All India Coordinated Research Project on Sugarcane
Year- 2011-12

ENTOMOLOGY

U.P. Council of Sugarcane Research, Shahjahanpur

Project	**E. 4.1**
Title	Evaluation of varieties for their reaction against major insect pests.
Objective	To grade the varieties in zonal varietal trials for their behaviour towards damages by key pests in the area.
Year of commencement	Regular feature
Location	Shahjahanpur

AVT (Mid late) I plant

Under AVT (mid late) I plant, Total 9 varieties were evaluated viz; Co 07028, CoLk 07202, 07203, CoPb 07212, 07213, CoS 07232, 07234, CoH 07263, 07264 with three standards (checks) CoS 767, 8436 and CoPant 97222 against major insect pests of the area. The incidence of shoot borer was recorded very low and ranged between 2.07 (CoS 767) to 4.20% (CoH 07263). The incidence of top borer (2^{nd} brood) was also low and ranged between 1.41 (CoS 767) to 3.81% (CoPb 07212) in the month of May. The incidence of top borer (at harvest was recorded maximum 14.05% (CoLk 07202) followed by 13.59% (CoPant 97222 and 13.34% (CoPb 07212) against minimum 8.07% (CoS 767). The infestation index of stalk borer ranged between 0.82% (CoS 767) to 2.01% (CoS 8436) (Table 1A).

AVT (Mid late) II plant

Under AVT (midlate) II Plant, total seven varieties viz; Co 06033, 06034, CoPb 06219, CoPant 06224, CoS 06247, CoH 06265, 06266, with three standards CoS 767, CoS 8436 and Co 1148 were evaluated against major insect pests of the area. The incidence of shoot borer was recorded minimum 5.17% (CoS 767) to maximum 10.70% (CoPant 06224).

The incidence of top borer (2nd brood) was recorded low and ranged between 1.47% (Co 06033) followed by 1.50% (CoS 767) and 1.69% (CoH 06265) to maximum 4.30% (CoPant 06224). The incidence of top borer (at harvest) was recorded maximum 14.01% (Co 06034) followed by 13.85% (CoH 06266) and 12.78% (Co 1148) against minimum 8.01% (CoS 767). The infestation index of stalk borer was recorded maximum 3.61% (CoH 06224) followed by 3.34% (CoH 06266) against minimum 1.32% (CoS 767) (Table 1B).

AVT (Early) I Plant

Under AVT (early) I plant, total five varieties viz; Co 06032, 07023, 07025, CoLk 07201, CoH 06261 with two standards CoPant 84211 and CoJ 64 were evaluated against major insect pests of the area. The incidence of shoot borer was recorded very low and ranged between 4.09% (Co 07025) to 9.20% (Co 06032). The incidence of top borer (2nd brood) was recorded minimum 2.77% (Co 07025) to maximum 6.46% (Co 06032). The incidence of top borer (at harvest) was recorded maximum 13.02% (CoLk 07201) followed by 12.95% (Co 06032) against minimum 8.37% (Co 07025) followed by 8.64% (CoJ 64). The infestation index of stalk borer was recorded maximum 2.40% (CoH 06261) followed by 2.33% (CoJ 64) against minimum 1.09% (CoLk 07201) (Table 1C).

AVT (Mid late) Ratoon

Under AVT (mid late) ratoon of I plant (2010-11) total seven varieties viz; Co 06033, 06034, CoPb 06219, CoPant 06224, CoS 06247, CoH 06265, 06266 with three standards CoS 767, CoS 8436 and Co 1148 were evaluated against major insect pests of the area. The incidence of shoot borer recorded low and ranged between 2.84% (CoS 767) to 9.83% (CoH 06266). The incidence of top borer 2nd brood was recorded low and ranged between 2.83% (CoS 767) to 6.05% (Co 1148). The incidence of top borer (at harvest) was recorded maximum 14.69% (Co 06034) followed by 14.26% (CoH 06266) against minimum 8.79% (CoS 767). The infestation index of stalk borer was recorded maximum 4.52% (CoH 06266) followed by 4.17% (CoPant 06224) against minimum 1.63% (CoS 767) (Table 1D).

Project	**E. 27**
Title	Mass multiplication of potential bio-agents of sugarcane insect pests.
Objective	To develop an economical mass multiplication techniques of promising bio-agents of the area.
Year of commencement	2003-04
Location	Shahjahanpur

Mass multiplication of *Trichogramma chilonis* and its host *Corcyra cephalonica* was done at Sugarcane Research Institute, Shahjahanpur for the control of sugarcane insect pests (Borers) in wooden cages on broken maize. During the year 2011-12, the egg production of *Corcyra cephalonica* was 4500 ml(12 ml/day and 3250 cards were prepared and released in research farm, DSCL, Nigohi, Sugar Mill, Bisauli Sugar Mill and farmers of different factory zones of U.P.

Project	**E. 28**
Title	Survey and surveillance of sugarcane insect pests.
Objective	To identify insect pests of sugarcane in the area.
Year of commencement	Regular feature
Location	Different factory zones of U.P.

Conclusion

Factories such as Azabapur (Kheri), Balrampur, Biswan (Sitapur), Baheri (Bareilly), Gola (Kheri), Rosa (Shahjahanpur), Seohara (Bijnor), Sultanpur and Mandi Dhanaura (J.P. Nagar) were surveyed to identify major insect pests of the area. The incidence of shoot borer in the month of May was recorded 15-18% (Azabapur), 14-16% (Balrampur), 16-20% (Biswan), 15-17% (Hargaon), 13-15% (Baheri), 12-15% (Gola), 18-20%

(Rosa), 14-17% (Seohara), 18-22% (Sultanpur) and 12-16% (Mandi Dhanaura). The percent incidence of top borer was recorded 16-18% (Azabapur), 20-22% (Balrampur), 18-20% (Biswan), 22-25% (Hargaon), 18-22% (Baheri), 15-18% (Gola), 20-25% (Roza), 15-18% (Seohara), 16-18% (Sultanpur) and 15-20% in Mandi Dhanaura. The incidence of stalk borer was recorded 20-25% (Azabapur), 20-22% (Balrampur), 22-28% (Biswan), 18-22% (Hargaon), 25-28% (Baheri), 18-20% (Gola) and 25-30% (Rosa), 20-25% (Seohara) and 15-18% in Sultanpur. The incidence of termite ranged between 6-8% (Balrampur) to 10-12% in Hargaon sugar factory zones (Table 2).

Project	**E. 30**
Title	Monitoring of insect pests and bio-agents in sugarcane agro-ecosystem.
Objective	To monitor the key insect pests and natural enemies in the area.
Year of commencement	2006-07
Location	Shahjahanpur

Conclusion

The incidence of shoot borer in experimental field (variety CoSe 01424) was recorded 18.00% in the month of May. The incidence of top borer 2nd and 3rd brood was recorded 4.8 and 7.2%, respectively, while the cumulative incidence of top borer was recorded 15.2% at harvest. The incidence of termites was recorded 12.8% (sett basis), 8.4% (sett end basis) and 7.73% (on sett bud basis) at hot weather. Parasitisation on top borer by *Isotima javensis* was recorded 1.3 to 20.5%, *Rhaconotus* spp. 2.2 to 5.4%, *Stenobracon* 1.3 to 3.1% and *Telenomus beneficiens* 1.0 to 22.4%. The incidence of other pests was found negligible (Table 3).

Project	**E. 32**
Title	Population dynamics of sugarcane borers (early shoot borer, top borer and stalk borer) through pheromone trap.
Objective	To study the population dynamics of sugarcane borers (early shoot borer, top borer and stalk borer) through pheromone trap and influence of weather parameter on moth catch. .
Year of commencement	2008-09
Location	Shahjahanpur

Conclusion

From March to October moth of shoot borer, top borer and stalk borer were trapped through pheromone traps. The moth of shoot borer was trapped 12.00, 35.00, 38.00, 20.00, 07.00, 03.00 and 01.00 in the month of March, April, May, June, July, August and September, respectively. The moth of top borer were trapped 2.00, 1.00, 4.00, 3.00, 2.00, 2.00 and 5.00 in the month of March,, April, May, June, July, August and September, respectively. The temperature (minimum and maximum) and percent relative humidity (FN and AN) was also recorded from March to December and correlation coefficient was calculated and found significant. The moth catch of shoot borer was positively, while top borer and stalks borer was negatively correlated with maximum temperature. The moth catch of shoot borer and stalk borer was negatively correlated with minimum temperature. The moth catch of shoot borer was found negatively correlated with relative humidity while stalk and top borer was positively correlated with relative humidity (FN and AN) (Table 4).

Table- 1 A: AVT (Mid late) I Plant (2011-12)

S N.	Varieties	% incidence at hot weather		% incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer (infestation index)
1	Co 07028	3.40	1.99	8.94	0.83
2	CoLk 07202	2.36	3.50	14.05	1.72
3	CoLk 07203	2.09	3.05	12.65	1.06
4	CoPb 07212	3.08	3.81	13.34	1.91
5	CoPb 07213	3.80	2.98	11.16	1.43
6	CoS 07232	3.52	2.58	10.48	1.85
7	CoS 07234	2.09	3.30	9.88	1.45
8	CoH 07263	4.20	3.42	9.67	1.31
9	CoH 07264	3.46	2.90	8.16	1.66
10	CoS 767	2.07	1.41	8.07	0.82
11	CoS 8436	3.33	3.09	12.71	2.01
12	CoPant 97222	3.69	2.24	13.59	1.69

Table- 1 B: AVT (Midlate) II Plant (2011-12)

S N	Varieties	% incidence at hot weather (May)		% incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer (infestation index)
1	Co 06033	0.08	1.47	11.70	2.26
2	Co 06034	6.18	3.97	14.01	1.44
3	CoPb 06219	8.70	3.05	8.79	3.05
4	CoPant 06224	10.70	4.30	10.71	3.61
5	CoS 06247	8.49	3.84	9.96	2.00
6	CoH 06265	8.77	1.69	10.59	3.12
7	CoH 06266	8.06	3.80	13.85	3.34
8	CoS 767	5.17	1.50	8.01	1.32
9	CoS 8436	7.88	3.47	12.34	3.23
10	Co 1148	8.32	4.00	12.78	2.38

Table- 1 C: AVT (Early) I Plant (2011-12)

S N	Varieties	% incidence at hot weather		% incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer (infestation index)
1	Co 06032	9.20	6.46	12.95	1.26
2	Co 07023	5.23	3.02	9.70	1.58
3	Co 07025	4.09	2.77	8.37	1.55
4	CoLk 07201	7.31	3.82	13.02	1.09
5	CoH 06261	8.19	3.52	9.55	2.40
6	CoJ 64	7.25	3.39	8.64	2.33
7	Co Pant 84211	6.07	3.28	9.00	1.38

Table- 1 D: AVT (Midlate) Ratoon (2011-12)

S N	Varieties	% incidence at hot weather		% incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer (infestation index)
1	Co 06033	4.20	5.09	11.48	3.35
2	Co 06034	3.48	3.48	14.69	2.30
3	CoPb 06219	4.53	4.53	9.21	3.75
4	CoPant 06224	3.92	3.92	11.39	4.17
5	CoS 06247	3.83	3.83	10.80	2.84
6	CoH 06265	6.04	5.14	11.40	3.82
7	CoH 06266	9.83	4.60	14.26	4.52
8	CoS 767	2.84	2.83	8.79	1.63
9	CoS 8436	4.04	5.50	12.79	3.58
10	Co 1148	7.28	6.05	12.97	2.91

Table 2: Percent incidence of major insect pests in different factory zones of U.P.

SN	Name of factory zone	At hot weather	At harvest			Others
		Shoot borer (%)	Top borer (%)	Stalk borer (%)	Termites (%)	
1	Azabapur (Kheri)	15-18	16-18	20-25	7-10	
2	Balrampur	14-16	20-22	20-22	6-8	
3	Biswan (Sitapur)	16-20	18-20	22-28	7-10	
4	Hargaon (Sitapur)	15-17	22-25	18-22	10-12	
5	Baheri (Bareilly)	13-15	18-22	25-28	8-10	
6	Gola (Kheri)	12-15	15-18	18-20	6-9	
7	Rosa (Shahjahanpur)	18-20	20-25	25-30	9-12	
8	Seohara (Bijnor)	14-17	15-18	20-25	7-9	
9	Sultanpur	18-22	16-18	15-18	8-10	
10	Mandi Dhanaura (J.P. Nagar)	12-16	15-20	-	-	White grub

Table-3: Natural enemies of major insect pests of sugarcane, parasitization along with meteorological data (CoSe 01424)

Month	Temperature^{0}C		R.H.		Rain fall (mm)	No. of rainy days	Top borer				Parasitiation on pyrilla	
	Max.	Min.	F.N.	A.N.			*Isotima Javensis* %	*Rhaconotus* sp. %	*Stenobracon deesae* %	*Telenomus beneficiens*	*Epiricania melanoleuca*	*Tetrastichus pyrillae*
April,11	36.6	18.6	50	30	8.8	04	1.3			1.0	-	-
May, 11	38.5	24.4	65	33	69.8	05	3.5			5.2	-	-
June,11	38.8	25.9	74	55	147.2	10	6.2			12.0	-	-
July, 11	32.9	26.0	86	75	279.0	18	15.8	2.2	1.3	13.5	-	-
Aug.,11	32.7	26.0	88	78	280.2	18	20.5	5.4	2.1	22.4	-	-
Sept.,11	33.2	25.2	86	71	572	07	10.2	3.0	3.1			
Oct.,11	32.7	18.7	76	46	-	-						
Nov., 11	27.6	13.7	87	56	-	-						
Dec., 11	21.2	7.2	90	60	-	-						
Jan., 12	17.5	6.2	87	64	36.6	4						
Feb., 12	24.723.1	9.4	80	45	-	-						
March,12	30.930.4	13.7	70	34	-	-						

Incidence of major insect pests	At harvest
(At hot weather) Shoot borer – 18.0% Top borer (2nd brood) – 4.8%, (3rd brood) – 7.2% Termite (Sett basis) – 12.8%, (Sett end basis) – 8.4%, (Sett bud basis)-7.73%	Top borer (cumulative) 15.2%, Stalk borer (infestation index) 2.12%

Table 4: Effect of pheromone trap on moth trapping (2011-12)

SN	Month	Shoot borer	Top borer	Stalk borer	Temperature^{0}C		R.H. %	
					Maximum	Minimum	F.N.	A.N.
1	March, 11	12	02	04	30.4	13.7	70	34
2	April,11	35	01	02	36.6	18.6	50	30
3	May, 11	38	04	02	38.5	24.4	65	33
4	June,11	20	03	06	38.8	25.9	74	55
5	July, 11	07	02	12	32.9	26.0	86	75
6	Aug.,11	03	02	07	32.7	26.0	88	78
7	Sept.,11	01	05	14	33.2	25.2	86	71
8	Oct.,11	-	-	12	32.7	18.7	76	46
9	Nov., 11	-	-	-	27.6	13.7	87	56
10	Dec., 11	-	-	-	21.2	7.2	90	60

Correlation coefficient

Maximum Temp.	0.748	-0.192	-0.474
Minimum Temp.	-0.236	0.441	0.327
R.H.% F.N.	-0.887	0.359	0.771
R.H. % A.N.	-0.829	0.201	0.713