

Project No. E.4.1 (1)

Title	: Evaluation of genotypes for their reaction against major insect pests [IVT (Early)].
Objective	: To grade the entries in the trials for their behaviour towards damage by key pest in the area.
Year of start	: 1985-86
Duration	: Long term
Location	: Central Sugarcane Research Station, Padegaon
Experimental Details	:
01 Date of Planting	: 15/02/2014
02 Varieties	: 13+03=16
03 Fertilizers	: 250:115:115 NPK (Kg ha ⁻¹)
04 Intercultural operations	: Weeding as and when required and earthing up after 4.5 months after planting.
05 Irrigation	: At an interval of 10-15 days as per availability
06 Plant protection measures	: Not applied.
07 Plot size	: 6m X 2 m
08 Design	: RBD
09 Replications	: Three
10 Harvesting date	: 12/04/2015

Methodology :

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

02 Internode borer, scale insect and mealy bugs :

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

Results:

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

Early shoot borer (ESB):

The cumulative per cent infestation of early shoot borer ranged from 13.76 to 35.88 per cent. The least incidence was observed in CoN 11072 (13.76%) followed by Co 11018 (14.93), PI 11131 (15.08), CoN 11071 (17.05) and CoM 11082 (17.12) per cent. A total of 2, 9 and 5 test genotypes were observed less susceptible, moderately susceptible and highly susceptible to early shoot borer, respectively.

Internode borer (IB):

Regarding internode borer, the incidence ranged from 20 to 60 per cent. The genotype CoN 11071 and Co 85004 recorded the least incidence (20%) each of internode borer followed by Co 11018 (26.67%) and Co 11004 (30%). Two genotypes showed less susceptible reaction while 7 test genotypes each observed moderately susceptible and highly susceptible reaction to internode borer.

Top shoot borer (TSB):

All test genotypes noticed no incidence of top shoot borer and ultimately showed less susceptible reaction for top shoot borer.

Mealy bug (MB):

The incidence of mealy bug, ranged from 70 to cent per cent. The genotypes Co 11016 and Co 11017 observed least incidence of mealy bug, i.e. 70 per cent each. This was followed by Co 94008 (73.33%) and CoC 671 (80%) per cent. Not a single test genotypes observed less susceptible as well as moderately susceptible reaction to mealy bug.

Scale insect (SI):

In case of scale insect the incidence ranged from 0 to 23.33 per cent. The entries viz., Co 11017, Co 11018, CoM 11082, CoM 11083, CoM 11084 etc. recorded no incidence of scale insect, whereas highest incidence (23.33%) was observed in Co 11001. The 13 and 3 test genotypes recorded less susceptible and moderately susceptible reactions to scale insect, respectively.

Conclusion :

None of the entries recorded less susceptible reaction to mealy bug where as highly susceptible reaction to scale insect. The two test genotypes each recorded less susceptible reaction to early shoot borer as well as internode borer. The entry Co 11017 recorded highest incidence to internode borer (60%), whereas showed least incidence to mealy bug (70%) and scale insect (no incidence). The entry CoN 11071 recorded least incidence to internode borer (20%) and scale insect (no incidence), where as highest incidence to mealy bug (cent per cent). The genotypes CoN 11072 observed least incidence to early shoot borer (13.76%), where whereas per cent incidence to mealy bug. The variety Co 85004 recorded highest incidence to early shoot borer (35.88%) as well as mealy bug (cent per cent), where as lowest incidence to internode borer (20%). The cumulative per cent infestation of early shoot borer ranged from 13.76 to 35.88 per cent. Regarding internode borer, the incidence ranged from 20 to 60 per cent. The incidence of mealy bug, ranged from 70 to cent per cent. In case of scale insect the incidence ranged from 0 to 23.33 per cent.

Table-1. Reaction of sugarcane genotypes / varieties to major insect pests [IVT Early].

Sr. No.	Genotypes/ Varieties	Early Shoot Borer		Internode Borer				Top Shoot Borer			Mealy Bug			Scale insect		
		% Cumulative Infestation	Reaction	% Incidence	% Intensity	% Infestation index	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction
01	Co 11001	21.48 (26.80)	MS	43.33 (41.15)	2.90	1.26	HS	00.00 (00.00)	0.00	LS	96.67 (83.85)	14.18	HS	23.33 (18.93)	2.69	MS
02	Co 11004	25.74 (30.37)	MS	30.00 (33.00)	2.01	0.60	MS	00.00 (00.00)	0.00	LS	100.00 (90.00)	17.34	HS	03.33 (6.15)	0.33	LS
03	Co 11016	31.40 (33.94)	HS	46.67 (43.07)	1.84	0.86	HS	00.00 (00.00)	0.00	LS	70.00 (57.00)	05.19	HS	16.67 (15.00)	0.82	MS
04	Co 11017	25.16 (33.09)	MS	60.00 (50.85)	3.51	2.11	HS	00.00 (00.00)	0.00	LS	70.00 (57.00)	05.40	HS	00.00 (00.00)	0.00	LS
05	Co 11018	14.93 (22.59)	LS	26.67 (30.78)	1.59	0.42	MS	00.00 (00.00)	0.00	LS	100.00 (90.0)	23.08	HS	00.00 (00.00)	0.00	LS
06	CoM 11081	23.20 (28.67)	MS	56.67 (49.22)	3.71	2.10	HS	00.00 (00.00)	0.00	LS	90.00 (75.00)	09.96	HS	16.67 (19.92)	1.43	MS
07	CoM 11082	17.12 (24.37)	MS	33.33 (34.92)	1.74	0.58	MS	00.00 (00.00)	0.00	LS	100.00 (90.00)	17.96	HS	00.00 (00.00)	0.00	LS
08	CoM 11083	30.64 (33.25)	HS	36.67 (36.93)	3.12	1.14	MS	00.00 (00.00)	0.00	LS	86.67 (72.29)	06.60	HS	00.00 (00.00)	0.00	LS
09	CoM 11084	33.19 (34.84)	HS	43.33 (40.86)	3.23	1.40	HS	00.00 (00.00)	0.00	LS	93.33 (77.71)	13.00	HS	00.00 (00.00)	0.00	LS
10	CoN 11071	17.05 (23.92)	MS	20.00 (26.07)	1.51	0.30	LS	00.00 (00.00)	0.00	LS	100.00 (90.00)	25.81	HS	00.00 (00.00)	0.00	LS
11	CoN 11072	13.76 (21.54)	LS	33.33 (35.22)	1.65	0.55	MS	00.00 (00.00)	0.00	LS	100.00 (90.00)	28.45	HS	00.00 (00.00)	0.00	LS

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Table-1. Contd. Reaction of sugarcane genotypes / varieties to major insect pests [IVT Early].

Sr. No.	Genotypes/ Varieties	Early Shoot Borer		Internode Borer				Top Shoot Borer			Mealy Bug			Scale insect		
		% Cumulative Infestation	Reaction	% Incidence	% Intensity	% Infestation index	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction
12	CoT 11366	20.51 (26.07)	MS	53.33 (46.92)	3.13	1.67	HS	00.00 (00.00)	0.00	LS	100.00 (90.00)	27.82	HS	10.00 (11.07)	1.29	LS
13	PI 11131	15.08 (22.77)	MS	36.67 (31.92)	2.61	0.96	MS	00.00 (00.00)	0.00	LS	96.67 (83.85)	19.77	HS	10.00 (11.07)	0.84	LS
14	Co 85004	35.88 (36.74)	HS	20.00 (26.07)	0.98	0.20	LS	00.00 (00.00)	0.00	LS	100.00 (90.00)	27.92	HS	00.00 (00.00)	0.00	LS
15	Co 94008	32.42 (34.63)	HS	40.00 (38.85)	1.98	0.79	MS	00.00 (00.00)	0.00	LS	73.33 (59.71)	05.75	HS	10.00 (11.07)	0.99	LS
16	CoC 671	25.21 (29.99)	MS	46.67 (43.08)	3.69	1.72	HS	00.00 (00.00)	0.00	LS	80.00 (63.44)	07.36	HS	10.00 (18.44)	0.19	LS
S. E. ±		2.99		6.60				-			4.61			8.35		
C.D. at 5 %		8.64		19.03				-			13.28			2.41		
Less Susceptible (LS)		0 – 15		0 – 20				0 – 10			0 – 5			0 – 10		
Moderate Susceptible (MS)		15.1 – 30		20.1 – 40				10.1 – 20			5.1 – 30			10.1 – 35		
High Susceptible (HS)		Above 30		Above 40				Above 20			Above 30			Above 35		

Project No. E.4.1 (2)

Title : **Evaluation of genotypes for their reaction against major insect pests [IVT ML].**
Objective : To grade the entries in the trial for their behaviour towards damage by key pest in the area.
Year of start : 1985-86
Duration : Long term
Location : Central Sugarcane Research Station, Padegaon

Experimental Details

01 Date of Planting : 15/02/2014
02 Varieties : 13+03=16
03 Fertilizers : 250:115:115 NPK (Kg ha⁻¹)
04 Intercultural operations : Weeding as and when required and earthing up after 4.5 months after planting.
05 Irrigation : At an interval of 10-15 days as per availability
06 Plant protection measures : Not applied.
07 Plot size : 6m X 2 m
08 Design : RBD
09 Replications : Three
10 Harvesting date : 12/04/2015

Results:

The data are presented in table 2. From the table, it is seen that the differences due to various genotypes in respect of cumulative per cent infestation of early shoot borer, internode borer, mealy bug and scale insect were statistically significant. It was observed that, there was no incidence of top shoot borer in all entries.

Early shoot borer (ESB):

The cumulative per cent infestation of early shoot borer ranged from 13.17 to 47.69 per cent. The least incidence of early shoot borer observed in Co 11020 (13.17) followed by Co 11021 (14.90) and Co 11012(15.97) per cent. A total of 2, 12 and 2 test genotype showed less susceptible, moderately susceptible and highly susceptible reaction to early shoot borer, respectively.

Internode borer (IB):

The incidence of internode borer ranged from 26.67 to 73.33 per cent. The least incidence of internode borer observed in CoM 11086 and Co 86032 (26.67% each). This was followed by Co 11019 (33.33) and Co 99004(36.67) per cent. None of the entry recorded less susceptible reaction to internode borer. A total of 4 and 12 test genotypes observed moderately susceptible and highly susceptible reaction to internode borer, respectively.

Top shoot borer (TSB):

All test genotypes noticed no incidence and ultimately showed less susceptible reaction for top shoot borer.

Mealy bug (MB):

Regarding mealy bug, the incidence ranged from 66.67 to cent per cent. The least incidence of mealy bug was observed in CoM 11085(66.67%). However, all test genotypes recorded highly susceptible reaction to mealy bugs. The entries viz; Co11005, Co 11007, Co 11012 etc. observed cent per cent incidence of mealy bugs.

Scale insect (SI):

In case of scale insect, the incidence ranged from 0 to 13.33 %. However all entries recorded less susceptible reactions to scale insect except Co 11019 and CoN 11074 which recorded moderately susceptible reactions, i.e. 13.33 per cent incidence.

Conclusion :

The test genotype Co 11023 showed highest incidence of early shoot borer (47.69%) as well as internode borer (73.33%). The entries CoM 11086 and Co 86032 recorded least incidence of internode borer (26.67%), where as highest incidence to mealy bug (cent per cent). Among total test genotypes, none of the entry observed less susceptible reaction to internode borer as well as mealy bug. All test genotypes showed less susceptible reaction to top shoot borer, where as highly susceptible reaction to mealy bugs. The cumulative per cent infestation of early shoot borer ranged from 13.17 to 47.69 per cent. The incidence of internode borer ranged from 26.67 to 73.33 per cent. Regarding mealy bug, the incidence ranged from 66.67 to cent per cent. In case of scale insect, the incidence ranged from 0 to 13.33 %.

Table-2. Reaction of sugarcane genotypes / varieties to major insect pests [IVTMidlate].

Sr. No.	Genotypes/ Varieties	Early Shoot Borer		Internode Borer				Top Shoot Borer			Mealy Bug			Scale insect		
		% Cumulative Infestation	Reaction	% Incidence	% Intensity	% Infestation index	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction
01	Co 11005	21.73 (27.49)	MS	43.33 (41.15)	2.54	1.10	HS	00.00 (00.00)	0.00	LS	100.00 (90.00)	23.26	HS	00.00 (00.00)	0.00	LS
02	Co 11007	16.24 (23.70)	MS	63.33 (52.78)	3.36	2.13	HS	00.00 (00.00)	0.00	LS	100.00 (90.00)	22.72	HS	00.00 (00.00)	0.00	LS
03	Co 11012	15.97 (23.39)	MS	56.67 (49.22)	3.62	2.05	HS	00.00 (00.00)	0.00	LS	100.00 (90.00)	34.39	HS	00.00 (00.00)	0.00	LS
04	Co 11019	17.37 (24.35)	MS	33.33 (34.22)	1.85	0.62	MS	00.00 (00.00)	0.00	LS	90.00 (75.00)	12.65	HS	13.33 (13.08)	1.07	MS
05	Co 11020	13.17 (21.20)	LS	43.33 (41.07)	3.71	1.61	HS	00.00 (00.00)	0.00	LS	96.67 (83.85)	14.80	HS	00.001 (00.00)	0.00	LS
06	Co 11021	14.90 (22.66)	LS	53.33 (46.92)	3.66	1.95	HS	00.00 (00.00)	0.00	LS	86.67 (76.92)	11.45	HS	00.00 (00.00)	0.00	LS
07	Co 11022	17.94 (24.88)	MS	60.00 (50.85)	4.08	2.45	HS	00.00 (00.00)	0.00	LS	100.00 (90.00)	33.90	HS	00.00 (00.00)	0.00	LS
08	Co 11023	47.69 (43.68)	HS	73.33 (59.22)	8.64	6.34	HS	00.00 (00.00)	0.00	LS	83.33 (70.08)	06.51	HS	00.00 (00.00)	0.00	LS
09	Co 11024	23.87 (29.03)	MS	53.33 (48.00)	4.19	2.23	HS	00.00 (00.00)	0.00	LS	80.00 (63.93)	08.79	HS	00.00 (00.00)	0.00	LS
10	CoM 11085	20.76 (26.99)	MS	63.33 (53.07)	4.79	3.03	HS	00.00 (00.00)	0.00	LS	66.67 (60.00)	07.44	HS	00.00 (00.00)	0.00	LS
11	CoM 11086	24.88 (29.73)	MS	26.67 (30.99)	1.41	0.38	MS	00.00 (00.00)	0.00	LS	100.00 (90.00)	36.61	HS	00.00 (00.00)	0.00	LS

Continued

Table-2. Contd. Reaction of sugarcane genotypes / varieties to major insect pests [IVTMidlate].

Sr. No.	Genotypes/ Varieties	Early Shoot Borer		Internode Borer				Top Shoot Borer			Mealy Bug			Scale insect		
		% Cumulative Infestation	Reaction	% Incidence	% Intensity	% Infestation index	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction
12	CoM 11087	29.71 (32.99)	MS	43.33 (41.15)	2.77	1.20	HS	00.00 (00.00)	0.00	LS	83.33 (66.64)	07.14	HS	00.00 (00.00)	0.00	LS
13	CoN 11073	32.21 (34.34)	HS	43.33 (40.78)	2.59	1.12	HS	00.00 (00.00)	0.00	LS	96.67 (83.85)	15.10	HS	00.00 (00.00)	0.00	LS
14	CoN 11074	21.20 (27.25)	MS	53.33 (47.01)	3.73	1.99	HS	00.00 (00.00)	0.00	LS	93.33 (81.15)	11.40	HS	13.33 (13.08)	1.48	MS
15	Co 86032	23.36 (28.79)	MS	26.67 (30.78)	1.46	0.39	MS	00.00 (00.00)	0.00	LS	100.00 (90.00)	13.68	HS	00.00 (00.00)	0.00	LS
16	Co 99004	19.04 (25.73)	MS	36.67 (37.22)	2.18	0.80	MS	00.00 (00.00)	0.00	LS	86.67 (72.29)	09.30	HS	00.00 (00.00)	0.00	LS
S. E. ±		2.70		5.80				-			6.48			4.70		
C.D. at 5 %		7.77		16.72				-			18.68			13.55		
Less Susceptible (LS)		0 – 15		0 – 20				0 – 10			0 – 5			0 – 10		
Moderate Susceptible (MS)		15.1 – 30		20.1 – 40				10.1 – 20			5.1 – 30			10.1 – 35		
High Susceptible (HS)		Above 30		Above 40				Above 20			Above 30			Above 35		

Project No. E.4.1 (3)

Title	: Evaluation of genotypes for their reaction against major insect pests [AVT (Early I PL)].
Objective	: To grade the entries in the trials for their behavior towards damage by key pest in the area.
Year of start	: 1985-86
Duration	: Long term
Location	: Central Sugarcane Research Station, Padegaon.

Experimental Details :

01 Date of Planting	: 15/02/2014
02 Varieties	: 03+03=06
03 Fertilizers	: 250:115:115 NPK (Kg ha ⁻¹)
04 Intercultural operations	: Weeding as and when required and earthing up after 4.5 months after planting.
05 Irrigation	: At an interval of 10-15 days as per availability
06 Plant protection measures	: Not applied.
07 Plot size	: 6m X 2 m
08 Design	: RBD
09 Replications	: Three
10 Harvesting date	: 12/04/2015

Results:

The data is presented in table 3. From the table, it is seen that the differences due to various genotypes in respect of cumulative per cent infestation of early shoot borer, internode borer, mealy bug and scale insect were statistically significant. It was observed that, there was no incidence of top shoot borer in all entries.

Early shoot borer (ESB):

The cumulative per cent infestation of early shoot borer ranged from 10.78 to 31.39 per cent. The least incidence of early shoot borer was observed in Co 09004 (10.78%), followed by CoN 09072 (11.32) and CoC 671 (15.73) per cent. A Total of 2, 3 and 1 test genotypes showed less susceptible, moderately susceptible and highly susceptible reaction to early shoot borer, respectively.

Internode borer (IB):

In case of internode borer, the infestation ranged from 20 to 73.33 per cent. The Co 85004 recorded least incidence of internode borer (20%) followed by CoN 09072 (46.67) per cent. None of the single genotype observed moderately susceptible reaction to internode borer. A total of 1 and 5 test genotypes showed less susceptible and highly susceptible reaction to internode borer, respectively.

Top shoot borer (TSB):

All test genotypes noticed no incidence and ultimately showed less susceptible reaction for top shoot borer.

Mealy bug (MB):

Regarding mealy bug, the incidence ranged from 86.67 to 93.33 per cent. The least incidence of mealy bug observed in Co 09007 (86.67) per cent. However, all test genotypes recorded highly susceptible reaction to mealy bug.

Scale insect (SI):

The incidence of scale insect ranged from 0 to 23.33 per cent. The entries Co 09004 and CoN 09072 observed no incidence of scale insect. A total of 4 and 2 test genotypes showed less susceptible and moderately susceptible reaction to scale insect, respectively.

Conclusion :

The entry Co 09004 showed no incidence to scale insect and least incidence to early shoot borer (10.78%), where as highest incidence of internode borer (73.33%). The entry Co 09007 recorded least incidence of mealy bug (86.67%), where as highest incidence of scale insect (23.33%) among the tested genotypes. The variety Co 85004 showed least incidence of internode borer (20%), where as highest incidence of early shoot borer (31.39%) as well as mealy bug (93.33%). The 2, 1 and 4 genotypes showed less susceptible reaction to early shoot borer, internode borer and scale insect, respectively. All test genotypes observed less susceptible reaction to top shoot borer, where as highly susceptible reaction to mealy bug. The cumulative per cent infestation of early shoot borer ranged from 10.78 to 31.39 per cent. In case of internode borer, the infestation ranged from 20 to 73.33 per cent. Regarding mealy bug, the incidence ranged from 86.67 to 93.33 per cent. The incidence of scale insect ranged from 0 to 23.33 per cent.

Table-3. Reaction of sugarcane genotypes / varieties to major insect pests [AVT Early- I Plant].

Sr. No.	Genotypes/ Varieties	Early Shoot Borer		Internode Borer				Top Shoot Borer			Mealy Bug			Scale insect		
		% Cumulative Infestation	Reaction	% Incidence	% Intensity	% Infestation index	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction
01	Co 09004	10.78 (17.83)	LS	73.33 (63.93)	4.54	3.33	HS	00.00 (00.00)	0.00	LS	90.00 (78.93)	11.41	HS	00.00 (00.00)	0.00	LS
02	Co 09007	25.62 (30.02)	MS	60.00 (51.15)	3.52	2.11	HS	00.00 (00.00)	0.00	LS	86.67 (68.85)	06.91	HS	23.33 (18.93)	3.85	MS
03	CoN 09072	11.32 (16.14)	LS	46.67 (42.99)	2.81	1.31	HS	00.00 (00.00)	0.00	LS	93.33 (81.15)	09.81	HS	00.00 (00.00)	0.00	LS
04	Co 85004	31.39 (33.98)	HS	20.00 (26.07)	1.31	0.26	LS	00.00 (00.00)	0.00	LS	93.33 (81.15)	19.62	HS	20.00 (22.14)	1.11	MS
05	Co 94008	19.11 (25.67)	MS	73.33 (59.01)	4.85	3.56	HS	00.00 (00.00)	0.00	LS	90.00 (75.00)	06.00	HS	10.00 (11.07)	0.81	LS
06	CoC 671	15.73 (22.91)	MS	60.00 (50.85)	4.32	2.59	HS	00.00 (00.00)	0.00	LS	90.00 (75.00)	07.20	HS	00.00 (00.00)	0.00	LS
S. E. ±		3.00		6.00				-			5.58			9.82		
C.D. at 5 %		9.45		18.88				-			17.57			30.89		
Less Susceptible (LS)		0 – 15		0 – 20				0 – 10			0 – 5			0 – 10		
Moderate Susceptible (MS)		15.1 – 30		20.1 – 40				10.1 – 20			5.1 – 30			10.1 – 35		
High Susceptible (HS)		Above 30		Above 40				Above 20			Above 30			Above 35		

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

Methodology :

Roving survey of sugarcane fields were carried out in 5-8 km area around Central Sugarcane Research Station, Padegaon. Survey was carried out during 2014-15 on farmers field in different villages viz., Padegaon Farm (Phaltan), Koparde (Khandala), Padegaon (Khandala), Pimpri kd. (Purandar) and Balu Patalachi wadi (Khandala) etc. In most of the fields, CoM 0265 and Co 86032 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 :

Early shoot borer :

The early shoot borer incidence was highest in *suru* planting which was ranged from 10.00 to 24.33 per cent. Maximum incidence was observed in late planting and in light soils. This year (2014), the incidence of early shoot borer was high during late planting (particularly march onwards) may be due to less availability of irrigation water and high temperature.

In case of *Adsali* planting, the incidence of early shoot borer ranged from 6.33 to 17.67 per cent. In *preseasonal* planting, incidence of early shoot borer ranged from 5.33 to 12.33 per cent. Hence, to avoid the incidence of early shoot borer, *preseasonal* / *adsali* planting of sugarcane is most suitable time. However, very negligible incidence of sugarcane woolly aphid was observed in farmers field. The predators viz., *Dipha aphidivora*, Syrphid and Lady bird beetle observed very rare on sugarcane woolly aphid colonies. However, the predators, *Micromus igorotus* as well as the parasitoid, *Encarsia flavoscutellum* observed more than the other predator/parasites. The rare activity of the predator viz., *Ankylopteryx* sp. (Neuroptera : Chrysopidae) recorded in the farmers field.

The incidence of mealy bug ranged from 10 to 50.00 per cent. However, during this year the intensity of mealy bug was ranged with 2.67 to 6.33 per cent. The incidence of scale insect ranged from 0 to 40 per cent. In ratoon crop, the incidence of scale insect and mealy bug was more. However, the scale, *Aclerda* sp. nr. *takahashii* belongs to family Aclerdidae recorded on ratoon crop of sugarcane at Central Sugarcane Research Station, Padegaon, which was identified from, “ National Bureau of Agricultural Important Insect, Bangalore, during previous year.”

Conclusion:

Early shoot borer is key pest of this area and per cent insect infestation was highest in *suru* planting than *adsali* and *preseasonal*. The incidence of early shoot borer ranged from 10.00 to 24.33 per cent. The incidence of internode borer was also observed up to 50.00 per cent. During this year (2014-15), the incidence of mealy bug was recorded up to 50.00 %. However, the intensity of mealy bug ranged between 2.67 to 6.33 per cent. The incidence of top shoot borer, sugarcane woolly aphid, white fly, pyrilla were in traces to low and most fields observed less susceptible reaction to these pests. However, the little incidence of the scale, *Aclerda* sp. nr. *takahashii* belongs to family Aclerdidae recorded on ratoon crop of sugarcane at Central Sugarcane Research Station, Padegaon.

Expt No.3 : **Project E 30**
Title : **Monitoring of insect pests and bio-agents in agro ecosystem.**
Objective : To monitor the key insect pests and natural enemies in the area.

Experimental Details :

1	Year of start	: 2006-07
2	Duration	: Long term.
3	Season	: Suru

Observations :

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.

Results :

The data regarding percent cumulative infestation and average number of woolly aphid per 2.5 cm² leaf area and meteorological data are presented in table – 5.

Early shoot borer:

The infestation of early shoot borer (0.13%) was noticed in 15 MW (i.e. 09-15 April). The maximum incidence (10.28%) was noticed in 20 MW (i.e. 3rd week of May), when the maximum and minimum temperature were 37.1 and 23.4^oC, respectively. Afterwards, it was decreased gradually up to 26 MW.

Sugarcane woolly aphid:

The first incidence of woolly aphid was noticed in 29 to 30 MW (i.e. 16-29 July) during every year at CSRS, Padegaon (table-5). However, this year (2014) it was observed in 33rd MW i.e. 13-9 August (0.22 woolly aphid / 2.5 cm² / 3 leaves). This may be due to continuous heavy rainfall since 27 to 35 MW (total 398.8 mm). From 36 to 40 MW, there was no incidence. Again, it was started from 41 MW. The peak incidence of white woolly aphid was observed 47 to 52 meteorological weeks. However, the highest incidence was observed during 51 MW i.e. 3rd week December of 2014 and it was 28.41 woolly aphid / 2.5 cm² / 3 leaves on infested stools. From 1 MW of 2015, incidence shown declined trend, which may be due to predator/parasite activity as well as high temperature in succeeding meteorological weeks at particular location.

The activity of predators viz., Syrphid, *Dipha aphidivora* and Lady bird beetle were in traces to low during September to October. The *Micromus igorotus* was observed @ 0.3 in 46 MW; 12 in 52 MW and 1.33 in 3 MW of 2015 per leaf on infested stools. The parasitoid, *Encarsia flavoscutellum* observed @ 3-22 per stool in December 2014 and first fortnight of January 2014, which is comparatively lower than that of previous years. *Encarsia flavoscutellum* recorded its peak activity in 52 MW (last week of December 2014) @ 07 to 28 numbers per leaf sugarcane having woolly aphid infestation. Due to heavy parasitism of *Encarsia flavoscutellum*, the woolly aphid again disappeared after 4 MW of 2015 (22-28 January 2015).

The parasitoid, *Encarsia flavoscutellum* played a pivotal role in suppressing the woolly aphid infestation, particularly in November- December 2014 and January 2015 followed by *Micromus igorotus* and *Dipha aphidivora* at Central Sugarcane Research Station, Padegaon. The activity of Syrphid as well as lady bird beetle was negligible during this year and it was rarely seen.

Conclusion:

The effect of meteorological parameters was studied against early shoot borer and sugarcane woolly aphid. Maximum incidence of early shoot borer was recorded in 20th MW (3rd week of May) (10.28%), when the maximum and minimum temperature was 37.1^o C and 23.4^o C, respectively. In case of sugarcane woolly aphid, the maximum incidence (28.41 woolly aphid/2.5 m²/3leaf) was recorded in 51 MW of 2014, when the maximum and minimum temperatures were 26.0 and 9.4^oC, respectively. The peak activity of *Encarsia flavoscutellum* was observed in 52 MW (last week of December 2014) @ 07 to 28 numbers per leaf sugarcane having woolly aphid infestation.

Table 4: Incidence of different pests and their natural enemies during 2014-15 at CSRS Padegaon.

Name of the Pest	Infestation (%)	Natural Enemies Recorded (Per Leaf)
Early shoot borer	15-24	--
Internode borer	18-22	--
Top shoot borer	In traces	--
Mealy bug	20-30	--
Scale insect	In traces to low	--
Pyrilla	In traces	<i>Epiricanea melanoleuca</i>
White fly	In traces	<i>Ablerus chionaspidis</i> , <i>Encarsia</i> sp. (both Aphelinidae) and <i>Amitus</i> sp. (Platygastridae)
Sugarcane woolly aphid	In traces to high (on very few stools in field)	<i>Micromus igorotus</i>: 0.3 per leaf in 46 MW; 12 per leaf in 52 MW (peak activity) ; 1.33 per leaf in 3 MW of 2015. <i>D. aphidivora</i> : 2-8 per leaf in 47 to 48 MW; peak activity – 18 per leaf in 50 MW. <i>E. flavoscutellum</i>: 1-2 per stool in 46 MW peak activity @ 11-28 per stool in 49 MW of 2014 to 2 MW of 2015. Lady bird beetle (rare); <i>Ankylopteryx</i> sp. (rare); Syrphid (rare).

Data in Table – 4 indicated that the occurrence of pests viz., top shoot borer, Pyrilla, White fly, Scale insect and Sugarcane woolly aphid were recorded at low levels which may be due to presence of natural enemies. The internode borer, recorded less susceptible to moderately susceptible reaction (18-22%), but moderate incidence of mealy bug up to 30 per cent was observed.

Table 5: Effect of climatic factors on the incidence of early shoot borer and wooly aphid.

Meteorological Week	Temp		RH %		Rainfall (mm)	ESB % infestation	Average Woolly Aphid/ 2.5 c m ² /3 Leaf
	Max	Min	RH1	RH2			
01	28.6	12.0	96	46	0.0	--	--
02	30.1	12.3	97	45	0.0	--	--
03	30.2	13.6	94	46	0.0	--	--
04	29.0	13.8	95	53	0.0	--	--
05	28.9	11.2	96	47	0.0	--	--
06	32.5	11.7	96	41	0.0	--	--
07	29.5	11.6	96	43	0.0	--	--
08	31.4	15.9	91	54	0.0	--	--
09	31.4	14.5	95	53	4.3	--	--
10	31.2	16.6	97	58	9.4	--	--
11	34.5	19.6	88	54	1.5	--	--
12	37.1	16.9	84	53	0.0	--	--
13	37.8	18.9	88	57	0.0	--	--
14	39.1	21.6	74	28	0.0	--	--
15	38.2	16.9	78	26	0.0	0.13	--
16	37.4	21.9	83	39	1.0	1.27	--
17	38.9	22.4	77	40	0.8	1.47	--
18	39.0	22.8	79	45	0.0	5.98	--
19	35.8	21.9	87	52	10.4	7.98	--
20	37.1	23.4	84	52	0.0	10.28	--
21	38.4	24.8	85	52	0.0	7.57	--
22	38.3	23.0	91	60	108.6	7.82	--
23	36.1	23.8	92	61	17.8	5.12	--
24	33.6	24.1	90	71	0.0	4.36	--
25	32.6	23.5	76	58	0.0	2.20	--
26	34.3	22.9	74	44	0.0	1.77	--
27	32.7	23.4	81	61	3.6	--	--
28	29.9	22.3	87	79	1.7	--	--
29	29.3	22.2	90	78	11.1	--	--
30	27.8	21.4	93	79	48.1	--	--
31	27.3	21.8	96	82	38.9	--	--
32	28.8	21.0	97	75	9.4	--	--

Meteorological Week	Temp		RH %		Rainfall (mm)	ESB % infestation	Average Woolly Aphid/ 2.5 c m ² /3 Leaf
	Max	Min	RH1	RH2			
33	30.8	22.0	90	64	0.0	--	0.22
34	31.7	22.4	95	72	195.0	--	0.14
35	27.7	21.5	97	82	91.0	--	0.12
36	28.7	22.5	91	78	9.6	--	0.00
37	29.3	21.2	95	68	1.2	--	0.00
38	31.1	21.7	94	63	3.9	--	0.00
39	32.8	21.5	88	54	8.2	--	0.00
40	33.4	22.3	91	55	12.8	--	0.00
41	32.0	20.6	93	61	39.7	--	0.56
42	32.2	20.7	95	56	2.5	--	1.02
43	27.5	18.5	93	68	10.8	--	1.32
44	30.9	15.3	95	45	0.0	--	4.04
45	31.7	17.2	87	38	0.0	--	5.81
46	29.3	20.0	92	68	86.7	--	9.81
47	29.4	16.7	97	55	0.0	--	23.25
48	29.2	12.4	95	45	0.0	--	26.91
49	29.5	11.4	93	40	0.0	--	24.00
50	29.4	16.1	94	56	31.6	--	26.64
51	26.0	09.4	93	51	0.0	--	28.41
52	27.7	09.7	97	53	0.0	--	20.59
01	25.9	14.1	97	57	0.0	--	13.23
02	27.9	06.8	92	39	0.0	--	6.90
03	28.7	10.0	92	39	0.0	--	1.22
04	29.4	12.8	96	49	0.0	--	0.18
05	30.1	11.9	96	48	0.0	--	--
06	31.3	12.4	88	52	0.0	--	--
07	33.2	12.0	94	53	0.0	--	--
08	34.0	13.3	85	39	0.0	--	--
09	30.5	13.0	92	55	43.8	--	--
10	32.1	14.4	88	49	0.0	--	--
11	33.1	17.2	95	64	1.8	--	--
12	36.6	19.7	80	41	0.0	--	--
13	37.6	19.8	83	39	0.0	--	--

Expt No.4 : **Project E.34**
Title : **Standardization of simple, cost effective techniques for mass multiplication of sugarcane bioagents.**
Objective : To develop simple and cost effective mass multiplication techniques of promising bio- agents of the area.

Experimental Details

- 1 Location : Padegaon
- 2 Duration : Three years
- 3 Year of Start : 2012-13
- 4 Bio-agent to be : ➤ *Chrysoperla carnae* multiplied

Methodology : Simple and cost effective host insect/media for multiplication of parasitoid/predator and insect pathogen/parasite.

Note: For mass multiplication of entomopathogenic fungi Plant Pathologist at the center may be requested to jointly work.

Results : Every year the incidence of white woolly aphid occurs during 29 or 30 MW at CSRS, Padegaon and surrounding area. However, this year (2014), it was occurred in 33rd MW i.e. 13-19 August (0.22 woolly aphid / 2.5 cm² / 3 leaves). This may be due to continuous rainfall since 27 MW. The experiment was planted on 20.03.2014. The incidence of white woolly aphid was on Co 86032 since 40 MW. However, sufficient urea was applied to make leaves succulent. The white woolly aphid was inoculated on 10/10/2014 (41MW) from farmer's field. But, woolly aphid was developed sporadically and it was irregular. Again, woolly aphid was inoculated on 26 November, 2014 (48 MW). However, this time it was developed up to 40 per cent.

- The predator, *Micromus igorotus* was observed since 47 MW in 1-2 numbers on white woolly aphid infested leaves. But, the population of *Micromus igorotus* was also present in farmers field, while collecting the infested leaves. The activity of *Micromus igorotus* was highest in 52 MW (i.e. last week of December) up to 3-12 numbers/leaf. It was continued up to 3rd MW of January 2015 (0-2 per leaf). The activity of *Dipha aphidivora* was recorded from 47 MW (i.e. 19-25 November 2014) to 02 MW of 2015 (i.e. second week of January, 2015) and it was up to 1-3 numbers/leaf. The activity of syrphid and lady bird beetle was in traces. The parasite, *Encarsia flavoscutellum* was observed @ 1-2 in 46 MW (i.e. 12-18 November) and peak activity @ 11-28 numbers per leaf during 52 MW i.e. last week of December 2014.

The bio-agents, particularly *Micromus igorotus* and *Encarsia flavoscutellum* played a pivotal role in suppressing the woolly aphid population.

The bio agent *Chrysoperla carnea* was also released in 38 and 48 MW. However, it was developed in traces in the experimental field up to 52 MW.

- Expt No.5** : **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.
- Experimental Details** :
- 1 Year of start : 2012-13
 - 2 Plot size : 1 acre
 - 3 Variety : Recommended variety of the location (CoM 0265)
- Treatment details** : Pheromone lures of sugarcane early shoot borer, internode borer and top shoot borer.
- Plot Size** : Two blocks, each of minimum half acre. In first block, all traps were installed and the second plot was kept as such (control). In between both blocks, one acre sugarcane crop was taken to avoid the pheromone effect.
- Methodology** :
- In *Peninsular* and East Coast Zone, the test insect-pests will be *early shoot borer, top borer and internode borer*, while in North West and north central zones, early shoot borer, top borer and stalk borer.
 - Three pheromone traps for each pest was installed in the second fortnight of February till harvest of crop in half acre of sugarcane crop.
 - The pheromone lure was changed after 1½ to 2 months.
- Observation to be recorded** :
- Observations on number of moths trapped was recorded at weekly interval.
 - The mean number of moth capture was worked out.
 - The correlation and regression of moth captures were worked out with weekly meteorological parameters.
 - Infestation of each borer was recorded in both blocks.

Table – 6 The average pheromone trap catches of pests as per meteorological weeks (Year 2014 and 2015).

Met. Week	Temp		RH %		Rainfall (mm)	ESB	IB	TSB
	Max	Min	RH1	RH2				
01	28.6	12.0	96	46	0.0	0	0	0
02	30.1	12.3	97	45	0.0	0	0	0
03	30.2	13.6	94	46	0.0	0	0	0
04	29.0	13.8	95	53	0.0	0	0	0
05	28.9	11.2	96	47	0.0	0	0	0
06	32.5	11.7	96	41	0.0	4	1	0
07	29.5	11.6	96	43	0.0	4	2	0
08	31.4	15.9	91	54	0.0	0	0	0
09	31.4	14.5	95	53	4.3	2	0	0
10	31.2	16.6	97	58	9.4	0	0	0
11	34.5	19.6	88	54	1.5	1	1	0
12	37.1	16.9	84	53	0.0	0	0	0
13	37.8	18.9	88	57	0.0	1	0	0
14	39.1	21.6	74	28	0.0	0	1	0
15	38.2	16.9	78	26	0.0	2	0	0
16	37.4	21.9	83	39	1.0	2	2	0
17	38.9	22.4	77	40	0.8	4	2	1
18	39.0	22.8	79	45	0.0	5	3	0
19	35.8	21.9	87	52	10.4	3	3	3
20	37.1	23.4	84	52	0.0	2	4	0
21	38.4	24.8	85	52	0.0	0	0	1
22	38.3	23.0	91	60	108.6	1	0	0
23	36.1	23.8	92	61	17.8	0	1	0
24	33.6	24.1	90	71	0.0	0	0	0
25	32.6	23.5	76	58	0.0	0	0	0
26	34.3	22.9	74	44	0.0	0	0	0
27	32.7	23.4	81	61	3.6	0	0	0
28	29.9	22.3	87	79	1.7	0	0	0
29	29.3	22.2	90	78	11.1	0	0	0
30	27.8	21.4	93	79	48.1	0	0	0
31	27.3	21.8	96	82	38.9	0	0	0
32	28.8	21.0	97	75	9.4	0	0	0
33	30.8	22.0	90	64	0.0	0	0	0
34	31.7	22.4	95	72	195.0	0	0	0
35	27.7	21.5	97	82	91.0	0	0	0
36	28.7	22.5	91	78	9.6	0	0	0
37	29.3	21.2	95	68	1.2	0	0	0
38	31.1	21.7	94	63	3.9	1	0	0
39	32.8	21.5	88	54	8.2	0	0	0
40	33.4	22.3	91	55	12.8	0	0	0
41	32.0	20.6	93	61	39.7	0	0	0
42	32.2	20.7	95	56	2.5	0	0	0
43	27.5	18.5	93	68	10.8	0	1	0
44	30.9	15.3	95	45	0.0	0	0	0
45	31.7	17.2	87	38	0.0	0	1	0
46	29.3	20.0	92	68	86.7	0	1	0

Met. Week	Temp		RH %		Rainfall (mm)	ESB	IB	TSB
	Max	Min	RH1	RH2				
47	29.4	16.7	97	55	0.0	0	0	0
48	29.2	12.4	95	45	0.0	0	0	0
49	29.5	11.4	93	40	0.0	0	0	0
50	29.4	16.1	94	56	31.6	0	0	0
51	26.0	09.4	93	51	0.0	0	0	0
52	27.7	09.7	97	53	0.0	0	0	0
01	25.9	14.1	97	57	0.0	0	0	0
02	27.9	06.8	92	39	0.0	0	0	0
03	28.7	10.0	92	39	0.0	0	0	0
04	29.4	12.8	96	49	0.0	0	0	0
05	30.1	11.9	96	48	0.0	0	0	0
06	31.3	12.4	88	52	0.0	0	0	0
07	33.2	12.0	94	53	0.0	0	0	0
08	34.0	13.3	85	39	0.0	0	0	0
09	30.5	13.0	92	55	43.8	0	0	0
10	32.1	14.4	88	49	0.0	0	0	0
11	33.1	17.2	95	64	1.8	0	0	0
12	36.6	19.7	80	41	0.0	0	0	0
13	37.6	19.8	83	39	0.0	0	0	0

Results : The data regarding meteorological week wise weather parameters with moth catches of early shoot borer, internode borer and top shoot borer are presented in table-6. During last year, the observations on trap catches of earlier installed traps did not show any moth catches since 01st to 05th MW. This is due to the traps were in old matured cane field. However, the new pheromone traps were installed in new planted Sugarcane crop. In that field, the highest number of moth catches in case of early shoot borer were trapped in 18 MW (5 numbers/trap), when the maximum and minimum temperature was 39.0 and 22.8^o C, respectively.

- : The moth catches decreased gradually up to 22 MW. However, again the moth catches observed in 38 MW. Afterwards, there was no moth catches of early shoot borer. The maximum average pheromone trap catches of internode borer was recorded in 20 MW (4 number per trap), when the maximum and minimum temperature was 37.1 and 23.4^o C, respectively. Afterwards, there were no moth catches except 23th MW. However, there were only one moth catch in 43,45 and 46 MW. In case of top shoot borer, the highest number of moth catches were observed in 19 MW (3 number per trap), when the maximum and minimum temperature was 35.8 and 21.9^o C, respectively. Since 22nd MW, there were no moth catches of top shoot borer.

Conclus ion : The highest number of moth catches in case of early shoot borer were trapped in 18 MW (5 numbers/ trap), when the maximum and minimum temperature was 39.0 and 22.8^o C, respectively. The maximum average pheromone trap catches of internode borer was recorded in 20 MW (4 number per trap), when the maximum and minimum temperature was 37.1 and 23.4^o C, respectively. In case of top shoot borer, the highest number of moth catches were observed in 19 MW (3 number per trap), when the maximum and minimum temperature was 35.8 and 21.9^o C, respectively.

Expt No.6 : Project E 37 (New Project):

Title : Bioefficacy of new insecticides for the control of sugarcane early shoot borer.

Objective : To find out effective strategy for the management of sugarcane early shoot borer.

Experimental Details :

- 1 Year of start : 2013-14
- 2 Design : RBD
- 3 Replications : Three
- 4 Plot size : 6.0 x 5.4 m Gross (Net : 6X3.6m)
- 5 Planting date : 11/03/2014
- 6 Variety : Co 86032
- 7 No. of : 8 treatments
- 8 Harvesting date : 12/04/2015

Treatment details :

Tr No.	Name of the treatment
1	: Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP
2	: Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP
3	: Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP
4	: Spraying of Spinosad 45 SC @ 90 ml/ha at 30 & 60 DAP
5	: Spraying of Flubendiamide @ 250 ml/ha at 30 & 60 DAP
6	: Soil application of Phorate 10G @15 kg/ha at the time of planting and 60 DAP
7	: Soil application of Carbofuron 3G @ 33 kg/ha at the time of planting and 60 DAP
8	: Untreated Control

Methodology :

Early Shoot borer:

- ESB infestation was recorded by counting number of dead hearts easily pulled out and emitting offensive odour as well as the total number of shoots/plant in each net plot on 45, 60, 90 and 120 DAP.
- The per cent incidence of shoot borer was worked out by following formula:
$$\text{Per cent incidence} = \frac{\text{Number of dead hearts}}{\text{Total number of shoots}} \times 100$$
- The cumulative per cent infestation was worked out by taking progressive total of infested shoots in proportion to total shoot formed.
- Number of millable cane and cane yield.

Results:

Data recorded on per cent incidence of early shoot borer (ESB), total number of millable canes (000 per ha) and yield (t/ha) are presented in table 7.

After 45 days of planting, the differences regarding incidence of early shoot borer were statistically significant. The soil application of chlorantraniliprole 0.4 G (T₂) showed least incidence of early shoot borer (1.63 %) which was at par with soil application of fipronil 0.3 G (5.10 %). These treatments were significantly superior over rest of the treatments.

After 60 days of planting, Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP (T₂) was significantly superior over rest of the treatments and observed 2.37 per cent ESB incidence. However, it was at par with Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP (T₃), which recorded 9.07 per cent incidence of early shoot borer. It was followed by treatment T₁ Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP and recorded 12.52 per cent incidence of early shoot borer.

After 90 days of planting, the treatment T₂ (Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP) was recorded least incidence of early shoot borer (0.68%). However, it was at par with T₁ (Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP) and T₃ (Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP), which recorded 1.01 and 2.87 per cent incidence of early shoot borer, respectively.

After 120 days of planting, the treatment T₁ (Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP) showed least incidence of early shoot borer (7.50 %). However, it was at par with the treatments T₂, T₃, T₇ and T₈.

The data on cumulative per cent incidence of early shoot borer revealed that, the treatment with Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP (T₂) was significantly superior over rest of the treatments and recorded 14.08 per cent ESB incidence. It was followed by the treatment T₃ (Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP), which recorded 21.48 per cent early shoot borer incidence and observed significantly superior over rest of the treatments. The next treatment is T₁ (Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP), which recorded 27.03 per cent incidence of early shoot borer. This treatment also observed significantly superior over rest of the treatments.

The treatment with Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP (T₂) observed significantly superior millable canes (82.87 thousand / ha). However, it was at par with T₃ (Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP), T₁ (Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP) and T₅ (Spraying of Flubendiamide @ 250 ml/ha at 30 & 60 DAP), which recorded 81.02, 79.07 and 73.33 thousand millable canes per hectare, respectively.

Regarding yield, the treatment with Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP (T₂) observed significantly superior yield (105.56 t / ha) over rest of the treatments. However, it was at par with the treatments T₃ (Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP) (90.67 t / ha) and T₁ (Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP), which recorded 98.61 and 91.20 tons yield per ha, respectively.

Conclusion:

The treatment Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP (T₂) was found most effective against early shoot borer, *Chilo infuscatellus* on sugarcane, having least cumulative incidence of early shoot borer (14.08 per cent) and recorded highest cane yield (105.56 t / ha).

Table -7. Effect of new insecticides against early shoot borer, *Chilo infuscatellus*.

Tr No	Treatments	Mean Early Shoot Borer Incidence (%) (Days After Planting)					Average Millable Canes (000/ha)	Average Cane Yield (t/ha)
		45	60	90	120	Cumulative incidence		
T ₁	Soil application of Fipronil 0.3 G @ 25 Kg/ha at the time of planting and 60 DAP	22.23	12.52	1.01	7.50	27.03	79.07	91.20
T ₂	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP	1.63	4.72	0.68	7.99	14.08	82.87	105.56
T ₃	Spraying of Chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 & 60 DAP	5.10	9.07	2.87	8.15	21.48	81.02	98.61
T ₄	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 & 60 DAP	17.20	22.42	5.19	11.73	38.77	69.35	80.65
T ₅	Spraying of Flubendiamide @ 250 ml/ha at 30 & 60 DAP	21.18	24.66	3.07	11.03	37.67	73.33	88.33
T ₆	Soil application of Phorate 10G @ 15 kg/ha at the time of planting and 60 DAP	17.09	26.51	4.90	12.07	42.58	69.17	77.69
T ₇	Soil application of Carbofuron 3G @ 33 kg/ha at the time of planting and 60 DAP	15.62	22.60	4.41	9.87	35.94	69.72	84.44
T ₈	Untreated Control	26.70	30.61	3.61	10.69	43.57	63.80	66.67
	S. E. ±	1.40	1.73	0.73	1.12	1.40	3.64	5.49
	C.D. at 5 %	4.26	5.24	2.20	3.40	4.24	11.04	16.61
	CV	10.91	11.93	12.77	10.71	7.04	8.58	10.96