

ENTOMOLOGY PANEL

Chairman: Dr. K. Ramaraju, Director, CPPS, TNAU
Co-Chairman: Dr. SandhyaKranthi, Head, Crop Protection Division, CICR, Nagpur
Convener: Dr (Mrs) B. Dharajothi, PI (Entomology)
Rapporteur: Dr. G. Asokan, Prof (Ento) & Dr. Rishi Kumar, Sr Scientist, CICR, Sirsa

Ent. 1 (a): Screening of breeding material for resistance to insect pests (National & Zonal Trials):

(All Centres including new centre)

Screening of all the breeding materials of the respective centres should be carried out under unprotected conditions as per the established standard protocol of AICCIP.

- Include **check entries without seed treatment** as that of coded entries
- Find out resistant/tolerant entries (reference to varieties)
- Shortlist resistant/tolerant entries-based on only grading as tolerant/susceptible.
- Collect seeds for advanced screening trial

Check entries for the different zones:

North Zone: RS2013 (resistant to jassid & whitefly); GA (susceptible) MRC 7017 BGII (bollworm resistant); MRC 7017 NBt (bollworm susceptible)

(Action: Dr P L Nehra/ Dr P Punthir, Sri Ganganagar, to provide seeds of RS2013 and GA to all concerned)

Central Zone: DHY286 (jassid resistant); DCH32 (susceptible) Bunny BGII (bollworm resistant); Bunny non Bt (bollworm susceptible)

(Action: Seeds supply – Sr Cotton breeders of their respective centres, Dr. S.B. Patil, Dharwad, Bunny Non Bt –PI, Entomology)

South Zone: Bunny (Jassid tolerant); DCH32 (susceptible) Bunny BGII (bollworm resistant); Bunny Non Bt (bollworm susceptible)

(Action: Dr. S.B. Patil, Dharwad to provide seeds to all concerned, & Bunny Non Bt –PI, Entomology)

Besides the zonal trials, entomologists of all centres should observe the National Trials (Breeding/Pathology) for healthy plants from point of sucking pests up to 70 DAS and at harvest and tag them, report them and collect seeds for further screening in the next year.

Ent. 1 (b): Advanced screening of promising entries for development of repository

Promising entries from the 2014-15 breeding trials and selected entries from the repository expt (Ent 1C) during 2014-15 have to be screened in common trial **and evaluate further**. The large scale testing (3 rows) will be carried out in two replications along with the susceptible and resistant checks. The following scientists will be distributing the seeds to the respective centres.

Action : Dr Suneet Pandher for North zone

Dr H R Desai for Central zone, Supply seed from Ent 1c (2014-15) to all participating centres of the zone.

Dr G M V Prasad Rao for South zone, Supply seed from Ent 1c (2014-15) to all participating centres of the zone.

North Zone: RS2013 (resistant to jassid & whitefly); GA (susceptible)

Central Zone: DHY286 (jassid resistant); DCH32 (susceptible)

South Zone: Bunny (Jassid tolerant); DCH32 (susceptible)

Ent. 2: Population dynamics to develop suitable forecasting model: All centres

Data should be taken for both sucking pests and bollworms from RS 2013, Ganganagar Ageti, HS-6, BG and BG-II respectively for North India and DCH32, BG and BG-II for Central and South India.

| Sl.no | States | Genotypes for sucking pests | Genotypes Bollworm | | Centres |
|-------|-----------|-----------------------------|--------------------|-----------------------|------------------------------|
| | | | Non BG | BG-II hybrids | |
| 1 | Rajasthan | Ganganagar Ageti, RS2013 | HS6 | Any popular Bt hybrid | Sri Ganganagar |
| 2 | Punjab | Ganganagar Ageti, RS2013 | HS6 | | Faridkot, Bhatinda |
| 3 | Haryana | Ganganagar Ageti, RS2013 | HS6 | | Hisar |
| 4 | Gujarat | DCH32 | DCH32 | | Surat (I), Junagarh, Bharuch |

| | | | | | |
|---|------------|-------|-------|-------------|------------------------------|
| 5 | MP | DCH32 | DCH32 | RCH-2 BG-II | Khandwa |
| 6 | Maharastra | DCH32 | DCH32 | RCH-2BG-II | Nanded, Akola, Rahuri |
| 7 | Karnataka | DCH32 | DCH32 | RCH-2BG-II | Dharwad, Raichur Samrajnagar |
| 8 | AP | DCH32 | DCH32 | RCH-2BG-II | Guntur, Nandyal, Raichur |
| 9 | Tamil Nadu | DCH32 | DCH32 | RCH-2BG-II | Coimbatore, Srivilliputhur |

- Experimental layout:** At least 3000-4000 sq. meter plots (as per availability) be sown for the studies on population dynamics. Divide the plot into 2 half each (both under protected and unprotected condition). In North Zone, division of area will be according to the varieties/hybrids sown. Keep one half untreated (for sucking pests) and apply required sprays of neonicotinoids (imidacloprid/acetamiprid/thiamethoxam/clothianidin) in the other half as per requirement to keep the population of leafhopper under control, along with Gaucho seed treatment so that the observations for the bollworm can be taken. Collect 150 bolls from each variety and hybrid at 120, 140 and 160 DAS and send the bolls to CICR, Sirsa (North), CICR, Nagpur (Central) and CICR Coimbatore (South) for further recovery of bollworms, particularly the PBW.
- Monitor for the presence of dead pink bollworm larvae beginning 90 DAS to 150 DAS and observe for the emergence of endoparasitoids at each centre.
- Observations to be recorded:** Weekly observations for aphid, jassid, whitefly, thrips (3 leaves/plant), mealy bug, ABW, SBW, PBW and associated natural enemies after one **month of sowing** (Natural enemies to be recorded species wise).
- Any unusual survival and higher levels of infestation must be notified to Dr. B.Dhara jothi and Dr. K. R. Kranthi immediately by mail and phone. The surviving bollworms (*Helicoverpa armigera* and *Pectinophora gossypiella*) larvae both from Bt and conventional cotton will be brought to the laboratory. From North Zone the larvae shall be sent to Dr. Rishi, Sirsa, Central Zone to Dr. Sandhya Kranthi, Nagpur and for South Zone to Dr. B. Dhara Jothi for carrying out resistance monitoring bioassays.
- Dr. P.L. Nehra/ Dr .P. Pundir will supply the seed of Ganganagar Ageti and RS2013 to all the concerned centres. Dr. K.K. Dahiya, Professor, Entomology, HAU, HISAR will-arrange for the seed of HS-6. Dr. S.B. Patil, Dharwad will supply the untreated seed of DCH 32 to

the concerned centres directly. The mentioned BG-II hybrid can be obtained directly from the market.

- Monitoring of bollworms across the country, through pheromone traps and lures uniformly sourced from a single best source may be carried out during the season and off season and data may be recorded. Care must be taken to change lures at recommended frequency.
- Monitoring of insect fauna in protected and unprotected plots: Apart from the regular 6 plant scouting, yellow sticky traps from standard companies (uniform source across centres) may be installed at recommended rates in the protected and unprotected plots to monitor the insect fauna (pest and natural enemies both diversity and numbers) to understand seasonal dynamics. Care must be taken to replace installation of yellow sticky traps at recommended frequency during the season.

Action --- All Centres

Ent 3 Compilation of last 10 years data on insect pests of cotton collected by AICCIP Entomologists

- Digitalization and Compilation of historical data in XL Sheet and also graphical representation for further publication.
- **Action: Dr. Rishi Kumar** ----- **Whitefly (North)**
Dr S.Kranthi - ----- **Leafhoppers (All zones)**
Dr. H .R .Desai and Dr Uttam Hole ----- **Sucking pests Central Zone**
Dr .Udikeri , Dr NVV Durga Prasad Rao ----- **Sucking pest (South Zone)**

Ent. 4: Survey for key and emerging pests in cotton in Farmers Field for weekly advisory

All the centre are requested to collect weekly information on the incidence of the pest and inform **through mail to the PI, Entomology** for further publishing the information through weekly advisory. **The centre Co-PI are requested to send the raw data also**

Action : All centres

Ent 5 a : To study the efficacy of insecticides and biopesticides as a module and in isolation against whitefly- **All Centers of North Zone.**

Name of the hybrid: **MRC 7017BG II**, No of treatments: **9**

Design: **RBD**

| S. N | 20 DAS | 45 DAS* | 60DAS | 75 DAS | 90 DAS | 105 DAS | 120 DAS |
|------|---|---------------------|---------------------------------|--------------|-------------------|-------------------------|---|
| T 1 | Nimbecidine | <i>V. lecanii</i> | <i>Metarhizium anisopliae</i> | Difenthiuron | Hort. Mineral oil | Triazophos 40%EC | *Spiromesifen/ <i>M. anisopliae</i> |
| T 2 | Nimbecidine | ----- | ----- | ----- | ----- | ----- | ----- |
| T 3 | ----- | <i>V. lecanii</i> * | ----- | ----- | ----- | ----- | ----- |
| T 4 | ----- | ----- | <i>Metarhizium anisopliae</i> * | ----- | ----- | ----- | ----- |
| T 5 | ----- | ----- | ----- | Difenthiuron | ----- | ----- | ----- |
| T 6 | ----- | ----- | ----- | ----- | Hort. Mineral oil | ----- | ----- |
| T 7 | ----- | ----- | ----- | ----- | ----- | Triazophos 40%EC | ----- |
| T 8 | ----- | ----- | ----- | ----- | ----- | ----- | * Spiromesifen (Oberon 200ml/acre/ <i>Metarhizium anisopliae</i> @ 10gms/lit |
| T 9 | Control | | | | | | |
| ❖ | <i>V. lecanii</i> *, <i>Metarhizium anisopliae</i> will be repeated after 15 days interval in T3&T4 | | | | | | |

Action : Sirsa/Faridkot/Hisar/Sri Ganaganagar

Observations: Populations of White fly, natural enemies will be recorded from 5 tagged plants in each plot at Pre and 3rd, 7th day after insecticidal spray. **Observations on the leaf curl virus incidence also will be recorded.**

Doses: Nimbecidine @ 5ml/litre, Triazophos 600g a.i/ha, Difenthiuron @ 325g ai /ha, Mineral oil 0.5 % (as per the availability and specification provided, Dr Suneet Pandher will arrange), *V.lecanii* @10 gm/lit (Common source), *Metarhizium anisopliae* -10gms/lit (Common source) (YST as per recommendation and from common source).

- ❖ Whiteflies will also be brought to the lab and observed for emergence of parasitoids atleast at 2 centres.
- ❖ Populations of leaf hoppers and thrips will also be recorded to see if these insecticides cause their flare up.
- ❖ Use yellow sticky traps at recommended rates (20 days interval) starting from 20DAS to monitor for whitefly activity in all plots and replace the trap at recommended frequency and record the observations.
- ❖ *The intervention at 120 days will be done depending on the whitefly population and availability of the product

Ent 5.b.To study the efficacy of insecticides against sucking pests .

Action : All Centers of Central and South Zone.

Name of the hybrid: RCH 2Bt, DCH 32 for Bhawanipatna

No of treatments: Design: RBD

Locations: All centres of Central and South Zone

Observations: Record the incidence of all the sucking pests and their natural enemies (predators and parasites) before and one week after application of insecticides, which will be done at the moderate level of incidence noticed. The natural enemy's population will be recorded individually.

| S. No. | Insecticide | Dose (g ai/ha) |
|--------|-------------------------------|----------------|
| 1 | Buprofezin 25% SC | 250 |
| 2 | Flonicamid 50% WG | 75 |
| 3 | Flonicamid 50% WG | 100 |
| 4 | NSKE | 5 % |
| 5 | Diafenthiuron 50% WP | 300 |
| 6 | <i>V.lacanii</i> | 10 gms/lit |
| 7 | <i>Metarhizium anisopliae</i> | 10 gms/lit |
| 8 | Untreated control | ---- |

Ent 6: Integrated Pest Management for HDPS

| SN | Treatments | Module 1 | Module 2 |
|----|--|--|----------------------------|
| 1 | Variety | Suraj- early sowing | Suraj- early sowing |
| 2 | Seed treatment | Gaucho treated cotton seeds and Rhizobium treated cowpea (intercrop) | --- |
| 3 | Spacing | 90 X10cms | 90 X10cms |
| 4 | Intercrop | Cowpea | -- |
| 5 | Fertilizer | RFD-to cotton through chemicals+ FYM@25-30Kg of Nitrogen equivalent | RFD (Chemical fertilizer) |
| 6 | Record of Pest/predator population and Disease index | Weekly | Weekly |
| 7 | Yield | | |
| 8 | Economics(B:C Ratio) | | |

Note:

1. Time of sowing of intercrop (COWPEA) - same time of the main crop
2. Record weed flora in both the modules
3. Plot size-1/4 an acre for each module.
4. No weedicide application.
- 5.*Choice of variety --- Suraj.
6. ** Analysis of the soil before sowing and after the removal of the intercrop –collect bulk samples from 3 locations in each spot. Separate samples for 0-15 and 15-39 cm depths.
(Centres: Cental and SouthZone centres)

Ent 6.b: To study the impact of seed treatment on pollinators

| S.N. | Treatment- 1 | Treatment- 2 |
|------|---|--|
| 1 | Treated Seed | Untreated Seed |
| 2 | Residue analysis for seed treatment insecticide in pollen, nectar and guttation fluid at 15 days interval till last season flower | -- |
| 3 | Soil Residue (before sowing of the crop) | Soil Residue(before sowing of the crop) |
| 4 | Observation on all pollinators using common protocol | Observation on all pollinators using common protocol |

Centre: CICR Nagpur/TNAU Coimbatore/ Hisar