RESEARCH HIGHLIGHT (2016-17)
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 11 varieties/genotypes screened Co13002 and Co13003 showed moderately susceptible reaction to early shoot borer. All varieties/ genotypes showed less susceptible reaction to internode borer and moderately 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 8 varieties/genotypes screened CoM 11082 and Co 85004 showed less susceptible reaction to early shoot borer, all varieties/genotypes showed less susceptible reaction to internode borer. All varieties/genotypes showed less susceptible reaction to mealy bug and scale insect except Co 85004, which was moderately susceptible to it.

E. 4.1.3: Evaluation of zonal varieties / genotypes for their reaction against major insect pests in AVT (II plant) Early

Out of 11 varieties/genotypes screened Co 10006 showed highly susceptible reaction to early shoot borer, all varieties/genotypes showed less susceptible reaction to internode borer and Co 10024, Co 10026 and Co 94008 showed less susceptible reaction to mealy bug.

E. 4.1.4: Evaluation of zonal varieties / genotypes for their reaction against major insect pests in AVT (Ratoon) Early.

All 11 varieties/genotypes screened showed less susceptible reaction to early shoot borer, internode borer and scale insect. Co 10026 and Co 94008 showed less susceptible reaction to mealy bug.

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

Out of 22 varieties/genotypes screened Co 13016, CoSnk13106, PI 13132 and Co 13009 found highly susceptible to early shoot borer, all 22 varieties/genotypes showed less susceptible reaction to internode borer and Co 13016,Co 86032, Co 13020, PI 13131 and CoSnk 13106 showed moderately susceptible reaction to mealy bug.

E. 4.1.6: Field screening of sugarcane varieties/ genotypes in AVT (I plant) Midllate to major pests

Out of 8 varieties/genotypes screened Co 11005, Co 11019 and CoM 11085 found less susceptible to early shoot borer, all 8 varieties/genotypes showed less susceptible reaction to internode borer. Co 11005 and Co 11007 were found less susceptible to mealy bug infestation. Co 86032 was found moderately susceptible to scale insect.

E. 4.1.7: Field screening of sugarcane varieties/ genotypes in AVT (II plant) Midllate to major pests

Out of 13 varieties/genotypes screened Co 10017, Co 10031, Co 10033, CoT 10369, CoVc 10061, Co 86032 and Co 99004, showed lees susceptible reaction to early shoot borer, all varieties/genotypes showed less susceptible reaction to internode borer and Co 10031, Co 09009, Co 10033 and Co 10017 showed less susceptible reaction to mealy bug. Co 10033 and Co 10017 showed moderately susceptible reaction to scale insect.

E. 4.1.8: Field screening of sugarcane varieties/ genotypes in AVT (Ratoon) Midllate to major pests

Out of 13 varieties/genotypes screened all varieties/clones were found less susceptible to early shoot borer and internode borer. Co 10031 was free from mealy bug infestation. Co10017 was found highly susceptible to scale insect.

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

The % incidence of early shoot borer was maximum 36.36 % in VSI 08005 planted in February 2017. The % incidence of internode borer and mealy bug was maximum 40.00% ant 20.00 % in CoM 10001 planted in July 2016 and Co 86032 planted in July 2016 respectively.

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

The % incidence of early shoot borer was noticed maximum 7.59 % in April 2016. The % incidence of internode borer was noticed maximum 14 % in November.2016.The incidence of mealy bug was observed maximum 13.0 % in August 2016 and November 2016.

E.34: Standardization of simple, cost effective techniques for mass multiplication of sugarcane bio-agents.

During 2016-17 Entomology Section has produced 1758.3 cc (351.66 lac) eggs of *C. cephalonica* and 1464 cards (292.80 lac parasites) of *Trichogramma chilonis* parasites. Supplied 505.5 Tricho cards for the control of sugarcane borer on 33.70 ha area.

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 10.59 % in May 2016 in treated plot, while it was maximum 6.53% in May 2015 in control plot. The % incidence of internode borer was noticed maximum 16.0 % in November 2016 in treated plot, while it was 24 % in August 2016 in control plot. Both treated and control plots were free from top borer infestation.

Research report 2016-17
Entomology Section, VSI, Pune.

I)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 **:** 2016 -2017(1st year)
8. Source of finance : ICAR/VSI Pune.
9. Project leader and :Shri.R.G.Yadav, Scientific Officer& Head, Entomology
Associate : Mrs.P.V.Gadade,Research Assistant, Entomology
10. Details of experiment:
a)Treatments **:**Eleven (8+3)
1. Co13002 **2.**Co13003 **3.**Co13004 **4.**CoN 13071 **5.**CoN 13072 **6.**CoSnk 13101 **7.** CoSnk 13102 **8.** MS 13081 **9.** Co 85004 (std) **10.** Co 94008(std) **11.**CoC 671(std)

b) Design : RBD
c) Replication **:** Three
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 **:** 01.01.2016
h) Date of harvesting **:** 28.11.2016
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

Cumulative % at 120 DAP = Total no.of dead hearts observed at 120+ no. of dead hearts observed at 30,60,90 DAP x 100
No. of shoot observed at 120 DAP + dead hearts at 30, 60, 90 DAP

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

No. of bored plants/ha = No. of dead hearts observed at 120, 30, 60 and 90 DAPx 10000/net plot area in sq.mt

Grade	**% Incidence**
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,

Grade	**Internode borer**	**Root borer**
	% Incidence	**% Incidence**
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.

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

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

Grade	% Incidence
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,

Grade	Pyrilla (nymph and adult) / leaf
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

Grade	White fly (nymph and puparia) / 2.5 sq.cm
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,

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

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

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 encrustion covering approximately ¼ of internode	-	light infestation (L)
3	Scale insect encrustion covering approximately ½ of internode	-	Moderate infestation (M)
4	Scale insect encrustion covering approximately ¾ of internode	-	Severe infestation (S)
5	Scale insect encrustion covering more than ¾ of internode	-	Very severe infestation (VS)

	The genotypes/varieties are then rated as follows		
1	Genotype/varieties showing 'VL' and L infestation	-	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.

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

% 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

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

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

b) **At harvest:** Twenty five canes will be randomly selected (preferably from middle row) from each plot. Number of infected 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

Population of grubs/ha= Total no. of grub x 2000

11. Results:

The data presented in table 1 indicated that the cumulative % incidence of early shoot borer was above 30% in all varieties/genotypes. except Co13002 (18.54 %) and Co13003 (26.61%). No of bored plants /ha was maximum in MS 13081 (69444) and Co 94008 (60185) , while it was minimum in Co 13002 (30556). The % incidence of internode borer was below 20 % in all varieties/ genotypes. The % intensity of internode borer was up to 1 % in all varieties/genotypes screened except CoSnk 13102 (1.04).The infestation index of internode borer was below 1 % in all varieties/genotypes screened. The per cent incidence of mealy bug was maximum 16.67% in CoC 671, while in other varieties/ genotypes it was above 5.00 %.

12. Conclusion:

Out of 11 varieties/genotypes screened Co13002 and Co13003 showed moderately susceptible reaction to early shoot borer. All varieties/ genotypes showed less susceptible reaction to internode borer and moderately 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)						Grade	Internode borer			Grade	Mealy bug		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Co13002	0.00	3.03	16.81	9.09	18.54 (23.40)	30556	MS	5.33 (2.39)	0.38	0.02	LS	8.00 (2.86)	1.32	MS
2	Co13003	0.00	1.52	20.56	11.43	26.61 (30.88)	32407	MS	1.33 (1.18)	0.09	0.001	LS	10.67 (3.24)	1.70	MS
3	Co13004	0.00	5.56	21.88	14.68	30.30 (33.05)	37963	HS	5.33 (2.39)	0.38	0.02	LS	9.33 (3.03)	1.42	MS
4	CoN 13071	0.00	5.88	37.65	19.59	43.30 (41.08)	50000	HS	2.67 (1.65)	0.19	0.01	LS	17.33 (4.22)	3.29	MS
5	CoN 13072	0.00	9.33	26.36	15.20	30.30 (32.80)	50926	HS	6.67 (2.59)	0.75	0.07	LS	6.67 (2.39)	0.84	MS
6	CoSnk 13101	0.00	10.14	32.53	16.98	37.31 (37.60)	48148	HS	9.33 (3.06)	1.00	0.11	LS	8.00 (2.77)	1.77	MS
7	CoSnk 13102	0.00	7.32	30.77	37.36	49.00 (44.43)	49074	HS	13.33 (3.19)	1.04	0.25	LS	12.00 (3.50)	2.17	MS
8	MS 13081	0.00	11.76	42.86	14.05	41.42 (39.99)	69444	HS	6.67 (2.65)	0.39	0.03	LS	13.33 (3.57)	2.18	MS
9	Co 85004 (std)	0.00	13.46	14.29	18.81	32.75 (34.17)	36111	HS	0.00 (0.71)	0.00	0.00	LS	8.00 (2.45)	0.88	MS
10	Co 94008(std)	0.00	29.55	35.21	37.50	59.25 (50.37)	60185	HS	5.33 (2.18)	0.42	0.03	LS	8.00 (2.86)	1.38	MS
11	CoC 671 (std)	0.00	12.82	27.78	32.53	44.62 (41.94)	43519	HS	1.33 (1.18)	0.14	0.01	LS	16.67 (4.04)	2.95	MS
	S.E ±					5.42			0.57				0.62		
	C.D at 5%					15.83*			1.67**				1.81		
	C.V					25.97			41.91				34.16		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible. Figures in parenthesis are transfored values while those outside original values.

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 **:** 2016-17 (1st Year)
8. Source of finance **:** ICAR/VSI, Pune
9. Project leader and **:** Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate **:** Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of experiment:
a) Treatments **:** Eight (5+3)
1.Co11001 **2.** Co 11004 **3.** Co M 11081 **4.**CoM 11082 **5.**CoM 11084
6. Co 85004 (Std.) **7.**Co 94008(Std.) **8.** CoC 671(std)

b. Design **:** RBD
c) Replications **:** Three
d) Type of soil **:** Heavy
e) Plot size: Gross **:** 6m X 4.2 m^2 **Net:** 6 m X 2.8 m^2
f) Location **:** Vasantdada farm
g) Date of planting **:** 03.01.2016
h) Date of harvesting **:** 06.01.2017
i) Method of observations: The observations were recorded as given in trial E.4.1.1
11. Results:

The data in table 2 reveled that the cumulative per cent incidence of early shoot borer was below 15.0 % in Co 85004 (13.57%) and CoM 11082 (9.41%), while it was maximum 43.25 % in Co 94008. The no. of bored plants/ha by early shoot borer were minimum 7937 in CoM 11082 , while it was maximum 49206 in Co 94008. The % incidence of internode borer was minimum 2.67 % in Co 11004 while it was maximum 14 % in Co 11001. The % intensity and infestation index of internode borer was below 1 % in all varieties/genotypes screened. The per cent incidence of mealy bug was maximum 6.67% in Co 85004, while varieties viz. Co 11004,CoM 11081, Com 11082 and CoM 11084 were free from it. All varieties/ genotypes were free from scale insect incidence except Co85004 (13.33%).

12. Conclusion:

Out of 8 varieties/genotypes screened CoM 11082 and Co 85004 showed less susceptible reaction to early shoot borer, all varieties/genotypes showed less susceptible reaction to internode borer. All varieties/genotypes showed less susceptible reaction to mealy bug and scale insect except Co 85004, which was moderately susceptible to it.

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

sr. no	Varieties/ Genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade	Scale insect		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants /ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=		% incidence	% intensity	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1	Co 11001	3.33	2.38	15.24	13.10	22.65 (28.14)	30159	MS	14.00 (3.80)	0.96	0.14	LS	4.00 (1.91)	0.34	LS	0.00 (0.71)	0.00	LS
2	Co 11004	0.00	0.00	25.00	16.35	26.96 (30.49)	26190	MS	2.67 (1.44)	0.26	0.02	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
3	CoM 11081	0.00	16.95	11.61	13.08	25.68 (30.36)	31746	MS	13.33 (3.57)	0.95	0.14	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
4	CoM 11082	0.00	2.63	8.05	2.00	9.41 (17.07)	7937	LS	9.33 (3.12)	0.52	0.05	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
5	CoM 11084	0.00	5.13	18.42	10.83	26.10 (30.71)	30159	MS	8.00 (2.86)	0.44	0.04	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
6	Co 85004 (Std.)	0.00	5.26	9.17	4.62	13.57 (20.17)	15873	LS	6.67 (2.59)	0.52	0.05	LS	6.67 (2.30)	0.42	MS	13.33 (2.59)	7.76	MS
7	Co 94008 (Std.)	0.00	13.04	37.65	22.43	43.25 (41.10)	49206	HS	4.00 (1.91)	0.33	0.02	LS	1.33 (1.18)	0.08	LS	0.00 (0.71)	0.00	LS
8	CoC 671 (Std.)	0.00	7.32	18.57	7.07	19.55 (25.99)	18254	MS	12.00 (3.50)	0.69	0.09	LS	2.67 (1.44)	0.15	LS	0.00 (0.71)	0.00	LS
	S.E ±					4.07			0.47				0.51			0.67		
	C.D at 5%					12.35*			1.44*				1.54			2.02		
	C.V					25.19			28.77				72.72			122.47		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible

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

1. Project No : E 4.1.3
2. Discipline **:** Agril Entomology
3. Title of project **:** Evaluation of zonal varieties / genotypes for their reaction against major insect pests in AVT (II plant) Early
4. Title of experiment **:** Field screening of sugarcane varieties/ genotypes in AVT (II plant) Early 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 **:** 2016-17
8. Source of finance **:** ICAR/VSI, Pune
9. Project leader and **:**Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate **:** Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of experiment:
a. Treatments **:** Eleven (8+3)

1.	Co 10004	**2.**	Co 10005	**3.**	Co 10006	**4.**	Co 10024
5.	Co 10026	**6.**	Co 10027	**7.**	CoT 10366	**8.**	CoT 10367
9.	Co 85004 (std)	**10.**	Co 940008 (std)	**11.**	CoC 671 (std)		

b. Design **:** RBD
c. Replication **:** Two
d. Type of soil **:** Heavy
e. Plot size **:** Gross 6m x 4.2 m^2 Net 6m x 2.8 m^2
f. Location **:** Vasantdada farm, VSI, Pune
g) Date of Planting **:** 02.01.2016
h) Date of Harvesting **:** 08.01.2017
i) Method of observations **:** The observations were recorded as given in trial E.4.1.1
11. Results:

The data in table 3 reveled that the cumulative per cent incidence of early shoot borer was above 30.0 % in Co 94008 (38.17%) and Co10006 (58.47%), while it was minimum 8.67 % in Co 10005. The no. of bored plants/ha by early shoot borer were minimum 9524 in CoT 10366, while it was maximum 77381 in Co 10006. The % incidence of internode borer was maximum in Co 10026 (24.00%), The % intensity of internode borer was maximum1.44 % in Co10026. The infestation index of internode borer was below 1 % in all varieties/genotypes screened. The per cent incidence of mealy bug was maximum 6% in CoT 10366 and Co 85004. All varieties /genotypes screened were free from scale insect incidence except Co 10026 (8.00%).

Pooled data in table no.4 indicates that the cumulative per cent incidence of early shoot borer was above 15 % in CoT 10367 (21.14 %), Co 94008 (22.97 %), and Co 10006 (37.24%). The % incidence of internode borer was minimum 4.67 % in Co 10004 and Co 85004, while it was maximum 18.00 % in Co 10026. The per cent incidence of mealy bug was maximum 14.67 % in Co 85004, while it was minimum 1.33 % in Co 10026.

12. Conclusion: Out of 11 varieties/genotypes screened Co 10006 showed highly susceptible reaction to early shoot borer, all varieties/genotypes showed less susceptible reaction to internode borer and Co 10024, Co 10026 and Co 94008 showed less susceptible reaction to mealy bug.

Table.3 Reaction of sugarcane genotypes/varieties to major insect pest in AVT II plant early.

sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade	Scale insect		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=		% incidence	% intensity	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1	Co 10004	0.00	2.08	9.18	4.92	11.81 (19.89)	19048	LS	6.00 (2.52)	0.36	0.03	LS	2.00 (1.41)	0.23	LS	0.00 (0.71)	0.00	LS
2	Co 10005	0.00	0.00	5.00	4.40	8.67 (16.79)	10714	LS	6.00 (2.12)	0.32	0.04	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
3	Co 10006	0.00	15.38	49.09	41.03	58.47 (49.97)	77381	HS	12.00 (3.49)	0.87	0.12	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
4	Co 10024	0.00	5.88	14.58	8.51	27.27 (28.66)	30952	MS	10.00 (3.10)	0.69	0.10	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
5	Co 10026	0.00	16.67	2.63	2.13	10.91 (19.20)	13095	LS	24.00 (4.88)	1.44	0.37	MS	0.00 (0.71)	0.00	LS	8.00 (2.91)	1.92	LS
6	Co 10027	0.00	1.96	15.71	4.40	15.57 (23.07)	19048	MS	14.00 (3.80)	0.98	0.14	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
7	CoT 10366	0.00	0.00	4.76	10.53	13.59 (21.63)	9524	LS	20.00 (4.53)	1.36	0.27	LS	6.00 (2.12)	0.48	MS	0.00 (0.71)	0.00	LS
8	CoT 10367	0.00	4.55	26.42	6.15	24.81 (29.87)	23810	MS	6.00 (2.52)	0.47	0.04	LS	4.00 (1.81)	0.60	LS	0.00 (0.71)	0.00	LS
9	Co 85004 (Std.)	0.00	6.25	10.14	5.17	12.21 (20.43)	17857	LS	4.00 (1.81)	0.28	0.02	LS	6.00 (2.52)	0.74	MS	0.00 (0.71)	0.00	LS
10	Co 94008 (Std.)	0.00	9.68	54.05	15.63	38.17 (38.08)	39286	HS	16.00 (4.06)	0.90	0.15	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
11	CoC 671 (Std.)	0.00	3.23	1.96	8.93	13.36 (20.59)	8333	LS	10.00 (3.23)	0.82	0.08	LS	2.00 (1.41)	0.13	LS	0.00 (0.71)	0.00	LS
	S.E ±					5.64			0.70				0.60			0.60		
	C.D at 5%					17.11			2.13*				1.82			1.81		
	C.V					31.09			30.38				67.35			83.83		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible

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

Table.4 Mean Per cent incidence of major insect pests in AVT Early (Pooled)

Sr. No.	Variety	Cum. % incidence Early shoot borer				Mean % incidence Internode borer				Mean % incidence Mealy bug			
		I PL	II PL	Ratoon	Mean	I PL	II PL	Ratoon	Mean	I PL	II PL	Ratoon	Mean
1	Co 10004	12.33 (20.26)	11.81 (19.89)	1.43 (6.90)	8.52 (15.68)	4.00 (1.81)	6.00 (2.52)	4.00 (1.81)	4.67 (2.05)	8.00 (2.38)	2.00 (1.41)	10.00 (2.62)	6.67 (2.14)
2	Co 10005	16.30 (23.58)	8.67 (16.79)	1.39 (6.83)	8.78 (15.73)	4 .00 (1.81)	6.00 (2.12)	10.00 (3.09)	6.67 (2.34)	6.00 (2.12)	0.00 (0.71)	12.00 (3.32)	6.00 (2.05)
3	Co 10006	38.62 (38.32)	58.47 (49.97)	14.61 (21.23)	37.24 (36.51)	4.00 (1.81)	12.00 (3.49)	14.00 (3.54)	10.00 (2.94)	2.00 (1.41)	0.00 (0.71)	20.00 (4.53)	7.33 (2.22)
4	Co 10024	7.86 (15.53)	27.27 (28.66)	4.48 (10.74)	13.20 (18.31)	2.00 (1.41)	10.00 (3.10)	8.00 (2.83)	6.67 (2.44)	0.00 (0.71)	0.00 (0.71)	10.00 (3.23)	3.33 (1.55)
5	Co 10026	14.79 (21.68)	10.91 (19.20)	7.61 (13.51)	11.10 (18.13)	12.00 (3.54)	24.00 (4.88)	18.00 (4.24)	18.00 (4.22)	0.00 (0.71)	0.00 (0.71)	4.00 (2.12)	1.33 (1.18)
6	Co 10027	15.97 (23.53)	15.57 (23.07)	9.23 (15.89)	13.59 (20.83)	4.00 (2.12)	14.00 (3.80)	2.00 (1.41)	6.67 (2.44)	12.00 (3.32)	0.00 (0.71)	12.00 (3.49)	8.00 (2.51)
7	CoT 10366	18.45 (25.44)	13.59 (21.63)	1.52 (7.04)	11.19 (18.04)	4.00 (1.81)	20.00 (4.53)	8.00 (2.91)	10.67 (3.08)	6.00 (2.52)	6.00 (2.12)	18.00 (4.24)	10.00 (2.76)
8	CoT 10367	29.09 (32.23)	24.81 (29.87)	9.51 (16.92)	21.14 (26.34)	14.00 (3.80)	6.00 (2.52)	14.00 (3.80)	11.33 (3.37)	10.00 (2.62)	4.00 (1.81)	12.00 (3.32)	8.67 (2.58)
9	Co 85004 (Std.)	11.15 (19.50)	12.21 (20.43)	3.43 (10.49)	8.93 (16.81)	4.00 (1.81)	4.00 (1.81)	6.00 (2.12)	4.67 (1.91)	10.00 (3.09)	6.00 (2.52)	28.00 (5.10)	14.67 (3.57)
10	Co 94008 (Std.)	19.64 (26.05)	38.17 (38.08)	11.09 (18.39)	22.97 (27.51)	4.00 (1.81)	16.00 (4.06)	8.00 (2.91)	9.33 (2.93)	4.00 (1.81)	0.00 (0.71)	4.00 (2.12)	2.67 (1.55)
11	CoC 671 (Std.)	15.27 (22.33)	13.36 (20.59)	4.85 (12.11)	11.16 (18.35)	1 2.00 (3.49)	10.00 (3.23)	18.00 (4.24)	13.33 (3.65)	8.00 (2.38)	2.00 (1.41)	14.00 (3.72)	8.00 (2.51)
	S.E ±		5.64	5.95	5.61		0.70	0.70	0.77		0.60	0.66	0.88
	C.D at 5%	NS	17.11	18.51	18.29**	NS	2.13*	2.19	2.35*	NS	1.82	2.07	3.07*
	C.V		31.09	68.90	37.29		30.38	33.31	38.88		67.35	28.25	53.61

1. Project No : E 4.1.4
2. Discipline : Agril Entomology
3. Title of project : Evaluation of zonal varieties / genotypes for their reaction against major insect pests in AVT (Ratoon) Early.
4. Title of experiment : Field screening of sugarcane varieties/ genotypes in AVT (Ratoon) Early 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 : 2016-17
8. Source of finance : ICAR/VSI, Pune
9. Project leader and :Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate : Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of experiment:
a. Treatments : Eleven (8+3)

1.	Co 10004	**2.**	Co 10005	**3.**	Co 10006	**4.**	Co 10024
5.	Co 10026	**6.**	Co 10027	**7.**	CoT 10366	**8.**	CoT 10367
9.	Co 85004 (std)	**10.**	Co 940008 (std)	**11.**	CoC 671 (std)		

b. Design : RBD
c. Replication : Two
d. Type of soil : Heavy
e. Plot size : Gross 6m x 3.6 m^2 Net 6m x 2.4 m^2
f. Location : Vasantdada farm, VSI, Pune
g) Date of Ratooning : 14.01.2016
h) Date of Harvesting : 07.01.2017
i) Method of observations: The observations were recorded as given in trial E.4.1.1
11. Results:

The data in table 5 reveled that the cumulative per cent incidence of early shoot borer was below 15 % in all varieties/genotypes screened. The no. of bored plants/ha by early shoot borer were minimum 1389 in Co 10004, Co 10005 and CoT 10366. while it was maximum 13889 in Co 10006 and Co 10027. The % incidence of internode borer was minimum 2 % in Co 10027, while it was maximum 18 % in Co 10026 and CoC 671. The % intensity of internode borer was maximum 1.88 % in Co 10026 and infestation index of internode borer was below 1 % in all varieties/genotypes screened. The per cent incidence of mealy bug was minimum 4 % in Co 10026 and Co 94008, while in other varieties/ genotypes it was in the range of 10 to 28.0%.

12. Conclusion:

All 11 varieties/genotypes screened showed less susceptible reaction to early shoot borer, internode borer and scale insect. Co 10026 and Co 94008 showed less susceptible reaction to mealy bug.

Table.5 Reaction of sugarcane genotypes/varieties to major insect pest in AVT (Ratoon) early.

sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Co 10004	0	2.86	0.00	0.00	1.43 (6.90)	1389	LS	4.00 (1.81)	0.26	0.02	LS	10.00 (2.62)	1.16	MS
2	Co 10005	0	0.00	0.00	1.35	1.39 (6.83)	1389	LS	10.00 (3.09)	0.64	0.09	LS	12.00 (3.32)	1.25	MS
3	Co 10006	1.32	3.23	0.00	8.24	14.61 (21.23)	13889	LS	14.00 (.3.54)	0.95	0.20	LS	20.00 (4.53)	2.89	MS
4	Co 10024	0	1.45	2.08	3.64	4.48 (10.74)	8333	LS	8.00 (2.83)	0.54	0.05	LS	10.00 (3.23)	1.35	MS
5	Co 10026	0	0.00	6.67	4.82	7.61 (13.51)	9722	LS	18.00 (4.24)	1.88	0.35	LS	4.00 (2.12)	0.54	LS
6	Co 10027	0	9.09	3.17	2.91	9.23 (15.89)	13889	LS	2.00 (1.41)	0.15	0.01	LS	12.00 (3.49)	2.08	MS
7	CoT 10366	0	0.00	1.67	0.00	1.52 (7.04)	1389	LS	8.00 (2.91)	0.43	0.04	LS	18.00 (4.24)	2.01	MS
8	CoT 10367	0	11.11	3.51	1.37	9.51 (16.92)	12500	LS	14.00 (3.80)	1.03	0.15	LS	12.00 (3.32)	2.00	MS
9	Co 85004 (Std)	0.00	0.00	0.00	3.64	3.43 (10.49)	5556	LS	6.00 (2.12)	0.43	0.05	LS	28.00 (5.10)	4.41	MS
10	Co94008 (Std)	0	2.17	2.13	8.93	11.09 (18.39)	9722	LS	8.00 (2.91)	0.65	0.05	LS	4.00 (2.12)	0.91	LS
11	CoC 671 (Std)	0	6.67	0.00	1.16	4.85 (12.11)	5556	LS	18.00 (4.24)	1.85	0.16	LS	14.00 (3.72)	2.22	MS
	S.E ±					5.95			0.70				0.66		
	C.D at 5%					18.51			2.19				2.07		
	C.V					68.90			33.31				28.25		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible .

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 Midlate 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 **:** 2016-17
8. Source of finance **:** ICAR/VSI, Pune
9. Project leader and **:**Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate **:** Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of experiment:
a. Treatments : Twenty two (20+2)

1.	Co 13005	**2.**	Co 13006	**3.**	Co 13008	**4.**	Co 13009
5.	Co 13011	**6.**	Co 13013	**7.**	CoT 13014	**8.**	Co 13016
9.	Co 13018	**10.**	Co 13020	**11.**	CoM 13082	**12**	CoN 13073
13.	CoN 13074	**14.**	CoSnk 13103	**15.**	CoSnk 13104	**16.**	CoSnk 13105
17.	CoSnk 13106	**18.**	CoT 13366	**19.**	PI 13131	**20.**	PI 13132
21.	Co 86032 (std)	**22.**	Co 94004 (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 4 R X 1.2 m
f. Location **:** Vasantdada farm, VSI, Pune
g) Date of Planting **:** 16.01.2016
h) Date of Harvesting **:** 24.01.2017
i) Method of observations **:** The observations were recorded as given in trial E.4.1.1

11. Results:

The data in table 6 indicated that cumulative % incidence of early shoot borer was above 30% in Co 13016 (30.16%),CoSnk13106 (35.61%), PI 13132 (36.27%)and Co 13009 (38.76%), while it was minimum 6.82% in Co 13005.The no. of bored plants/ha by early shoot borer was maximum 51389 in PI 13132,while it was minimum 8333 in Co 13005. The % incidence of internode borer was maximum 12 % in CoM 13082, while Co 13013 and PI 13132 were free from it. The % intensity of internode borer was maximum 1.16 % in CoM 13082, while in other varieties/clones it was bellow 1.0%. The infestation index of internode borer was below 1.00 in all varieties/ genotypes screened. The incidence of mealy bug was maximum 10 % in Co Snk 13106.

12. Conclusion:

Out of 22 varieties/genotypes screened Co 13016, CoSnk13106, PI 13132 and Co 13009 found highly susceptible to early shoot borer, all 22 varieties/genotypes showed less susceptible reaction to internode borer and Co 13016,Co 86032, Co 13020, PI 13131 and CoSnk 13106 showed moderately susceptible reaction to mealy bug.

Table.6 Reaction of sugarcane genotypes/varieties to major insect pest in IVT Midlate.

sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Co 13005	0	3.13	7.14	1.69	6.82 (12.86)	8333	LS	8.00 (2.38)	0.55	0.09	LS	2.00 (1.41)	0.22	LS
2	Co 13006	0	20.83	4.00	6.10	14.82 (20.98)	16667	LS	10.00 (3.23)	0.73	0.08	LS	4.00 (1.81)	0.73	LS
3	Co 13008	0	5.71	6.25	3.13	10.25 (17.29)	9722	LS	6.00 (2.52)	0.37	0.03	LS	4.00 (1.81)	0.36	LS
4	Co 13009	0	38.71	15.79	18.46	38.76 (38.49)	45833	HS	2.00 (1.41)	0.15	0.01	LS	4.00 (1.81)	0.46	LS
5	Co 13011	0	12.82	19.72	2.56	21.45 (27.32)	29167	MS	8.00 (2.91)	0.67	0.06	LS	0.00 (0.71)	0.00	LS
6	Co 13013	0	2.94	6.56	16.67	18.37 (22.62)	26389	MS	0.00 (0.71)	0.00	0.00	LS	0.00 (0.71)	0.00	LS
7	Co 13014	0	12.50	5.13	8.11	21.74 (23.98)	15278	MS	6.00 (2.52)	0.41	0.03	LS	2.00 (1.41)	0.39	LS
8	Co 13016	0	16.67	20.00	20.00	30.16 (33.03)	41667	HS	4.00 (1.81)	0.35	0.03	LS	6.00 (2.12)	0.92	MS
9	Co 13018	0	13.33	8.82	11.54	22.92 (28.39)	29167	MS	2.00 (1.41)	0.17	0.01	LS	2.00 (1.41)	0.34	LS
10	Co 13020	0	28.13	7.81	4.42	14.89 (22.69)	26389	LS	2.00 (1.41)	0.15	0.01	LS	8.00 (2.38)	1.39	MS
11	Co M 13082	0	1.45	0.00	6.19	7.97 (15.70)	9722	LS	12.00 (3.49)	1.16	0.15	LS	4.00 (1.81)	0.36	LS

12	Co N 13073	0	25.00	5.08	2.13	10.16 (18.37)	15278	LS	8.00 (2.83)	0.47	0.05	LS	0.00 (0.71)	0.00	LS
13	Co N 13074	0	32.26	14.55	11.76	26.63 (30.99)	38889	MS	4.00 (2.12)	0.57	0.02	LS	2.00 (1.41)	0.14	LS
14	Co Snk 13103	0	6.90	8.77	11.58	17.89 (24.99)	25000	MS	10.00 (3.23)	0.72	0.08	LS	0.00 (0.71)	0.00	LS
15	Co Snk 13104	0	4.76	3.57	8.33	11.00 (18.57)	16667	LS	6.00 (2.12)	0.49	0.06	LS	0.00 (0.71)	0.00	LS
16	Co Snk 13105	0	8.00	7.69	8.82	15.05 (22.18)	23611	MS	2.00 (1.14)	0.16	0.01	LS	0.00 (0.71)	0.00	LS
17	Co Snk 13106	0	24.44	11.29	20.73	35.61 (36.61)	48611	HS	4.00 (1.81)	0.43	0.03	LS	10.00 (3.23)	0.91	MS
18	CoT 13366	0	0	6.67	8.33	11.89 (19.22)	11111	LS	2.00 (1.41)	0.28	0.01	LS	0.00 (0.71)	0.00	LS
19	PI 13131	0	5	5.88	12.20	17.5 (24.22)	11111	MS	8.00 (2.38)	0.65	0.11	LS	8.00 (2.38)	1.29	MS
20	PI 13132	0	16.67	22.03	21.69	36.27 (37.02)	51389	HS	0.00 (0.71)	0.00	0.00	LS	4.00 (1.81)	0.33	LS
21	Co 86032 (Std.)	0	22.92	7.14	6.25	23.61 (28.83)	29167	MS	4.00 (1.81)	0.30	0.03	LS	6.00 (2.12)	0.91	MS
22	Co 99004 (Std.)	0	8	15.38	4.62	14.25 (2.06)	15278	LS	10.00 (3.23)	0.64	0.07	LS	0.00 (0.71)	0.00	LS
	SE					6.51			0.85				0.78		
	CD 5%					19.16			2.49				2.29		
	CV					37.02			56.16				74.24		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible.

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

1. Project No **:** E 4.1.6
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 (I plant) 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 **:** 2016-17
8. Source of finance **:** ICAR/VSI, Pune
9. Project leader and **:** Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate **:** Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of experiment:
a. Treatments **:** Eight (6+2)

1.	Co 11005	**2.**	Co 11007	**3.**	Co 11012	**4.**	Co 11019
5.	CoM 11085	**6.**	CoM 11086	**7.**	Co 86032 (std)	**8.**	Co 99004 (std)

b. Design **:** RBD
c. Replication **:** Three
d. Type of soil **:** Heavy
e. Plot size **:** Gross 6m x 4.2 m^2 Net 6m x 2.8 m^2
f. Location **:** Vasantdada farm, VSI, Pune
g) Date of Planting **:** 03.01.2016
h) Date of Harvesting **:** 06.01.2017
i) Method of observations **:** The observations were recorded as given in trial E.4.1.1
11. Results:

The data in Table 7 indicated that cumulative % incidence of early shoot borer was bellow 15% in Co 11019 (8.63%), Co11005 (11.41%) and CoM 11085 (11.73%), while it was maximum in Co 11012 (22.30 %) and Co11007 (23.69%).The no. of bored plants/ha by early shoot borer was maximum 31746 in Co 11012 ,while it was minimum 8730 in Co 11019. The % incidence of internode borer was maximum 13.33 % in Co11012, while it was minimum 4% in Co 11005 and Co 86032.The % intensity/ infestation index of internode borer was below 1% in all varieties/ genotypes screened. The incidence of mealy bug was below 5.0% in Co 11007 (2.67%) and Co 11005 (4.00%). The incidence of Scale insect was found only in Co11007 (1.33 %) and Co 86032 (12.00%).

12. Conclusion:

Out of 8 varieties/genotypes screened Co 11005, Co 11019 and CoM 11085 found less susceptible to early shoot borer, all 8 varieties/genotypes showed less susceptible reaction to internode borer. Co 11005 and Co 11007 were found less susceptible to mealy bug infestation. Co 86032 was found moderately susceptible to scale insect.

Table.7 Reaction of sugarcane genotypes/varieties to major insect pest in AVT I Pl Midlate.

sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade	Scale Insect		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=		% incidence	% intensity	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1	Co11005	0.00	0.91	5.37	6.47	11.41 (19.37)	15873	LS	4.00 (1.91)	0.32	0.02	LS	4.00 (2.12)	0.48	LS	0.00 (0.71)	0.00	LS
2	Co 11007	0.00	17.19	14.85	5.61	23.69 (29.09)	25397	MS	8.00 (2.86)	0.48	0.05	LS	2.67 (1.65)	0.32	LS	1.33 (1.18)	1.02	LS
3	Co 11012	0.00	1.49	19.84	10.45	22.30 (26.89)	31746	MS	13.33 (3.66)	0.88	0.13	LS	6.67 (2.30)	0.54	MS	0.00 (0.71)	0.00	LS
4	Co 11019	0.00	0.00	2.56	6.87	8.63 (16.94)	8730	LS	6.67 (2.65)	0.55	0.04	LS	9.33 (3.06)	0.89	MS	0.00 (0.71)	0.00	LS
5	CoM 11085	0.00	0.00	5.65	7.63	11.73 (19.92)	13492	LS	6.67 (2.39)	0.44	0.04	LS	6.67 (2.39)	0.68	MS	0.00 (0.71)	0.00	LS
6	CoM 11086	0.00	0.00	20.87	4.35	19.16 (25.48)	23016	MS	8.00 (2.91)	0.59	0.05	LS	5.33 (2.18)	0.36	MS	0.00 (0.71)	0.00	LS
7	Co 86032 (Std)	0.00	5.56	10.00	8.78	17.02 (24.08)	22222	MS	4.00 (1.91)	0.24	0.02	LS	6.67 (2.65)	0.54	MS	12.00 (2.48)	7.81	MS
8	Co 99004 (Std.)	0.00	5.00	6.17	9.78	15.99 (23.56)	12698	MS	10.67 (3.33)	0.66	0.07	LS	8.00 (2.56)	0.82	MS	0.00 (0.71)	0.00	LS
	SE					3.10			0.52				0.38			0.66		
	CD 5%					9.40			1.59				1.16			2.01		
	CV					23.22			33.62				28.08			115.98		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible. Figures in parenthesis are transformed values while those outside are original values

1. Project No : E 4.1.7
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 II Plant 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 : 2016-17
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 : Thirteen (11+2)

1.	Co 09009	**2.**	Co 10015	**3.**	Co 10017	**4.**	Co 10031
5.	Co 10033	**6.**	CoM 10083	**7.**	CoT 10368	**8.**	Co T 10369
9	CoVc 10061	**10**	PI 10131	**11**	PI 10132	**12**	Co 86032 (Std)
13	Co 99004 (Std)						

b. Design : RBD
c. Replication : Two
d. Type of soil : Heavy
e. Plot size : Gross 6m x 4.2 m^2 Net 6m x 2.8 m^2
f. Location : Vasantdada farm, VSI, Pune
g) Date of Planting : 02.01.2016
h) Date of Harvesting : 08.01.2017
i) Method of observations : The observations were recorded as given in trial E.4.1.1

11. Results:

The data in Table 8 indicated that cumulative % incidence of early shoot borer was above 30% in Co 09009 (30.56%) and Co 86032 (34.27 %) while it was minimum in CoVc 10061 (5.45%).The no. of bored plants/ha by early shoot borer was maximum 39286 in Co 09009 ,while it was minimum 7143 in CoVc 10061 and Co 99004. The % incidence of internode borer was maximum 16.00 % in Co 10031, while CoT 10369 was free from it.
The % intensity of internode borer was maximum 1.20 % in Co 10031, while in other varieties/gene types it was below 1%. The infestation index of internode borer was below 1.00 in all varieties/ genotypes screened. The incidence of mealy bug was maximum 6.00 % in CoM 10083 and CoT 10368. The incidence of Scale insect was maximum 8.00 % in Co 10033 and 2% in PI 10132, while other varieties / genotypes were free from it.

Pooled data in table no.9 indicates that the cumulative per cent incidence of early shoot borer was below 15 % in Co 10017, Co 10031, Co 10033, CoT 10369, CoVc 10061, Co 86032 and Co 99004. The % incidence of internode borer was minimum 4.67 % in Co 10033,while in other varieties /genotypes below 20 %. The per cent incidence of mealy bug was below 5 % in Co 10031(1.33), Co 09009 (2.00), Co 10033 (2.00,) and Co 10017 (4.00). The per cent infestation of scale insect was maximum in Co 10033(11.31%) and Co 10017 (15.33), while CoM 10083, CoT 10368 and Co 99004 were free from it.

12. Conclusion:

Out of 13 varieties/genotypes screened Co 10017, Co 10031, Co 10033, CoT 10369, CoVc 10061, Co 86032 and Co 99004, showed lees susceptible reaction to early shoot borer, all varieties/genotypes showed less susceptible reaction to internode borer and Co 10031, Co 09009, Co 10033 and Co 10017 showed less susceptible reaction to mealy bug. Co 10033 and Co 10017 showed moderately susceptible reaction to scale insect.

Table 8. Reaction of sugarcane genotypes/varieties to major insect pest in AVT II Plant Midlate.

sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade	Scale Insect		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=		% incidence SMW=	% intensity SMW=	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1	Co 09009	0	5.66	25.00	14.77	30.56 (32.76)	39286	HS	8.00 (2.91)	0.34	0.05	LS	2.00 (1.41)	0.13	LS	0.00 (0.71)	0.00	LS
2	Co 10015	0	8.11	22.03	4.60	18.98 (25.74)	23810	MS	8.00 (2.91)	0.46	0.04	LS	2.00 (1.41)	0.12	LS	0.00 (0.71)	0.00	LS
3	Co 10017	0	4.55	12.24	11.84	20.34 (26.78)	20238	MS	4.00 (1.81)	0.20	0.02	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
4	Co 10031	0	1.92	14.04	6.17	14.23 (21.79)	16667	LS	16.00 (4.06)	1.20	0.19	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
5	Co 10033	0	7.69	17.02	3.61	14.89 (21.13)	16667	LS	8.00 (2.91)	0.68	0.05	LS	2.00 (1.41)	0.11	LS	8.00 (2.83)	2.40	LS
6	CoM 10083	0	8.82	8.77	8.00	19.55 (25.12)	16667	MS	14.00 (3.80)	0.91	0.13	LS	6.00 (2.12)	0.92	MS	0.00 (0.71)	0.00	LS
7	CoT 10368	0	3.77	27.66	13.00	24.31 (29.54)	33333	MS	14.00 (3.72)	0.95	0.16	LS	6.00 (2.12)	0.49	MS	0.00 (0.71)	0.00	LS
8	CoT 10369	0	2.44	11.54	6.12	14.76 (22.58)	19048	LS	0.00 (0.71)	0.00	0.00	LS	2.00 (1.41)	0.34	LS	0.00 (0.71)	0.00	LS
9	Co Vc 10061	0	0.00	7.14	2.83	5.45 (13.49)	7143	LS	4.00 (2.12)	0.26	0.01	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
10	PI 10131	0	0.00	30.91	7.14	22.33 (28.06)	27381	MS	12.00 (3.49)	0.85	0.11	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
11	PI 10132	0	4.88	15.56	16.67	29.77 (32.29)	21429	MS	12.00 (3.32)	0.89	0.14	LS	0.00 (0.71)	0.00	LS	2.00 (1.41)	0.32	LS
12	Co 86032 (Std)	0	15.79	30.00	17.28	34.27 (35.82)	41667	HS	10.00 (3.23)	0.57	0.06	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
13	Co 99004 (Std)	0	0	3.12	6.76	8.68 (16.97)	7143	LS	6.00 (2.52)	0.37	0.03	LS	0.00 (0.71)	0.00	LS	0.00 (0.71)	0.00	LS
	SE					5.60			0.68				0.64				0.26	
	CD 5%					16.88			2.04				1.94				0.78**	
	CV					31.51			36.06				82.42				41.31	

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible. Figures in parenthesis are transformed values while those outside are original values

Table.9 Mean Per cent incidence of major insect pests in AVT midlate (Pooled)

Sr. No	Variety	Cum. % incidence Early shoot borer				Mean % incidence Internode borer				Mean % incidence Mealy bug				Mean % incidence Scale insect			
		I PL	II PL	Ratoon	Mean	I PL	II PL	Ratoon	Mean	I PL	II PL	Ratoon	Mean	I PL	II PL	Ratoon	Mean
1	Co 09009	34.56 (35.96)	30.56 (32.76)	5.25 (12.88)	23.46 (27.20)	4.00 (1.81)	8.00 (2.91)	14.00 (3.54)	8.67 (2.75)	0.0 (0.71)	2.00 (1.41)	4.00 (1.81)	2.00 (1.31)	0.00	0.00 (0.71)	28.00 (4.94)	9.33 (2.12)
2	Co 10015	19.72 (26.36)	18.98 (25.74)	9.61 (17.74)	16.11 (23.28)	2.00 (1.41)	8.00 (2.91)	6.00 (2.52)	5.33 (2.28)	6.00 (1.81)	2.00 (1.41)	10.00 (3.09)	6.00 (2.34)	0.00	0.00 (0.71)	4.00 (1.81)	1.33 (1.07)
3	Co 10017	10.43 (18.80)	20.34 (26.78)	8.33 (16.24)	13.03 (20.61)	10.00 (3.23)	4.00 (1.81)	10.00 (3.23)	8.00 (2.75)	2.00 (1.41)	0.00 (0.71)	10.00 (3.09)	4.00 (1.74)	0.00	0.00 (0.71)	46.00 (6.68)	15.33 (2.70)
4	Co 10031	10.94 (15.97)	14.23 (21.79)	5.05 (12.34)	10.07 (16.70)	2.00 (1.41)	16.00 (4.06)	10.00 (3.23)	9.33 (2.90)	4.00 (2.12)	0.00 (0.71)	0.00 (0.71)	1.33 (1.18)	0.00	0.00 (0.71)	10.00 (3.09)	3.33 (1.50)
5	Co 10033	6.43 (14.47)	14.89 (21.13)	3.25 (10.18)	8.19 (15.26)	4.00 (2.12)	8.00 (2.91)	2.00 (1.41)	4.67 (2.15)	0.0 0 (0.71)	2.00 (1.41)	4.00 (1.81)	2.00 (1.31)	0.00	8.00 (2.83)	26.00 (5.05)	11.33 (2.86)
6	CoM 10083	25.96 (29.05)	19.55 (25.12)	10.49 (18.45)	18.67 (24.20)	2.00 (1.41)	14.00 (3.80)	6.00 (2.52)	7.33 (2.58)	18.00 (4.29)	6.00 (2.12)	20.00 (4.31)	14.67 (3.57)	0.00	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
7	CoT 10368	18.79 (25.22)	24.31 (29.54)	10.16 (18.59)	17.75 (24.45)	8.00 (2.83)	14.00 (3.72)	10.00 (3.23)	10.67 (3.26)	0.00 (0.71)	6.00 (2.12)	12.00 (3.49)	6.00 (2.11)	0.00	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
8	CoT 10369	11.95 (19.95)	14.76 (22.58)	3.62 (10.96)	10.11 (17.83)	6.00 (2.52)	0.00 (0.71)	12.00 (2.83)	6.00 (2.02)	2.00 (1.41)	2.00 (1.41)	12.00 (3.32)	5.33 (2.05)	0.00	0.00 (0.71)	2.00 (1.41)	0.67 (0.94)
9	Co Vc 10061	16.45 (23.81)	5.45 (13.49)	3.70 (10.82)	8.53 (16.04)	10.00 (2.52)	4.00 (2.12)	10.00 (3.23)	8.00 (2.86)	8.00 (2.52)	0.00 (0.71)	8.00 (2.91)	5.33 (2.18)	0.00	0.00 (0.71)	2.00 (1.41)	0.67 (0.94)
10	PI 10131	16.13 (23.46)	22.33 (28.06)	6.60 (14.74)	15.02 (22.09)	4.00 (2.12)	12.00 (3.49)	2.00 (1.41)	6.00 (2.34)	12.00 (3.32)	0.00 (0.71)	12.00 (3.32)	8.00 (2.45)	0.00	0.00 (0.71)	2.00 (1.41)	0.67 (0.94)
11	PI 10132	16.68 (23.87)	29.77 (32.29)	10.84 (17.44)	19.10 (24.53)	10.00 (2.62)	12.00 (3.32)	4.00 (2.12)	8.67 (2.69)	2.00 (1.41)	0.00 (0.71)	16.00 (4.06)	6.00 (2.06)	0.00	2.00 (1.41)	0.00 (0.71)	0.67 (0.94)
12	Co 86032 (Std)	3.57 (9.78)	34.27 (35.82)	3.45 (9.64)	13.76 (18.41)	2.00 (1.41)	10.00 (3.23)	12.00 (3.54)	8.00 (2.72)	2.00 (1.41)	0.00 (0.71)	26.00 (5.05)	9.33 (2.39)	0.00	0.00 (0.71)	2.00 (1.41)	0.67 (0.94)
13	Co 99004 (Std)	11.11 (16.09)	8.68 (16.97)	7.87 (16.19)	9.22 (16.42)	4.00 (1.81)	6.00 (2.52)	8.00 (2.91)	6.00 (2.41)	8.00 (2.83)	0.00 (0.71)	8.00 (2.83)	5.33 (2.12)	0.00	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
	S.E ±		**5.60**	**4.20**			**0.68**	**0.74**		**0.61**	**0.64**	**0.88**	**0.70**			**0.85**	**0.52**
	C.D at 5%	**NS**	**16.88**	**12.66**	**NS**	**NS**	**2.04**	**2.24**	**NS**	**1.84***	**1.94**	**2.65***	**2.10****			**2.56****	**1.64*****
	C.V		**31.51**	**42.09**			**36.06**	**37.13**		**40.79**	**82.42**	**41.25**	**47.16**			**54.86**	**57.51**

1. Project No **:** E 4.1.8
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 Ratoon 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 **:** 2016-17
8. Source of finance **:** ICAR/VSI, Pune
9. Project leader and **:** Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate **:** Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of experiment:
a. Treatments **:** Thirteen (11+2)

1.	Co 09009	**2.**	Co 10015	**3.**	Co 10017	**4.**	Co 10031
5.	Co 10033	**6.**	CoM 10083	**7.**	CoT 10368	**8.**	Co T 10369
9	CoVc 10061	**10**	PI 10131	**11**	PI 10132	**12**	Co 86032 (Std)
13	Co 99004 (Std)						

b. Design **:** RBD
c. Replication **:** Two
d. Type of soil **:** Heavy
e. Plot size **:** Gross 6m x 3.6 m^2 Net 6m x 2.4 m^2
f. Location **:** Vasantdada farm, VSI, Pune
g) Date of Ratooning **:** 14.01.2016
h) Date of Harvesting **:** 07.01.2017
i) Method of observations **:** The observations were recorded as given in trial E.4.1.1
11. Results:

The data in Table 10 indicated that cumulative % incidence of early shoot borer was above 15% in all varieties/ genotypes screened, while it was maximum in PI 10132 (10.84 %). The no. of bored plants/ha by early shoot borer was maximum 20833 in Co 10015and, while it was minimum 4167 in Co 10033. The % incidence of internode borer was maximum 14 % in Co 09009, while it was minimum 2% in Co 10033 and PI 10131. The % intensity of internode borer was below 1 % in all varieties/ genotypes screened, The infestation index of internode borer was below 1.00 in all varieties/ genotypes screened. The incidence of mealy bug was maximum 26 % in Co 86032, while Co 10031 was free from mealy bug infestation. The incidence if scale insect was maximum 46 % in Co 10017, while CoM 10083, CoT 10368, PI 10132 and Co 99004 were free from it.

12. Conclusion:

Out of 13 varieties/genotypes screened all varieties/clones were found less susceptible to early shoot borer and internode borer. Co 10031 was free from mealy bug infestation. Co10017 was found highly susceptible to scale insect.

Table 10. Reaction of sugarcane genotypes/varieties to major insect pest in AVT Ratoon Midlate.

sr. no	Varieties/ genotype	Early shoot borer (% incidence)						Grade	Internode borer			Grade	Mealy bug		Grade	Scale Insect		Grade
		30 DAS	60 DAS	90 DAS	120 DAS	cum	No. of bored plants/ha		% incidence	% intensity	Infestation index		% incidence SMW=	% intensity SMW=		% incidence SMW=	% intensity SMW=	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Co 09009	0	0.00	2.59	2.50	5.25 (12.88)	8333	LS	14.00 (3.54)	0.91	0.20	LS	4.00 (1.81)	0.72	LS	28.00 (4.94)	13.93	MS
2	Co 10015	2.19	9.72	3.16	1.46	9.61 (17.74)	20833	LS	6.00 (2.52)	0.40	0.01	LS	10.00 (3.09)	1.17	MS	4.00 (1.81)	2.77	LS
3	Co 10017	0	6.06	1.96	3.13	8.33 (16.24)	18056	LS	10.00 (3.23)	0.82	0.09	LS	10.00 (3.09)	1.44	MS	46.00 (6.68)	25.01	HS
4	Co 10031	0	1.85	0.00	3.49	5.05 (12.34)	5556	LS	10.00 (3.23)	0.84	0.09	LS	0.00 (0.71)	0.00	LS	10.00 (3.09)	4.69	LS
5	Co 10033	0	1.54	1.56	1.08	3.25 (10.18)	4167	LS	2.00 (1.41)	0.12	0.01	LS	4.00 (1.81)	0.06	LS	26.00 (5.05)	10.95	MS
6	CoM 10083	0	6.25	6.90	2.11	10.49 (18.45)	15278	LS	6.00 (2.52)	0.32	0.02	LS	20.00 (4.31)	2.92	MS	0.00 (0.71)	0.00	LS
7	CoT 10368	1.28	3.28	1.15	5.26	10.16 (18.59)	11111	LS	10.00 (3.23)	0.68	0.07	LS	12.00 (3.49)	1.08	MS	0.00 (0.71)	0.53	LS
8	CoT 10369	0	0.00	0.00	3.65	3.62 (10.96)	6944	LS	12.00 (2.83)	0.68	0.17	LS	12.00 (3.32)	2.14	MS	2.00 (1.41)	1.24	LS
9	Co Vc 10061	1.05	2.33	1.11	0.99	3.70 (10.82)	5556	LS	10.00 (3.23)	0.63	0.07	LS	8.00 (2.91)	0.88	MS	2.00 (1.41)	0.25	LS
10	PI 10131	0.98	2.78	2.63	2.52	6.60 (14.74)	12500	LS	2.00 (1.41)	0.14	0.01	LS	12.00 (3.32)	2.37	MS	2.00 (1.41)	0.63	LS
11	PI 10132	0	0.00	1.72	8.22	10.84 (17.44)	9722	LS	4.00 (2.12)	0.54	0.02	LS	16.00 (4.06)	1.34	MS	0.00 (0.71)	0.00	LS
12	Co 86032 (Std)	0	1.64	1.41	2.02	3.45 (9.64)	5556	LS	12.00 (3.54)	0.88	0.11	LS	26.00 (5.05)	3.59	MS	2.00 (1.41)	0.92	LS
13	Co 99004 (Std)	0	6.90	0.00	4.84	7.87 (16.19)	6944	LS	8.00 (2.91)	0.77	0.06	LS	8.00 (2.83)	0.76	MS	0.00 (0.71)	0.00	LS
	SE					4.20			0.74				0.88			0.85		
	CD 5%					12.66			2.24				2.65*			2.56**		
	CV					42.09			37.13				41.25			54.86		

LS-Less Susceptible, MS-Moderately Susceptible, HS-Highly Susceptible. Figures in parenthesis are transformed values while those outside are original values

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.
6. Year of commencement **:** 2003-04
7. Year of implementation **:** 2016-17
8. Source of finance **:** ICAR/VSI, Pune.
9. Project leader and **:**Shri.R.G.Yadav, Scientific Officer & Head, Entomology.
Associate **:** 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 intercrops, 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

Table 11 shows that % incidence of early shoot borer was in the range of 0.00 to 36.36 % , while it was maximum 36.36 % in VSI 08005 planted in February 2017. The % incidence of internode borer was in the range of 0.00 to 40.00 %, while it was maximum 40 % in CoM 10001 planted in July 2016. The % incidence of mealy bug was in the range of 0.00 to 20.00 % , while it was maximum 20.00 in Co 86032 planted in July2016

12. Conclusion:

The % incidence of early shoot borer was maximum 36.36 % in VSI 08005 planted in February 2017. The % incidence of internode borer and mealy bug was maximum 40.00% ant 20.00 % in CoM 10001 planted in July 2016 and Co 86032 planted in July 2016 respectively.

Table 11: % incidence /intensity of major pests at Daund Sugar Pvt 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	%inten	% inci	% inten
1	Mr.Lagad Satyavan V.	Nanvij	Co 86032	15.7.2016	-	0	0	0	0	0	0
2	Mr. Sutar	Nanvij	CoM 265	Nov.2016 Ratoon	2.64	-	-	-	-	-	-
3	Mr.Patole Vitthal Rajaram	Nanvij	Co 86032	Nov.2016	6.02	-	-	-	-	-	-
4	Mr.Patole Vitthal Rajaram	Nanvij	Co M 0265	Nov.2016	2.52	-	-	-	-	-	-
5	Mr.Patankar Popat Maruti	Nanvij	Co 86032	1.7.2016	-	0	0	0	0	10.00	0.89
6	Mr.Patankar Popat Maruti	Nanvij	Co 86032	Dec.2016 Ratoon	3.70	-	-	-	-	-	-
7	Mr.Patole Vitthal Rajaram	Nanvij	CoM 265	July.2016	-	0	0	0	0	0	0
8	Mr.More Balbhim Dasharath	Nanvij	CoM 265	1.7.2016	-	0	0	0	0	0	0
9	Mr.Salunkhe Milind Vitthal	Lingali	CoM 265	1.7.2016	-	0	0	0	0	20.00	2.10
10	Mr.Jagdale Subhash Dnyandeo	Lingali	CoM 265	27.11.2016	2.13	0	0	0	0	0	0
11	Mr.Jagdale Vikas Dnyandeo	Lingali	CoM 265	10.11.2016	3.15	0	0	0	0	0	0
12	Mr.Wani Dhanseth Ambarnath	Masaner wadi	CoM 10001	Jan.2017	12.09	0	0	0	0	0	0
13	Mr.Wani Dhanseth Ambarnath	Masaner wadi	CoM 10001	03.72016	-	0	0	0	0	40	9.52
14	Mr.Wani Kashinath Ambarnath	Masaner wadi	Co 86032	11.8.2016	-	0	0	0	0	0	0
15	Mr.Wani Kashinath Ambarnath	Masaner wadi	CoM 265	July 2016	-	0	0	0	0	0	0
16	Mr.Kale Kisan Baburao	Alegaon	VSI 08005	Oct.2016 Ratoon	3.03	-	-	-	-	-	-
17	Mr.Kale Kisan Baburao	Alegaon	Co 86032	Oct.2016 Ratoon	15.78	-	-	-	-	-	-
18	Mr.Kale Kisan Baburao	Alegaon	CoM 10001	Oct.2016 Ratoon	2.94	-	-	-	-	-	-
19	Mr.Kale Kisan Baburao	Alegaon	CoM 265	Oct.2016 Ratoon	3.70	-	-	-	-	-	
20	Mr.Gulankar Vitthal	Devulgaon raje	VSI 08005	15.10.2016	9.52	-	-	-	-	-	
21	Mr.Kadam Nandkumar Keraba	Karamwasti	VSI 08005	1.11.2016	0	-	-	-	-	-	-
22	Mr.Gaikwad Dattatray Sabaji	Devulgaon raje	Co 86032	July 2016	0	20.00	2.98	0	0	10.00	1.49
23	Mr.Girankar Balasaheb	Devulgaon raje	Co 86032	Jan 2017 Ratoon	1.05	-	-	-	-	-	-
24	Mr. Sonawane Sanjay	Devulgaon raje	CoM 265	Nov.2016 Ratoon	0	-	-	-	-	-	-
25	Mr.Waghmare	Vadgaon Darekar	CoM 265	Feb.2017	20.00	-	-	-	-	-	-
26	Mr.Waghmare Sambhaji	Vadgaon Darekar	CoM 265	Feb.2017	20.00	-	-	-	-	-	-
27	Mr.Waghmare Shahaji Zumbar	Vadgaon Darekar	VSI 08005	Feb.2017	36.36	-	-	-	-	-	-
28	Factory Nursery	Alegaon	Co 86032	15.11.2016	1.04	-	-	-	-	-	-

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 : 2016-17
8. Source of finance : ICAR/VSI Pune.
9. Project leader and : Shri.R.G.Yadav, Scientific Officer & Head, Entomology.
Associate : Mrs.P.V.Gadade, Research Assistant, Entomology
10. Details of Experiment
a. Location : Vasantdada Farm, VSI, Pune
b.Variety : Co 86032
c. Date of Planting : 03.02.2016
d. Date of Harvesting : Dec.2016 (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 7.59 % in April 2016, while in May 2016 it was minimum 1.98 %.The % incidence of internode bore was maximum 14 % in Nov.2016.The % intensity and infestation Index of internode borer was maximum 1.51 % and 0.20 respectively in August 2016. The incidence of mealy bug was maximum 13 % in August 2016 and November 2016. Intensity of mealy bug was observed maximum 2.49 % June 2016 (Table 12)

13. Conclusion

The % incidence of early shoot borer was noticed maximum 7.59 % in April 2016. The % incidence of internode borer was noticed maximum 14 % in November.2016.The incidence of mealy bug was observed maximum 13.0 % in August 2016 and November 2016.

Table 12: The % incidence / intensity of major insect pests during 2016-17.

Sr. No	Month	Early shoot borer	Internode borer			Mealy bug	
		% incidence	% incidence	% intensity	Infestation index	% incidence	% intensity
1	March 2016	7.56					
2	April 2016	7.59					
3	May 2016	1.98					
4	June 2016		4.00	0.90	0.04	7.00	2.49
5	July 2016		1.00	0.14	0.001	1.00	0.28
6	August 2016		13.00	1.51	0.20	13.00	2.27
7	September2016		5.00	0.41	0.02	7.00	0.90
8	October 2016		5.00	0.34	0.02	3.00	0.34
9	November 2016		14.00	1.23	0.17	13.00	1.83

Project No : E-34
2. Title : Standardization of simple, cost effective techniques for mass multiplication of sugarcane bio-agents.
3. Location : VSI, Pune
4. Project leader and : Shri. R.G. Yadav, Scientific Officer & Head, Entomology
Associate : Mrs.P.V.Gadade, Research Assistant, Entomology
5. Objective : To develop simple and cost effective mass multiplication techniques of promising bio-agents of the area.
6. Duration : Three years
7. Year of commencement : 2003-04
8. Year of implementation : 2016-17
9. Source of finance : ICAR/VSI, Pune
10. Treatments **:** Mass multiplication of *Trichogramma chilonis*

11. Methodology: Studies on mass production of *Corcyra cephalonica*, laboratory host for *Trichogramma* egg parasite

Filling of *Corcyra* rearing boxes: Emergence of adults took place 40-45 days and it continues for further 45 days. The wooden *Corcyra* rearing cages of 20x10x7 cubic inch are used for filling of heat sterilized 2.5 Kg of half crushed jowar flour. Dried yeast tablets are mixed in it to increase the nutritive value of the diet. Nucleus culture of 0.5 cc (Approximately 10,000) *Corcyra* eggs has introduced in it. The rearing cage has a wooden lid at the top. The lid has a window of wire mesh for ventilation. Laboratory sanitation and sterilization of wares has adopted to avoid fungal / bacterial contamination. At hatching, *Corcyra* larvae feed on the provided diet throughout their larval period and pupate in the cages. In each cage, 10,000 introduced *Corcyra* eggs hatched into only 3000 to 5000 larvae/adult within 60 days. The life of *Corcyra* adult varies from 3 to 5 days.

Collection of host eggs: The emerged *Corcyra* adults were collected regularly, using plastic tubes preferably in morning hours. Collected adults have placed to egg laying chamber for mating. A size of wooden *Corcyra* eggs laying chamber is 8x8x8 cubic h. Eggs laying chamber has a wire mesh at bottom and a wooden lid at the top with wire mesh window to provide the honey (35% diluted) swab to adult moths as a feeding material. The eggs laid by the female come out directly through the wire mesh fitted at the bottom of egg laying chamber. The chambers are provided with iron steel tripod stand with egg collecting vial at the bottom. On the next day, an egg-collecting vial has removed from eggs laying chambers. Dust, scale and antennae are separated with the help of tea sieve, hairbrush and blotting paper. Cleaned eggs were counted with measuring cylinder/cc unit and poured in screw jar & stored at 10 C in B.O.D. incubator up to 10 to 21 days and used for *Trichogramma* multiplication.

12. Results:

Table No.13 indicates that during 2016-17 Entomology Section produced Corcyra eggs 1758.30 cc (351.66 lac) with a monthly average of 146.52 cc (29.30 lac).During 2016-17 Entomology Section produced 1464 Tricho cards (292.80 lac parasites) of *Trichogramma chilonis* parasites with a monthly average of 122 cards (24.40 lac parasites).

During 2016-17 Entomology Section supplied 505.5 Tricho cards for the control of borers on 33.70 ha area and 5.00 cc *Corcyra* eggs as a nucleus culture. (Table 14).

13. Conclusion:

During 2016-17 Entomology Section has produced 1758.3 cc (351.66 lac) eggs of *C. cephalonica* and 1464 cards (292.80 lac parasites) of *Trichogramma chilonis* parasites. Supplied 505.5 Tricho cards for the control of sugarcane borer on 33.70 ha area.

Table 13 : Monthly production of *C. cephalonica* eggs and *T. chilonis* parasitoids cards during April, 2016 to March 2017

Sr. No.	Month	*Corcyra* eggs Produced (cc)		*T. chilonis* parasitoids cards	
		Per month	Per day	Per month	Per day
1	April 2016	83.60	2.79	54	1.8
2	May 2016	58.20	1.88	39	1.26
3	June 2016	182.80	6.09	83	2.77
4	July 2016	282.60	9.12	164	5.29
5	August 2016	191.80	6.19	187	6.03
6	September 2016	245.80	8.19	213	7.1
7	October 2016	162.60	5.24	228	7.35
8	November 2016	253.20	8.44	192	6.4
9	December 2016	124.80	4.02	138	4.45
10	January 2017	55.60	1.79	60	1.93
11	February 2017	72.30	2.58	56	2.00
12	March 2017	45.0	1.45	50	1.61
	Total	1758.3	57.78	1464	47.99
	Average	146.52	4.81	122	3.99

Table 14: Supply of *T. chilonis* parasitoids cards/Corcyra eggs during 2016-17

Sr. No.	Name of sugar mill/other	No.of Tricho cards supplied	Amount (Rs.)	Area covered (ha)	Corcyra eggs supplied(cc)	Amount (Rs.)
1.	Dr.V.Patil SSK Dist. Ahmednagar	2	190.00	0.13	5.0	475.00
2.	Farmers	176	16720.00	11.73		
3.	Shri.Datta SSK Ltd, Shirol	20	1900.00	1.33		
4	Venketeshkrupa Sugar mill,Dist-Pune	20	1900.00	1.33		
	Total A=	218	**20710.00**	14.53		
7	VSI Farm (Gratis) Total B=	287.5	**27312.5**	19.17		
	Total C= (A+B)=	505.5	**48022.5**	33.70		
				Total D=	5.00	**475.00**
	Grand Total F=(C+D)=		**48497.50**			

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 traps.
6. Year of commencement : 2012-13
7. Year of implementation : 2016-2017
8. Source of finance : ICAR/VSI Pune.
9. Project leader and : Shri.R.G.Yadav, Scientific Officer & Head, Entomology.
Associate : 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 : VSI 08005
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 : 28.01.2016
f. Date of Harvesting : Dec.2016 (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 fortnight 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 15 shows that the % incidence of ESB was maximum 10.59 % in May 2016 in treated plot, while it was maximum 6.53% in May 2015 in control plot. The % incidence of internode borer was noticed maximum 16 % in Nov 2016 in treated plot, while it was 24 % in August 2016 in control plot. Both treated and control plots were free from top borer infestation.

During 12 th to 48 th meteorological week maximum 0.83 moths of ESB were captured per trap/week in 16th and 25th meteorological week. During 12 th to 48 th meteorological week maximum 0.17 moths of Internode borer were captured per trap/week in 16th, 25 th , 28th and 33rd meteorological week. During 12 th to 48th meteorological week maximum 0.17 moths of top shoot borer were captured per trap/ week in 14th, 25th and 26th meteorological week. (Table 16)

Conclusion:

In Pheromone traps negligible adults of early shoot borer, Internode borer and top shoot borer were captured. The % incidence of ESB was maximum 10.59 % in May 2016 in treated plot, while it was maximum 6.53% in May 2015 in control plot. The % incidence of internode borer was noticed maximum 16.0 % in November 2016 in treated plot, while it was 24 % in August 2016 in control plot. Both treated and control plots were free from top borer infestation.

Table 15: 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	March 2016	4.83	2.24	0.00	0.00						
2	April 2016	5.35	6.26	0.00	0.00						
3	May 2016	10.59	6.53	0.00	0.00						
4	June 2016			0.00	0.00	4.00	8.00	1.20	3.53	0.05	0.28
5	July 2016			0.00	0.00	0.00	4.00	0.00	0.53	0.00	0.02
6	August 2016			0.00	0.00	8.00	24.00	1.35	2.48	0.11	0.60
7	September 2016					12.00	16.00	0.76	1.36	0.09	0.22
8	October 2016					4.00	16.00	0.28	1.23	0.01	0.20
9	November 2016					16.00	20.00	1.63	2.30	0.26	0.46

Table 16: Mean Moths captured/week/trap

Sr. No.	SMW	Mean Moths captured/week/trap		
		Early shoot borer	Internode borer	Top shoot borer
1	12	0	0	0
2	13	0.17	0	0
3	14	0	0	0.17
4	15	0.33	0	0
5	16	0.83	0.17	0
6	17	0.17	0	0
7	18	0.17	0	0
8	19	0	0	0
9	20	0	0	0
10	21	0	0	0
11	22	0	0	0
12	23	0	0	0
13	24	0	0	0
14	25	0.83	0.17	0.17
15	26	0.17	0	0.17
16	27	0	0	0
17	28	0.50	0.17	0
18	29	0	0	0
19	30	0	0	0
20	31	0	0	0
21	32	0	0	0
22	33	0	0.17	0
23	34	0.17	0	0
24	35	0	0	0
25	36	0	0	0
26	37	0	0	0
27	38	0	0	0
28	39	0	0	0
29	40	0	0	0
30	41	0.17	0	0
31	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	0.33	0
40	48	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.

The trail was vitiated.

Technical Programme 2017-18 (2016-17 Planting)
Entomology Section

I. RESEARCH SPONSERED BY ICAR

ALL INDIA COORDINATED RESEARCH PROGRAMME

A) AICRP'S Programme

Project No : E 4.1
Title : Evaluation of zonal varieties / genotypes for their reaction against major insect pests.

Project No : E 4.1.1/5
Title : Field screening of sugarcane varieties/genotypes in IVT Early/ Midlate to major pests

Project No : E 4.1.2/6
Title : Field screening of sugarcane varieties/genotypes in AVT Early/ Midlate (I plant) to major pests

Project No : E 4.1.3
Title : Field screening of sugarcane varieties/ genotypes in AVT (II PL) Early **to** major pests

Project No : E 4.1.4
Title : Field screening of sugarcane varieties/ genotypes in AVT (ratoon) Early to major pests.

Project No : E 4.1.7
Title : Field screening of sugarcane varieties/genotypes in AVT midlate (II plant) to major pests

Project No : E 4.1.8
Title : Field screening of sugarcane varieties/genotypes in AVT midlate (Ratoon) to major pests

Project No : E.28
Title : Survey and surveillance of sugarcane insect pests.

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.38
Title : Formulation and validation of IPM Module of sugarcane insect pests