PROCEEDINGS OF AICCIP ANNUAL GROUP MEETING: 2014-15

PLANT PATHOLOGY PANEL: PROGRAMME FOR 2015-16

Chairman: Dr.D.Alice, Professor and Head, Department of Plant Pathology, TNAU, Coimbatore – 641 003

Convener: Dr. D. Monga, Head, CICR Research Station, Sirsa and PI, Plant Pathology, AICCIP.

Rapporteurs: Dr (Smt) Sreelakshmi, Principle Scientist (Plant Pathology) , ANGRAU, Guntur and Dr. S.Nakkeeran, Professor (Plant Pathology), TNAU, Coimbatore.

Dr.D. Alice, the Chairman of the session, strongly emphasized to establish artificial screening facilities for analyzing the response of various germplasm and hybrids for the disease reaction. She also advised to formulate management strategies for mitigating viral diseases using micronutrients. Dr. D. Monga during his introductory remarks, he addressed the achievements made during 2014-15 crop season by the scientists of Plant Pathology from different centers of AICCIP and CICR following thematic research programmes. In addition, he emphasized the AICCIP scientists to record the data in per cent disease index in 10 locations in farmers' field and research farm during early, mid and late season. Besides, a**s** per the technical program he asked to use susceptible checks in screening trials either one check with susceptible reaction against all major diseases or more than one for different diseases. He also advised scientists to analyse the long term data of CLCuD, *Alternaria* Leaf Blight, Bacterial Leaf Blight, Grey Mildew and rust by developing regression equations. ADG, Commercial Crops advised the cotton scientists to investigate the impact of seed dressing chemicals on the population dynamics of microflora in the rhizosphere and non-rhizosphere soil.

The following scientists from different AICCIP Centers attended the meeting and presented the results of 2014-15 trials. The technical programme for the year 2015- 16 was finalized.

1. Dr. Jagdish Beniwal, CCSHAU, Hisar.
2. Dr.R.R. Perane, Cotton Pathologists, MPKV. Rahuri
3. Dr. Venkatesh R.Kulkarni, Scientist Plant Pathology, ARS, Dharwad Farm (UAS, Dharwad)
4. Dr.Aman Sharma, Assistant Plant Pathologist, Punjab Agricultural University, Regional Station, Faridkot
5. Dr.Pradeep Kumar, Asst. Professor (Pl. Pathology), Agr;. Research Station, Sriganganagar – 335040

6. Dr/ Rupash Kumar Arora, Astt. Plant Pathologist, PAU, Regional Station, Bathinda, Punjab
7. Dr.P.Latha, Asst. Professor (Plant Pathology) Department of Cotton, TNAU, Coimbatore -641 003.
8. Dr.P. P .Shastry, Principal Scientist, College of Agriculture, Khandwa
9. Dr. V.S. Dagaonkar, Lead Breeder –Cotton, Bayer Bioscience Pvt. Ltd., Hyderabad – 500 081
10. Dr. N. B. Pawar, MPKV, Rahuri.
11. Dr. Bimal Gopinath, Market Development Manager, Seed Works, International Pvt. Ltd., Hyderabad.
12. Mr. P. Govindhan, Monsanto India Ltd., Attur, Salem
13. Dr.Gokul Shelke, Breeding Head, Ankur Seeds Nagpur

Technical Programme: 2015 – 16.

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),Sriganganagar;ARS(MPUAT),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* expect 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 bight at Rahuri center

will be validated in the respective zones by other centers during 2015-16 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 Akola Centre Plant)

3.South Zone - 1. Guntur centre will collect leaf rust data from south zone and develop prediction model (Action Dr Sree Lakshmi)

The exercise is in progress and will be completed and validated within 2015.

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.

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 Cotton Pathologist, 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, 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.

Development of disease rating scale (0-4) for TSV has to be validated. 0-Free from the disease, 1- few upper leaves showing chlorosis or necrosis; 2 – Moderate sruare drying and few branches affected; 3 – Severe burning of squares and more branches affected; 4 – Severe stunting inclusive of above symptoms. Besides yield loss assessment may continue at different centers.

As feeler experiments three centres (Guntur, Coimbatore and Rahuri) will try the influence of micronutrients and biocontrol agents for the management of TSV. The treatment details will be communicated later.

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.

For screening against CLCUD, a simplified scale has been decided during the panel meeting in consultation with with Dr,C,D, Mayee and Director CICR, Nagpur will be used as detailed below.

(0-Complete absence of symptoms; 1- Symptoms of vein thickening on few upper leaves; 2 – Symptoms of vein thickening, cupping and curling on few upper leaves; 3- i/4th plant affected with vein thickening, cupping and curling, leaf enations; 4 –1/2 plant affected with vein thickening, cupping and curling, leaf enations; 5 -3/4th plant affected

with vein thickening, cupping and curling, leafy enation ; 6- Plants stunted severely and complete plant affected with vein thickening, cupping and curling and leafy enation)

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. Dharwad and Rahuri centres are requested to deposit the seed materials (25-50 g Seed) of resistant entries to Head, Division of Crop Protection, CICR, Nagpur under intimation toPI Plant Pathology.

Path. 2 (c) Monitoring of breakdown of resistance against CLCuD in cotton. (Centres- Hisar, Sriganganagar, 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 Varities 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.

Comment: Pooled analysis with CBR will be reported. Impact of seed dressing chemicals on the influence of rhizosphere and rhizospplan microflora of treated and untreated seed will be documented (Dharwad, Coimbatore).

Path 3 a3. Evaluation of TrichoCASH (Trichoderma harzianum) CICR-G 1% WP for cotton root diseases (Centres: Pune, CICR Nagpur and its Regional Station Sirsa). (DOS 2013- 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 treatmnet (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 4to 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 measures 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 – *Trichoderma viride* (TV-TNAU) @ 10g/Kg of seed ; SA @ 2.5 Kg/ha ; Foliar spray with *T. viride* @ 1%.	ST – *Bacillus subtilis* (BSC5-TNAU) @ 10g/Kg of seed;SA @ 2.5 Kg/ha ; Foliar spray with *B. subtilis* @ 1%	ST – *Pseudomonas fluorescens* (PF-TNAU) ; SA @ 2.5 Kg/ha ; Foliar spray with *P. fluorescens* @ 1%
T-4: Module 4	**T-5: Module 5**	**T-6: Module 6**
Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application - *Pseudomonas fluoresccens* – – PF CICR @ 2.5 Kg/ha in 250 Kg of Compost or FYM; Foliar Spray with Pseudomonas fluoresccens - 1% – PF CICR.	Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application of *Trichoderma viride* @ 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 *Trichoderma viride* @ 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.

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

The data on CLCuD will be recorded from the experiments laid out by the entomologists. (Ent.3. To study the efficacy of insecticides and biopesticides as a module and in isolation against whitefly and CLCuD.) as decided last year.

Path 3 (e). innovative interventions for the management of CLCuD

Locations: Faridkot, Sirsa (CICR), Sriganganagar , Hisar & Bhatinda

Treatment details: T1- Butter milk @ 5%, T2- Cow urine @ 6.6%, T3- Neem oil @ 1%, T4- Mustard oil @ 3%, T5- Calcium nitrate @ 0.5%, T-6 –Cow urine+Calcium nitrate , T7-Cow urine+Butter milk.,T8- Butter milk+Calcium nitrate,T9-Lachesis 30, T10-Digitalis 30, T11-Apis Mallifera 30, T12-Bryonia 30, T13-Natrum Mure 30, T14- Polo @ 0.1% and T15- Control
Spacing-1.0 x .6 m
Plot size- 5x5.4m (60 plants)
Replications-2
Design-RBD
Spray: Sprays to be initiated 30 days after sowing and to be followed at fortnightly interval. A total of five sprays will be given for white fly.
Observations: Pre spray, 7 DAS and 15 DAS observations on CLCuD incidence will be recorded. To work out PDI, after fortnight of 5th spray, observations will recorded according to new grade scale (0 to 6). Data will be analyzed statistically and tabulated.

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.

Experiment 3:In order to study CLCD progress and yield estimations, an experiment with two resistant and two susceptible Bt hybrids will be sown at Sirsa in half an acre area to study CLCuD progress from 40 days after sowing at biweekly intervals and correlated with yield reductions.

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

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