

# All India Coordinated Research Project on Sugarcane

Year- 2012-13

## ENTOMOLOGY

U.P. Council of Sugarcane Research, Shahjahanpur

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

### AVT (Mid late) I plant

Under AVT (mid late) I plant, total 6 varieties were evaluated viz; CoS 08234, CoS 08235, CoPb 08217, CoH 08262, CoH 08263, CoH 08264 along with three standards (cheks) CoS 767, 8436 and CoPant 97222 against major insect pests of the area. During hot weather the varieties CoS 08234 (16.37%), CoPb 08217(18.26%), CoH 08263(15.59%) and CoH 08264(16.89%) were recorded moderate susceptible reaction to shoot borer while rest of the varieties including standard showed less susceptible reaction. Based on cumulative incidence of 3<sup>rd</sup> and 4<sup>th</sup> brood of top borer the variety CoH 08263 (11.65%) including

standard CoS 8436(12.42%) and CoPant 97222 (13.81%) showed moderate susceptible reaction while rest of the varieties including standard CoS 767 (9.25%) showed less susceptible reaction to top borer.

Regarding the stalk borer infestation the variety CoH 08263 (5.10) showed highly susceptible reaction, the varieties viz, CoPb 08217(2.10), CoH 08263 (3.08) CoH 08264(02.32) including standard CoPant 97222 (2.10) showed moderate susceptible reaction while rest of the varieties including standard viz. CoS 767(1.76) and CoS 8436 (1.93) showed less susceptible reaction to stalk borer. The infestation index of stalk borer ranged from 1.23 in CoS 08234 to 5.10 in CoH 08262. (Table: 1a)

#### **AVT (Mid late) II plant**

Under AVT (midlate) II Plant, total nine varieties viz; Co 07028, CoLk 07202, 07203, CoPb 07212, 07213, CoS 07232, 07234, CoH 07263, 07264 along with three standards (checks) CoS 767, CoS 8436 and CoPant 97222 were evaluated against major insect pests of the area.

All the varieties including standard showed less susceptible reaction to shoot borer. The minimum and maximum infested varieties were (3.93%) CoS 767 and (9.21%) CoPb 07213. Based on cumulative incidence of 3<sup>rd</sup> and 4<sup>th</sup> brood of top borer only standard variety CoPant 97222 (20.22%) showed highly susceptible. While rest of the varieties including standard CoS 767 (15.17%) and CoS 8436 (19.75%) showed moderate susceptible reaction to top borer. It ranged from 11.03% in Co 07028 to 20.22% in CoPant 97222. Regarding stalk borer infestation the variety CoS 07232 (2.58) including standard CoS 8436 (2.22) and CoPant 97222 (2.04) showed moderate susceptible reaction, while rest of the varieties including CoS 767 showed less susceptible reaction to stalk borer. (Table: 1b)

### **AVT (Early) I Plant**

Under AVT (early) I plant, total two varieties viz; CoPb 08211 and CoPb 08212 along with two standards (check) CoPant 84211 and CoJ 64 were evaluated against shoot, top and stalk borer.

All the varieties including standard showed less susceptible reaction to shoot borer. It ranged from 9.17% in CoPant 84211 (standard) to 14.14% in CoPb 08211. Based on cumulative incidence of 3<sup>rd</sup> and 4<sup>th</sup> brood of top borer, only standard variety CoPant 84211 (12.04%) showed moderate susceptible reaction while rest of the varieties including standards CoJ 64 (7.78%) showed less susceptible reaction to top borer. Regarding the stalk borer infestation only CoPb 08212 (2.82) showed moderate susceptible reaction to stalk borer while rest of the varieties including standard viz. CoJ 64 (1.75) and CoPant 84211 (1.69) showed less susceptible reaction to stalk borer. The infestation index of stalk borer ranged from 1.69 in CoPb 08211 to 2.82 in CoPb 08212. (Table: 1c)

### **AVT (Early) II plant**

Under AVT (early) II Plant five varieties viz; Co 06032, Co 07023, Co 07025 CoLk 07201, CoH 06261 along with two standards CoJ 64 and CoPant 84211 were evaluated against major insect pests of the area. The incidence of shoot borer recorded low and ranged between 5.47% (Co 07025) to 12.43% (Co 06032). Based on cumulative incidence of 3<sup>rd</sup> and 4<sup>th</sup> brood of top borer all the varieties including standards were recorded moderate susceptible reaction to top borer. It ranged from 12.24 % (Co 07025) to 18.36% (CoLk 07201). Regarding the stalk borer infestation the varieties Co 07023 (2.41) and Co 07025 (2.31) showed moderate susceptible reaction to stalk borer. Its infestation index ranged from 1.13 in CoPant 84211 (standard) to 2.41 in Co 07023. (Table: 1d)

### **AVT (Mid late) Ratoon**

Under AVT (mid late) ratoon, total nine varieties viz; Co 07028, CoLk 07202, 07203, CoPb 07212, 07213, CoS 07232, 07234, CoH 07263, 07264 along with three standards (checks) CoS 767, 8436 and CoPant 97222 were evaluated against major insect pests of the area. All the varieties including standards showed less susceptible to shoot borer. It ranged from 3.26% in CoS 767 (standard) to 8.37% in CoPb 07213. Based on cumulative incidence of 3<sup>rd</sup> and 4<sup>th</sup> brood of top borer only Co 07028 (9.67 %) showed less susceptible reaction while all the varieties including standard showed moderate susceptible reaction to top borer. Regarding the stalk borer infestation the varieties viz; CoLk 07202 (2.03%) and CoS 07232 (2.09%) showed moderate susceptible reaction while rest of the varieties showed less susceptible reaction to stalk borer. The infestation index of stalk borer ranged from 1.14 % in CoS 767 (standard) to 2.09% in CoS 07232. (Table: 1e)

### **AVT (Early) Ratoon**

Under AVT (early) ratoon five varieties viz; Co 06032, Co 07023, Co 07025 CoLk 07201, CoH 06261 along with two standards CoJ 64 and CoPant 84211 were evaluated against major insect pests of the area. All the varieties including standards showed less susceptible reaction to shoot borer. It ranged from 4.31 % in Co 07025 to 10.53% in Co 06032. Based on cumulative incidence of 3<sup>rd</sup> and 4<sup>th</sup> brood of top borer only the variety Co 07025 (9.52 %) showed less susceptible reaction while rest of the varieties showed moderate susceptible reaction to top borer infestation. The minimum and maximum infested varieties were Co 07025 (9.52%) and CoLk 07201 (16.74%). Regarding the stalk borer infestation, all the varieties including standards showed less susceptible reaction to stalk borer. It ranged from 1.10% in CoPant 84211 to 1.95 in Co 07025. (Table: 1 f)

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

### **Conclusion**

Sugarcane fields around sugar factory area were surveyed to know the major insect pests of the area. The incidence of early shoot borer was moderate to high; it ranged from 15-18 % (minimum) around Azabapur and Balrampur factory zone, while maximum 30-35 % around Maqsdapur followed by Gola (28-35%) and Nigohi (25-30%). During hot weather the maximum no. of mealy bug/ plant (20-100) was recorded in ratoon crop of CoS 767 and CoS 97264 at Maqsdapur, followed by 15-70 mealy bug/ plant in CoS 97264 (ratoon) at Nigohi factory zone. At Gola 10-50 mealy bug/ plant was recorded in CoS 97264 (ratoon). The percent incidence of top borer was minimum 10-15% around Baheri factory zone and maximum 20-25% around Biswan factory zone. The infestation of stalk borer was ranged from 12-15% around Azabapur to 20-25 % in Baheri factory zone. The incidence of termite was ranged from 5-8 % around Balrampur and 10-12 % in Rosa factory zone. The infestation of pyrilla and white grub was recorded around Rosa factory zone. There was no incidence of other insect pests in the area. (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**

An experiment was conducted on 0.2 ha area CoSe 01424 cultivars at Shahjahanpur to monitor the key insect pests and natural enemies. The incidence of early shoot borer was recorded 19.00 % in the month of may. The incidence of 2<sup>nd</sup> and 3<sup>rd</sup> brood of top borer was recorded as 4.20% and 6.20%, respectively. The cumulative incidence of top borer was recorded 16.40 % at harvest. The incidence of termite was recorded as 11.2 % on sett basis, 7.20 % on sett end basis and 6.40% on sett bud basis during hot weather.

*Isotima javensis*, *Rhaconotus spp*; *Stenobracon deezae*, *Telenomus beneficiens* were recorded major parasitoid of top borer. *Epiricania melanoleuca* was recorded for *Pyrilla perpusilla*. Minimum parasitisation 2.65% by *Isotima javensis* was recorded in the month of may while it was maximum 18.60 % in the month of August. The

parasitisation of top borer by *Rhaconotus spp.* was observed with minimum 3.20 % in June which increases up to 12.35 % in the month of August. The parasitisation of *Stenobracon deezae* was ranged from 2.60% (July) to 5.10 % in the month of September. *Telenomus beneficiens*, an egg parasitoid of top borer was recorded maximum 19.60 % in the month of July and reduces up to 5.20 % in the month of September. The parasitisation of *Pyrilla* by *Epiricania melanoleuca* was recorded maximum 72.60 % in the month of September. (Table: 3)

**Project** E. 32

**Title** Management of borer complex of sugarcane through lures.

**Objective** To manage sugarcane borers (early shoot borer, top borer and stalk borer) through pheromone trap.

**Year of commencement** 2012-13

**Location** Shahjahanpur

**Conclusion**

The experiment was conducted on 0.4 ha area with CoSe 01424 cultivar at Shahjahanpur; to study the management of borer complex of sugarcane (early shoot, top and stalk borer) through pheromone trap and influence of weather parameters on moth catches. Three

pheromone traps for each pest were installed during 9<sup>th</sup> MW till the harvest of the crop. Total no. of moth trapped were recorded at weekly intervals. The mean no. of moth captured was worked out. The pheromone lure was changed after two month intervals.

Study reveals that highest no. (5.33 moths/trap) of shoot borer was recorded during 17<sup>th</sup> and 25<sup>th</sup> MW followed by 24<sup>th</sup> MW (4.66 moths/trap) and 16<sup>th</sup> MW (4.33 moths/trap); respectively. Top borer moth catches were recorded maximum (3.66 moths/trap) during 27<sup>th</sup> MW followed by 28<sup>th</sup> MW (2.66 moths/trap). The peak activity of stalk borer was observed maximum (3.00 moths/trap) during 39<sup>th</sup> MW followed by 2.66 moths/trap during 38<sup>th</sup> MW and 2.33 moths/trap during 28<sup>th</sup> MW.

Moth catches of shoot borer was positively associated with maximum ( $r= 0.4897$ ) and minimum ( $r= 0.0687$ ) while negatively correlated with relative humidity ( $r= -0.4952$ ,  $r= -0.5553$ ). Top borer moth catches were found positively correlated with maximum temperature ( $r= 0.4897$ ) and relative humidity ( $r= 0.1041$ ,  $r= 0.1187$ ); while negatively associated with minimum temperature ( $r= -0.0251$ ). The moth catches of stalk borer was observed positively correlated with weather parameters viz. Max. Temperature ( $r= 0.1471$ ), minimum temperature ( $r= 0.2620$ ) relative humidity ( $r= 0.1247$ ,  $r= 0.1065$ ).

Incidence percent was also observed in treated (application of pheromone trap) and untreated plots (without pheromone trap). The incidence percent of shoot, top and stalk borer was recorded 15.00%, 4.20 (2<sup>nd</sup> brood), 4.90 % (3<sup>rd</sup> brood), 13.50% (at harvest) and 2.10 (infestation index of stalk borer) in treated plot respectively. While it was 17.80, 5.30 % (2<sup>nd</sup> brood) , 7.10 % (3<sup>rd</sup> brood), 15.40 % (at harvest) and 2.80 (infestation index of stalk borer) in untreated plots respectively. (Table: 4)



**Table- 1 a: AVT (Mid late) I Plant (2012-13)**

<b>S N.</b>	<b>Varieties</b>	<b>% incidence at hot weather</b>	<b>% incidence at harvest</b>	
		<b>Shoot borer</b>	<b>Top borer cumulative (3<sup>rd</sup> and 4<sup>th</sup> )</b>	<b>Stalk borer (infestation index)</b>
1	CoS 08234	16.37	5.60	1.23
2	CoS 08235	8.87	8.87	1.52
3	CoPb 08217	18.26	7.32	2.10
4	CoH 08262	13.39	9.16	5.10
5	CoH 08263	15.59	11.65	3.08
6	Co H 08264	16.89	7.75	2.32
7	CoS 767	10.04	9.25	1.76
8	CoS 8436	12.30	12.42	1.93
9	CoPant 97222	14.44	13.81	2.04

**Table- 1 b: AVT (Midlate) II Plant (2012-13)**

S N	Varieties	% incidence at hot weather	% incidence at harvest	
		Shoot borer	Top Borer cumulative (3 <sup>rd</sup> and 4 <sup>th</sup> )	Stalk borer (infestation index)
1	Co 07028	7.93	11.03	1.25
2	CoLk 07202	5.99	15.86	1.95
3	CoLk 07203	5.28	18.12	1.56
4	CoPb 07212	8.10	17.22	1.42
5	CoPb 07213	9.21	19.11	1.59
6	CoS 07232	6.28	12.09	2.58
7	CoS 07234	4.99	19.77	1.22
8	CoH 07263	8.39	14.69	1.73
9	CoH 07264	7.78	11.46	1.73
10	CoS 767	3.93	15.17	1.43
11	CoS 8436	8.26	19.75	2.22
12	CoPant 97222	8.45	20.22	2.04

**Table- 1 c: AVT (Early) I Plant (2012-13)**

S N	Varieties	% incidence at hot weather	% incidence at harvest	
		Shoot borer	Top Borer cumulative (3 <sup>rd</sup> and 4 <sup>th</sup> )	Stalk borer (infestation index)
1	CoPb 08211	14.14	7.01	1.69
2	CoPb 08212	12.53	6.09	2.82
3	CoJ 64	10.51	7.78	1.75
4	CoPant 84211	9.17	12.04	1.69

**Table- 1 d: AVT (Early) II Plant (2012-13)**

S N	Varieties	% incidence at hot weather	% incidence at harvest	
		Shoot borer	Top Borer cumulative (3 <sup>rd</sup> and 4 <sup>th</sup> )	Stalk borer (infestation index)
1	Co 06032	12.43	16.28	1.88
2	Co 07023	5.62	13.45	2.41
3	Co 07025	5.47	12.24	2.31
4	CoLk 07201	9.33	18.36	1.80
5	CoH 06261	11.13	13.70	1.42
6	CoJ 64	10.42	15.28	1.28

7	Co Pant 84211	8.09	17.40	1.13
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**Table- 1 e: AVT (Midlate) Ratoon (2012-13)**

S N	Varieties	% incidence at hot weather	% incidence at harvest	
		Shoot borer	Top Borer cumulative (3 <sup>rd</sup> and 4 <sup>th</sup> )	Stalk borer (infestation index)
1	Co 07028	6.64	9.67	1.24
2	CoLk 07202	4.72	13.39	2.03
3	CoLk 07203	4.29	13.05	1.54
4	CoPb 07212	7.40	16.23	1.39
5	CoPb 07213	8.37	13.77	1.43
6	CoS 07232	5.56	11.23	2.09
7	CoS 07234	4.06	12.70	1.33
8	CoH 07263	7.58	14.01	1.37
9	CoH 07264	6.59	10.51	1.30
10	CoS 767	3.26	13.68	1.14
11	CoS 8436	6.90	17.40	1.96
12	CoPant 97222	7.16	18.98	1.95

**Table- 1 f: AVT (Early) Ratoon (2012-13)**

<b>S N</b>	<b>Varieties</b>	<b>% incidence at hot weather</b>	<b>% incidence at harvest</b>	
		<b>Shoot borer</b>	<b>Top Borer cumulative (3<sup>rd</sup> and 4<sup>th</sup> )</b>	<b>Stalk borer (infestation index)</b>
1	Co 06032	10.53	14.05	1.67
2	Co 07023	4.57	11.79	1.59
3	Co 07025	4.31	9.52	1.95
4	CoLk 07201	7.62	16.74	1.85
5	CoH 06261	9.65	11.19	1.45
6	CoJ 64	8.71	13.27	1.53
7	Co Pant 84211	6.43	15.22	1.10

**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 (%)	Mealy bug/plant	Top borer (%)	Stalk borer (%)	Termites (%)	
1	Azabapur (Kheri)	15-18	-	18-20	12-15	8-10	-
2	Biswan (Sitapur)	16-20	-	20-25	18-22	7-9	-
3	Gola (Kheri)	28-35	10-50, CoS 97264 (R)	15-20	17-25	6-8	-
4	Rosa (Shahjahanpur)	16-20	-	16-22	18-20	10-12	Pyrrilla and white grub
5	Nigohi (spn)	25-30	15-70 CoS 97264 (R)	15-18	16-18	8-10	-
6	Maqsudapur (spn)	30-35	20-100 CoS 767, 97264 (R)	12-16	20-22	6-8	-
7	Sultanpur	15-20	-	13-16	15-18	7-10	-
8	Balrampur	15-18	-	15-18	16-20	5-8	-
9	Baheri (Bareilly)	18-20	-	10-15	20-25	8-12	-

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

Month	Temperature <sup>0</sup> C		R.H.		Rain fall (mm)	No. of rainy days	Top borer (parasitized by)				Pyrilla parasitized by
	Max.	Min.	F.N.	A.N.			<i>Isotima Javensis</i> %	<i>Rhaconotus</i> sp. %	<i>Stenobracon deesae</i> %	<i>Telenomus beneficiens</i>	<i>Epiricania melanoleuca</i>
April,12	36.6	19.8	58.2	29.2	6.2	3	-	-	-	-	-
May, 12	40.0	24.4	41.0	23.0	-	-	2.65	-	-	3.15	-
June,12	41.1	28.1	47.0	31.0	3.4	1	4.25	3.20	-	4.80	-
July, 12	33.7	26.5	83.0	75.0	332.3	17	12.30	8.35	2.60	19.60	14.65
Aug.,12	32.4	26.0	89.0	62.0	479.0	16	18.60	12.35	3.90	5.20	64.25
Sept.,12	33.4	25.2	89.0	71.0	249.0	6	8.95	4.05	5.10	-	72.60
Oct.,12	32.0	17.6	82.0	50.0	1.8	1	-	-	-	-	70.25

<p>Incidence of major insect pests</p> <p><b>(At hot weather)</b></p> <p>Shoot borer – 19.00%</p> <p>Top borer (2<sup>nd</sup> brood) – 4.20%, (3<sup>rd</sup> brood) – 6.20%</p> <p>Termite (Sett basis) – 11.20%, (Sett end basis) – 7.20%, (Sett bud basis)- 6.40%</p>	<p style="text-align: center;"><b>At harvest</b></p> <p>Top borer (cumulative)- 16.40%,</p> <p>Stalk borer (infestation index)- 2.92%</p>
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**Table 4: Effect of pheromone trap on moth trapping (2012-13)**

Met. week	Date	Shoot borer	Top borer	Stalk borer	Temperature <sup>0</sup> C		R.H. %		Rain fall (mm)/days
					Maximum	Minimum	F.N.	A.N.	
9	26-4 March'2012	0.66	0.33	0.66	26.80	11.03	70.50	35.62	-
10	5-11	1.00	2.00	0.66	28.11	12.52	74.00	34.00	-
11	12-18	1.66	1.66	1.33	28.46	12.14	72.57	41.71	-
12	19-25	2.33	1.00	2.00	31.60	14.36	71.71	27.14	-
13	26-01 April	1.33	0.33	0.66	35.22	17.10	61.00	28.42	-
14	2-8	2.00	0.66	0.33	37.07	21.71	61.57	27.86	-
15	9-15	3.33	0.33	0.33	35.21	18.91	72.57	37.00	6.2/3
16	16-22	4.33	0.33	0.33	36.80	21.08	55.14	24.14	-
17	23-29	5.33	0.33	0.33	37.90	21.24	45.00	22.71	-
18	30-06 May	1.00	1.33	0.66	37.30	20.77	42.28	22.71	-

19	7-13	1.66	1.00	0.66	39.67	23.87	49.00	29.28	-
20	14-20	3.33	0.66	0.33	40.08	25.30	40.71	21.85	-
21	21-27	4.00	0.33	0.33	41.61	25.95	45.85	19.14	-
22	28-03 June	1.33	0.33	3.00	43.01	26.52	41.14	21.28	3.4/1
23	04-10	2.00	0.33	3.66	40.91	27.05	40.71	24.42	-
24	11-17	4.66	0.66	2.33	42.70	29.45	36.28	20.42	-
25	18-24	5.33	1.00	1.66	38.85	27.70	60.00	46.14	-
26	25-01 July	0.33	1.66	0.66	41.07	27.57	55.00	37.85	-
27	2-8	0.66	3.66	1.66	33.10	27.41	77.42	75.42	55.0/3
28	9-15	1.33	2.66	2.33	33.60	26.15	89.71	75.71	78.4/5
29	16-22	1.66	1.33	1.33	34.85	26.85	82.42	73.28	60.4/3
30	23-29	1.66	0.33	0.66	32.65	26.10	86.42	81.28	133.3/5
31	30-05 Aug	0.33	0.33	0.33	30.40	25.92	88.28	79.14	43/4
32	06-12	0.33	0.33	0.66	34.04	26.07	83.85	78.14	26/5
33	13-19	0.66	0.33	0.66	33.38	26.04	84.14	76.14	8.4/3
34	20-26	0.66	0.66	1.00	29.90	24.78	93.57	88.00	226/4
35	27-02 Sep	0.33	0.33	1.33	32.65	24.91	92.85	82.43	214.4/4

36	03-09	0.33	0.33	1.00	33.40	25.39	85.71	70.29	-
37	10-16	-	0.33	2.00	31.96	25.66	90.43	81.14	29.8/3
38	17-23	-	0.66	2.66	30.60	24.26	92.14	71.29	188.8/2
39	24-30	-	0.66	3.00	33.24	23.53	87.29	60.86	-
40	01-07 Oct	-	-	2.00	33.71	21.69	82.29	53.43	-
41	08-14	-	-	2.33	32.32	18.84	84.42	58.28	-
42	15-21	-	-	1.00	31.84	17.21	81.14	50.28	-
43	22-28	-	-	0.33	29.98	14.08	82.28	43.71	1.8/1

**Correlation coefficient**

Maximum Temp.	0.4897	0.4897	0.1471
Minimum Temp.	0.0687	-0.0251	0.2620
R.H.% F.N.	-0.4952	0.1041	0.1247
R.H. % A.N.	-0.5553	0.1187	0.1065

<b>% incidence of insect pest</b>		
<b>Insect-Pest</b>	<b>Treated (pheromone trap)</b>	<b>Untreated (without pheromone trap)</b>
Shoot borer	15.00	17.80
Top borer (2 <sup>nd</sup> brood)	4.20	5.30
Top borer(3 <sup>rd</sup> brood)	4.90	7.10
Top borer(at harvest)	13.50	15.40
Stalk borer ( infestation index)	2.10	2.80