

**ANNUAL REPORT - 2014-15**  
**OF**  
**ENTOMOLOGY DISCIPLINE UNDER AICRP ON SUGARCANE**

**REGIONAL AGRICULTURAL RESEARCH STATION,  
ANAKAPALLE**

**ANGRAU, ANDHRA PRADESH**

**DETAILED REPORT  
AICRP ON SUGARCANE**

**Project No. E.4.1 (1)**

- 1. Title** : **Evaluation of genotypes for their reaction against major insect pests [IVT (Early)].**
- 2. Objective** : To grade the entries in the trials for their behaviour towards damage by key pest in the area.
- 3. Year of start** : 1990-91
- 4. Duration** : Recurring study
- 5. Location** : Regional Agricultural Research Station, Anakapalle
- 6. Project leader and her associates** : Dr. B. Bhavani, Senior Scientist (Entomology)  
Dr. M. Visalakshi, Senior Scientist (Entomology)  
Dr. M. Bharatha lakshmi, Principle Scientist (sugarcane)

**Experimental Details :**

- a Date of Planting** : 05/03/2014
- b Varieties** : Co A 12321, Co A 12322, Co A 12323, Co V 12356  
Susceptible check: 93 A 145 (Co A 99082),  
Popular varieties : Co C 01061, 87 A 298, Co 6907
- c Fertilizers** : 112:100:120 NPK (Kg ha<sup>-1</sup>)
- d Intercultural operations** : Weeding as and when required and earthing up after 4 months after planting.
- e Irrigation** : At an interval of 10-15 days as per requirement
- f Plant protection measures** : Not applied.
- g Plot size** : Gross : 6m X 0.8 m X 4R= 19.2m<sup>2</sup>
- h Design** : RBD
- i Replications** : Three
- j Harvesting date** : 27/02/2015

## **7. Methods of recording observations :**

### **a Early shoot borer :**

The observations on the total number of shoots and number of dead hearts due to the early shoot borer were recorded at 30, 60, 90 and 120 days after planting and cumulative per cent incidence upto 120 DAP was worked out. Number of bored plants /ha was also recorded

### **b Internode borer :**

The observations were recorded at harvest on 25 randomly selected canes of each entry per replication. The per cent incidence, intensity of internode borer and infestation index were worked out.

## **8. Results of the previous year:**

During 2012-13, among three test entries, Co A 10 321 recorded less incidence of early shoot borer (3.25%DH) and highest was recorded in Co Or 10346 (21.79%) as against 15.92% DH in the check, 93 A 145. The incidence of internode borer was also less (20.97%) in Co A 10 321 whereas 51.22 % was recorded in the check, Co 86249. However, all the test entries showed least susceptible reaction towards early shoot borer (<15%DH) and found promising against early shoot borer.

During 2013-14, among three test entries in IVT (early), Co C 10 336 (16.38%DH) recorded highest incidence of early shoot borer whereas Co A 11 321 (12.50%) and Co A 11 323 (11.33%) recorded less incidence of early shoot borer as against 17.22% DH in the susceptible check, 93 A 145 (Co A 99082) and found promising against early shoot borer. All the entries found susceptible to internode borer.

## **9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc., :**

The data were presented in table 1a indicated that the differences due to various genotypes in respect of cumulative per cent incidence of early shoot borer and internode borer were statistically significant.

During 2014-15, in Initial varietal trial (early), out of four test entries, lowest cumulative per cent incidence of early shoot borer was recorded in Co A12 322 (6.91 %DH) and highest incidence was recorded in Co A 12 323 (12.85 %DH) as against 37.89%DH in susceptible check, 93 A 145 (Co A 99082). However, all the test entries found promising against early shoot borer as compared to the susceptible check, 93 A 145 (37.89 %). Internode borer incidence and intensity were also less in Co A 12 322 (26.67%, 1.83%) and more in Co A 12 323 (66.67%, 6.61%) (Table 1a).

Table 1a

## Reaction of zonal varieties /genotypes against insect pests of sugarcane in Anakapalle

Genotype		Early shoot borer incidence (%DH)						Internode borer (%)				Scale insect (%)			
IVT (early)	30 DAP	60 DAP	90 DAP	120 DAP	cumulative upto 120 DAP	Reaction	No. of bored plants/ha	Incidence (%)	Intensity (%)	Infestation index	Reaction	Incidence	Intensity	Infestation index	Reaction
<b>IVT (early )</b>															
Co A 12 321	3.71	3.2	3.05	0.56	9.63	LS	11420	40.00	2.77	1.11	MS	33.33	4.61	1.54	HS
Co A 12 322	0.68	3.25	2.18	0.00	6.91	LS	6790	26.67	1.83	0.49	MS	10.00	0.86	0.09	LS
Co A 12 323	4.69	2.89	3.18	0.42	12.85	LS	12963	66.67	6.61	4.41	MS	10.00	0.86	0.09	LS
Co V 12 356	6.03	5.64	2.85	0.44	12.70	LS	17901	56.67	5.19	2.94	HS	0.00	0.00	0.00	LS
Co 6907 *	3.35	3.13	3.08	0.96	4.17	LS	12963	36.67	3.58	1.31	MS	0.00	0.00	0.00	LS
Co C 01061*	7.31	2.73	4.34	0.40	14.14	LS	17284	56.67	5.19	2.94	HS	10.00	1.58	0.16	LS
93 A 145**	18.27	7.21	4.75	0.00	37.89	HS	32099	66.67	6.74	4.49	HS	13.33	0.96	0.13	MS
87 A 298***	5.30	2.00	0.45	0.52	9.32	LS	10185	66.67	5.99	3.99	HS	53.33	5.51	2.94	HS
SEd	0.93	0.52	0.82	NS	1.1			6.78	0.54			3.65	0.68		
CD (p=0.05)	2.00	1.11	1.76		2.36			15.1	1.2			0.14	1.51		
CV%	13.9	17.43	33.84		10.21			14.94	12.82			24.39	39.24		

\*Standard check in yield trials

\*\* Susceptible check for ESB

\*\*\* Susceptible check for scale insect & standard check in yield trials

**Project No 1** : **E 4.1 (2)**

**1.Title** : **Evaluation of genotypes for their reaction against major insect pests [AVT (early)].**

**2.Objective** : To grade the entries in the trial for their behaviour towards damage by key pest in the area.

**3.Year of start** : 1990-91

**4.Duration** : Long term

**5.Location** : Regional Agricultural Research Station, Anakapalle

**6.Project leader and her associates** : Dr. B.Bhavani, Senior Scientist (Entomology)  
Dr. M.Visalakshi, Senior Scientist (Entomology)  
Dr. M.Bharatha lakshmi, Principle Scientist (Sugarcane)

**Experimental Details :**

**A Date of Planting** : 9/03/2014

**B Varieties** : 03+04 =7  
Co C 10336, Co A 11321, Co A 323,  
Susceptible check, 93 A 145 (Co A 99082),  
Standard checks- Co C 01061, 87 A 298, Co 6907

**C Fertilizers** : 112:100:120 NPK (Kg ha<sup>-1</sup>)

**D Intercultural operations** : Weeding as and when required and earthing up after 4 months after planting.

**E Irrigation** : At an interval of 10-15 days as per requirement

**F Plant protection measures** : Not applied.

**G Plot size** : Gross : 6m X 0.9 m X 4R = 21.6m<sup>2</sup>

**H Design** : RBD

**I Replications** : Three

**J Harvesting date** : 29/01/2015

**7. Methods of recording observations :**

**1 Early shoot borer :**

The observations on the total number of shoots and number of dead hearts due to the early shoot borer were recorded at 30, 60, 90 and 120 days after planting and cumulative per cent infestation was worked out.

**2 Internode borer and scale insect:**

The observations were recorded at harvest on 25 canes in each genotype per replication. The per cent incidence and intensity of internode borer and scale insect were worked out.

**8.Results of the previous year:**

During 2013-14, among three test entries in IVT (early), Co C 10 336 (16.38%DH) recorded highest incidence of early shoot borer whereas Co A 11 321 (12.50%) and Co A 11 323 (11.33%) recorded less incidence of early shoot borer as against 17.22% DH in the susceptible check, 93 A 145 (Co A 99082) and found promising against early shoot borer. All the entries found susceptible to internode borer.

**9.Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc., :**

The data were presented in table 1c and 1d. From the table, it is seen that the differences due to various genotypes in respect of cumulative per cent infestation of early shoot borer and internode borer were statistically significant. It was observed that, there was no incidence of scale insects in all entries.

In AVT (early), out of three entries, Co C 10 336 recorded less incidence of early shoot borer (10.15%) and highest incidence was recorded in Co A 11 323 (14.45%) as against 17.58% DH in susceptible check, 93 A 145 (Co A 99082). However, all the three entries showed least susceptible reaction towards early shoot borer and found promising. Among test entries, Co A 11 323 recorded less incidence of internode borer (36.67%) and showed moderate susceptibility whereas highest incidence was recorded in Co C 10 336 (46.67%). However, all the entries showed susceptible reaction towards internode borer. Incidence of scale insect was 0% in Co A 12 323 and found less susceptible to scale insect. Remaining two test entries (Co C 10 336 & Co A 11321) recorded highest incidence and showed susceptible reaction towards scale insect (Table 1b).

Table 1b

## Reaction of zonal varieties/genotypes against insect pests of sugarcane in Anakapalle

Genotype	Early shoot borer incidence (%DH)						Internode borer (%)					Scale insect(%)				
	AVT (early)	30 DAP	60 DAP	90 DAP	120 DAP	cumulative upto 120 DAP	Reaction	No. of bored plants/ha	Incidence (%)	Intensity (%)	Infestation index	Reaction	Incidence	Intensity	Infestation index	Reaction
Co C 10 336		5.43	1.60	0.74	0.23	10.15	LS	9444	80.00	6.14	4.89	HS	50.00	3.33	1.67	HS
Co A 11 321		4.69	3.76	1.70	0.19	11.38	LS	14074	54.85	3.69	2.02	HS	46.67	5.36	2.50	HS
Co A 11 323		6.27	6.11	2.00	3.07	14.45	LS	8704	50.00	2.83	1.42	MS	0.00	0.00	0.00	LS
Co C 010 61*		7.55	1.11	0.93	0.00	11.29	LS	13704	20.00	1.55	0.31	LS	40.00	1.54	0.62	HS
Co 6907 *		7.35	5.15	0.49	0.00	13.54	LS	16111	10.00	1.19	0.12	HS	46.67	1.55	0.72	HS
93 A 145 **		6.90	4.32	1.27	5.00	17.58	MS	19074	63.33	3.36	2.13	HS	53.33	2.47	1.32	HS
87 A 298***		7.24	2.09	1.38	0.00	11.11	LS	14074	53.33	2.65	1.41	HS	63.33	5.38	3.41	HS
SEd		0.57	0.7	NS	NS	1.12			15.87	1.06			8.53	1.77		
CD (p=0.05)		1.24	1.53			2.44			17.11	18.71			11.58	6.20		

\*Standard check in yield trials

\*\* Susceptible check for ESB

\*\*\* Susceptible check for scale insect & standard check in yield trials

## II

- 1.Experiment No.2 : Project E 28**
2. Title : **Survey and surveillance of sugarcane insect pests.**
3. Objective : To identify key insect pests of sugarcane in the area.
4. Project leader and her associates : Dr. B. Bhavani, Senior Scientist (Entomology)  
Dr. M. Visalakshi, Senior Scientist (Entomology)
5. Year of start : 2003-04
6. Duration : Long term.
- Experimental Details :**
- a. Season : 2014-15

### **7. Methodology & observations recorded :**

Roving survey of sugarcane fields at 5-8km distance and different sugar factory operational areas in Andhra Pradesh.

Observations on incidence of borers were recorded by examining 100 canes at five places (four corners and in the middle), sucking pests by examining 20 canes. Sucking pests were recorded by examining 20 canes

### **8.Results of the previous year :**

During 2013-14, the early shoot borer incidence was highest in March-May planting which was ranged from 3.50 to 56.40 per cent. Maximum incidence was observed in late planted crop and in light soils due to high temperatures coupled with low relative humidity, unavailability of irrigation water and late onset of monsoon. The per cent incidence of internode borer in early planting ranged from 15.40 to 85 per cent. Though, the incidence of internode borer appeared so highly, its intensity ranged from 2.66-10.50 per cent only. Moderate to severe incidence of red mite (3.66 to 57 %) was observed during the months of May, June and July months due to high temperature and late onset of monsoons. The incidence of leafhoppers, *Pyrilla perpusilla* ( 4-11 A & N / leaf) and *Proutista moesta* (3-10/ leaf) were observed from June to September months. Whitefly population (5.33-27.66/square inch) was observed in some pockets of sugarcane growing area due to inundation of flood water. The incidence of scale insect ranged from low to traces during 2013 due to high rainfall received after cane formation stage. Top shoot borer incidence was ranged between 0.20 to 3.0 % in different sugar factory areas of Andhra Pradesh during 2013-14.



**9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc., :**

During 2014-15, roving surveys were done in operational areas of different sugar factories and observed that early shoot borer and internode borer were major insect pests which caused economic yield losses in Andhra Pradesh. During the surveys it was observed that due to hot weather and late onset of monsoon rains, the early shoot borer incidence was highest in February-April planted crop which was ranged from 6.0 to 48.0 per cent on all popular sugarcane varieties. Maximum incidence was observed in March-April planted crop due to high day temperatures prevailed during the months of May and June, 2014. The per cent incidence of internode borer ranged from 20.0 to 80.0 per cent during June to October months on all popular varieties of sugarcane. Moderate to severe incidence of red mite (2.0 to 40.0 %) was observed during the months of April-July months due to high temperature and low relative humidity. Low to moderate incidence of mealy bug (4.0-20.0%) was observed during the months of May-June due to high temperature, drought and late onset of monsoon. *Pyrilla* incidence (3A&N/ plant) was recorded in month of August and reached its peak level of 17A & N/leaf in the month of September and thereafter the incidence was decreased in October due to Hud-hud cyclone. Earlier *Pyrilla* was a minor pest but in recent years it has attained major pest status in some pockets of Andhra Pradesh. It was observed mostly during the months of August to November on mature sugarcane crop. Along with *Pyrilla* population, *Epiricanea* parasitisation (1-5%) was also observed.. The incidence of other pests like grasshopper, whitefly, white woolly aphid and derbids were also observed on different popular varieties viz., 87 A 298, 83 V15, 86 V 96, 2001 A 63, 93 A 145, C0 86032 etc. All the sugarcane crop in Srikakulam, Vizianagaram and Visakhapatnam was lodged due to cyclone during the month of October. The scale insect incidence was low to traces during 2014 due to Hud-Hud cyclone during the month of October, 2014. The top borer incidence was very low (1-5%) in different sugar factory areas of Andhra Pradesh and it is mostly observed on mature sugarcane crop during November- December months (Table 2).

**Table 2 Survey and surveillance of sugarcane insect pests(E.28)**

S. No.	Variety	Location	Name of the pest	% incidence or population			Remarks
				Min.	Max.	Aver.	
1	87 A 298, 86 V96, 2003 V 46 Co 86032	Navabharat Ventures Pvt., Ltd., Samalkot, East Godavari district	Early shoot borer	6.00	26.00	16.00	Incidence of early shoot borer and internode borer were high on variety, Co 86032. Moderate to high incidence of scale insect was observed on variety, 87 A 298 (Viswamitra) both on plant and ratoon crops.
			Root borer	1.00	3.00	2.00	
			Top shoot borer	2.00	5.00	3.50	
			Internode borer	20.00	70.00	45.00	
			Pyrilla/leaf	8.00	17.00	12.50	
			<i>Epiricania melanoleuca</i> /plant	3.00	5.00	4.00	
			Whitefly ( per 2.5sq.cm.)	10.33	18.33	14.33	
			Woolly aphid (Average grade)	1	2	1.5	
			Scale insect (incidence	10.00	60.00	35.00	
			Mealy bug (%incidence)	14.00	20.00	17.00	
			Red Mite (% incidence)	2.00	21.00	15.00	
			Termite (% incidence)	15.00	30.00	22.50	
			Derbid planthopper/leaf	3.00	11.00	7.00	
Sugarcane grass hopper, <i>Hieroglyphus banian</i>	1-2/clump	3-4/clump					
2	Co7219, 87 A 298 , Co 62175, Co7805	Chodavaram sugar factory operational area, Visakhapatnam dt.	Early shoot borer (% incidence)	12.00	46.00	29.00	On variety, Co 62175 red rot incidence was observed along with severe incidence of internode borer
			Internode borer (% incidence)	20.00	80.00	50.00	
			<i>Pyrilla</i> /leaf	4.00	11.00	7.50	
			<i>Epiricania melanoleuca</i> /plant	1.00	3.00		
			Whitefly ( per 2.5sq.cm.)	5.33	21.00	2.00	
			Mealy bug (%incidence)	5.00	10.00	7.50	
			Woolly aphid (Average grade)	1.00	1.00	1.00	
			Scale insect	5.00	10.00	7.50	
			Red mite	5.00	40.00	22.50	
Termite (% incidence)	13.00	24.00	18.50				
3	87 A 298, 2001 A	Thummapala	Early shoot borer	9.00	46.00	27.50	Due to Hud-hud cyclone

	63, 93 A 145, Co7219,Co7805	Sugar factory area, Anakapalle, Visakhapatnam district	Internode borer	15.00	80.00	47.50	scale insect was washedout. But at harvest stage of the crop, scale insect incidence was observed (Feb,15).
			<i>Pyrrilla</i> /leaf	5.00	13.00	9.00	
			Whitefly	13.33	16.67	15.00	
			Termite (% incidence)	8.00	15.00	11.50	
			Derbid planthoppers/leaf	7.00	17.00	12.00	
			Mealybug( %incidence)	4.00	10.00	7.00	
			scale insect(% incidence)	5.00	30.00	17.50	
			Red mite	5.00	16.00	10.5	
4	87 A 298, Co62175, 2001 A 63	Bhimasingi sugar factory area, Vizianagaram district	Early shoot borer (% incidence)	12.00	48.00	30.00	Moderate to severe incidence of white grub and termite were observed in some pockets of Vizianagaram district of A.P.
			Internode borer (% incidence)	20.00	70.00	45.00	
			<i>Pyrrilla</i> /leaf	3.00	13.00	8.00	
			Red Mite (% incidence)	12.00	30.00	21.00	
			Whitefly(%incidence)	14.33	21.33	17.83	
			White woolly aphid (average grade)	2	2	2	
			scale insect (incidence)	5	10	7.50	
			Termite (% incidence)	20.00	40.00	30.00	
			White grub (no .of grub/ha)	4000	6000	5000	
			Derbid planthoppers/ leaf	5.00	11.00	8.00	
<i>Pyrrilla</i> per leaf	2.00	12.00	7.00				
5	87 A 298, 93 A 145, 2001 A 63	Etikoppaka sugar factory operational areas	Early shoot borer	18.00	34.00	26.00	High incidence of early shoot borer and internode borer were observed on variety, Co 86032. Moderate to high incidence of scale insect was observed on variety 87 A 298 (Viswamitra) both on plant and ratoon crops.
			Root borer	1.00	3.00	1.50	
			Top shoot borer	2.00	3.00	2.50	
			Internode borer	20.00	50.00	35.00	
			<i>Pyrrilla</i> /leaf	8.00	11.00	9.50	
			<i>Epiricania melanoleuca</i> /plant	1.00	3.00	2.00	
			Whitefly ( per 2.5sq.cm.)	16.33	18.33	17.33	
			Woolly aphid (Average grade)	1	1	1	
			Scale insect (incidence)	5.00	10.00	7.50	
			Red mite (%incidence)	14.00	22	18.00	

- 1.Experiment No.3** : **Project E 3**
- 3. Title** : **Monitoring of insect pests and bio-agents in agro ecosystem.**
- 4. Objective** : To monitor the key insect pests and natural enemies in the area.
- 5. Project leader and her associates** : Dr. B. Bhavani, Senior Scientist (Entomology)  
Dr. M. Visalakshi, Senior Scientist (Entomology)
6. Year of start : 2006-07
7. Duration : Long term.

- Experimental Details** :
- 1 Season : 2014-15
- 2 Plot size : 0.5ac
- 3 Design : Bulk plot
- 4 Date of planting : 07-3-2014
5. Date of harvest : 14-2-2015

**Observations recorded :**

1.Observations on incidence of borers were recorded by examining 100 canes at five places (four corners and in the middle), sucking pests by examining 20 canes.

**8.Results of the previous year :**

During 2013-14, the infestation of early shoot borer (2.33%) was noticed in 13 SW (i.e. 3<sup>rd</sup> week of March) and the maximum incidence (38.60%) was noticed in 21SW (i.e. 3<sup>rd</sup> week of May). Red mite infestation (3.0 to 40.0%) was observed from 13<sup>th</sup> SW (i.e. 3<sup>rd</sup> week of March) to 25<sup>rd</sup> SW (3<sup>rd</sup> t week of June). Incidence of internode borer was noticed at 26<sup>th</sup> SW (2.6%) and the maximum incidence of internode borer was noticed in 35<sup>th</sup> SW i.e., last week of August (80.40%). Scale insect incidence was observed from 52th SW (0.33%) and highest incidence was observed during last week of February (9.33%). The per cent parasitism of *T. chilonis* on early shoot borer eggs was ranged between 0.33 to 4.80 during March –April months(Table 3a). The bio-agent, *Euborellia annulipes*, an earwig (Ord. Dermaptera) was predatory on eggs and early instar larvae of early shoot borer was noticed on plant and ratoon crop in the early stage. Certain natural collections of *T.chilonis* and *S. inferens* were also found in the ecosystem. In addition to these regular predator, *Epiricania melanoluca* parasitism was observed on adults of *Pyrilla* on underside of the sugarcane leaves

**9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc., :**

Sugarcane variety, 93 A 145 (Co 99082) was planted in 0.2ha area on 7-3-14 with an objective to record insect pests and their natural enemies occurred during 2014. Early shoot borer incidence was observed from 13MW, i.e during the last week of March (4.0%) and the maximum incidence was noticed during the month of May (26.00%) and decreased thereafter due to scattered rainfall received during the crop period. Internode borer incidence was noticed from June month onwards (1.60%) and maximum incidence was observed in the month of November, 2014( 48.90%).Sucking pest, red mite incidence was observed from March month (1.80%) and peak incidence was recorded in 31MW i.e in the last week of July (42.60%). Peak incidence of whitefly ( 19.25N & P/2.5sq.cm of leaf) was observed in 43<sup>rd</sup> MW in the month of October. Peak incidence of *Pyrilla* and *Proutista moesta* were observed during 43<sup>rd</sup> MW along with parasitisation of *Epiricania melanoluca* and *Tetrastichus pyrillae* (12%). Peak incidence of scale insect (18.0%) was observed at maturity stage i.e during January,2015. Incidence of mealybug (3%) was recorded during 26MW and it was reduced due to scattered rainfall received during July month (Table 3a, 3b, 3c).

The bio-agent, *Euborellia annulipes*, an earwig (Ord. Dermaptera) was predatory on eggs and early instar larvae of early shoot borer was noticed on plant and ratoon crop in the early stage. . Certain natural collections of *T.chilonis* (0.74- 3.80%) and *Stenobracon* sp on early shoot borer, *sturmiapsis inferens* and *Apanteles flavipes* on internode borer larvae, *Epiricania melanoluca* on cocoons and eggs of *Pyrilla* on underside of the sugarcane leaves and *Tetrastichus pyrillae* on egg stages of *Pyrilla* were observed. *Pharoscyms horni*, a coccinellid predator were also noticed in the leaf sheaths infested with pink mealy bug, *Saccharicoccus sacchari*. *Coccinella septempunctata* and *Cheilomenes sexmaculata* were found to be predating on aphids and mealybugs of sugarcane. (Table 3b)

**Table 3a. Monitoring of insect pests and bio-agents in Sugarcane agro-ecosystem**

Period of observation Date/SMW	% incidence of early shoot borer	Parasites/predators observed on ESB			% incidence of Internode borer	% Parasitism (INB),		
		<i>T. chilonis</i> (% parasitism)	<i>E. annulipes</i>	<i>Stenobracon</i> sp (% parasitism)		<i>T. chilonis</i>	<i>S. inferens</i>	<i>Apanteles flavipes</i>
26-3-14 /13MW	4.00	0.74	5-8/clump	-	-	.-	-	-
24-4-14 /18MW	13.00	3.80	5-6/clump	-	-	-	-	-
23-5-14 /22MW	26.00	2.10	4-3/clump	0.60	-	-	-	-
24-6-14 /26MW	23.00	1.60	1-3/clump	1.30	1.60	traces	-	-
25-7-14 /31MW	--	-	--	--	4.30	--	traces	-
23-8-14 /35MW	-	-	--	--	16.80		1.00	-
23-9-14 /39MW	--	-	-	-	28.00	1.00	1.66	1.00

22-10-14/43MW	-	-	2-3/cane	-	39.70	traces	1.33	1.00
21-11-14/48MW	-	-	2-3/cane	-	48.90	-	traces	1.80
23-12-14/52MW	-	-	-	-	17.40	-	-	3.20
4-1-15/1MW	-	-	-	-	4.33	-	-	7.10

**Table 3b . Monitoring of sucking pests in Sugarcane agro-ecosystem**

Period of observation Date/SMW	Red mite incidence (% incidence)	Mealy bug		White fly (population/ 2.5sq.cm)	<i>Ascharsonia</i> sp.	% incidence of Scale insect
		% incidence	% intensity			
25-3-14/12MW	1.80	-	-	-	-	-
24-4-14/18MW	11.00	-	-	-	-	-
23-5-14/22MW	18.60	--	-	-	-	-
24-6-14/26MW	33.00	3.0	0.70%	-	-	-
25-7-14/31MW	42.60	.0	1.50%	-	--	-
23-8-14/35MW	6.50	Traces	Traces	-	-	-
23-9-14/39MW	--	-	-	traces	-	-
22-10-14/43MW	-	-	-	19.25N&P	-	traces
21-11-14/48MW	-	-	-	13.30 N &P	-	2.60
23-12-14/52MW	-	-	-	6.40 N & P	2.80	5.33
4-1-15/1MW	-	--	-	-	6.00	18.00

A=Adults; N= Nymph; P= Puparia

**Table 3c Monitoring of *Pyrilla*/Derbids and its bio agents in sugarcane agro-ecosystem**

Period of observation Date /SMW	Incidence of <i>Pyrilla perpusilla</i>			Derbid ( <i>Proutista moesta</i> Adults /leaf)	%Parasitization on <i>Pyrilla</i>			<i>Tetrastichus pyrillae</i>
	No. of adults/ leaf	No. of Nymphs/leaf	No .of egg mass/ leaf		<i>Epiricania melanoleuca</i>			
					Cocoon	Egg mass	Adults	
25-3-14/12MW	-	-	-	-	-	-	-	-
24-4-14/18MW	-	-	-	-	-	-	-	-
23-5-14/22MW	0.13	-	-	-	-	-	-	-
24-6-14/26MW	1.25	3.15	0.4	2.00	-	-	-	-
25-7-14/31MW	1.80	4.30	2.15	1.80	-	-	-	-
23-8-14/35MW	2.15	5.90	3.60	2.10	-	-	-	4.0
23-9-14/39MW	2.80	6.30	5.50	3.60	1	0.80	1	9.0
22-10-14/43MW	4.45	8.15	6.40	4.20	2.30	4.60	2.40	12.0
21-11-14/48MW	2.05	2.60	3.20	2.10	3.60	2.80	3.10	3.0
23-12-14/52MW	0.80	1.20	1.20	0.20	2.10	Traces	-	Traces
4-1-15/1MW	0.40	0.20	-	-	-	-	-	-

#### IV

- Experiment No. 4** : Project E. 33
- 1.Title** : Bio-efficacy of insecticides against mealy bugs in sugarcane
- 2.Objective** : To evaluate efficacy of insecticides against mealy bugs in sugarcane.
- 3. Project leader and** : Dr. B. Bhavani, Senior Scientist (Entomology)  
her associates : Dr. M. Visalakshi, Senior Scientist (Entomology)
- 4. Year of start** : 2011-12
- 5. Location** : Regional Agricultural Research Station, Anakapalle
- 6. Experimental Details** :
- a. **Design** : RBD
- b. **Replications** : Three
- c. **Plot size** : 6.0 x 5.4 m
- d. **Planting date** : 05/03/2014
- e. **Variety** : 93 A 145 (Co A 99082)
- f. **No. of treatments** : 9
- g. **Date of harvest** : 31/01/2015

<b>Treat No.</b>	<b>Name of the treatment</b>
1	Sett treatment of imidacloprid 70 WG / SP 25 g a.i./ha + spraying of imidacloprid 17.8 SL 0.005%
2	Sett treatment of imidacloprid 70 % WG / SP 25 g a.i./ha + spraying of thiamethoxam 25WG 0.004%
3	Sett treatment of Imidacloprid 70 % WG / SP 25 g a.i./ha + spraying of clothianidin 50 WSG 0.004%
4	Sett treatment of imidacloprid 70 % WG / SP 25 g a.i./ha + spraying of acetamaprid 20 SP 0.004%
5	Sett treatment of thiamethoxam 70 WG / SP 10 g a.i./ha + spraying of imidacloprid 17.8 SL 0.005%
6	Sett treatment of thiamethoxam 70 WG / SP 10 g a.i./ha + spraying of thiamethoxam 25 WG 0.004%
7	Sett treatment of thiamethoxam 70 WG / SP 10 g a.i./ha + spraying of clothianidin 50 WSG 0.004%
8	Sett treatment of thiamethoxam 70 WG / SP 10 g a.i./ha + spraying of acetamaprid 20 SP 0.004%
9	Untreated Control



## Method of Application :

Dose of a.i. is based on 35000 three eye bud setts. Spraying will be done at the time of cane formation (Approximately 4-5 months after planting).

## 7. Method of observation :

- Germination percentage at 35 DAP

## 8. Results of previous year:

During 2013-14, sett treatment was done with different test insecticides before planting and the per cent germination was ranged from 87.82 to 92.50 in different insecticidal treatments whereas in untreated control it was 73.90%. Mealybug incidence was not observed in experimental field due to heavy down pore after cane formation stage due to neelam thufan. Hence, the trial is vitiated at Regional Agricultural Research Station, Anakapalle

## 9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc., :

Sett treatment with different insecticides were done at the time of planting. But mealybug incidence was negligible in the experimental plot during 2014-15. Hence, foliar sprays were not imposed in the experimental plot. Due to heavy rainfall received during October month the mealybug population was washed-out. Hence, the trial was vitiated.

<b>S.No.</b>	<b>Treatment</b>	<b>Germination (%)</b>
1	Sett treatment with imidacloprid 70% SP @ 25 g a.i./ha + spraying of imidacloprid 17.8SL @ 0.005%	90.60
2	Sett treatment with imidacloprid 70% SP @ 25 g a.i./ ha + spraying of thiamethoxam 25 WG @ 0.004%	89.44
3	Sett treatment with imidacloprid 70% SP @ 25 g a.i./ ha + spraying of clothianidin 50 WSG @ 0.004%	88.00
4	Sett treatment with imidacloprid 70% SP @25 g a.i./ ha + spraying of acetamiprid 20 SP @ 0.004%	88.40
5	Sett treatment with thiomethoxam 70%SP @ 10 g a.i./ ha + spraying of imidacloprid 17.8SL @ 0.005%	88.82
6	Sett treatment with thiamethoxam 70%SP @ 10 g a.i./ ha + spraying of thiamethoxam 25 WG @ 0.0045%	88.50
7	Sett treatment with thiamethoxam 70%SP@ 10 g a.i./ ha + spraying of clothianidin 50 WSG @ 0.004%	88.50
8	Sett treatment with thiamethoxam 70%SP @ 10 g a.i./ha + spraying of acetamiprid 20 SP @ 0.004%	90.00
9	Untreated control	73.30
	CD (0.05)	6.32
	CV%	13.40

- Expt No.5** : **Project E.34**  
**1.Title** : Standardization of simple, cost effective techniques for mass multiplication of sugarcane bioagents (*Beauveria bassiana*).  
**2.Objective** : To develop simple and cost effective mass multiplication techniques of promising bio- agents of the area.  
**3. Year of start** : **2012-13**  
**4 .Location** : Regional Agricultural Research Station, Anakapalle  
**5. Project leader and her associates** : Dr. B. Bhavani, Senior Scientist (Entomology)  
Dr. N.Raj Kumar, Scientist (Plant Pathology)  
Dr. M.Visalakshi, senior Scientist (Entomology)

**6.Experimental Details :**

**7. Methodology adopted :**

**Simple and cost effective host media for multiplication of insect pathogen, *Beauveria bassiana***

Mycelial discs of *Beauveria* were inoculated in PDA broth supplemented with 1% yeast extract and incubated at 26 °C for 48 h with shaking at 180 rev min<sup>-1</sup>.

The mass culturing of *Beauveria* is being done on yeast broth as well as on solid medium (whole grains) supplemented with 1% yeast extract.

Yeast broth was made by mixing 20g of brewer's yeast and 20g of sucrose in one liter of water. The mixture was dispensed into 250ml conical flasks and three replications (flasks) maintained then plugged loosely with a bung of non-absorbent cotton wool and autoclaved at 121<sup>0</sup> C, 15 psi for 40 minutes. After cooling, each flask was inoculated with loopful spores from *B. bassiana* culture and were then incubated at room temperature (25 ± 5<sup>0</sup>C), on a rotary shaker revolving at 150 rpm for 72 hours as described (Jenkins *et al.* 1998) for production of spores.

**Whole grain media**

Grains are cheap, easily available and act a best nutritive media for the mass multiplication of many micro and macro organisms. Hence, five whole grains viz., rice, ragi, sorghum, pearl millet and maize are used for estimating the sporulation of *B. bassiana* at 28<sup>0</sup> c. 100 g of each grain are washed well and soaked in water overnight except rice and pearl millet which are soaked for 2-3 hours prior to starting the experiment. The excess water is drained by decanting and shade drying it for half an hour to further remove the excess moisture. Three replications maintained for each grain. The grains are packed separately in individual 500 ml flask for *B. bassiana*. They are plugged with cotton wool and autoclaved at 15psi for 1 hour. After cooling, 1ml of the spore suspension of fungal pathogen is inoculated in to each bottle, separately. All these procedures are done under laminar air flow chamber. They are incubated in BOD incubator at 28<sup>0</sup>c for 15 days. To avoid clumping, after 7 days of inoculation, the flasks and bottles are shaken vigorously to separate the grain and to break the mycelia mat. After 15 days of incubation,10g homogenous grain sample drawn from each replicate uniformly sporulating bottle/ flasks are transferred to 100 ml sterilized distilled water containing Tween 80 (0.05%) solution in 250 ml conical flasks. The flasks are shaken in mechanical shaker for 10 min. The suspension is made after the serial dilution

of the suspension using double ruled Neubauer hemocytometer for determining the number of conidia in 1 g of the cereal grains.

### 8. Results of previous year:

During 2013-14, among the whole grains tested, *B. bassiana* spore production was significantly higher on rice ( $11.28 \times 10^8$ ) and found to be the suitable media for the spore production followed by ragi ( $10.76 \times 10^8$ ) and sorghum ( $10.28 \times 10^8$ ) and lowest spore production was recorded in maize ( $9.48 \times 10^8$ ).

### 9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc., :

During 2014-15, mass culturing of *Beauveria* on different solid media was tried and the results indicated that among the solid media, par boiled rice produced highest spore count of  $12.40 \times 10^8$  per 100 gm with less biomass (0.11g/ 100gm) and found as the best suitable medium for mass culturing of *Beauveria bassiana* (Table 5).

**Table 5. Spore ( $\times 10^8$ ) and biomass production (g) of entomopathogenic fungi, *B. bassiana* on different whole grains.**

Media	Spore count ( $\times 10^8$ ) per 100gm	Biomass (g) per 100gm
Parboiled rice	12.40	0.11
Rice	10.80	0.17
Sorghum	10.09	0.65
Pearl millet	8.90	0.61
Ragi	11.12	0.70
Maize	8.98	0.63
Rice bran	5.95	0.31
CD(p=0.05)	0.53	0.04
CV%	1.66	5.32

- Expt No.6** : **Project E 36**  
**1.Title** : **Management of borer complex of sugarcane through lures.**
- 2. Objective** : To manage sugarcane borers (early shoot borer, top borer, internode borer and stalk borer) through pheromone traps.
- 3.Year of start** : **2012-13**
- 4.Location** : Regional Agricultural Research Station, Anakapalle
- 5. Project leader and her associates** : Dr. B. Bhavani, Senior Scientist (Entomology)  
Dr. M.Visalakshi, Senior Scientist (Entomology)
- 6.Experiemment details :**
- 1 Season : 2014-15
  - 2 Plot size : 1 acre
  - 3 Variety : 93 A 145 ( Co A 99082)
  - 4 Planting Date : 05/04/ 2014
  - 5 Harvesting Date : 02/03/2015
- Treatment details** : Pheromone lures of sugarcane early shoot borer and internode borer
- Plot Size** : Two blocks, each of minimum half acre. In first block, trap should installed and the second be kept a such (control). In between both blocks, at least one acre sugarcane crop should be taken to avoid the pheromone effect.
- Methodology adopted** : ➤ The test insect pests at RARS, Anakapalle were early shoot borer and internode borer,.  
➤ Five pheromone traps for ESB and internode borer were installed in the second fortnight of March till harvest of crop in one acre of sugarcane crop.  
➤ The pheromone lures were changed after 1 month.
- Observation recorded** : ➤ Observations on number of moths trapped recorded at weekly interval.  
➤ The mean number of moths captured were worked out.  
➤ The correlation of moth captures were worked out with weekly meteorological parameters.  
➤ Infestations of each borer were recorded in both blocks.

## **8. Results of the Previous year:**

The plot with pheromone traps installed @ 10traps/acre + Trichocards released at 7 days interval for six times (T2) followed by T1 (where pheromone traps @ 10traps/acre were installed for mass trapping of adult moths of ESB as well as INB) recorded lowest cumulative incidence of early shoot borer (3.92%, 8.33%) as against 26.94% in untreated control (T3). Low per cent incidence (6.33%, 11.30%) and intensity (3.66%, 5.40%) of internode borer was recorded in T2 and T1 compared to untreated plot (84.2% incidence and 15.40% intensity of internode borer). Highest cane yield was recorded in plot with pheromone traps @10/acre + Trichocards@20,000/ac (96.42t/ha) followed by pheromone traps@10/acre alone (89.50t/ha) as compared to control plot (85.50t/ha)

## **9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc.,**

During 2014-15, the experiment was laid out during 1<sup>st</sup> week of April and the early shoot borer moth catches were started from 16<sup>th</sup> MW(3<sup>rd</sup> week of April). The highest number of moth catches (172 moths per 5 traps/week) were recorded in 22<sup>nd</sup> MW when the maximum, minimum temperature was 35.7<sup>o</sup>C and 24.4<sup>o</sup>C and at 88% & 64% RH respectively, and the high moth catches were continued upto last week of June,15 due to late onset of monsoon. The internode borer (INB) moth catch was started in 21<sup>th</sup> MW (1moth/ trap/week) and the maximum INB moth catch was recorded in 34<sup>th</sup> MW(161 moths/ 5 traps/week) when the maximum, minimum temperatures and morning , evening RH were 34.6<sup>o</sup>C, 21.6<sup>o</sup> C and 92 &76 %, respectively. Afterwards, the moth catches decreased up (Table 6a).

Studies on association of early shoot borer and internode borer moth catches with weather parameters indicated that maximum ( $r = 0.69$ ), minimum( $r = 0.53$ ) temperature and evaporation ( $r = 0.79$ ) showed positive correlation with early shoot borer moth catches whereas evening ( $r = 0.60$ ), morning ( $r = 0.46$ ) relative humidity and number of rainy days showed positive correlation with internode borer moth catches in pheromone traps(Table 6b).

In management of borer complex of sugarcane through lures, the plot with pheromone traps installed @ 10traps/acre (T1) reduced the incidence of early shoot borer (13.33%) and internode borer (19.0%) as compared to control plot (36.94%, 34.60%) and recorded per cent reduction of 63.91% and 45.87% respectively, over control. Highest per cent sucrose (16.60%) and cane yield (71.70 t/ha) were recorded in Plot with pheromone traps (T1) as against 15.98% and 68.50t/ha respectively, in plot without pheromone traps (Table 6c).

SMW	Date	Pheromone trap catches/ week/ 5 traps		Temperature (°C)		Relative humidity (%)		Evaporation (mm)	Rainy days	Rainfall	Sunshine
		ESB	INB	Max	Min	Morn	Evening				
14	02.4.14	0	0	36.4	18.4	87	49	5.8	0	0	8.2
15	9.4.14	0	0	36.4	21.4	89	50	5.5	0	0	7.0
16	16.4.14	14	0	36.8	22.1	86	50	5.1	0	0	5.8
17	23.4.14	32	0	37.9	23.6	83	49	5.8	0	0	7.0
18	30.4.14	48	0	36.8	21.4	81	59	6.3	3	20.4	7.6
19	7.5.14	89	0	35.6	22.6	84	58	6.6	1	66.8	9.0
20	14.5.14	137	0	39.2	23.9	84	55	5.4	0	0	7.3
21	21.5.14	164	1	31.7	23.3	84	54	5.3	1	25.6	6.7
22	28.5.14	172	1	35.7	24.4	88	64	4.4	1	3	6.4
23	4.6.14	159	2	36.9	23.9	87	61	4.7	1	27.6	7.4
24	11.6.14	114	1	40.8	25.3	68	39	5.0	1	3	6.9
25	18.6.14	113	2	37.9	24.5	92	53	6.1	1	12.4	7.1
26	25.6.14	129	3	36	24.1	88	61	5.3	1	6	3.3
27	2.7.14	77	5	38.3	23.6	84	56	4.5	2	23.6	1.8
28	9.7.14	47	8	32.9	22.4	96	79	3.7	2	32	3.7
29	16.7.14	30	10	30.3	22.8	98	82	2.0	1	13.8	1.6
30	23.7.14	23	13	32.1	22.2	97	77	1.7	2	24.6	0.1
31	30.7.14	11	15	32.4	23.2	97	69	3.1	2	17.6	3.2
32	6.8.14	3	39	35.5	22.6	95	62	2.4	2	36.2	1.6
33	13.8.14	1	68	33.8	22.6	98	80	4.2	3	21	5.2
34	20.8.14	0	161	34.6	21.6	92	76	2.6	2	45.2	4.6

35	27.8.14	1	123	29.3	21.4	97	88	3.3	7	16.4	8.1
36	03.09.14	0	92	32.5	22	91	77	1.8	1	13.8	0.4
37	10.09.14	0	86	33.7	22.5	93	68	2.9	1	12.6	3.5
38	17.09.14	0	65	32.3	22.1	95	68	4.8	4	68.2	4.8
39	24.09.14	0	30	34.6	21.9	91	59	2.1	-	2	4.0
40	01.10.14	0	23	34.4	21.6	90	65	4.0	3	14	6.8
41	08.10.14	0	34	32.4	21.4	87	58	4.4	3	232.6	7.1
42	15.10.14	0	23	-	-	-	-	3.3	3	51.4	2.4
43	22.10.14	0	25	30.2	21.8	87	71	3.9	1	18.4	6.7
44	29.10.14	0	14	31.4	20.4	84	47	3.5	-	-	7.4
45	05.11.14	0	14	31.9	20.2	84	52	3.6	1	-	5.4
46	12.11.14	0	15	32.5	21.6	90	68	2.9	2	-	3.9
47	19.11.14	0	7	32.4	19.5	88	53	3.0	-	-	5.5
48	26.11.14	0	8	31.7	16.4	79	35	3.1	-	-	6.2
49	03.12.14	0	6	32.3	17.5	83	40	3.6	-	-	7.1
50	10.12.14	0	6	31.1	19.7	92	54	3.7	-	-	7.8
51	17.12.14	0	6	29.7	15.9	82	40	3.0	-	-	3.3
52	24.12.14	0	7	29.9	17.7	84	51	3.4	-	-	5.9
1	01.01.15	0	8	30.7	21.8	88	58	3.7	-	-	5.6
2	08.01.15	0	6	31.3	16.5	82	36	2.7	-	-	5.7
3	15.01.15	4	0	31.1	15.6	85	37	3.5	-	-	7.9
4	22.01.15	2	0	31.5	15.5	82	43	3.7	-	-	7.9
5	29.01.15	5	0	32.8	14.7	87	44	3.3	-	-	8.5

**Table 6b Association between weekly ESB & INB moth catches in pheromone traps and weather parameters**

Weather parameters	Early shoot borer moth catch	Internode borer moth catch
Rainfall	-0.20	0.07
No. of rainy days	-0.18	0.58
Max. temp (°) C	0.69	-0.19
Min. temp (°) C	0.53	0.13
Morning RH (%)	-0.33	0.46
Evening RH (%)	-0.14	0.60
Evaporation (mm)	0.79	-0.22

ESB- Early shoot borer, INB- Internode borer

**Table 6c. Impact of mass trapping of early shoot borer and internode borer moths through pheromone lures on the incidences of ESB and INB**

Treatment	Incidence of early shoot borer upto 120 DAP					Internode borer (%)				
	45 DAP	60 DAP	90 DAP	120 DAP	Cumulative upto 120 DAP	Incidence (%)	Intensity (%)	Infestation index	Sucrose (%)	Cane yield (t/ha)
Plot with Pheromone traps installed@ 10traps/acre	3.60	10.40	4.00	0	13.33	19.00	1.20	0.23	16.60	71.70
Plot without pheromone traps (Untreated control)	12.00	19.60	7.00	3.50	36.94	34.60	10.00	4.46	15.98	68.50
<b>Per cent reduction over control</b>					<b>63.91</b>	<b>45.87</b>				



- Expt No.6** : **Project E 37**  
**1.Title** : **Bioefficacy of new insecticides for the control of sugarcane early shoot borer**
- 2. Objective** : To find out effective strategy for the management of sugarcane early shoot borer.
- 3. Year of start** : **2013-14**
- 4. Location** : **Regional Agricultural Research Station, Anakapalle**
- 5. Project leader and her Associates** : Dr. B. Bhavani, Senior Scientist (Entomology)  
Dr. M.Visalakshi, Senior Scientist (Entomology)

**6 Experimental detail :**

- a. Design** : RBD  
**b. Plot size** : 6 X 0.9m X6R (Gross plot size)  
**c. Variety** : 93 A 145 (Co A 99082)  
**d. Date of Planting** : 05/03/2014  
**e. Date of harvesting** : 31/01/2015  
**f. Treatments** : 8

1. Soil application of fipronil 0.3G @25kg/ha at the time of planting and 60 DAP
2. Soil application of chlorantraniliprole 0.4G@22.5kg/ha at the time of planting and 60 DAP
3. Spraying of chlorantraniliprole18.5SC @375ml/ha at 30 and 60 DAP
4. Spraying of spinosad 45SC @90ml/lit at 30 and 60DAP
5. Spraying of flubendiamide @250ml/ha at 30 and 60 DAP
6. Soil application of phorate 10G @15kg/ha at the time of planting and 60 DAP
7. Soil application of carbofuran3G @33kg/ha at the time of planting and 60 DAP
8. Untreated control

**7. Observation recorded:**

- a. Data on germination recorded at 30 DAP
- b. Incidence of early shoot borer recorded at 30, 45, 60, 90 and 120 days after planting.
- c. Tillering per cent at 120 DAP
- d. Data on single cane weight, cane height & girth were recorded.
- e. Data on cane yield and juice quality were also recorded at harvest

## 8. Results of the previous year:

During 2013-14, among the test insecticides, soil application of chlorantraniliprole 0.4G (Ferterra)@22.5kg/ha at the time of planting and 60 DAP recorded less cumulative incidence of ESB (14.86%) as compared to untreated control(43.15%). Highest cane yield was recorded in chlorantraniliprole 0.4G@22.5kg/ha(99.10t/ha) followed by fipronil 0.3G @ 25kg/ha (97.76t/ha) and flubendiamide 20 SC @250ml/ha (97.64t/ha).

## 9. Results of the current year with tables, clearly indicating the details regarding name of the pest, insecticidal sprays etc.,

During 2014-15, incidence of early shoot borer (11.47%) was significantly reduced in chlorantraniliprole 0.4G @ 22.5 kg/ha applied at the time of planting and 60 DAP as compared to untreated control (32.67%) which was statistically on par with chlorantraniliprole 18.5SC @ 375ml/ha (12.76%), fipronil 0.3G @25 kg/ha (13.47%) and flubendiamide 20 SC @250ml/ha (15.00%). Highest cane yield was recorded in chlorantraniliprole 0.4G @ 22.5kg/ha (71.04 t/ha) and it was statistically on par with chlorantraniliprole 18.5SC @ 375ml/ha (69.82 t/ha) and flubendiamide 480SC @ 250 ml/lt (70.10 t/ha)and fipronil (68.96t/ha) as compared to untreated control (63.20t/ha). Among the treatments soil application of chlorantraniliprole 0.4G @ 22.5kg/ha at planting and 60 days after planting found effective against both early shoot borer and recorded highest cane yield (Table 7a & 7b).

Treatment	Germination (%)	Per cent incidence of Early shoot borer (%DH)					No .of bored plants/ha
		45 DAP	60 DAP	90 DAP	120 DAP	Cumulative upto 120 DAP	
T1- Fipronil 0.3G @25 kg/ha	65.63	9.08	5.25	4.84	0.28	13.47	23765
T2- Chlorantraniliprole 0.4 G @ 22.5kg/ha	70.49	9.63	5.32	1.11	0.18	11.47	17901
T3- Chlorantraniliprole18.5 SC @ 375ml/ha	66.30	15.23	6.64	1.23	0.19	12.76	19444
T4- Spinosad 45SC @ 90 ml/lt	65.12	16.36	4.86	1.39	0.00	15.46	23765
T5- Flubendiamide 20 SC @ 250ml/ha	66.20	15.10	7.59	1.74	0.43	14.83	27469
T6- Phorate 10G @15 kg/ha	71.54	10.63	6.73	2.28	0.19	17.57	25926
T7- Carbofuran3G @ 33 kg/ha	72.07	10.30	9.01	4.99	1.73	23.48	32099
T8- Untreated control	65.97	17.17	16.07	4.58	2.19	32.67	39815
CD (p=0.05)	1.40	2.69	3.16	5.57	3.53	4.15	
CV %	15.10	13.25	16.61	17.37	21.83	7.48	

**Table 7b. Impact of different treatments on the growth parameters**

<b>Treatment</b>	<b>% Sucrose</b>	<b>Cane weight ( kg)</b>	<b>Cane height (mt)</b>	<b>Cane girth (cm)</b>	<b>Cane yield (t/ha)</b>
T1-Fipronil 0.3G @25kg/ha	18.16	1.40	2.22	2.56	68.96
T2- Chlorantraniliprole 0.4G@22.5kg/ha	18.51	1.45	2.45	2.64	71.04
T3-Chlorantraniliprole18.5 SC @375ml/ha	18.40	1.35	2.43	2.64	69.82
T4- Spinosad 45SC @90ml/lt	18.26	1.45	2.47	2.65	68.31
T5-Flubendiamide 20 SC @250ml/ha	18.30	1.46	2.40	2.67	70.10
T6-Phorate 10G @15kg/ha	18.07	1.35	2.17	2.59	65.60
T7- Carbofuran3G @33kg/ha	18.05	1.40	2.25	2.60	68.40
T8- Untreated control	18.82	1.00	1.90	2.19	63.00
CD(p=0.05)	NS	0.70	0.23	0.39	2.69
CV %	-	12.37	11.83	14.50	18.25

**TECHNICAL PROGRAMME (AICRP ON SUGARANE)  
OF ENTOMOLOGY DISCIPLINE, RARS, ANAKAPALLE(2015-16)**

<b>Experiment No.1 (Project E 4.1) :</b>		
<b>Evaluation zonal varieties / genotypes for their reaction against major insect pests</b>		
	<b>Trials</b>	<b>Entries</b>
1	Evaluation of main yield trial – Early [IVT-Early] genotypes for their reaction against major insect pests.	05+04=09
2	Evaluation of Main Yield Trial –Midlate (MYT- Midlate) genotypes for their reaction against major insect pests.	09+04=13
	<b>Total</b>	<b>9+13= 22</b>
<b>Experiment No.2 (E 28)</b>	Survey and surveillance of sugarcane insect pests.	
<b>Experiment No.3 (E 30)</b>	Monitoring of insect pests and bio-agents in sugarcane agro- ecosystem.	
<b>Experiment No.4 (E 33)</b>	Bio-efficacy of insecticides against mealy bugs in sugarcane.	
<b>Experiment No.5 (E 34)</b>	Standardization of simple and cost effective techniques for mass multiplication of Sugarcane bio-agents.	
<b>Experiment No.6 (E 36)</b>	Management of borer complex of sugarcane through pheromone lures.	
<b>Experiment No.7 (E 37)</b>	Bio-efficacy of newer insecticide for the control of sugarcane early shoot borer.	