

PROCEEDINGS OF AICCIP ANNUAL GROUP MEETING: 2010-11**ENTOMOLOGY PANEL**

MPUAT, Udaipur

The entomology panel met under the chairmanship of Dr. K.R. Kranthi, Director, CICR, Nagpur, Co-chairman Dr. O.P. Ameta, HOD, Entomology, RCA, Udaipur and Dr. T. Surulivelu, P.I. Entomology as Convenor and Dr. V.V. Ramamurthy, Principal Scientist (Agril. Entomology), Division of Entomology, IARI attended as a special guest. Dr. Rishi Kumar, Senior Scientist, CICR, Sirsa and Dr. N.V.V.S. Durga Parsad, RARS, Lam, Guntur were the Rapporteurs of the sessions. A total of 34 participants (list attached) comprising of the entomologists and representatives from the pesticide and seed industry actively participated in the deliberations to discuss the results of 2009-10 and formulation of technical programme for the year 2010-11.

Dr. Kranthi in his address expressed his concern for the monitoring of bollworms population particularly *Helicoverpa armigera* and *Pectinophora gossypiella* on non-BG, BG-I and BG-II hybrids in systematic manner across the zones and to conduct some base line studies on it. The increasing population of sucking pests was another concern from him for which he emphasized the need of meticulous screening of breeding material for its resistance towards the sucking pests alongwith the confirmation of any biochemical basis, if exists. He also emphasized the need of testing some potential Ecofriendly strategies for the management of sucking pests. Dr. Kranthi also stressed to record predators species wise instead of collective manner.

Dr. O.P. Ameta expressed his concern for the increasing population of whitefly vis-à-vis the CL CuD (Cotton leaf curl virus) in cotton in the north zone. According to him Integrated Management of insect pests in the cotton.

Dr. V.V. Ramamurthi informed the house regarding the mealybug species available in cotton ecosystem. He cleared the prevailing confusion regarding the identification of *Phenacoccus solenopsis* and *P. solani* (inter-specific variations). . Dr. Ramamurthi emphasized the need of accurate identification for the management of insect pests. He requested all the AICCIP entomologists to send all the mealybug and whitefly specimens collected from different hosts (alongwith host) to him.

Similarly, any new insect pests or natural enemy observed may be sent to Dr. Ramamurthy after preserving in 90-100% alcohol along with the detail of name of collector, host crop/insect, place and date of collection for its proper identification that can be handled in Network project on biosystematics.

Dr. T. Surulivelu stressed the need for epizootic screening under controlled condition and working out the mechanism of resistance for major pests of cotton and the preparation and submission of annual report as per schedule.

Salient findings from the entomological experiments conducted during 2009-10

- Cultivars tolerant to Jassid and bollworms were identified in 28 breeding trials of the three cotton growing zones of India.
- **North zone:** Population dynamics study revealed that jassid population was at higher level (8.5 to 33.0 per 3 leaves) in Ludhiana, at moderate level (5.8 to 8.8) in Hisar and at below threshold level throughout the season in Faridkot and Sriganaganar. Whitefly was in higher level only in Sriganaganar (31.2 to 35.8 per 3 leaves), while thrips were at below threshold level in all the centres.
- There were no incidences of *H. armigera* and *S. litura* in Sriganaganar, Faridkot and Ludhiana. Sriganaganar and Ludhiana had moderate to higher level of Spotted bollworm (5.0 to 9.5 larvae per 5 plants). Pink bollworm was at higher level (2.0 to 6.2 per 20 green bolls) only in Sriganaganar and almost no incidence was noticed in Faridkot and Ludhiana.
- Central zone: Except Khandwa in all other centres viz., Akola, Banskara, Junagadh, Bhawanipatna, Nanded and Rahuri high population of jassid was recorded ranging from 7.8 to 47.1 per 3 leaves. Junagadh recorded higher thrips population (33.2 to 63.6/3 leaves), while Banskara had higher whitefly population (32.6 to 35.6/3 leaves). Junagadh also had higher aphid population (35.0 to 64.0/3 leaves). Very low intensity of mealy bug damage was observed in Junagadh, Surat and Rahuri and it was absent in other centres.
- *H. armigera* bollworm was at moderate level (3.0 to 8.0/5 plants) in Akola, Bhawanipatna, Junagadh, Khandwa, Rahuri and Surat while *Earias* bollworm was at higher level (4.0 to 10.0 larvae/5 plants) in Bhawanipatna and Rahuri. Pink bollworm was at higher level in Junagadh (6.4 to 5.6 larvae/20 green bolls), Surat (5 to 9.4), Rahuri (4 to 8) and in Akola (3.4 to 6.4).
- **South zone:** Jassid population was at higher level in Lam (13.8 to 52.7/3 leaves), Srivilliputtur (10.2 to 18.4), Coimbatore (6.0 to 15.7), Dharwad (6.2 to 13.2) and Raichur (6.9 to 13.2). Aphid was at higher level in Lam (2.6 to 52.7/3 leaves) while thrips were higher in Dharwad (37.0 to 41.0/3 leaves).
- The intensity of mealybug infestation was 2.0 to 4.0 grade in Coimbatore and 1.0 grade in Srivilliputtur. Mired bug was at higher level in Dharwad (10.0 to 29.0/25 squares).
- *H. armigera* was at higher level in Dharwad (5.3 to 10.2 larvae/5 plants) and at moderate level in Raichur (2.2 to 4.6). *Earias* bollworm was at moderate level in Srivilliputtur (2.0 to 4.0 larvae/5 plants) and at higher level in Dharwad (4.3 to 8.2). Pink bollworm was at higher level in Dharwad (5.0 to 23.0 larvae/20 green bolls). Nandyal (6.0 to 9.0), Raichur (2.8 to 4.4) and Srivilliputtur (2.0 to 5.0)
- Acephate 75 SP (750 g) and the new formulation of Acephate 95% SG (562.5 & 750 g) were effective against major sucking pests (Jassid, aphid, thrips and whitefly) and resulted in higher yield ranging from 63.3 to 76.0% followed by Imidacloprid (57.3 %) and Acetamiprid (51.1 %) in **North zone**.

- Acephate 75 SP and Acephate 75 SP (750 g) were effective against major sucking pests (Jassid, whitefly, thrips and aphid) and gave higher yield by 52.0 to 59.6% over control in **Central zone**.
- Acephate 75 SP, Thiomethoxam, Acetamiprid and Acephate 95% SG were effective against major sucking pests (Jassid, aphid, thrips and whitefly) and resulted in higher yield by 35.0 to 38.0% over control in **South zone**.
- Profenophos, chlorpyrifos and Buprofezin were effective against mealybug and resulted in higher yield in North, Central and South zone. Biopesticides viz., Mealy kill, mealy quit, *M. anisopliae*, *B. bassiana*, *V. lecanii* were moderately effective.

Technical Programme for 2010-11

Ent 1a. Screening of breeding material for resistance to insect pests: All Centers

The screening of all the breeding materials of the respective centre should be carried out under unprotected condition as per the established standard protocol of AICCIP.

- The seeds of consistently tolerant entry of the respective centre should be collected from the respective Senior Cotton Breeder.
- Include **check entries without seed treatment** as that of coded entries
- Find out resistant/tolerant entries (reference to varieties)
- Collect seeds
- Grow second season
- Short list resistant/tolerant entries –observe mechanism of resistance/tolerance
- Send one set of seeds to Dr. K.R. Kranthi, CICR, Nagpur for cage studies with artificial bombardment. The second set of seeds should be carried forward for Ent 1b advanced screening trial.

Check entries for the different zones.

North zone: RS2013 (resistant to jassid & whitefly); GA (susceptible)
RCH 134 Bt (bollworm resistant); HS6 (bollworm susceptible)
(Action: Dr. Vichiter Singh, Sri Ganganagar, to provide seeds to all concerned)

Central zone: DHY286 (jassid resistant); DCH32 (susceptible)
Bunny Bt (bollworm resistant); RCH 2 NBt (bollworm susceptible)
(Action: Seeds supply – Sr Cotton breeders of their respective centres)

South zone: Bunny (Jassid tolerant); DCH32 (susceptible)
Bunny Bt (bollworm resistant); DCH 32 (bollworm susceptible)
(Action: Dr. S.B. Patil, Dharwad to provide seeds to all concerned)

Ent 1b. Advanced screening of promising entries:

The promising lines should be screened under artificial bombardment in controlled conditions in the concerned centres to investigate the mechanism of resistance/tolerance with specific reference to antixenosis and antibiosis. Some biochemical studies can also be done in the respective universities or send to CICR Nagpur. These materials also may be given to breeder for developing improved varieties/hybrids.

The centres and the respective pests are:

Pests	North zone	Central zone	South zone
Jassid	-	Khandwa, Surat, Nanded, Banswara	Lam, Coimbatore, Dharwad, Raichur
Whitefly	Faridkot, Ganganagar	-	-
Spotted bollworm	Faridkot,	Akola	Dharwad
Pink bollworm	Sri Ganganagar	Akola	Dharwad, Lam
Stem weevil			Srivilliputtur
Miridbug	-	-	Coimbatore; Dharwad, Raichur

Ent 2. Population dynamics to develop suitable forecasting model:

Data should be taken for both sucking pests and bollworms from Ganganagar Ageti and HS-6, respectively for North India and DCH32 (untreated) for Central and South India.

Sr. No.	State	Bt Variety/Hybrid		Conditions	Centers
		Sucking pest	Bollworm		
1	Rajasthan	Ganganagar Ageti	HS6*	Irrigated	Sri Ganganagar
2	Punjab	Ganganagar Ageti	HS6*	Irrigated	Faridkot, Ludhiana
3	Haryana	Bt RCH-134, Ganganagar Ageti	HS6*	Irrigated	Hisar
4	Gujarat	DCH32	DCH 32*	Irrigated & rainfed	Surat(I), Junagadh Bharuch
5	Madhya Pradesh	DCH32	DCH 32*	Irrigated	Khandwa
6	Maharashtra	DCH32	DCH 32*	Irrigated & rainfed	Nanded, Akola, Rahuri
7	Karnataka	DCH32	DCH 32*	Irrigated & rainfed	Dharwad Raichur
8	Andhra Pradesh	DCH32	DCH 32*	rainfed	Guntur, Nandyal, Raichur
9	Tamil Nadu	DCH32	DCH 32*	Irrigated	Coimbatore, Srivilliputhur

* The data from any popular BG-I and BG-II hybrid shall also be collected from farmer's field at fortnightly interval and the information regarding the spray applied may also be recorded. The surviving Bollworms (*Helicoverpa armigera* and *Pectinophora gossypiella*) larvae both from Bt and Non Bt genotypes 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. Dharajothi for carrying out resistance monitoring bioassay.

Dr. Vichhitar Singh will supply the seed of Ganganagar Ageti to all the concerned centres. Dr. K.K. Dahiya, Professor, Entomology, HAU, HISAR will arrange for the seed of HS-6. Dr. S.B. Pail, Dharwad will supply the untreated seed of DCH32 to all the concerned centres directory.

At least 2000 Sq. meter plot has to be sown for population dynamic study. Divide the plot into half of 1000 sq mt each. Keep one half untreated (for sucking pests) and apply minimum two sprays of neonicotoid (imidacloprid/acetamiprid/ thiamethoxam/ clothiadinin) in the another half of 1000 sq metre as per requirement to keep the population of jassid under control so that the observations for the bollworm can be taken.

Observations to be recorded:

Weekly observations for aphid, jassid, whitefly, thrips (3 leaves/plant), mealy bug, ABW, SBW, PBW & Natural enemies after one **month of sowing**(Natural enemies species wise to be recorded).

Ent. 3a. Chemical control of sucking pests through foliar application (Testing of New Chemical)

Target pests – Mealy bug, Jassid, Aphid, Thrips, White fly

Treatment No.	Chemical	Dose/ha
1.	Acephate 95% SG (RIL-059/F95%SG)	562.5 g a.i./ha
2.	Acephate 95% SG (RIL-059/F95%SG)	750 g a.i./ha
3.	Acephate 75 SP	562.5 g a.i./ha
4.	Acephate 75 SP	750 g a.i./ha
5.	Imidacloprid 200 SL (Std)	40 g a.i./ha
6.	Acetamiprid 20 SP (Std)	20 g a.i./ha
7.	Thiamethoxam (Std)	25 g a.i./ha
8.	Dimethoate (Std)	250 g a.i./ha
9.	Triazophos 40 SC (Std)	600 g a.i./ha
10.	Fipronil 5% SC (Std)	40 g a.i./ha
11.	Control	-

Centers:

North zone: Sriganagar, Faridkot, CICR Sirsa

South zone: Dharwad, Raichur, Coimbatore (CICR), Lam (Guntur)

Central zone: Akola, Junagarh, Bhawanipatna.

Observations:

- Record observation pre-treatment and 7 days after spray
- Ganganagar Ageti for North Zone (spray at 75, 90 and 105 days after sowing along with additional spray if required)
- RCH-2 Bt hybrid for South & Central Zone (spray 30-35, 45-50 and 60-65 days after sowing as per appearance of sucking pests).

Replications: 3 (50 plants per plot), Design: RBD

Ent 3b: Evaluation of IGR, insecticides and fungicides mixture against major pests and diseases of cotton

Target pests: Sucking pests and Bollworms.

Target diseases: Alternaria leaf spot, Myrothecium leaf spot and Grey mildew.

Treatment No.	Chemical	Dose g a.i./ha	Dose formulation/ ha
1.	Buprofezin 20% + Acephate 50% WP(RIL-049/F1 70% WP)	250 + 625	1250 g
2.	Buprofezin 25% SC	250	1000 ml
3.	Acephate 75% SP	625	833 g
4.	Acephate 60% WP + Kresoxim methyl 15% WG (RIL-074/F1 75% WG)	750 + 187.5	1250 g
5.	Acephate 75% SP	750	1000 g
6.	Kresoxim methyl 50% SC	187.5	375 ml
7.	Spinetoram 12% SC	36	300 ml
8.	Spinetoram 12% SC	48	400 ml
9.	Bt Cotton Check(North: RCH-134 Bt,RCH2 Bt for South and Central Zone)	-	-
10.	Untreated Control	-	-

Centres: 9

North zone: Sriganganagar, Faridkot

Central zone: Akola, Junagarh, Surat, Khandwa

South zone: Dharwad, Lam (Guntur), Srivilliputtur

Observations:

- Record observations pre-treatment and 7 days after spray. Record natural enemies (predator/parasitoids) population individually pre and 7 day after application of treatment).
- Record Phytotoxicity symptoms if appears.
- Ganganagar Ageti for North Zone (spray initiation at 60 to 75 DAS followed by 2-3 subsequent sprays if required and 4-6 sprays for bollworms.
- RCH-2 non-Bt hybrid for South & Central Zone (spray initiation after 30-35,45-50,60-65 DAS for sucking pests and 4-6 sprays for bollworms)

Replications: 3 (50 plants per plot)

Ent 3c. Insecticidal selectivity towards mealybugs and their natural enemies in Bt cotton Treatments

S. No.	Treatments	Dose (g a.i./ha)
1.	Acephate 75 SP	750
2.	Quinalphos 25 EC	500
3.	Chlorpyrifos 20 EC	1000
4.	Profenophos 50 EC	750
5.	Thiodicarb 75% WP	750
6.	Buprofezin (IGR) 25% SC	312.5
7.	NSKE 5%	50 ml/lit
8.	Endosulfan 35 EC (Std)	700
9.	Phosalone 35 EC (Std)	700
10.	Control	-

Centers: All centres can do as per the availability of mealybug infestations.

- North zone : Sriganganagar, Ludhiana, Faridkot and Hisar (subject to appearance of mealybug)
- Central zone : Nanded, Rahuri, Banswara.
- South zone : Coimbatore (TNAU), Nandyal

Hybrid: Popular Bt cotton hybrid of the region.

Replications: 3

- Field study:** Record the incidence of mealybugs and their natural enemies (predators and parasites) before, one and two weeks after application of insecticides which will be done at the moderate level of incidence noticed. The natural enemies population will be recorded individually.
- Bring the parasitized mealybug to the laboratory and observe for the emergence of parasitoid and its extent of parasitization.
