DETAILED REPORT
AICRP - ON SUGARCANE

Project No. E.4.1 (1)

Title	**:**	**Evaluation of genotypes for their reaction against major insect pests [IVT (midlate)].**
Objective	**:**	To grade the entries in the trials for their behaviour towards damage by key pest in the area.
Year of start	**:**	1990-91
Duration	**:**	Recurring study
Location	**:**	Regional Agricultural Research Station, Anakapalle

Experimental Details :

01	**Date of Planting**	**:**	17/03/2012
02	**Varieties**	**:**	03+4=7 (Co Or 10346, Co A 10 321 and Co C 10 336 Standards: 93 A 145 (Co A 99082), Co 7219, 83 V 15 and Co86249)
03	**Fertilizers**	**:**	112:100:120 NPK (Kg ha $^{-1}$)
04	**Intercultural operations**	**:**	Weeding as and when required and earthing up after 4 months after planting.
05	**Irrigation**	**:**	At an interval of 10-15 days as per requirement
06	**Plant protection measures**	**:**	Not applied.
07	**Plot size**	**:**	Gross : 6m X 0.8 m X 6R= 28.8m^2 Net : 5m X 0.8m X 4R= 16.0m^2
08	**Design**	**:**	RBD
09	**Replications**	**:**	Three
10	**Harvesting date**	**:**	16/01/2013

Methods of recording observations :

1 Early shoot borer :

The observations on the total number of shoots and number of dead hearts caused by the early shoot borer were recorded at 45, 60, 90 and 120 days after planting and cumulative per cent incidence was worked out.

2 Internode borer and scale insect:

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

8.Results of the previous year:

During 2011-12, in IVT (mid-late), four entries along with four standards were tested. Cumulative incidence of early shoot borer upto 120 days was ranged from 6.04 per cent in Co C 06 030 to 27.52 per cent in 93 A 145. All the test entries showed least susceptible reaction against early shoot borer. All the test entries recorded < 5% incidence of internode borer. The intensity of internode borer was ranging from 0.24% in Co C 06 030 to 2.96 % in the standard check, 93 A 145. The intensity of scale insect was below 5 % in all test entries. Among the test entries, Co C 06 030 was found to be promising against early shoot borer (6.04%) and internode borer (0.24%) whereas Co A 2007 – 322 (0%) showed promising reaction against scale insect.

In Advanced varietal trial (early), five entries along with four standards were screened. Cumulative incidence of early shoot borer up to 120 days varied from 5.66 per cent in Co V 2009-356 to 10.42 per cent in 93 A 145. All the test entries showed least susceptible reaction against early shoot borer. Less incidence of internode borer (0.29 % in Co 6907 to 4.11 5 in Co C 01-061) and scale insect (0% in Co A 2008-321, 323 to 5.04 5 in Co V 2009-356) were recorded in all the test entries due to scattered rainfall received during grand growth stage (June to September). Among the test entries, Co V 2009-356 (5.66%) found to be promising against early shoot borer whereas the genotypes Co A 2008-321 (0%), Co A 2008-323 (0%) showed promising reaction against scale insect by recording lowest incidences as compared to susceptible check (93 A 145).

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

The data is presented in table 1 and 1a. The data indicated that the differences due to various genotypes in respect of cumulative per cent incidnece of early shoot borer and internode borer were statistically significant whereas scale insect incidence was not recorded due to heavy rainfall received during October month, 2013 due to neelam thufan.

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). Among the test entries, Co C 10 336 recorded highest per cent sucrose (16.26%) whereas 17.21% was recorded in the checks, 83 V 15 and 93 A 145(Table 1 & 1a).

Table 1. Incidence of early shoot borer in IVT (mid-late) entries

Genotype	Early shoot borer incidence upto 120 DAP (%DH)					Grading
	ESB at 45 DAP	ESB at 60 DAP	ESB at 90 DAP	ESB at 120 DAP	Cumulative upto 120 DAP	
CO A 10 321	5.19 (12.86)	1.34 (5.86)	0.46 (3.59)	0	6.94(11.91)	LS
Co Or 10 346	1.96(6.03)	2.03(7.22)	1.96(6.03)	0	21.79(26.45)	MS
Co C 10 336	2.84(8.57)	2.10(7.90)	0.00(2.03)	0	3.25(9.61)	LS
CO86249	5.32(11.40)	2.79(9.44)	0.00(2.03)	0	7.42(14.88)	LS
83 V 15	4.49(10.65)	1.94(7.95)	0.00(2.03)	0	7.45(15.04)	LS
Co7219	2.65(8.34)	2.99(9.47)	0.28(3.12)	0	6.52(14.33)	LS
93 A 145 (C0 A 99082)	9.27(17.61)	8.03(16.42)	2.50(9.04)	0	15.92(23.46)	
SEd	2.6028	2.7934	2.51		4.02	
CD(0.05)	6.1069	6.09	5.48		8.76	
CV%	31.85	37.26	77.42		28.95	

(Figures in parenthesis are transformed values)

Table 1a. Incidence of internode borer, scale insect and % sucrose in different IVT(mid-late) entries

Genotype	incidence of INB(%)	intensity of INB(%)	Infestation index	Incidence of scale insect (%)	Sucrose (%)
CO A 10 321	20.97(27.26)	7.52(15.82)	1.58(LS)	0	13.81
Co Or 10 346	40.00(33.98)	5.06(14.78)	2.02(MS)	0	14.6
Co C 10 336	30.86(34.77)	6.52(14.18)	2.01 (LS)	0	16.26
CO86249	51.22(53.42)	7.14(16.02)	3.64(MS)	0	16.79
83 V 15	26.67(30.28)	7.63(16.49)	2.03 (LS)	0	17.21
Co7219	18.57(27.02)	8.06(14.16)	1.50 (LS)	0	15.06
93 A 145 (Co A 99082)	25.00(33.47)	6.02(15.06)	1.51(LS)	12.18	17.21
SEd	5.36	2.49			0.32
CD(0.05)	11.67	5.43			0.7
CV%	19.13	20.93			2.5

(Figures in parenthesis are transformed values)

Project No. E.4.1 (2)

Title	**:**	**Evaluation of genotypes for their reaction against major insect pests [MYT(Early)].**
Objective	**:**	To grade the entries in the trial for their behaviour towards damage by key pest in the area.
Year of start	**:**	1990-91
Duration	**:**	Long term
Location	**:**	Regional Agricultural Research Station, Anakapalle
Project leader and her associates	:	Dr. B.Bhavani,Senior Scientist (Entomology) Dr. M.Visalakshi, Senior Scientist (Entomology) Dr. K.Prasada Rao, Principle Scientist (Sugarcane)

Experimental Details :

1	**Date of Planting**	**:**	9/03/2012
2	**Varieties**	**:**	09+01=10 2008 A 387, 2008 A 104, 2008 A 105, 2008 A 160, 2008 A 171, 2008 A 187, 2008 A 380 and 2008 A 466 Susceptible check, 93 A 145 (Co A 99082)
3	**Fertilizers**	**:**	112:100:120 NPK (Kg ha $^{-1}$)
4	**Intercultural operations**	**:**	Weeding as and when required and earthing up after 4 months after planting.
5	**Irrigation**	**:**	At an interval of 10-15 days as per requirement
6	**Plant protection measures**	**:**	Not applied.
7	**Plot size**	**:**	Gross : 6m X 0.8 m X 6R= 28.8m^2 Net : 5m X 0.8m X 4R = 16m^2
8	**Design**	**:**	RBD
09	**Replications**	**:**	Three

10 Harvesting date : 17/03/2013

Methods of recording observations :

01 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.

02 Internode borer and scale insect:

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

3. **Per cent Juice Sucrose:**

The per cent juice sucrose was recorded during juice analysis before harvest of the cane.

8.Results of the previous year:

During 2011-12, in Advanced varietal trial (early), five entries along with four standards were screened. Cumulative incidence of early shoot borer up to 120 days varied from 5.66 per cent in Co V 2009-356 to 10.42 per cent in 93 A 145. All the test entries showed least susceptible reaction against early shoot borer. Less incidence of internode borer (0.29 % in Co 6907 to 4.11 5 in Co C 01-061) and scale insect (0% in Co A 2008-321, 323 to 5.04 5 in Co V 2009-356) were recorded in all the test entries due to scattered rainfall received during grand growth stage (June to September). Among the test entries, Co V 2009-356 (5.66%) found to be promising against early shoot borer whereas the genotypes Co A 2008-321 (0%), Co A 2008-323 (0%) showed promising reaction against scale insect by recording lowest incidences as compared to susceptible check (93 A 145).

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 2 and 2a. 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 except in check, 93 A 145 (Co A 99082).

All the nine test entries showed least susceptible reaction against early shoot borer. Among the test entries, 2008 A 105 recorded lowest cumulative incidence of early shoo borer (0.93%DH) as against 16.97% recorded in the susceptible check, 93 A 145. The per cent incidence of internode borer was ranged between 33.10 (2008 A 387) to 63.34 (2008 A 458) in test entries where as in check it was 34.91% (93 A 145) (Table 1 &1a). Except two entries, all the test entries recorded zero per cent incidence of scale insect. The entry, 2008 A 387 recorded highest incidence of scale insect (21.05%). Among the test entries, 2008 A 466 recorded highest per cent sucrose (19.38%) and lowest was recorded in 2008 A 160 (15.39%)(Table2 & 2a).

Table 2. Per cent incidence of early shoot borer in MYT(early) entries at different days after planting

Genotype	ESB at 45 DAP	ESB at 60 DAP	ESB at 90 DAP	ESB at 120 DAP	Cumulative upto 120 DAP	Grading
2008 A 466	2.48 (8.56)	0.00 (2.03)	0.00(2.03)	0	3.01(9.26)	LS
2008 A 458	0.55 (3.81)	2.90 (8.53)	0.17(2.73)	0	2.94(9.06)	LS
2008 A 187	2.25 (7.70)	1.01 (5.29)	0.00(2.03)	0	4.91(11.17)	LS
2008 A 160	1.55(6.90)	1.79 (7.07)	0.00(2.03)	0	3.24(10.26)	LS
2008 A 171	1.98 (7.28)	0.28 (5.84)	0.58(3.87)	0	5.45(8.73)	LS
2008 A 380	5.64 (12.65)	0.28 (3.12)	0.00(2.03)	0	5.45(11.93)	LS
2008 A 105	0.51 (3.73)	0.30 (3.18)	0.00(2.03)	0	0.93(5.45)	LS
2008 A 104	1.70 (6.61)	0.83 (4.39)	0.00(2.03)	0	2.55(8.19)	LS
2008 A 387	0.87 (4.45)	0.83 (4.39)	0.00(2.03)	0	1.01(5.36)	LS
93 A 145 (Co A 99082)	10.20(18.59)	5.47(13.45)	5.02(12.94)	3.05	16.97(22.35)	
SEd	3.32	2.81	0.82		3.69	
CD(0.05)	6.98	5.9	1.73		7.75	
CV%	50.72	60.05	29.07		43.61	

(Figures in parenthesis are transformed values)

Table 2a. Incidence of internode borer, scale insect and % sucrose in different MYT(early) entries

Genotype	Incidence of INB(%)	Intensity of INB(%)	Infestation index	Incidence of scale insect (%)	Sucrose (%)
2008 A 466	55.96(48.59)	8.34(16.78)	4.67(MS)	7.69	19.38
2008 A 458	63.34(52.81)	7.36(15.73)	4.66(MS)	0	17.99
2008 A 187	46.01(42.70	9.70(18.14)	4.46(MS)	0	16.38
2008 A 160	34.44(35.94)	7.88(16.29)	2.71(MS)	0	15.39
2008 A 171	36.92(37.38)	6.98(15.31)	2.58(MS)	0	18.03
2008 A 380	33.34(35.27)	7.51(15.84)	2.50(MS)	0	15.56
2008 A 105	45.16(42.21)	6.54(14.81)	2.95(MS)	0	17.39
2008 A 104	55.88(48.38)	9.44(17.89)	5.27(HS)	0	16.02
2008 A 387	33.10(33.70)	5.89(14.05)	1.95(LS)	21.05	16.89
93 A 145 (Co A 99082)	34.91(34.93)	5.48(13.54)	1.91(LS)	0	18.7
SEd	4.05	0.69			2.35
CD(0.05)	8.51	1.46			4.86
CV%	12.16	5.38			17.1

(Figures in parenthesis are transformed values)

Project No. E.4.1 (3)

Title	**:**	**Evaluation of genotypes for their reaction against major insect pests [MYT (mid-late)].**
Objective	**:**	To grade the entries in the trials for their behaviour towards damage by key pest in the area.
Year of start	**:**	1990-91
Duration	**:**	Long term
Location	**:**	Regional Agricultural Research Station, Anakapalle
Project leader and her associates	**:**	Dr. B.Bhavani,Senior Scientist (Entomology) Dr. M.Visalakshi, Senior Scientist (Entomology) Dr. K.Prasada Rao, Principle Scientist (Sugarcane)

Experimental Details		**:**	
1	**Date of Planting**	**:**	9/03/2012
2	**Varieties**	**:**	06+01=07 (2008 A 15, 2008 A 113, 2008 A 120, 2008 A 124, 2008 A 234 and 2008 A 419; Susceptible check, 93 A 145 (Co A 99082)
3	**Fertilizers**	**:**	112:100:120 NPK (Kg ha $^{-1}$)
4	**Intercultural operations**	**:**	Weeding as and when required and earthing up after 4 months after planting.
5	**Irrigation**	**:**	At an interval of 10-15 days as per requirement
6	**Plant protection measures**	**:**	Not applied.
7	**Plot size**	**:**	Gross: 6m X 0.8m X 6R= 28.8m^2 Net : 5m X 0.8 m X 4R = 16m^2
8	**Design**	**:**	RBD
9	**Replications**	**:**	Three
10	**Harvesting date**	**:**	11/01/2013

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 recorded at 45, 60, 90 and 120 days after planting and cumulative per cent incidence was worked out.

2 Internode borer and scale insect:

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

3. Per cent Juice Sucrose:

The per cent juice sucrose was recorded during juice analysis before harvest of the cane.

8.Results of the previous year:

During 2011-12, in IVT (mid-late), four entries along with four standards were tested. Cumulative incidence of early shoot borer upto 120 days was ranged from 6.04 per cent in Co C 06 030 to 27.52 per cent in 93 A 145. All the test entries showed least susceptible reaction against early shoot borer. All the test entries recorded < 5% incidence of internode borer. The intensity of internode borer was ranging from 0.24% in Co C 06 030 to 2.96 % in the standard check, 93 A 145. The intensity of scale insect was below 5 % in all test entries. Among the test entries, Co C 06 030 was found to be promising against early shoot borer (6.04%) and internode borer (0.24%) whereas Co A 2007 – 322 (0%) showed promising reaction against scale insect.

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

The data is presented in table 3 and 3a. The results showed that the differences due to various genotypes in respect of cumulative per cent incidence of early shoot borer, internode borer and scale insects were statistically significant.

Among six test entries, lowest incidence of early shoot borer was recorded in 2008 A 419 (4.08% DH) and highest incidence (10.48% DH) was recorded in 2008 A 15 whereas 28.92% was recorded in the susceptible check, 93 A 145. However, all the test entries showed least susceptible reaction against early shoot borer. The per cent incidence of internode borer was less in 2008 A 419 (20.53%) and highest in 2008 A 15 (48.51%) where as 34.91% incidence was recorded in the check, 93 A 145. All the entries except the entry, 2008 A 15(10.44%) recorded low intensity of internode borer (< 10%). Among the test entries, highest per cent sucrose was recorded in 2008 A 113 (18.43) and lowest was recorded in 2008 A 120 (14.48%) whereas 19.04% was recorded in 93 A 145 (Table 3 & 3a).

Among the test entries, 2008 A 419 found promising against early shoot borer and internode borer by recording least susceptible reaction.

Table 3. Incidence of early shoot borer in MYT (mid-late) entries

Genotype	Early shot borer incidence upto 120 DAP (%DH)					Grading
	at 45DAP	at 60 DAP	at 90 DAP	at 120 DAP	Cumulative upto 120 DAP	
2008 A 113	4.43(10.57)	2.90(8.70)	0.00(2.03)	0	6.96	LS
2008 A 15	8.56(16.86)	5.05(12.86)	0.00(2.03)	0	10.48	LS
2008 A 234	1.89(7.03)	4.01(11.53)	0.62(3.96)	0	5.91	LS
2008A 120	6.26(14.41)	3.10(9.87)	0.00(2.03)	0	7.4	LS
2008 A 124	3.30(9.25)	2.10(7.29)	0.58(2.03)	0	5.25	LS
2008 A 419	6.75(12.34)	3.92(8.04)	0.00(2.03)	0	4.08	LS
93 A 145 (Co A 99082)	20.89(27.12)	15.56(23.05)	9.16(18.75)	0	28.92	
SEd	4.99	3.77	1.5053		3.28	
CD(0.05)	10.88	8.22	3.28		7.16	
CV%	43.9	11.53	37.21		23.71	

(Figures in parenthesis are transformed values)

Table 3a. Incidence of internode borer, scale insect and % sucrose in different MYT (mid-late) entries

Genotype	Incidence of INB(%)	Intensity of INB(%)	Infestation index	Incidence of scale insect (%)	Sucrose(%)
2008 A 113	29.86(33.00)	5.46(13.50)	1.63 (LS)	0	18.43
2008 A 15	48.51(44.13)	10.44(18.84)	5.06(HS)	0	17.41
2008 A 234	38.09(38.10)	7.72(16.10)	2.94(MS)	0	16.63
2008A 120	32.48(34.66)	6.54(14.81)	2.12(MS)	0	14.48
2008 A 124	24.43(29.60)	7.42(15.76)	1.81(LS)	0	17.14
2008 A 419	20.53(26.94)	4.93(12.82)	1.01 (LS)	0	17.21
93 A 145 (Co A 99082)	34.91(34.93)	5.48(13.62)	1.91(LS)	12.18	19.04
SEd	4.05	0.69			2.35
CD(0.05)	8.51	1.46			4.86
CV%	12.16	5.38			17.1

(Figures in parenthesis are transformed values)

Experiment No.2 : **Project No. E.28**

Title **Survey and surveillance of sugarcane insect pests.**

Objective : To identify key insect pests of sugarcane in the area.

Year of start : 2004-05

Duration : Long term

Project leader and her associates : Dr. B.Bhavani, Senior Scientist (Entomology)
Dr. M.Visalakshi, Senior Scientist (Entomology)

Methodology :

Roving survey of sugarcane fields were carried out in 5-8 km area around Regional Agricultural Research Station, Anakapalle . Survey was carried out during 2012-13 on farmers field in different villages under operational areas of different sugar factories viz., Navbharath Pvt. Ventures, Samalkot, East Godavari district; Sri Sarvaraya Sugars Ltd, Chelluru, East Godavari, Bheemasingi Cooperative Sugar factory, Vizianagaram, Chodavaram Cooperative Sugars, Chodavaram and Parry's Sugar factory, Sankili, Srikakulam district. In most of the fields, 87 A 298, 86 A 96 varieties were planted. The observations on the incidence of borers on 100 canes were examined at five places and for sucking pests 20 canes were observed.

Results of the Previous year:

Surveys on insect pest incidence in sugarcane fields both plant and ratoon crops in adjoining areas of Regional Agricultural Research Station, Anakapalle, North Coastal zone and Krishna Godavari zone of Andhra Pradesh were conducted at fortnightly intervals. The pest problems are identified in sugarcane plant and ratoon crops and remedial measures are suggested to the farming community. Sugarcane crop was infested by early shoot borer (*Chilo infuscatellus*) in the early stage, as internode borer after cane formation (87 A 298, 93 A 145, 83 V 15, 2001 A 63, Co 6907 and Co A 7602), pink mealybug, scale insect, leaf mealy bug and red mite in many pockets of sugarcane growing areas in A.P. A new species, a Grass Derbid *Proutista moesta* was observed along with *Pyrilla perpusilla* population was observed in sugarcane fields in operational areas of Samalkot sugar factory during the months of August and Spetember,2011.

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

Early shoot borer :

The early shoot borer incidence was highest in March-May planting which was ranged from 2.33 to 58.20 per cent. Maximum incidence was observed in late planting and in light soils. The incidence of early shoot borer was high during late planting due to high temperatures coupled with low relative humidity, unavailability of irrigation water and late onset of monsoon (Table 4).

In case of early (December-January) planting, the incidence of early shoot borer ranged from 2.33 to 14.50 per cent.

Internode borer :

The per cent incidence of internode borer in early planting ranged from 4.6 to 66.40 per cent. Though, the incidence of internode borer appeared so highly, its intensity ranged from 2.66-8.50 per cent (Table 4).

Other pests :

Moderate to severe incidence of red mite (5.66 to 47 %) 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 mesta* (3-10/ leaf) were observed from June to September months. Whitefly incidence (43-110/square inch) was observed after neelam thufan in some pockets of sugarcane growing area due to inundation of flood water. The Incidence of scale insect ranged from low to traces during 2012 due to high rainfall received after cane formation stage. In few pockets, the incidence of sugarcane woolly aphid observed only on few stools on sugarcane i.e. 2-4% in the field are highly infested with sugarcane woolly aphid. The stools, which are infected by sugarcane woolly aphid covered the leaf area up to 70-80% with sugarcane woolly aphid mostly during August to October, 2012. The top borer incidence was very low (1-3%) in different sugar factory areas of Andhra Pradesh during 2012-13 (table -4).

Table 4 : Survey and surveillance of insect pests of sugarcane

Month/Year	Location	Insect pest	Incidence (%)	Varieties affected	Any other information
May, 2012	Anakapalle,	Early shoot borer	2.33 to 14.50	87 A 298, 93 A 145, 83 V 15, 2001 A 63, Co A 7602	Plant and Ratoon crop
	Kasimkota and Thimmaraju pet	Early shoot borer	20- 46%		
	Chodavaram sugar factory area	Red mite	5.66-20%	Co7219, Co6907, 97 A 85	Plant crop
	Samalkot sugar factory area	*Chilo infuscatellus* damage on internodes	5-9%	83 V 15, 87 A 298, 86 V 96, 97 A 85, 93 A 145, 83 V 15	Plant crop
June, 2012	Samalkot sugar factory areas	Pink mealy bug Red mite	7-9% 20-47%	Co6907, 87 A 298, 81 V48, 93 A 145, 86 V 96, 83 V15	Plant crop
July, 2012	Munagapaka, Kasimkota, Anakapalle mandals	Early shoot borer (Rainfed)	10-23%	93 A 145, 87 A 298, Co7219, 93 A 145, 81 V 48	Plant & ratoon crop
August, 2012	Jaggannapeta, East Godavari district	Red mite, *Chilo infuscatellus* damage on internodes, *Pyrilla perpusilla*, *Proutista moesta*	5-10% 6-9% 2-3A&N/ leaf 3-5A/leaf	86 V 96, 83 V15, 87 A 298,	Plant crop
September,2012	Jaggannapeta, East Godavari district	Whitefly, Scale insect, Leaf mealy bug *Pyrilla perpusilla* Grass Derbid	6-10% 4-7% 1-2 nymphs/ leaf 2-3A&N/leaf 4-5adults/leaf	87 A 298, 86 V 96, 83 V15	Plant crop
October, 2012	Bobbili sugar factory area, Vizianagaram district	White grub	2-3 grubs/m^2	87 A 298	Plant crop
	Samalkot sugar factory area, East Godavari district	Whitefly	10-13%	86 V 96, 83 V15	Plant / ratoon crop

	Chuchukonda, Munagapaka Jaggampeta, Peravaram Bhimasingi of Vizianagaram	Scale insect Mealy bug, internode borer, Top borer	6-7% 8-14N/sq. inch 4.6 to 66.40 % 1-3%	87 A 298, 93 A 145, 81 V48, 97 A 85	Plant / ratoon crop
November, 2012	Bheemasingi Peravaram, Iaggampeta, Simhadripuram of East Godavari Ramabhadrapuram, Rajupeta, Pulaparthi of Etikoppaka Chelluru sugar factory	Whitefly Internode borer Internode borer	10-23/ sq.inch of leaf 10-27% 7-15% 16-28%	87 A 298, 83 V15, 86 V96, 2003 V46 and Co A 86032 87 A 298, 84 A 125, 81 V48 and 97 A 85 87 A 298, 86 V96,	Plant &ratoon crop and the crop was damaged due to cyclone
January, 2013	Yeditha, Sithnagaram , Muramanda and Dulla of East Godavari dt.	Scale insect mealy bug and internode borer Top borer	3-4% 2% 5-16% 1-3%	Co C 85036 and 87 A 298	Plant & ratoon crop

1.Experiment : Project E 30
2.Project : No.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 **:** 2012-13

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.
2. Meteorological data (Weekly average) was recorded on temperature (maximum and minimum), relative humidity and total rainfall.

8.Results of the previous year

In monitoring of insect pests and natural occurring bio-agents, the infestation of early shoot borer (0.52%) was noticed on 14 MW (i.e. 1st week of April). The maximum incidence (38.77%) was noticed in 18 MW (i.e. 1st week of May). Incidence of internode borer was noticed at 26th MW. T he maximum incidence of internode borer was noticed in 29th MW (16%) 3rd week of July. Incidence of internode borer was noticed at 26th MW. The maximum incidence of internode borer was noticed in 29th MW (16%) 3rd week of July.

The moth catches were started from 13th MW, and the highest number of moth catches (34.4 number per trap/trap) were recorded when the maximum, minimum temperature was 36.0C and 22.4C and at 88% RH, respectively there after the moth catch was reduced gradually due to scattered rainfall received from last week of May to October, 2011. Studied on the ESB moth catch in relation to weather parameters revealed that the maximum(r: 0.69) and minimum (r : 0.57) temperatures showed positive correlation whereas morning relative humidity showed negative correlation (-0.56) with ESB moth catch in pheromone traps.

The bio-agents *viz*., *Euborellia annulipes*, an earwig (Ord. Dermaptera) was predatory on eggs and early instar larvae of early shoot borer. *Coccinella septempunctata* and *Cheilomenes sexmaculata* were found to be predating on mealybugs of sugarcane. Certain natural collections of *T.chilonis* was also found in the ecosystem. Along with these regular parasites, *Encarsia* sps was observed on sugarcane woolly aphid.

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

The data regarding percent cumulative incidence of early shoot borer, incidence of internode borer, scale insect are presented in table –.

In monitoring of insect pests and natural occurring bio-agents, the infestation of early shoot borer (5.0%) was noticed on 15 SW (i.e. 1st week of April). Red mite infestation (3.0 40.0%) to was observed from 17th SW (last week of April) to 23rd SW (Last week of June). The maximum incidence (48.20%) was noticed in17 SW (i.e. last week of April). Incidence of internode borer was noticed at 26th SW(2.6%). The maximum incidence of internode borer was noticed in 49th SW (56.40%). Scale insect incidence was observed from 52th SW (0.33%) and highest incidence was observed during last week of February (22%) (Table 5).

The bio-agents viz., *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. *Chrysoperla carnea* (neuropteran) and *Pharoscymus horni*, a coccinellid predator were also noticed in the leaf sheaths infested with pink mealy bug, *Saccharicoccus sacchari*. *Coccinella septempunctata*. Certain natural collections of T.chilonis was also found in the ecosystem. In case of sugarcane woolly aphid, the maximum incidence (26 woolly aphid/2.5 m2/3leaf) was recorded during the months of September and October, 2012. The bioagents viz., *Micromus igorotus* @ 2-3 per leaf observed during Dec-January, Syrphid population was observed in traces whereas *Encasia flavoscutellum* @ 3-4 per stool were observed during December and 1-3 per leaf during January and Lady bird beetles were noticed 2-5/ leaf during August along with other natural enemies viz., Chrysoperla carnea, *Pharoscymus horni* and *Cheilomenes sexmaculata* (Table 5).

Data in Table – 5 indicated that the occurrence of pests *viz.,* top shoot borer, Pyrilla, White fly, Scale insect and Sugarcane woolly aphid were recorded at low levels may be due to presence of natural enemies. During 2012-13, the incidences of early shoot borer, red mite and internode borer were moderate to severe but the scale insect incidence was low due to high rainfall received after cane formation stage.

Table 5 : Natural enemies of major insect pests of sugarcane (Plant and ratoon)

S. No.	Insect pest	Prevalence period	Maximum incidence	Reaction	Natural enemy	Prevalence period	Maximum parasitisation/ Population
1	Early shoot borer	March-June	5.0-48.20	Moderate to severe	*Trichogramma chilonis* *Euborellia annulipes* *Cheilomenes sexmaculata*.	March-June March-January -do-	15% 3-8/clump 2-3/clump
2	Red mite	May-June	(3.0- 40.0%)	Moderate to severe	Predatory mites	May-July	10-12/ 2.5cm^2
3	Mealy bug	May -June	Traces		*Chrysoperla carnea* (neuropteran) and Coccinellids *Coccinella septempunctata* *Menochilas sexmacumalatus*	March-December	2-5A/ clump
4	*Chilo infuscatellus* damage on internodes	June – September	(5.80%)	Low			
5	*Internode borer, Chilo sacharifagous indicus*	July to January	2.6-56.40	Low to severe			
6	White fly	August - September	(9.33/cm^2/ leaf)	Moderate	*Ascharsoni*a sp	Sep.	Traces
7	*Pyrilla perpusilla*	August - November	1-2 egg masses/ clump 2-7 A & N/ clump	*Low to moderate*	*Epiricania melanoleuca*	September-November	2-4/clump
8	Derbid, *Proutista moesta*	August - September	3-11 A/ clump	Low to moderate			
9	Grasshopper	July - August	2-3 A / Clump	Low			
10	Scale insect	November-March	0.33-22.0%	Low to moderate	*Chilocorus nigritus*	Nov- March	3-6 A/stool
11	Termite		2.33- 10.33%	Low to moderate			
12	Yellow mite		3-4%	Low			
13	White woolly aphid	June-July December-January	2-4/cm^2/ leaf 11.67/cm^2/ leaf	In traces to highly (on very few stools in field)	Syrphids *Encasia sps.* *Micromus igorotus*; *D. aphidivora*	June- July Dec-January	4-6/leaf 3- 10/ stool 2-4 /leaf 1-2 per leaf

1. Experiment : Project E. 33

3. Project No. 4

4. Title : Bio-efficacy of insecticides against mealy bugs in sugarcane

5. Objective : To evaluate efficacy of insecticides against mealy bugs in sugarcane.

5. Project leader and her associates : Dr. B.Bhavani,Senior Scientist (Entomology)
Dr. M.Visalakshi, Senior Scientist (Entomology)

6. Experimental Details :

1 **Year of start** : 2012-13

2 **Design** : RBD

3 **Replications** **:** Three

4 **Plot size** : 6.0 x 5.4 m

5 **Planting date** **:** 17/3/2012

6 **Variety** : 93 A 145

7 **No. of treatments** **:** 9

Treat No.	Name of the treatment
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

Randomaly select 10 canes from 3 meter row length and count number of infested internodes out of total number of internodes.

- Before spraying and 7, 15 and 30 DAS and harvest.
- Yield and quality parameters.

8. Results of previous year:

The trial was vitiated due to negligible incidence of mealybugi in experimental plot during2011-12.

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

During 2012-13, 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% (Table 6). Mealybug incidence was not observed not only in experimental field but also in other sugarcane fields due to heavy down pore after cane formation stage due to neelam thufan. Hence, the trial is vitiated at Regional Agricultural Research Station, Anakapalle

Table 6 Impact of sett treatment with different insecticides on the per cent germination of sugarcane

S.No.	Treatment	Germination (%)
1	Sett treatment with imidacloprid 70% SP @ 25 g a.i./ha + spraying of imidacloprid 17.8SL @ 0.005%	90
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%	87.87
4	Sett treatment with imidacloprid 70% SP @25 g a.i./ ha + spraying of acetamiprid 20 SP @ 0.004%	85.37
5	Sett treatment with thiomethoxam 70%SP @ 10 g a.i./ ha + spraying of imidacloprid 17.8SL @ 0.005%	87.82
6	Sett treatment with thiamethoxam 70%SP @ 10 g a.i./ ha + spraying of thiamethoxam 25 WG @ 0.0045%	87.5
7	Sett treatment with thiamethoxam 70%SP@ 10 g a.i./ ha + spraying of clothianidin 50 WSG @ 0.004%	88.24
8	Sett treatment with thiamethoxam 70%SP @ 10 g a.i./ha + spraying of acetamiprid 20 SP @ 0.004%	92.5
9	Untreated control	73.9
	SEd	3.54
	CD (0.05)	7.51

1.Expt No.5 : Project E.34

2.Title : Standardization of simple, cost effective techniques for mass multiplication of sugarcane bioagents (*Beauveria bassiana*).

3.Objective : To develop simple and cost effective mass multiplication techniques of promising bio- agents of the area.

4.Year of start : 2012-13

5. Location : Regional Agricultural Research Station, Anakapalle

6. Project leader and her associates : Dr. B. Bhavani, Senior Scientist (Entomology)
Dr. N.Raj Kumar, Scientist (Plant Pathology)
Dr. M.Visalakshi, senior Scientist (Entomology)

7.Experimental Details :

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 ^{0}C for 48 h with shaking at 180 rev min^{-1}.

The mass culturing of *Beauveria* is being done on yeast broth as well as on solid medium (broken maize) 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 then plugged loosely with a bung of non-absorbent cotton wool and autoclaved at 121^0 C, 15 psi for 40 minutes. After cooling, each flask was inoculated with a loopful spores from each of three different cultures. Three flasks were used for each isolate and were then incubated at room temperature (25 ± 5^{0}C), on a rotary shaker revolving at 150 rpm for 72 hours as described (Jenkins *et al.* 1998) for production of spores.

Three kilograms of maize was weighed and boiled until the grains were just soft but not cooked. A sample (250g) of the boiled rice (replicated six times) was sterilized by autoclaving at 121^{0}C, 15 psi for 30 minutes. Maize husks were only washed and dispensed into the bags. Inoculating the solid substrate Bags containing the cooled solid substrates were eadies ch inoculated with the diluted inoculum (1:1 ratio), aseptically under the laminar air flow. Contamination check was performed before inoculation into the solid substrate. The bags were massaged to mix the broth with the grains and then placed in plastic bowls (30 cm diameter by 10 cm depth, with 4 holes each 3 cm wide on the side) plugged with a bung of non asorbent cotton wool. The bowls were then stack one on top of the other and incubated at room temperature until the substrates were fully colonized by fungal hyphae. Cotton wool bungs were removed at this point to air dry the substrates and encourage maximum sporulation on the substrates and this took 21 days.

8. Results of previous year: New study

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

Preliminary studies to develop simple and cost effective mass multiplication techniques of *Beauveria bassiaana* were initiated at RARS, Anakapalle. The work is in progress**.**

Expt No.6 : Project E 36 (New Project):
Title : Management of borer complex of sugarcane through lures.

Objective : To manage sugarcane borers (early shoot borer, top borer, internode borer and stalk borer) through pheromone traps.

Year of start : 2012-13

Location : Regional Agricultural Research Station, Anakapalle

Project leader and her associates : Dr. B. Bhavani, Senior Scientist (Entomology)
Dr. M.Visalakshi, Senior Scientist (Entomology)

Experiement details :

1	Year of start	:	2012-13
2	Plot size	:	1 acre
3	Variety	:	93 A 145 (Co A 99082)
4	Planting Date	:	30-3- 2012
5	Harvesting Date	:	22-1-2013

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.

Results of the Previous year:

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

The data regarding meteorological week wise weather parameters with moth catches of early shoot borer, are presented in table- 7, 7a and 7b and Fig. 1.

Ten pheromone traps for early shoot borer (ESB) and Internode borer (INB) were installed in sugarcane crop and the lures were changed at monthly interval.

The maximum average pheromone trap catches of ESB moth catches were started from 15th MW, and the highest number of moth catches (36.2 moths per trap) were recorded when the maximum, minimum temperature was 36.9C and 24.5C and at 84% RH, respectively, there after the moth catch was reduced gradually due to scattered rainfall received from last week of May to September, 2012 and high rainfall received during October month due to Neelam thufan. Correlation studies on the ESB moth catch in relation to weather parameters indicated that the maximum(r: 0.69) and minimum (r : 0.58) temperatures as well as evaporation (0.78) showed positive correlation whereas morning relative humidity showed negative correlation (r: -0.62) with ESB moth catch in pheromone traps (Table 7b).

The internode borer (INB) moth catch was started in 24th MW (4 number per trap) and the maximum INB moth catch was recorded in 29thMW(12number/trap)when the maximum and minimum temperature was 31.4 and 22.6^{0} C, respectively. Afterwards, the moth catches decreased up. There was no moth catches during 42nd to 50th MW (Table 7a).

Data presented in Table-7 indicated that the plot with pheromone traps installed@ 10traps/acre + Trichocards released at 7 days interval for six times (T1) recorded lowest cumulative incidence of early shoot borer (4..69%) as against 36.34% in untreated control (T2). Low per cent incidence(24%) and intensity (5.85%) of internode borer with lowest infestation index (1.4) was recorded in T1 whereas T2 (untreated plot) recorded 54.2% incidence and 17.74% intensity of internode borer with highest infestation index (9.61). Superior cane yield (99.15 t/ha) was recorded with 21.58% sucrose in T1 as compared to untreated control (75.74t/ha; 18.54%)

Table 7. Impact of mass trapping of ESB moths and Trichocard releases at weekly intervals for four times on the incidences of early shoot borer (ESB) and internode borer (INB)

Treatment	Incidence of early shoot borer upto 120 DAP					Incidence of INB (%)	Intensity of INB (%)	Infesta-tion index	Sucrose (%)	Cane yield (t/ha)
	45 DAP	60 DAP	90 DAP	120 DAP	Cumula-tive upto 120 DAP					
T1 - Pheromone traps installed@ 10traps/acre + Trichocards for 6 times at weekly interval commenced from 30 DAP & at 120 DAP	2.69	4.4	3.44	0	4.69	24	5.85	1.4	21.58	99.15
T2- Untreated Control	29.81	20.61	8.74	4.2	36.34	54.2	17.74	9.61	18.54	75.74

Table 7a Early shoot borer male moth catches in pheromone traps in association with weather parameters

Standard Week	Rainfall (m .m)	No. of Rainy days	Temp. ^{0}c		Relative Humidity (%)		Wind (kmph)	No. of hours Bright sun shine	Evapo-ration (m.m)	ESB moth catch/ week/ trap	Internode borer moth catch/wee k/trap
			Max.	Min.	FN	AN					
15th Week	0	0	36.4	23	83	52	1.2	7.4	6.5	16.2	-
16th Week	0	0	36.9	23.2	84	52	0.4	7.2	6.7	24.2	-
17th Week	0	0	36	22	79	55	0.8	8.8	6.9	28.4	-
18th Week	8.6	1	36.3	23.7	84	54	1	6	5.5	25.6	-
19th Week	28.8	1	36	22	85	52	0.9	6.8	6	32.8	-
20th Week	2.6	1	36.9	24.5	84	58	0.9	7.5	6.5	36.2	-
21st Week	0	0	38.8	26.2	84	52	0.7	6.5	6	32.4	-
22nd Week	0	0	38.8	26.3	82	51	0.5	4.9	5.7	20.4	-
23rd Week	0.2	0	40.9	26.2	66	43	1.3	7.3	7.9	13.2	-
24th Week	5.8	1	35.5	24.8	75	61	1.1	3.3	5.5	15.2	4
25th Week	33.4	2	31.8	23.2	83	72	0.9	0.7	3.2	20.6	4
26th Week	14.2	1	35	22.7	84	63	0.7	2.7	3.9	14.2	5
27th Week	69.4	2	33	23.2	88	62	0.6	4.2	4.4	19.6	7
28th Week	43.8	1	31.5	21.6	89	76	0.6	5.1	4.1	10	7
29th Week	19	2	31.4	22.6	88	72	0.5	3.9	2.9	9	12
30th Week	26.8	2	31.1	22.2	92	73	0.6	2	3	7.4	8
31st Week	16.8	1	29.7	21.6	92	73	0.8	0.2	1.8	5.6	4
32nd Week	40.8	3	27.4	22.1	91	69	0.9	2.7	3	5	6
33rd Week	34.2	2	31.9	22.1	92	68	0.4	2.6	3.3	3.2	4
34th Week	22	1	32.5	21.8	92	68	0.7	5.9	3.2	4.6	2
35th Week	74.8	4	30.8	22	92	73	0.5	4.6	3.5	2.8	5
36th Week	101.4	4	31.2	21.5	93	77	0.8	2.9	2.5	1.4	4
37th Week	48.4	3	31.1	21.4	92	73	0.3	2.3	2	0	6
39th Week	47.6	3	32.6	21.6	91	75	1	5.1	3.2	0	7
40th Week	119.6	5	29.6	21.2	94	78	1	2.4	1.9	0	4
41st Week	9.6	1	32.2	20.7	92	71	0.4	4.5	2.8	0	2
42nd Week	6.8	1	32.6	20.1	91	58	1	6.3	3.5	0	-
43rd Week	5.4	1	32.8	19.2	88	58	1	7.9	3.5	0	-
44th Week	270.4	4	29.5	19.5	91	79	1.5	4.7	2.9	0	-
45th Week	28.4	1	29.3	17.3	92	70	0.4	4.8	2.4	0	-
46th Week	0	0	29.6	14	92	48	1.5	8.6	3.5	0	-
47th Week	0	0	30.9	19.9	90	64	1.8	5.6	2.9	3.3	-
48th Week	0	0	30.6	15.5	94	54	1.1	6.6	3.2	1.6	-
49th Week	0	0	30.9	14.6	84	50	1.3	6.8	3.6	1	-
50th Week	0	0	31.9	14.9	95	53	1	8.3	3.4	1	-
51st Week	0	0	30.7	13.8	93	48	1.6	7.5	3.5	0	1
52nd Week	0	0	29	14.4	93	48	1.3	6.9	3.1	0	2

Impact of weather parameters on ESB moth catches in pheromone traps

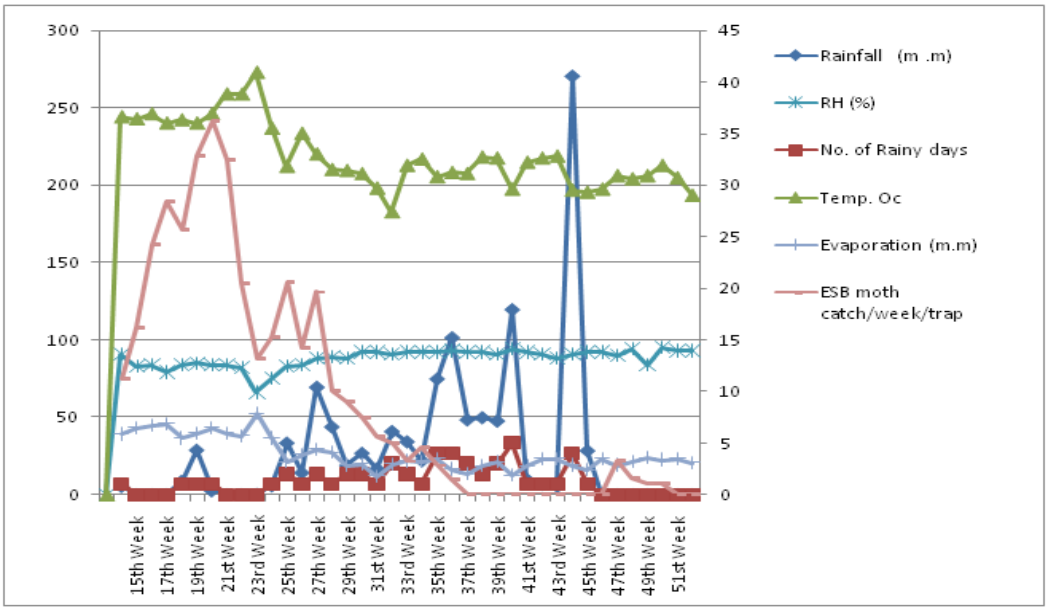

Table 7b Association between weekly ESB moth catches in pheromone traps and weather parameters

Weather parameters	Correlation coefficient (r)
Rainfall	-0.24
No. of rainy days	-0.27
Max. temp (°) C	0.69
Min. temp (°) C	0.58
Monring RH (%)	-0.62
Evening RH (%)	-0.33
wind velocity(kmph)	-0.14
No. of bright sunshine hours	-0.19
Evaporation (mm)	0.78

Experiment No.1 (Project E 4.1) :		
Evaluation zonal varieties / genotypes for their reaction against major insect pests		
	Trials	**Entries**
1	Evaluation of main yield trial – Early [MYT-Early] genotypes for their reaction against major insect pests.	11+04=15
2	Evaluation of Main Yield Trial –Midlate (MYT- Midlate) genotypes for their reaction against major insect pests.	04+04=09
	Total	**15+8= 23**

Experiment No.2 (E 28)	Survey and surveillance of sugarcane insect pests.
Experiment No.3 (E 30)	Monitoring of insect pests and bio-agents in sugarcane agro- ecosystem.
Experiment No.4 (E 33)	Bio-efficacy of insecticides against mealy bugs in sugarcane.
Experiment No.5 (E 34)	Standardization of simple and cost effective techniques for mass multiplication of Sugarcane bio-agents.
Experiment No.6 (E 36)	Management of borer complex of sugarcane through pheromone lures.
Experiment	Bio-efficacy of newer insecticide for the control of

No.7 (E 37)	sugarcane early shoot borer.