

## RESEARCH HIGHLIGHT (2014-15)

Entomology Section, Vasantdada Sugar Institute, Pune

### I) ALL INDIA COORDINATED RESEARCH PROGRAMME

#### **E 4.1: Evaluation of zonal varieties /genotypes for their reaction against major insect pests.**

##### **E. 4.1.1: Evaluation of zonal varieties /genotypes for their reaction against major insect pests in IVT Early:**

Out of 16 varieties/genotypes screened Co M11081, CoM11082, CoM11084 and CoN 11072 were free from early shoot borer, all 16 varieties/genotypes showed less susceptible reaction to internode borer and 15 varieties/genotypes showed less susceptible reaction to mealy bug.

##### **E. 4.1.2: Evaluation of zonal varieties /genotypes for their reaction against major insect pests in AVT I Plant Early:**

Out of 6 varieties/genotypes screened Co09007, CoN 09072 and Co 85004 were moderately susceptible to early shoot borer, all 6 varieties/genotypes showed less susceptible reaction to internode borer and moderately susceptible to mealy bug.

##### **E. 4.1.5: Evaluation of zonal varieties /genotypes for their reaction against major insect pests in IVT Midlate:**

Out of 16 varieties/genotypes screened Co 11021, Co 11022 and Co 11023 found moderately susceptible to early shoot borer, all 16 varieties/genotypes showed less susceptible reaction to internode borer and Co 11007, Co 11022 and CoM 11086 showed moderately susceptible reaction to mealy bug

#### **E.28: Survey and Surveillance of sugarcane insect pests:**

The Dec.2014 planted sugarcane was free from early shoot borer infestation. The % incidence of internode borer was maximum 30.00 % in 12 month old Co 86032 ratoon crop. The % incidence of root borer was maximum 40.00 % in July 2014 planted sugarcane plot.

#### **E.30: Monitoring of insect pests and bio agents in sugarcane Agro-ecosystem:**

The % incidence of early shoot borer noticed maximum 0.72 % in April 2014. The % incidence, intensity and infestation index of internode borer was noticed maximum 5.0 %, 0.38 % and 0.02 respectively in the month of Sept.2014. The incidence and intensity of mealy bug was observed maximum 92.0% and 45.45% in June 2014.

#### **E.36: Management of borer complex of sugarcane through lures.**

In Pheromone traps negligible adults of Early shoot borer, Internode borer and Top shoot borer were captured. The % incidence of ESB was maximum 10.86% in April 2014 in treated plot, while it was maximum 2.75% in May 2014 in control plot. The % incidence of internode borer was noticed maximum 8 % in treated plot and 12 % in control plot in the month of Jan.2015. Both treated and control plots were free from top borer infestation.

#### **E.37: Bioefficacy of new insecticides for control of sugarcane early shoot borer.**

In January planted Co 86032 sugarcane, soil application of Chlorantronilliprol 0.4 G @22.5 kg/ha at the time of planting and 60 DAP, spraying of Chlorantronilliprol 18.5 SC @ 375 ml/ha at 30 & 60DAP, spraying of Flubendiamide 39.5 % SC @250 ml/ha at 30 & 60DAP and soil application of Fipronil 0.3 G @25 kg/ha at the time of planting and 60 DAP were found best for control of Early shoot borer.

**Annual Report of AICRP on Sugarcane 2014-15**  
**Entomology Section, VSI, Pune.**

**D) ALL INDIA COORDINATED RESEARCH PROGRAMME**

- 1. Project no.** : E. 4.1.1 (AICRP'S)  
**2. Discipline** : Agril. Entomology  
**3. Title of the project** : Evaluation of zonal varieties /genotypes for their reaction against major insect pests.  
**4. Title of experiment** : Field screening of sugarcane varieties/genotypes in IVT Early to major pests.  
**5. Objective** : To grade the entries in the trials for their behavior towards damage by key pests in the area.  
**6. Year of commencement** : 1985 – 86 (Continuing)  
**7. Year of implementation** : 2014 -2015(1<sup>st</sup> year)  
**8. Source of finance** : ICAR/VSI Pune.  
**9. Project leader and Associate** : Shri.R.G.Yadav, Scientific Officer& Head, Entomology  
: Mrs.P.V.Gadade, Research Assistant, Entomology

**10. Details of experiment:**

- a) Treatments** : Sixteen (13+3)  
1. Co11001, 2.Co11004, 3.Co11016, 4.Co11017, 5.Co11018, 6.CoM11081, 7.CoM11082, 8.CoM11083, 9. CoM 11084 10. CoN 11071 11.CoN 11072 12. CoT 11366 13. PI 11131 14.Co 85004 (Std.) 15. Co 94008 (Std.) 16.CoC 671 (STD.)  
**b) Design** : RBD  
**c) Replication** : Two  
**d) Type of soil** : Heavy  
**e) Plot size** : Gross:6 m x 6 rows x1.2 mt,Net:5 m x 6 rows x 1.2 mt.  
**f) Location** : Vasantdada farm,VSI, Pune  
**g) Date of planting** : 1.1.2014  
**h) Date of harvesting** : **8.11.2014**  
**i) Method of observations:**

**Early shoot borer:** Observations to be recorded in post-germination phase at 30 days interval up to 120 days (At 30,60,90 and 120 DAP).Ten clumps were selected from each plot and total germinated shoots were counted. The shoots affected by early shoot borer showing “dead hearts” were counted. Calculated the % incidence as per the following formula,

$$\% \text{ Incidence} = \frac{\text{Number of dead hearts}}{\text{Total number of shoots}} \times 100$$

Cumulative incidence of up to 120 DAP should be calculated. Number of bored plants/ha be also recorded.

The grade of infestation was given as under,

30 DAP			60 DAP			90 DAP			90 DAP			Cumulative % incidence	No. of bored plants/ha
No. of shoots (I+II+III)	No. of dead hearts (I+II+III)	% Incidence	No. of shoots (I+II+III)	No. of dead hearts (I+II+III)	% Incidence	No. of shoots (I+II+III)	No. of dead hearts (I+II+III)	% Incidence	No. of shoots (I+II+III)	No. of dead hearts (I+II+III)	% Incidence		

No. of shoots observed at 120 DAP + Dead hearts at 30, 60 and 90 DAP  
 No. of dead hearts observed at 120, 30, 60 and 90 DAP

$$\text{Cumulative \% at 120 DAP} = \frac{\text{Total no. of dead hearts observed at 120} + \text{no. of dead hearts observed at 30,60,90 DAP}}{\text{No. of shoot observed at 120 DAP} + \text{dead hearts at 30,60,90 DAP}} \times 100$$

No. of bored plants/ha will be calculated on the basis of cumulative percentage

$$\text{No. of bored plants/ha} = \text{No. of dead hearts observed at 120, 30, 60 and 90 DAP} \times 10000/\text{net plot area in sq.mt}$$

<b>Grade</b>	<b>% Incidence</b>
Less Susceptible (LS)	below 15
Moderately Susceptible (MS)	15.1-30
Highly Susceptible (HS)	above 30

**Internode borer/ root borer:** Minimum twenty-five canes were selected randomly from each plot and total no. of internodes and internodes affected due to internode borer in each cane were counted. Calculated the % incidence on cane basis, % intensity on nodal basis (by considering total number of nodes on observed cane will be recorded to compute infestation index). Infestation index will be recorded for internode borer, whereas only percent incidence will be observed for root borer on external visible symptoms as per following formula,

$$\% \text{ Incidence} = \frac{\text{Number of affected canes}}{25(\text{Cane})} \times 100$$

$$\% \text{ Intensity} = \frac{\text{Number of affected internodes}}{\text{Total number of internodes}} \times 100$$

$$\text{Infestation index} = \frac{\% \text{ Incidence} \times \% \text{ Intensity}}{100}$$

The grade of infestation was given as under,

<b>Grade</b>	<b>Internode borer % Incidence</b>	<b>Root borer % Incidence</b>
Less Susceptible (LS)	below 20	below 15
Moderately Susceptible (MS)	20.1-40	15.1-30
Highly Susceptible (HS)	above 40	Above 30

**Top Borer:**

For east and peninsular zone it should be recorded on fifth/seventh month and at harvest. Observation to be recorded from at least three meter row length. Count the total no. of canes and the total no. of infested canes. At harvest minimum 25 canes will be selected randomly from each plot and top portion of cane should be split for the confirmation of incidence of top borer. Calculated the % incidence as per following formula.

$$\% \text{ Incidence} = \frac{\text{Total number of infested cane observed from 3 m row length}}{\text{Total number of canes observed from 3 m row length}} \times 100$$

$$\% \text{ Incidence} = \frac{\text{Total no. of infested cane (I+II+III)}}{\text{Total number of canes (I+II+III)}} \times 100$$

<b>Grade</b>	<b>% Incidence</b>
Less Susceptible (LS)	below 10
Moderately Susceptible (MS)	10.1- 20
Highly Susceptible (HS)	above 20

**Pyrilla :** The population of nymph and adult to be recorded from a unit of 10 canes (20 leaves)

Average population of nymphs and adults per leaf will be recorded.

Observations on egg mass and cocoons of ecto-parasite, *Epiricania melanoluca* will be recorded.

Observations to be recorded at an interval of Fortnight and pick incidence of pyrilla and its ecto-parasitoids will be reported in the report.

The grade of infestation was given as under,

<b>Grade</b>	<b>Pyrilla (nymph and adult) / leaf</b>
Less Susceptible (LS)	below 5
Moderately Susceptible (MS)	5.1-20
Highly Susceptible (HS)	above 20

**White fly:**

Population of nymph and puparia will be recorded from a unit of 10 cane (20 leaves) from proximal, middle and distal region.

Average population per 2.5 sq.cm will be recorded.

The grade of infestation was given as under

<b>Grade</b>	<b>White fly (nymph and puparia) / 2.5 sq.cm</b>
Less Susceptible (LS)	below 2.0
Moderately Susceptible (MS)	2.1-5
Highly Susceptible (HS)	above 5

**Scale insect:**

A. **Natural infestation:-** At harvest 25 canes will be selected randomly from each plot and affected internodes due to Scale insect in each cane will be recorded. Calculated the % incidence as per following formula,

$$\% \text{ Incidence} = \frac{\text{Total no of infestated canes (I+II+III)}}{75(\text{Cane})} \times 100$$

$$\% \text{ Intensity} = \frac{\text{Total no of infestated internodes (I+II+III)}}{\text{Total no of internodes (I+II+III)}} \times 100$$

Grade of infestation was given as under,

Grade	Scale insect (% Incidence)
Less Susceptible (LS)	below 10
Moderately Susceptible (MS)	10.1-35
Highly Susceptible (HS)	above 35

**B. Artificial infestation:** The genotypes of ratoon consisting of single row of 6m/3m for each genotype are evaluated after artificially infesting individual cane in each row with scale infested cut pieces of canes at about five months age of the crop.

**The evaluation will be done at harvest by considering following points.**

1. The total no. of canes, no. of scale insect infested cane and no. of canes died due to scale insect will be recorded.
2. Number of internodes affected by scale insects in 10 randomly selected canes in each row, total no. of internodes in these 10 canes will also be recorded.
3. Visual rating of genotypes on the basis of degree of scale insect encrustation on internodes will be observed by adopting the following different levels of scale insect encrustation.

Artificially infested canes by scale insect will exhibit cent percent incidence, hence per cent incidence may not be necessary.

$$\% \text{ Intensity} = \frac{\text{No. of internodes affected by scale insect in 10 canes}}{\text{Total no of internodes in 10 canes}} \times 100$$

$$\% \text{ drying} = \frac{\text{No. of cane dried due to scale insect attack}}{\text{Total no of canes in the row}} \times 100$$

Visual rating will be employed for the degree of scale insect encrustation. Even if one internode shows encrustation, the variety will be rated accordingly. The different levels of infestation are given below:

	Degree of scale insect encrustation		Category
1	Few scale insects here and there without well established colony on any internode	-	Very light infestation (VL)
2	Scale insect encrustation covering approximately ¼ of internode	-	light infestation (L)
3	Scale insect encrustation covering approximately ½ of internode	-	Moderate infestation (M)
4	Scale insect encrustation covering approximately ¾ of internode	-	Severe infestation (S)
5	Scale insect encrustation covering more than ¾ of internode	-	Very severe infestation (VS)

The genotypes/varieties are then rated as follows			
1	Genotype/varieties showing 'VL' and Linfestation	-	Less susceptible (LS)
2	Genotype/varieties showing 'M' infestation	-	Moderately susceptible (MS)
3	Genotype/varieties showing 'S' and 'VS' infestation/ those showing drying of canes	-	Highly susceptible (HS)

**Mealy bug:** At harvest, twenty five canes will be selected randomly from each plot and affected internodes due to Mealy bug will be recorded. Calculate the %incidence and % intensity as per the following formula,

$$\% \text{ Incidence} = \frac{\text{Number of affected canes}}{25(\text{Cane})} \times 100$$

$$\% \text{ Intensity} = \frac{\text{Total number of infected internodes}}{\text{Total number of internodes}} \times 100$$

**Grade of infestation given as under,**

Grade	Mealy bug % Incidence
Less Susceptible (LS)	below 5
Moderately Susceptible (MS)	5.1-30
Highly Susceptible (HS)	above 30

$$\% \text{ Incidence} = \frac{\text{Total no of infestated canes (I+II+III)}}{75(\text{Cane})} \times 100$$

$$\% \text{ Intensity} = \frac{\text{Total no of infestated internodes (I+II+III)}}{\text{Total no of internodes (I+II+III)}} \times 100$$

**Sugarcane Woolly Aphid (SWA):** Five canes will be selected from each plot and observe the incidence of SWA on top, middle and bottom leaf in each cane. Observations will be recorded on the basis of percentage leaf area covered by nymphs and adults.

$$\text{Avg SWA Grade} = \frac{\text{Total grade (I+II+III)}}{45(5 \text{ Plants} \times 3 \text{ Leaves} \times 3 \text{ Replications})}$$

% leaf area covered by aphid colony	SWA Grade	Observed grade	Categorization of variety/genotype
Nil	0	-	-
<25%	1	Up to 1.0	Less susceptible (LS)
25-50	2	1.1-3.0	Moderately susceptible (MS)
>50%	3	>3.0	Highly susceptible (HS)

**Spittle bug:** Twenty five canes will be selected randomly from each plot and presence of spittle bug on cane will be considered as infested cane.

% incidence will be calculated as per following formula:

$$\% \text{ Incidence} = \frac{\text{Total number of affected canes}}{25(\text{Cane})} \times 100$$

$$\% \text{ Incidence} = \frac{\text{Total number of infested canes (I+II+III)}}{75(\text{Cane})} \times 100$$

Grade will be calculated as given below:

Grade	% Incidence
Less Susceptible (LS)	below 5
Moderately Susceptible (MS)	5.1. -30
Highly Susceptible (HS)	above 30

**Termite :**

- a) **At germination:** After germination carefully dug out 1 m row length (Aprox.4 setts) at 2 places in each plot preferably from boarder lines without affecting setts and observe eye bud damage and cut end damage caused by termite. After taking the observation, setts should be covered with the soil so that maintain the plant population in the experimental plots.,

Calculated the % incidence as per following formula

$$\% \text{ Incidence at germination} = \frac{\text{Total no of setts affected due to eye bud damage or cut end damage}}{\text{Total no.of setts observed}} \times 100$$

$$\% \text{ Incidence at germination} = \frac{\text{Total no of setts affected due to eye bud damage or cut end damage (I+II+III)}}{\text{Total no.of setts observed in spot I \& spot II (I+II+III)}} \times 100$$

- b) **At harvest:** Twenty five canes will be randomly selected (preferably from middle row) from each plot. Number of infested cane will be judge on the basis of mud tunnels present on the cane or dry leaf sheath on observed cane. Calculated the % incidence as per following formula

$$\% \text{ Incidence at harvest} = \frac{\text{Total no of infestated canes (I+II+III)}}{75(\text{Cane})} \times 100$$

Grade will be calculated as given below:

Grade	% Incidence
Less Susceptible (LS)	below 10
Moderately Susceptible (MS)	10.1-35
Highly Susceptible (HS)	above 35

**White grub:** Grubs population will be recorded by digging 1 sq.m area at 5 different sites in the field. Population per ha. will be calculated as per given formula

$$\text{Population of grubs/ha} = \text{Total no. of grub} \times 2000$$

### **11. Results:**

The data presented in table 1 indicated that the cumulative % incidence of early shoot borer was above 15 % in Co 94008(21.31%), Co 11018(17.74 %) & PI 11131 (15.13 %) , while genotypes viz..Co M11081, CoM11082, CoM11084 and CoN 11072 were free from it . No. of bored plants/ha by early shoot borer were maximum 52,778 in Co11018. The % incidence of internode borer was maximum (8.0 %) in CoT 11366 While varieties / genotypes viz..Co 11004, CoM 11084 &Co 94008 were free from it. In all varieties / genotypes screened % intensity of internode borer was bellow 1.0 %. The infestation index of internode borer was bellow 1.00 in all varieties / genotypes screened. The incidence of mealy bug was found maximum (10 %) in CoT 11366 and in varieties / genotypes viz. Co 11016 (4.0%), CoN 11072 (4 %), PI 11131 (4 %), Co 11018 (2 %) and Co 85004 (2 %), while other varieties were free from it.

### **12. Conclusion:**

Out of 16 varieties/genotypes screened Co M11081, CoM11082, CoM11084 and CoN 11072 were free from early shoot borer, all 16 varieties/genotypes showed less susceptible reaction to internode borer and 15 varieties/genotypes showed less susceptible reaction to mealy bug.



**Table.1** Reaction of sugarcane genotypes/varieties to major insect pest in IVT early.

Sr.no	Varieties/ genotype	Early shoot borer (% incidence)						Top borer			Internode borer			Stalk borer			Root borer
		30 DAP	60 DAP	90 DAP	120 DAP	cum	No. of bored plants/ha	III Brood	III Brood	At harvest	% incide nce	% intensit y	Infestatio n index	% incidence	% inten sity	Infes tatio n inde x	% incid ence
								5 <sup>th</sup> month	7 <sup>th</sup> month								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IVT early																	
1	Co 11001	5	0.00	1.92	9.68	11.31 (18.44)	22222				4 (2.12)	0.28	0.01				
2	Co 11004	0	0.00	0.00	5.71	5.00 (11.24)	5556				0 (0.71)	0	0				
3	Co 11016	0	0.00	10.81	2.74	7.99 (16.11)	16667				6 (2.12)	0.48	0.06				
4	Co 11017	0	4.55	0.00	1.64	3.79 (11.02)	5556				6 (2.52)	0.41	0.03				
5	Co 11018	0	14.29	15.91	10.84	17.74 (24.33)	52778				2 (1.41)	0.14	0.01				
6	CoM 11081	0	0.00	0.00	0.00	0.00 (4.05)	0				6 (2.52)	0.44	0.03				
7	CoM 11082	0	0.00	0.00	0.00	0.00 (4.05)	0				4 (1.81)	0.36	0.03				
8	CoM 11083	0	0.00	13.95	9.09	13.70 (21.30)	38889				4 (1.81)	0.27	0.02				
9	CoM 11084	0.00	0.00	0.00	0.00	0.00 (4.05)	0				0 (0.71)	0	0				
10	CoN 11071	0	4.55	4.65	1.30	5.14 (12.59)	11111				2 (1.41)	0.17	0.01				
11	CoN 11072	0	0.00	0.00	0.00	0.00 (4.05)	0				2 (1.41)	0.14	0.01				
12	CoT 11366	0	0.00	8.93	0.00	11.36 (18.78)	13889				8 (2.38)	0.48	0.08				
13	PI 11131	0	0.00	19.51	2.33	15.13 (21.63)	25000				2 (1.41)	0.26	0.01				
14	Co 85004 (Std.)	0	2.38	5.88	0.00	7.14 (13.13)	11111				6 (2.52)	0.68	0.05				
15	Co 94008(Std.)	0	20.00	4.76	9.38	21.31 (25.78)	25000				0 (0.71)	0	0				
16	CoC 671(Std.)	0	0.00	2.56	4.62	6.44 (14.60)	11111				4 (2.12)	0.26	0.01				
	S.E ±																
	C.D at 5%					NS					NS						
	C.V																

Sr.no	Varieties/genotype	Pyrilla		white fly per 2.5 sq.cm SMW=	Scale insect				Mealy bug		Av. SWA Grade SMW=	Mites	Thrips	Black bug /leaf SMW= W=	Spittle bug	Termite (%)		White grub
		N+A /leaf SMW=	EME/ CE per plant SMW=		Nat.Infe		Art.Infe		% incidence	% intensity		No.of grubs/ ha SMW=	% intensity SMW=		% incidence SMW= =	Germ ination	Harve st	No.of grubs/ ha SMW= =
					% incidence	% intensity	% incidence	% drying										
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	Co 11001								0	0								
2	Co 11004								0	0								
3	Co 11016								4	0.85								
4	Co 11017								0	0								
5	Co 11018								2	0.16								
6	CoM 11081								0	0								
7	CoM 11082								0	0								
8	CoM 11083								0	0								
9	CoM 11084								0	0								
10	CoN 11071								0	0								
11	CoN 11072								4	0.39								
12	CoT 11366								10	0.72								
13	PI 11131								4	0.5								
14	Co 85004 (Std.)								2	0.34								
15	Co 94008(Std.)								0	0								
16	CoC 671(Std.)								0	0								
	S.E ±																	
	C.D at 5%																	
	C.V																	

- 1. Project No** : E 4.1.2
- 2. Discipline** : Agril Entomology
- 3. Title of project** : Evaluation of zonal varieties/ genotypes for their reaction against major insect pests.
- 4. Title of experiment** : Field screening of sugarcane varieties/ genotypes in AVT Early (I plant) to major pests.
- 5. Objective** : To grade the entries in the trial for their behavior towards damage by key pest in the area.
- 6. Year of commencement** : 1982 – 83  
(Change of varieties as per AICRP'S Programme)
- 7. Year of implementation** : 2014-15 ( 1<sup>st</sup> Year)
- 8. Source of finance** : ICAR/VSI, Pune
- 9. Project leader and Associate** : Shri. R.G. Yadav, Scientific Officer &Head,Entomology  
: Mrs.P.V.Gadade, Research Assistant, Entomology
- 10. Details of experiment:**
- a) Treatments** : Six (3+3)  
1. Co09004, 2. Co09007, 3. CoN09072, 4. Co85004 (std) 5.Co94008 (std) and 6. CoC 671 (std)
- b. Design** : RBD
- c) Replications** : four
- d) Type of soil** : Heavy
- e) Plot size: Gross** : 6m X 3.6 m<sup>2</sup> **Net:** 6 m X 2.4 m<sup>2</sup>
- f) Location** : Vasantdada farm
- g) Date of planting** : 3.01.14
- h) Date of harvesting** : 26.2.2015
- i) Method of observations:** The observations were recorded as given in trial E.4.1.1

### 11. Results:

The data in table 2 revealed that the cumulative per cent incidence of early shoot borer was above 30.0 % in CoC 671 (51.97 %), Co 94008 (43.39%) and Co 09004 (42.25 %), while it was minimum 18.98 % in Co 85004. The no. of bored plants/ha by early shoot borer were minimum 13,889 in Co 09007, while it was maximum 36,806 in Co 94008 and CoC 671. The % incidence of internode borer was minimum 3 % in Co 09004, Co 09007 and CoN 09072, while it was maximum 12 % in CoC671. The % intensity of internode borer was maximum 1.08 % in CoC 671, while it was below 1.0% in other varieties/genotypes screened. The infestation index of internode borer was below 1.0 in all varieties/genotypes screened. The per cent incidence of mealy bug was maximum 22% in Co 85004, while it was minimum 9% in Co 09004.

### 12. Conclusion:

Out of 6 varieties/genotypes screened Co09007, CoN 09072 and Co 85004 were moderately susceptible to early shoot borer, all 6 varieties/genotypes showed less susceptible reaction to internode borer and moderately susceptible to mealy bug.

**Table.2** Reaction of sugarcane genotypes/varieties to major insect pest in AVT I plant early.

Sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Top borer			Internode borer			Stalk borer		Root borer	
		30 DAP	60 DAP	90 DAP	120 DAP	cum	No. of bored plants/ha	III Brood	III Brood	At harvest	% incidence	% intensity	Infestation index	% incidence	% intensity	Infestation index	% incidence
1	2	3	4	5	6	7	8	5 <sup>th</sup> month	7 <sup>th</sup> month	11	12	13	14	15	16	17	18
AVT I plant early																	
1	Co 09004	0	12.50	25.86	28.92	42.25 (40.39)	30556				3 (1.77)	0.23	0.01				
2	Co 09007	0	0.00	12.82	10.99	20.30 (26.41)	13889				3 (1.77)	0.22	0.01				
3	CoN 09072	0.00	11.11	6.90	15.95	24.09 (28.65)	26389				3 (1.41)	0.35	0.04				
4	Co 85004 (Std)	5	8.70	1.01	15.04	18.98 (25.47)	18750				5 (2.32)	0.49	0.03				
5	Co 94008(Std)	0.00	12.20	29.58	29.03	43.39 (40.88)	36806				10 (3.16)	0.74	0.09				
6	CoC 671(Std)	0	4.88	40.00	36.49	51.97 (46.49)	36806				12 (3.47)	1.08	0.16				
	S.E ±					4.06					0.43						
	C.D at 5%					12.24**					1.31*						
	C.V					23.40					37.47						

Sr. no	Varieties/genotype	Pyrilla		white fly per 2.5 sq.cm SMW=	Scale insect				Mealy bug		Av. SWA Grade SMW=	Mites	Thrips	Black bug /leaf SMW=	Spittle bug	Termite (%)		White grub			
		N+A /leaf SMW=	EME/ CE per plant SMW=		Nat.Infe		Art.Infe		% incidence	% intensity						No.of grubs/ha SMW=	% intensity SMW=		% incidence SMW=	Germination	Harvest
					% incidence	% intensity	% incidence	% drying													
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
1	Co 09004								9 (3.03)	1.07											
2	Co 09007								12 (3.21)	2.13											
3	CoN 09072								12 (3.38)	2.41											
4	Co 85004 (Std)								22 (4.62)	5.38											
5	Co 94008(Std)								13 (3.52)	1.94											
6	CoC 671(Std)								19 (3.99)	3.84											
	S.E ±																				
	C.D at 5%								NS												

Figures in parenthesis are transformed values while those outside are original values.

- 1. Project No** : E 4.1.5  
**2. Discipline** : Agril Entomology  
**3. Title of project** : Evaluation of zonal varieties/ genotypes for their reaction against major insect pests.  
**4. Title of experiment** : Field screening of sugarcane varieties/ genotypes in IVT Midllate to major pests.  
**5. Objective** : To grade the entries in the trial for their behavior towards damage by key pest in the area.  
**6. Year of commencement** : 1982 – 83  
(Change of varieties as per AICRP'S Programme)  
**7. Year of implementation** : 2014-15  
**8. Source of finance** : ICAR/VSI, Pune  
**9. Project leader and Associate** : Shri. R.G. Yadav, Scientific Officer & Head, Entomology  
: Mrs.P.V.Gadade, Research Assistant, Entomology

**10. Details of experiment:**

- a. Treatments** : Sixteen (14+2)  
1. Co 11005 2. Co 11007 3. Co 11012 4. Co 11019 5. Co11020 6. Co11021 7. Co 11022 8. Co 11023 9 Co 11024. 10. CoM 11085 11. CoM 11086 12. CoM 11087 13. CoN 11073 14. CoN11074. 15. Co 86032 (std) 16. Co 99004 (std).  
**b. Design** : RBD  
**c. Replication** : Two  
**d. Type of soil** : Heavy  
**e. Plot size** : Gross 6m x 6 R X 1.2 m Net 5m x 6 R X 1.2 m  
**f. Location** : Vasantdada farm, VSI, Pune  
**g) Date of Planting** : 20.12.2013  
**h) Date of Harvesting** : 22.12.2014  
**i) Method of observations** : The observations were recorded as given in trial E.4.1.1

**11. Results:**

The data in Table 3 indicated that cumulative % incidence of early shoot borer was above 15 % in Co11021 (24.39%) Co11022 (20.36 %) and Co 11023 (18.18 %), while it was minimum in varieties viz. Co11007 (1.52%) and Co 11024. (1.61 %). The no. of bored plants/ha by early shoot borer was maximum 55,556 in Co 11021 ,while it was minimum 2778 in Co 11007 , Co 11024 and Co 86032. The % incidence of internode borer was maximum 14 % in Co 11020, while Co 11022 and Co 99004 were free from it. The % intensity of internode borer was maximum 1.14% in Co 11020, while in other varieties/genotypes screened it was below 1.00 %. The infestation index of internode borer was below 1.00 in all varieties/ genotypes screened. The incidence of mealy bug was maximum in Co 11022 (14.00%), CoM 11086 (12.00 %) and Co 11007 (8.00%).

**12. Conclusion:**

Out of 16 varieties/genotypes screened Co 11021, Co 11022 and Co 11023 found moderately susceptible to early shoot borer, all 16 varieties/genotypes showed less susceptible reaction to internode borer and Co 11007, Co 11022 and CoM 11086 showed moderately susceptible reaction to mealy bug

**Table.3** Reaction of sugarcane genotypes/varieties to major insect pest in IVT Midlate.

Sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Top borer			Internode borer			Stalk borer			Root borer
		30 DAP	60 DAP	90 DAP	120 DAP	cum	No. of bored plants/ha	III Brood	III Brood	At harvest	% incidence	% intensity	Infestation index	% incidence	% intensity	Infestation index	% incidence
								5 <sup>th</sup> month	7 <sup>th</sup> month								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<b>IVT Midlate</b>																	
1	Co 10015	10	0.00	0.00	3.39	6.12 (14.21)	11111				6 (2.52)	0.38	0.03				
2	Co 10017	0	0.00	0.00	1.43	1.52 (7.04)	2778				2 (1.41)	0.12	0.01				
3	Co 10031	0	0.00	5.66	4.00	7.50 (15.87)	16667				6 (2.52)	0.76	0.05				
4	Co 10033	0	0.00	2.08	10.10	10.83 (19.13)	30556				10 (3.09)	0.68	0.1				
5	Com 10083	0	0.00	0.00	2.99	3.02 (9.99)	5556				14 (3.52)	1.14	0.19				
6	Com 10084	0	0.00	20.00	16.67	24.39 (29.27)	55556				8 (2.91)	0.52	0.04				
7	Co N 10073	0	3.45	2.78	19.23	20.36 (26.30)	36111				0 (0.71)	0	0				
8	Co T 10368	0	4.00	17.95	8.70	18.18 (25.24)	38889				6 (2.52)	0.76	0.06				
9	Co T 10369	0.00	0.00	0.00	1.79	1.61 (7.20)	2778				6 (2.52)	0.4	0.03				
10	Co Vc 10061	0	0.00	2.00	5.88	6.12 (12.27)	16667				4 (2.12)	0.36	0.02				
11	Co VSI 10121	0	0.00	0.00	8.93	8.84 (17.28)	13889				2 (1.41)	0.13	0.01				
12	Co VSI 10122	0	3.85	7.55	3.41	8.67 (15.68)	22222				8 (2.83)	0.58	0.06				
13	PI 10131	0	0.00	2.90	1.47	4.17 (11.75)	8333				4 (1.81)	0.32	0.03				
14	PI 10132	0	0.00	0.00	8.16	8.25 (16.12)	11111				8 (2.38)	0.5	0.08				
15	Co 86032 (std)	0	0.00	2.38	0.00	1.67 (7.28)	2778				8 (2.83)	0.48	0.05				
16	Co 99004 (std)	0	8.00	9.09	0.00	5.63 (13.70)	13889				0 (0.71)	0	0				
	S.E ±					4.02											
	C.D at 5%					12.00*					NS						
	C.V					38.12											

Sr. no	Varieties/genotype	Pyrilla		white fly per 2.5 sq.cm SMW=	Scale insect				Mealy bug		Av. SWA Grade SMW=	Mites No.of grubs/ha SMW=	Thrips % intensity SMW=	Black bug /leaf SMW=	Spittle bug		Termite (%)		White grub No.o f grubs /ha SMW=	
		N+A /leaf SMW=	EME/CE per plant SMW=		Nat.Infe		Art.Infe		% incidence	% intensity					% incidence	% intensity	% incidence SMW=	Germ ination		Harv est
					% incidence	% intensity	% incidence	% dryin g												
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
1	Co 10015								0	0										
2	Co 10017								8	1.07										
3	Co 10031								4	0.29										
4	Co 10033								0	0										
5	Com 10083								0	0										
6	Com 10084								0	0										
7	Co N 10073								14	1.51										
8	Co T 10368								4	0.76										
9	Co T 10369								0	0										
10	Co Vc 10061								0	0										
11	Co VSI 10121								12	0.95										
12	Co VSI 10122								0	0										
13	PI 10131								0	0										
14	PI 10132								2	0.25										
15	Co 86032 (std)								0	0										
16	Co 99004 (std)								4	0.64										
	S.E ±																			
	C.D at 5%																			
	C.V																			



- 1. Project no.** : E. 28 (AICRP's)  
**2. Discipline** : Agril. Entomology  
**3. Title of the project** : Survey and surveillance of sugarcane insect pests.  
**4. Title of experiment** : Survey and surveillance of sugarcane insect pests.  
**5. Objective** : To identify the key insect pests of sugarcane in the area and their natural enemies..  
**6. Year of commencement** : 2003-04  
**7. Year of implementation** : 2014 –2015  
**8. Source of finance** : ICAR/VSI, Pune.  
**9. Project leader and Associate** : Shri.R.G.Yadav, Scientific Officer & Head, Entomology.  
: Mrs.P.V.Gadade, Research Assistant, Entomology

**10. Method of observations:**

- i) Roving survey of sugarcane fields at 5-8 Km distance be recorded.
- ii) Report containing information on location, variety, date of planting. Spacing, fertilizer doses and inter crops, if any.
- iii) Observations on incidence of borers be recorded by examining 100 canes at five places (four corners and in the middle), sucking pests by examining 20 canes and others as mentioned in technical programme of E 4.1.

**11. Results**

The Dec.2014 planted sugarcane was free from early shoot borer infestation. The % incidence of internode borer was maximum 30.00 % in 12 month old Co 86032 ratoon crop. The % incidence of root borer was in the range of 0.00 to 40.00 % (Table 4).

**12. Conclusion:**

The Dec.2014 planted sugarcane was free from early shoot borer infestation. The % incidence of internode borer was maximum 30.00 % in 12 month old Co 86032 ratoon crop. The % incidence of root borer was maximum 40.00 % in July 2014 planted sugarcane plot.

**Table 4: % incidence /intensity of major pests at Vighnagar/Sant Tukaram SSK ltd. Dist. Pune.**

Sr. No.	Name of the Farmer	Village	Variety	Date of planting/ratoon	Name of the Pest						
					Early shoot borer	Mealy bug		Root borer		Internode borer	
						% Inci.	% inci.	% inten.	% inci.	% inci.	% inci.
1	Sh. Karale Bansi Haribhau	Dhangar wadi	Co M 0265	1 July 2014 (Seedling )	-	0.00	0.00	40.00		20.00	4.68
2	Sh. Bhor Suresh K.	Hivare Bk	Co M 0265	15 July 2014	-	0.00	0.00	0.00		10.00	2.12
3	Sh. Jadhav Sanjay Damodar	Hivare Bk	Co 86032	Aug.2014	-	0.00	0.00	0.00		0.00	0.00
4	Sh. Padwal Vilas shet Mahadev	Hivare Bk	Co 86032	Aug 2014	-	0.00	0.00	0.00		0.00	0.00
5	Sh. Padwal Vilas shet Mahadev	Hivare Bk	Co 86032	Nov.2013 (R)	-	0.00	0.00	0.00		20.00	0.66
6	Sh.Dhere Rangnath Bhau	Narayng oan	Co VSI 03102	Dec 2013 (R)	-	-	-	-		20.00	0.90
7	Sh. Landge Ramesh	Kinhi	Co 86032	8 Feb 2014 (R)	-	10.00	0.84	-		30.00	1.68
8	Sh.Pinjan Nivruti M.	Kinhi	Co 86032	23.3.2014 (R)	-	10.00	0.45	10.00		10.00	0.45
9	Sh.Kalate Ankush	Induri	Co VSI 03102	Jan 2014 (Seedling )	-	0.00	0.00	0.00		20.00	0.82
10	Sh.Borade Ananta Nathoba	Zarud	Co 86032	28 Dec.2014	0.00	-	-	-		-	-

- 1. No. of experiment** : E. 30 (AICRP's)
- 2. Discipline** : Agril. Entomology.
- 3. Title of the project** : Monitoring of insect pests and bio agents in sugarcane agro- ecosystem.
- 4. Title of experiment** : Monitoring of insect pests and bio agents in sugarcane agro- ecosystem.
- 5. Objective** : To monitor the key insect pests and natural enemies in the area.
- 6. Year of commencement** : 2006-2007
- 7. Year of implementation** : 2014 –2015
- 8. Source of finance** : ICAR/VSI Pune.
- 9. Project leader and Associate** : Shri.R.G.Yadav, Scientific Officer & Head, Entomology.  
: Mrs.P.V.Gadade, Research Assistant, Entomology
- 10. Details of Experiment**
- a. Location : Vasantdada Farm, VSI, Pune
- b. Variety : CoVSI 03102
- c. Date of Planting : 10.01.2014
- d. Date of Harvesting : Jan.2015 (for Seed)

**11. Method of observation:**

- : i) Planting of sugarcane variety recommended for the region in 0.2 ha area.
- ii) All recommended practices to be followed except application of insecticide.

**Observations to be recorded:** Observations on incidence of borers be recorded by examining 100 canes at five places (four corners and in middle), sucking pests by examining 20 canes and others as mentioned in technical programme of E 4.1.

ii) Meteorological data (weekly averages) to be recorded on: temperature (max & min), relative humidity, no. of rainy days and total rainfall.

**12. Results and Discussion**

The per cent incidence of early shoot borer was maximum 0.72 % in April 2014, while in Feb & March 2014 crop was free from ESB infestation. The % incidence, intensity and infestation Index of internode borer was maximum 5.0 %, 0.38 % and 0.02 respectively in Sept.2014, while in June, July and August 2014 crop was free from Internode borer infestation. The incidence and intensity of mealy bug was observed maximum 92.0% and 45.45% in June 2014, while it was minimum 16.00 & 1.32 % in December 2014. (Table 5)

**13. Conclusion**

The % incidence of early shoot borer noticed maximum 0.72 % in April 2014. The % incidence, intensity and infestation index of internode borer was noticed maximum 5.0 %, 0.38 % and 0.02 respectively in the month of Sept.2014. The incidence and intensity of mealy bug was observed maximum 92.0% and 45.45% in June 2014.

**Table 5: The % incidence / intensity of major insect pests during 2014-15.**

Sr. No	Month	Early shoot borer	Internode borer			Mealy bug	
		% incidence	% incidence	% intensity	Infestation index	% incidence	% intensity
1	February 2014	0.00					
2	March 2014	0.00					
3	April 2014	0.72					
4	May 2014	0.15					
5	June 2014		0.00	0.00	0.00	92	45.45
6	July 2014		0.00	0.00	0.00	36	5.47
7	August 2014		0.00	0.00	0.00	48	4.54
8	Sept.2014		5.0	0.38	0.02	73	12.09
9	Oct.2014		2.0	0.17	0.003	51	7.79
10	Nov.2014		2.0	0.12	0.002	70	12.10
11	Dec.2014		2.0	0.09	0.002	16	1.32

1. **Project No** : E.33  
 2. **Discipline** : Agril Entomology  
 3. **Title of the project** : Bioefficacy of insecticides against mealy bugs in sugarcane  
 4. **Title of experiment** : Bioefficacy of insecticides against mealy bugs in sugarcane  
 5. **Objective** : To evaluate efficacy of insecticides against mealy bugs in sugarcane

**The trial was not conducted because during last three years this trial was vitiated as there was no incidence of Mealy bug.**

1. **Project No** : E.36  
 2. **Discipline** : Agril Entomology  
 3. **Title of the project** : Management of borers complex of sugarcane through lures.  
 4. **Title of experiment** : Management of borers complex of sugarcane through lures.  
 5. **Objective** : To manage sugarcane borers (Early shoot borer,top borer,internode borer and stalk borer ) through pheromone lures.  
 6. **Year of commencement** : 2012-13  
 7. **Year of implementation** : 2014-2015  
 8. **Source of finance** : ICAR/VSI Pune.  
 9. **Project leader and Associate** : Shri.R.G.Yadav, Scientific Officer & Head, Entomology.  
 : Mrs.P.V.Gadade, Research Assistant, Entomology  
 10. **Details of Experiment**  
 a. **Treatment** : Pheromone lures of early shoot borer, Top borer & Internode borer  
 b. **Location** : Vasantdada Farm, VSI, Pune  
 c. **Variety** : CoVSI 03102  
 d. **Plot size** : Two block each of minimum half acre. In first block trap should be installed and second be kept as such.  
 e. **Date of Planting** : 10.1.2014 (T) & 17.1.2014 (C)  
 f. **Date of Harvesting** : Jan 2015 (for seed)

**11. Methodology:**

In Peninsular and East Coast Zone ,the test insect-pest will be early shoot bore,top borer & internode borer.Six pheromone traps for each pest will be installed in second foertnight of February till harvest of crop.In half acre of sugarcane crop.The pheromone lures will be changed after two months.

**Observations to be recorded:**

i.Observations on number of moths trapped will be recorded at weekly interval.The mean number of moth capture will be worked out.The correlation and regression of moth captures will be worked out with weekly meteorological parameters.

**12. Result:**

Data in Table 6 shows that the % incidence of ESB was maximum 10.86% in April 2014 in treated plot, while it was maximum 2.75% in May 2014 in control plot. The % incidence of internode borer was noticed maximum 8 % in treated and 12 % in control plot in the month of Jan.2015. Treated and control plots were free from top borer infestation. Data in Table 7 shows that in 12<sup>th</sup> and 17<sup>th</sup> meteorological week 0.33 moths of ESB were captured per trap/week. In 17<sup>th</sup> and 18<sup>th</sup> meteorological week 0.33 moths of Top borer were captured per trap/week. In 1<sup>st</sup> and 9<sup>th</sup> to 52<sup>nd</sup> meteorological week Moths of internode borer was not captured.

**Conclusion:**

In Pheromone traps negligible adults of Early shoot borer, Internode borer and Top shoot borer were captured. The % incidence of ESB was maximum 10.86% in April 2014 in treated plot, while it was maximum 2.75% in May 2014 in control plot. The % incidence of internode borer was noticed maximum 8 % in treated plot and 12 % in control plot in the month of Jan.2015. Both treated and control plots were free from top borer infestation.

**Table 6:** The per cent incidence /intensity of borers in treated/control plot.

Sr. No.	Month	Early shoot borer		Top shoot borer		Internode borer					
		% incidence		% incidence		% incidence		% intensity		Infestation index	
		T	C	T	C	T	C	T	C	T	C
1	February 2014	0.00	0.00	0	0	-	-	-	-	-	-
2	March 2014	7.77	0.36	0	0	-	-	-	-	-	-
3	April 2014	10.86	2.49	0	0	-	-	-	-	-	-
4	May 2014	6.58	2.75	0	0	-	-	-	-	-	-
5	June 2014	-	-	0	0	4.00	0.00	1.81	0.00	0.07	0.00
6	July 2014	-	-	0	0	0.00	0.00	0.00	0.00	0.00	0.00
7	August 2014	-	-	0	0	4.00	4.00	0.45	0.43	0.01	0.01
8	Sep-14	-	-	0	0	0	0	0	0	0	0
9	Oct-14	-	-	0	0	0	8.00	0	0.53	0	0.04
10	Nov-14	-	-	0	0	0	4.00	0	0.53	0	0.02
11	Dec-14	-	-	0	0	0	8.00	0	0.83	0	0.07
12	Jan-2015	-	-	0	0	8.00	12.00	0.51	0.90	0.04	0.11

**Table 7: Mean Moths captured/week/trap**

Sr. No.	SMW	Mean Moths captured/week/trap		
		Early shoot borer	Internode borer	Top shoot borer
1	9	0	0	0
2	10	0	0	0
3	11	0	0	0
4	12	0.33	0	0
5	13	0	0	0
6	14	0	0	0
7	15	0	0	0
8	16	0	0	0
9	17	0.33	0	0.33
10	18	0	0	0.33
11	19	0	0	0
12	20	0	0	0
13	21	0	0	0
14	22	0	0	0
15	23	0	0	0
16	24	0	0	0
17	25	0	0	0
18	26	0	0	0
19	27	0	0	0
20	28	0	0	0
21	29	0	0	0
22	30	0	0	0
23	31	0	0	0
24	32	0	0	0
25	33	0	0	0
26	34	0	0	0
27	35	0	0	0
28	36	0	0	0
29	37	0	0	0
30	38	0	0	0
31	39	0	0	0
32	40	0	0	0
33	41	0	0	0
34	42	0	0	0
35	43	0	0	0
36	44	0	0	0
37	45	0	0	0
38	46	0	0	0
39	47	0	0	0
40	48	0	0	0
41	49	0	0	0
42	50	0	0	0
43	51	0	0	0
44	52	0	0	0
45	1	0	0	0

- 1. Project No** : E.37 (AICRP'S)  
**2. Discipline** : Agril Entomology  
**3. Title of the project** : Bioefficacy of new insecticides for control of sugarcane early shoot borer.  
**4. Title of experiment** : Bioefficacy of new insecticides for control of sugarcane early shoot borer  
**5. Objective** : To find out effective strategy for the management of early shoot borer  
**6. Year of commencement** : 2013-2014  
**7. Year of implementation** : 2014 –2015  
**8. Source of finance** : ICAR/VSI Pune.  
**9. Project leader and Associate** : Shri.R.G.Yadav, Scientific Officer & Head, Entomology.  
: Mrs.P.V.Gadade, Research Assistant, Entomology

**10. Details of Experiment**

**a. Treatment**

- T 1-** Soil application of fipronil 0.3G @25kg/ha at the time of planting and 60 DAP  
**T 2-**Soil application of chlorantraniliprol 0.4 G @22.5kg/ha at the time of planting and 60 DAP  
**T 3-**Spraying of chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 and 60 DAP  
**T 4-**Spraying of Spinosad 2.5 SC @ 1600 ml/ha at 30 and 60 DAP  
**T5-** Spraying of flubendiamide 39.5% @ 250 ml/ha at 30 and 60 DAP  
**T6-** Soil application of Phorate 10 G 15 kg/ha at the time of planting and 60 DAP  
**T 7-** Soil application of Carbofuron 3G @ 33 kg/ha at the time of planting and 60 DAP

**T 8-Untreated control**

- b. Design** : RBD  
**C.Replication** : Three  
**d. Type of soil** : Heavy  
**e. Plot size** : Gross-6 m x 7.2 m<sup>2</sup> Net: 6 x 4.8 m<sup>2</sup>  
**f. Location** : Vasantdada Farm, VSI, Pune  
**g. Variety** : Co 86032  
**h. Date of Planting** : 29.1.2014  
**i. Date of Harvesting** : 25.2.2015

- j. Method of observation:** Germination per cent at 45 DAP. Tillering per cent at 120 DAP. ESB infestation will be 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 percent incidence of early shoot borer will be worked out by following formula

$$\% \text{ incidence} = \frac{\text{No. of dead hearts}}{\text{Total no of shoots}} \times 100$$

The cumulative percent infestation will be worked out by taking progressive total of infected shoots in proportion to total shoot formed.



## **Yield, growth and quality parameters.**

- a. Germination %
- b. Tillering percent at 120 DAP
- c. No. of millable canes
- d. Cane yield (ton/ha)
- e. Growth parameters (total cane height(cm), millable cane height(cm), number of internodes and girth of cane)
- f. Quality parameters

## **11. Results:**

The germination percent at 45 DAP was lowest (35.33%) in spraying of Flubendiamide 39.5 % SC @250 ml/ha at 30 & 60DAP and highest 47.83 % in untreated control. (Table 8)

At 120 DAP tillering ratio was highest 3.09 in spraying of Chlorantraniliprole 18.5 % SC @375 ml/ha at 30 & 60DAP and it was lowest 0.71 in untreated control.

Cumulative incidence of early shoot borer was statistically lowest (6.63%) in spraying of Chlorantraniliprol 18.5 SC @ 375 ml/ha at 30 & 60DAP while it was highest in Phorate (47.99%) @ 15 kg /ha and Untreated control (45.54 %). Cumulative incidence of early shoot borer was 16.96 %, 17.46 %, 19.03 % and 28.75 % respectively in spraying of Flubendiamide 39.5% @250 ml/ha at 30 & 60DAP, soil application of Chlorantraniliprol 0.4 G @22.5 kg/ha, soil application of Carbofuran 3 G @ 33 kg/ha and soil application of Fipronil 0.3 G @ 25 kg/ha at the time of planting and 60 DAP.

No. of bored plants/ha were lowest 25,000 in spraying of Chlorantraniliprol 18.5 SC @ 375 ml/ha at 30 & 60DAP, while it was highest 1,20,486 in soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP.(Table 9)

The total cane height, millable cane height and no. of internodes were highest 245.0, 208.00 and 19.33 respectively, in soil application of Fipronil 0.3 G @25 kg/ha at the time of planting and 60 DAP. Brix %, Pole % and CCS % was highest 20.37, 80.28 and 19.31 respectively in soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP. Plant population was statistically maximum 75,347 /ha in spraying of Chlorantraniliprol 18.5 SC @ 375 ml/ha at 30 & 60DAP and minimum 49,653/ha in untreated control. Cane yield t/ha was statistically high 114.75, 112.06, 111.96 and 109.61 t/ha in soil application of Chlorantraniliprol 0.4 G @22.5 kg/ha, spraying of Chlorantraniliprol 18.5 SC @ 375 ml/ha, spraying of Flubendiamide 39.5 % SC @250 ml/ha and soil application of Fipronil 0.3 G @25 kg/ha respectively, while it was lowest 84.25 t/ha in untreated control.(Table 10.)

## **12. Conclusion:**

In January planted Co 86032 sugarcane, soil application of Chlorantraniliprol 0.4 G @22.5 kg/ha at the time of planting and 60 DAP, spraying of Chlorantraniliprol 18.5 SC @ 375 ml/ha at 30 & 60DAP, spraying of Flubendiamide 39.5 % SC @250 ml/ha at 30 & 60DAP and soil application of Fipronil 0.3 G @25 kg/ha at the time of planting and 60 DAP were found best for control of Early shoot borer.

**Table 8: Growth parameters**

sr. no	Treatment	Mean% Germination 45 DAP	Tillering ratio 120 DAP
1	T-1 Soil application of fipronil 0.3G @25kg/ha at the time of planting and 60 DAP	44.33	1.84
2	T-2 Soil application of chlorantraniliprol 0.4 G @22.5kg/ha at the time of planting and 60 DAP	37.00	2.33
3	T-3 Spraying of chlorantraniliprole18.5 SC @ 375 ml/ha at 30 and 60 DAP	41.67	3.09
4	T-4 Spraying of spinosad 2.5% SC @ 1600ml/ha at 30and 60DAP	43.17	1.66
5	T-5 Spraying of flubendiamide 39.5 % SC @ 250 ml/ha at 30 and 60 DAP	35.33	2.31
6	T-6 Soil application of phorate 10 G 15 kg/ha at the time of planting and60 DAP	47.67	1.08
7	T-7 Soil application of carbofuron 3G @ 33 kg/ha at the time of planting and 60 DAP	40.17	2.29
8	T-8 Untreated control	47.83	0.71
	<b>SE</b>		
	<b>CD</b>	NS	NS
	<b>CV</b>		

**Table.9 -. % incidence of early shoot borer**

sr. no	Varieties//genotype	Early shoot borer (% incidence)						No. of bored plants/ha
		30D AS	45DAS	60 DAS	90 DAS	120 DAS	Cumulative	
1	2	3	4	5	6	7	8	9
1	T1	0.52	0.38	3.55	30.23	14.88	28.75 (32.30)	99653
2	T2	0.00	0.90	2.78	8.64	8.76	17.46 (23.80)	38194
3	T3	0.00	0.00	0.29	6.24	3.57	6.63 (14.48)	25000
4	T4	0.00	0.39	4.66	26.04	18.71	36.16 (36.10)	83681
5	T5	0.00	0.47	2.73	11.80	4.95	16.96 (23.18)	32639
6	T6	0.00	0.35	2.15	50.31	28.74	47.99 (43.87)	120486
7	T7	0.00	2.49	4.27	20.00	9.59	19.03 (25.45)	62500
8	T8	0.00	2.09	4.88	46.42	22.12	45.54 (42.36)	98958
	S.E ±						5.41	
	C.D at 5%						16.37*	
	C.V						31.03	

Figures in parenthesis are transformed values while those outside are original values.

**Table 10:- Growth and quality parameters.**

Sr. no	Treatment	Total cane height (cm)	Millable cane height (cm)	No.of internodes	Diameter (cm)	Brix %	pole %	CCS %	CCS ton /ha	Plant Population /ha	Single cane Wieght (Kg)	Yield/ha tonn
1	T1	245.00	208.00	19.33	2.73	20.18	77.60	18.70	20.64	62500	1.74	109.61
2	T2	222.00	184.00	18.00	2.80	19.77	78.27	18.85	21.63	70486	1.63	114.75
3	T3	225.33	194.00	17.67	2.73	19.93	78.27	18.88	21.15	75347	1.49	112.06
4	T4	211.33	179.33	17.67	2.63	20.30	79.28	19.27	17.64	55556	1.64	91.13
5	T5	219.67	182.00	17.33	2.70	19.57	76.60	18.51	20.80	65972	1.69	111.96
6	T6	200.67	166.33	15.33	2.70	19.99	76.27	18.81	16.75	50347	1.77	88.95
7	T7	225.00	189.67	16.33	2.67	20.37	80.28	19.31	20.31	63542	1.66	105.05
8	T8	191.33	158.00	15.67	2.60	19.72	76.93	18.56	15.67	49653	1.70	84.25
	S.E $\pm$	8.77	7.60							4177.03		6.93
	C.D at 5%	26.53	23.06	NS	NS					12641.46	NS	20.99
	C.V	6.98	7.21							11.73		11.75

**Technical Programme 2015-16 (2014-15 Planting)**  
**Entomology Section**

**I. RESEARCH SPONSERED BY ICAR**

**ALL INDIA COORDINATED RESEARCH PROGRAMME**

- Project No** : E 4.1  
**Title** : Evaluation of zonal varieties / genotypes for their reaction against major insect pests .
- Project No** : E 4.1.1  
**Title** : Field screening of sugarcane varieties/genotypes in IVT Early to major pests
- Project No** : E 4.1.2  
**Title** : Field screening of sugarcane varieties/genotypes in AVT Early (I plant) to major pests
- Project No** : E 4.1.3  
**Title** : Field screening of sugarcane varieties/genotypes in AVT Early (II plant) to major pests
- Project No** : E 4.1.4  
**Title** : Field screening of sugarcane varieties/genotypes in AVT Early (Ratoon) to major pests
- Project No** : E 4.1.5  
**Title** : Field screening of sugarcane varieties/genotypes in IVT Midlate to major pests
- Project No** : E 4.1.6  
**Title** : Field screening of sugarcane varieties/genotypes in AVT midlate (I plant) to major pests
- Project No** : E.28  
**Title** : Survey and surveillance of sugarcane insect pests in Maharashtra State.
- Project No** : E.30  
**Title** : Monitoring of insect pests and bio-agents in sugarcane agro-ecosystem.
- Project No** : E.34  
**Title** : Standardization of simple, cost effective techniques for mass multiplication of sugarcane Bioagents
- Project No** : E.36  
**Title** : Management of borer's complex of sugarcane through lures.
- Project No** : E.37  
**Title** : Bioefficacy of new insecticides for the control of sugarcane early shoot borer