by conducting pathogenicity studies (Dharwad Centre). Studies on symptomatology in different genotypes to be documented and reported. Besides morphological and physiological variations has to be studied. Similarly, TNAU, Coimbatore may also conduct studies on symptomatology and morphological characters of *Alternaria* spp., infecting cotton genotypes.
- Seed- borne nature of *Alternaria* spp., will be repeated using blotter technique and component plating method (Dharwad and Coimbatore).
- All the scientists from different centres should send the cultures of *Alternaria* isolated from the leaf Blight samples with confirmed pathogenicity for diversity analysis of *Alternaria* at species level to Dr. S. Nakkeeran, Professor (Plant Pathology), Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore – 641 003.
- The isolates need be deposited with authenticated validation at NBAIM. Mau Nath Bhanjan, Uttar Pradesh, India. All isolates are to be sent to PI (Dr Dilip Monga) who will coordinate the registration process.

1(d) Survey and Epidemiology of TSV (Centers-Lam, Guntur, RARS, Nandyal TNAU, Coimbatore, TNAU, Srivalliputhur and Dr PDKV, Akola; CRS, Nanded; MPKV, Rahuri);. (DOS 2009-10)

- Survey for occurrence of TSV from major cotton growing tracts of different districts in the states mentioned above will be carried out.
- Area wide TSV incidence may be recorded to have idea on threat perception.
- Occurrence of TSV may be confirmed through Sero diagnosis/ PCR/ local lesion hosts assay at Guntur and centres at Maharashtra depending on availability of facilities as done by TNAU, Coimbatore centre. Besides yield loss assessment may continue at different centers.

Path.2: Screening of AICCIP entries for disease reaction - cont.....

Path.2: (a) Screening of breeding lines for disease reaction (all centers)

North Zone Centers: Both National and Zonal entries*

Central and South zones centres: - do –

*Only National entries at CICR, RS, Sirsa

Susceptible check for each important disease (Common or individual) should be maintained in each screening trial at all the centres.

Path.2 (b) Confirmation and maintenance of disease resistant lines (all centers) (DOS 2009-10)

At all centre's, scientists will keep the resistant entries (few bolls of selfed seed) from the initial evaluation trials (National trials) like Br02a or b for *G. hirsutum* Varieties, Br 22 a/b for *G. arborum*, Br 34 b for *G. herbaceum* and Br 14a for *G. barbadense* after screening against important diseases.

A maximum of 2-3 important diseases prevailing in the area will be considered.

A maximum of five entries will be kept from each trial.

Seed cotton yield and quality aspects will also be recorded keeping resistance as first priority. Those lines will be evaluated again next year by the concerned pathologist at his centre under field conditions and also tested at hot spot for that particular disease under nursery/ artificial inoculation condition at below mentioned centers to have confirmed final reaction.

Artificial Screening Centres:

1 Cotton leaf curl virus, CICR, Regional Station, Sirsa

2 Bacterial leaf blight PDKV, Akola

3 Alternaria leaf spot MPKV, Rahuri

4 Myrothecium leaf spot Khandwa

5 Grey mildew Dharwad

6 Root rot CICR,RS,Sirsa

7 Fusarium wilt Pune

Such entries with two years field screening and one year artificial screening data will be kept by plant pathologists for use in developing resistant varieties / hybrid by that centre.

Note: The field screening will be considered valid only in those years when at least 3 or 4 grade reaction is observed in susceptible checks in screening trials

As per the decision taken during the Research Advisory Committee meeting of CICR, Nagpur held on 14th March, 2014, One set of confirmed resistant entries (25-50 g seed) may be sent to Head, Division of Crop Protection, CICR, Nagpur under intimation to PI Plant Pathology, which will serve as a repository.

Path. 2 (c) Monitoring of breakdown of resistance against CLCuD in cotton. (Centres- Hisar, Sriganagar, Bhatinda) (DOS 2013-14)

Entries: 8

Replication: 3

Design: RBD

Plot Size: 5.4m x 3.75m

Spacing: 67.5 x 30 cm (114 Plants) – For Varieties

67.5 x 60cm (60 Plants) – For Hybrids

Observation: Incidence and severity of CLCuD

Varieties:

HS6, F846, RST-9 (Susceptible)

H1236, LH 2076, RS 2013 – Resistant

Hybrids:

RCH134 BGII (Susceptible), RCH 650 (Resistant)

Seed of varieties to be supplied by respective centres @ 500g for each variety.

Use new set of resistant varieties/hybrids after three years. Special efforts should be made to observe and collect virus isolates from resistant entries that subsequently turn susceptible.

Path.3: Management of Diseases (Centers-Junagadh, Dharwad, Guntur and Coimbatore) (DOS 2012-13)

Path 3(a.1): Validation of seed dressing chemicals against seed and soil borne diseases of cotton. Susceptible varieties in the respective regions will be used. Each centres has to record the pathogens associated with the seedling mortality through isolation and confirmation.

Thiram 75 WS – Seed Treatment @ 20g, 30g, 40g/ha

Carboxin 75% WP – Seed Treatment @ 1g, 2g, 3g/Kg of seed

Carboxin 37.5% + Thiram37.5% DS - Seed Treatment @ 2.5g, 3.5g and 4.5g/Kg of seed.

Untreated control.

Replication: 3

Design RBD.

Observation: The incidence of seedling rot, anthracnose, BLB and Root rot will be recorded up to 1 month. Final yield parameters will be also recorded.

Path 3a3. Evaluation of TrichoCASH (*Trichoderma harzianum*) CICR-G 1% WP for cotton root diseases (Centres: Pune, CICR Nagpur and its Regional Station Sirsa). (DOS 20113-14)

Treatments:

- T1. Control (No seed treatment)
- T2. TrichoCASH (*Trichoderma harzianum*) CICR-G 1% WP – Seed treatment (5g/Kg seed)
- T3. TrichoCASH (*Trichoderma harzianum*) CICR-G 1% WP – Seed treatment (10g/Kg seed)
- T4. Standard chemical seed treatment – Thiram @ 3g/Kg seed)
- T5. TrichoCASH (*Trichoderma harzianum*) CICR-G 1% WP – Seed treatment (5g/Kg seed)+ Thiram @ 3g/Kg seed.
- T6. TrichoCASH (*Trichoderma harzianum*) CICR-G 1% WP – Seed treatment (10g/Kg seed)+ Thiram @3g/Kg seed.
- T7. Any locally available Trichoderma commercial formulation (5g/Kg seed)
- T8. Any locally available Trichoderma commercial formulation – Seed treatment (10g/Kg seed)
- T9. Trichocash seed treatment (5g/kg seed)+ drenching at the base of the plant after one month with 200 ml preparation @0.5%
- T10. Trichocash seed treatment (10g/kg seed)+ drenching at the base of the plant after one month with 200 ml preparation @1.0%

Replications: Three

Design: RBD.

Susceptible variety should be used.

Please store the formulation product in a cool dry place away from direct sun light (preferably at 4 to 10°C but do not store below 0°C).

For seed treatment - take 5 to 10g Tricho CASH powder, mix with 25ml water and make it a slurry. Treat one Kg seed with the slurry in a poly bag and dry the seeds before sowing.

Note: The Tricho CASH sample (50 grams each) will be supplied to both the centres by Head, Crop Protection, CICR, Nagpur.

(Cfu counts in the formulation and following application at mid and end season should be ensured by plating techniques. Efforts should be made to develop signatures for each of the biocontrol agents and compared with original cultures as a measure of GAP)

Observations:

Germination %

Final Plant stand

Seedling root rot /Root rot/Wilt incidence

Yield parameters

C:B ratio

Record the rhizosphere population of *Trichoderma* and *Rhizoctonia solani* (CICR Nagpur & Sirsa)/*Fusarium* (Pune) in the treated and untreated pots/field.

Note: Nagpur center will conduct the experiment in pots in polyhouse through artificial inoculation of *Rhizoctonia sps.*

Path 3 (c): Developing IDM modules for the management of cotton diseases (Centres- Dharwad, Akola, Junagarh) (DOS 2011-12)

Treatment details:

- T-1: Module 1
- T-2: Module 2
- T-3: Module 3
- T-4: Module 4
- T-5: Module 5
- T-6: Module 6
- T-7: Control

Susceptible Bt cotton hybrid will be selected

Design: RBD

Replications: 3

Plot size: Approximately 50sq.m

T-1: Module 1	T-2: Module 2	T-3: Module 3
ST – <i>Trichoderma viride</i> (TV-TNAU) @ 10g/Kg of seed ; SA @ 2.5 Kg/ha ; Foliar spray with <i>T. viride</i> @ 1% .	ST – <i>Bacillus subtilis</i> (BSC5-TNAU) @ 10g/Kg of seed ;SA @ 2.5 Kg/ha ; Foliar spray with <i>B. subtilis</i> @ 1% .	ST – <i>Pseudomonas fluorescens</i> (PF-TNAU) ; SA @ 2.5 Kg/ha ; Foliar spray with <i>P. fluorescens</i> @ 1% .
T-4: Module 4	T-5: Module 5	T-6: Module 6
Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application - <i>Pseudomonas fluorescens</i> – PF CICR @ 2.5 Kg/ha in 250 Kg of Compost or FYM; Foliar Spray with <i>Pseudomonas fluorescens</i> - 1% – PF CICR.	Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application of <i>Trichoderma viride</i> @ 2.5 Kg/ha TV-TNAU1 FS with propiconazole 0.1% for foliar diseases and COC (0.3%) + Streptocycline (0.01%) for BLB or Carbendazim 0.1% for grey mildew on need basis	Seed Treatment - – PF CICR @ 10g/Kg of seed; Soil Application of <i>Trichoderma viride</i> @ 2.5 Kg/ha TV-TNAU1 in 250 Kg of Compost or FYM; Foliar spray with Ergon @ 1ml/Litre followed by Taqat @ 1.5g/Litre for fungal diseases or COC (0.3%) + Streptocycline (0.01%) for BLB
T-7: Control		

** - Need based application of sprays(number as well as time) may be given based on the disease severity observed in the respective places. Formulations of *Trichoderma viride*, *Pseudomonas fluorescens* and *Bacillus subtilis* will be supplied by TNAU, Coimbatore Centre and another preparation of *Pseudomonas fluorescens* by CICR, Nagpur, respectively..

□ The interventions within a module can be modified based on location needs.

Observation:

Germination %, Plant Height, Days taken for First flowering, soil borne and foliar diseases and Yield Parameters.

Note: The experiment has completed three years at Coimbatore, Guntur and Rahuri and the centers should compile the results, do pooled analysis with BCR calculations and conclude the trial.

Path 3 (d): Management of cotton leaf curl virus through its vector – (Centers-Hisar, Faridkot, Sirsa and Sriganaganar (DOS 2012-13)

The experiment was carried out for two years but significant results wrt CLCuD management were not obtained. Keeping that in view a new experiment has been designed by Entomology panel with same objectives.(Ent.3. To study the efficacy of insecticides and biopesticides as a module and in isolation against whitefly and CLCuD.) The experiment will be laid out by entomologist and plant pathologists will record observations on CLCuD incidence and severity before each intervention. The last observation on disease will however be recorded after 15 days of last intervention.

Path.4 (e) Crop loss estimation due to CLCuD and distribution pattern of CLCuD in north zone-(DOS2011-12)

Experiment 1: To work out relationship between Disease index and yield reduction due to cotton leaf curl virus disease

Location: Hisar, Faridkot, Ganganagar

Variety /hybrid : Local Popular Bt Hybrids

Treatment details and observations:

On research farm 4 local popular hybrids will be sown in half an acre area and 10 sets each (50 plants/set) of diseased and healthy plants will be tagged and data on Disease Index, yield loss and quality parameters will be recorded and analyzed.

Same hybrids may be selected at all locations to develop multi location data

Experiment 2: Study on distribution pattern of cotton leaf curl virus disease on local popular Bt hybrid at farmer's field.(DOS 2009-10)

Location: Hisar (Sirsa - Sub Centre), Faridkot, Ganganagar and Bhatinda

Observations of CLCuD occurrence (PDI) in two villages in each block (district wise) will be recorded during the cropping season for popular hybrids. The locations will be evenly spread over the entire state. At each location, 4 set of observations (25 plants each totaling 100 plants) will be recorded in a field.

The data recording should be uniform at all the centres.

While making disease maps & to tune it with the new Disease scale, the following modifications may be followed: Very severe > 50%, Severe- 30.1-50% (combining MS & S of Disease scale), Moderate- 20.1-30%, Low- 10.1-20%, Traces-0.1-10% in place of that presently being followed.

Path. 7 Fusarium wilt of cotton (Pune Centre) - cont.....

The Pune Center will screen all Desi cotton genotypes (*G arboreum* and *G herbaceum*) in combined Fusarial cultures at sick plot. The seeds (25 gm of each entry) of all desi cotton trials may be sent to Pune centre from CICR Regional station, Coimbatore while distributing seeds, for screening Fusarium wilt (Action: Project Coordinator & PI Plant Breeding).

The centre will also conduct the following studies

1. The seed borne nature of Indian isolates
2. The effect of available isolates on *G.hirsutum* and *G. barbadense*
3. Confirmation of available races in India by using race specific primers

The session ended with vote of thanks by Dr. J. S. Dhiman.