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ALL INDIA CO-ORDINATED RESEARCH PROJECT ON SUGARCANE
(Indian Council of Agricultural Research)

TECHNICAL REPORT

ENTOMOLOGY

(2015-16)

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LUCKNOW – 226 002 (U.P.) INDIA

CONTENT

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Project E. 4.1		
Title of Project	**:**	Evaluation of zonal varieties/genotypes for their reaction against major insect pests.
Objective	**:**	To grade the entries in the zonal varietal trials for their behaviour towards damage by key pests in the area.
Year of Start	**:**	1985-86 (Continuing)
Duration	**:**	Long term
Location	**:**	As hereunder
North Western Zone	**:**	Kapurthala (Ludhiana), Uchani, Karnal (SBI), Shahjahanpur and Lucknow
North Central Zone and Eastern Zone	**:**	Pusa and Seorahi
Peninsular Zone	**:**	Akola, Kolhapur, Padegaon, Pune, Powarkheda, Navsari, Mandya, Coimbatore
East Coast Zone	**:**	Anakapalle, Vuyyuru (Voluntary centre since 2013-14)
No. of replication	**:**	03 (Three)
Plot size	**:**	A minimum of 3 (three), six metre row/variety per replication

I. NORTH WESTERN ZONE

1. Regional Research Station, PAU., Kapurthala (Punjab)

Forty three genotypes comprising of seventeen early maturing (ten under IVT E, four under AVT E I plant and three under AVT E II plant) and twenty six mid-late maturing (fifteen under IVT ML, six under AVT ML I plant and five under AVT ML II plant) with respective group standards were evaluated against early shoot borer, top borer and stalk borer of sugarcane at Punjab Agricultural University, Regional Research Station, Kapurthala (Table-4.1.1).

Salient Findings:

The early shoot borer incidence was found to be low in all the tested genotypes viz. CoH 12026, Co 12027, CoH 12261, CoLk 12201, CoLk 12202, CoLk 12203, CoPant 12221, CoPant 12222, CoS 12231, CoH 11262, CoLk 11201, CoLk 11202, CoLk 11203, Co 10035, CoH 10261, CoS 10231, Co 12028, Co 12029, CoH 12263, CoLk 12205, CoLk 12206, CoPant 12224, CoPant 12226, CoPb 12181, CoPb 12182, CoPb 12211, CoPb 12212,

CoS 12232, Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214, CoPb 11232, Co 10036, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182. Moreover, genotype *viz*., CoLk 12204 (IVT E), Co Pant 12221 (IVT E), CoH 12262 (IVT ML), CoPant 12223 (IVT ML) and CoPant 12225 (IVT ML) showed moderately susceptible to early shoot borer. The cumulative incidence of top borer was recorded as less susceptible to moderately susceptible. However, it ranged from 5.56 per cent in CoH 11262 (AVT E I) to 11.94 per cent in CoLk 12204 (IVT E) in all the genotypes evaluated which exhibited low to moderately susceptible reaction against top borer. The per cent incidence of stalk borer ranged from 6.67 per cent in CoPant 12222 (IVT E) to 16.00 per cent in CoPb 12211 (AVT ML). However, the genotypes under six different group showed less susceptible reaction to stalk borer.

2. Regional Research Station, Uchani Dist- Karnal (Haryana)

Report not submitted by concern centre even though continuous reminders.

3. ICAR-SBI Coimbatore Regional Centre, Karnal (Haryana)

Thirty two genotypes comprising twelve under AVT E I P, ten under AVT E II P and ten under ratoon with respective group standard check were evaluated for their reaction against shoot borer, top borer, root borer and stalk borer of sugarcane at Karnal centre (Table-4.1.2).

Salient Findings:

AVT R: The entire test genotypes *viz.* Co 10035, CoH 10261, CoS 10231, CoH 10262, CoPant 10221, CoPb 1018, Co 10036 and CoPb 10182 showed less susceptible reaction to black bug, early shoot borer and top borer. These genotypes were also less susceptible to shoot borer. In case of root borer, one genotype, Co 10036 showed moderately susceptible reaction whereas seven genotypes; Co 10035, CoH 10261, CoS 10231, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182 were highly susceptible.

AVT I P: All the tested genotypes; CoS 11232, CoPb 11214, CoH 11262, CoLk 11204, CoH 11263, Co 11027, CoLk 11203, CoLk 11202, CoLk 11201 and CoLk 11206 showed less susceptible reaction to early shoot borer and top borer. These genotypes were also less susceptible to shoot borer. In case of root borer, four genotypes *viz.*, CoLk 11204, CoH 11263, Co 11027 and CoLk 11202 exhibited moderately susceptible reaction whereas six genotypes viz., CoS 11232, CoPb 11214, CoLk 11206, CoLk 11203, CoLk 11201 and CoH 11262 were highly susceptible.

AVT II P: All the tested genotypes showed less susceptible reaction to early shoot borer and top borer. One genotype; CoPant 10221 exhibited moderately susceptible reaction to root borer while seven genotypes *viz*., CoPb 10182, CoPb 10181, CoH 10262, Co 10036, CoS 10231, CoH 10261 and Co 10035 were highly susceptible. In case of shoot borer, six genotypes; (CoPb 10182, CoPant 10221, CoH 10262, Co 10036, CoH 10261 and Co 10035) showed less susceptible reaction whereas two genotypes; CoPb 10181 and CoS 10231 exhibited moderately susceptible reaction

4. U.P. Council of Sugarcane Research, Shahjahanpur (U.P.)

Twenty six entries consisting of four under AVT E I P, three under AVT E II P, three under AVT E R, six under AVT ML I P, five under AVT ML II P and five under AVT ML R with respective group standard check were evaluated for their reaction against early shoot borer, top borer and stalk borer of sugarcane at Shahjahanpur centre (Table- 4.1.3).

Salient Findings:

AVT ML I P: Based on cumulative incidence of shoot borer only the variety Co 11027 (8.50%) showed less susceptible while rest of the varieties including standard showed moderate susceptible to shoot borer and ranged from 17.18 per cent in CoS 11232 to 25.97 per cent in CoS 767. At harvest, the varieties Co 11027 (12.00%), CoLk 11204 (14.67%), CoPant 97222 (14.67%) and CoLk 11206 (17.33%) showed moderate susceptible reaction while the varieties CoS 767 (21.33%), CoS 8436 (21.33%), CoH 11263 (25.33%), CoPb 11214 (28.00%) and CoS 11232 (32.00%) showed highly susceptible reaction to top borer. The stalk borer infestation ranged from 0.41 in CoLk 11206 to 1.36 in CoPant 97222 and showed less susceptible reaction.

AVT ML II P: Based on cumulative incidence of shoot borer the varieties *viz*., CoPb 10182 (22.16%), CoS 767 (25.76%), Co 10036 (26.44%), CoPant 10221 (26.69%) and CoH 10262 (29.71%) showed moderate susceptible while the varieties CoS 8436 (30.27%), CoPant 97222 (34.36%) and CoPb 10181 (39.63%) showed highly susceptible reaction to shoot borer. At harvest, the varieties CoPb 10181 (16.00%), CoPb 10182 (18.67%) and CoPant 97222 (13.33%) showed moderate susceptible while rest of the varieties CoH 10262 (21.33%), CoPant 10221 (26.67%), Co 10036 (26.67%), CoS 767 (26.67%) and CoS 8436 (21.33%) registered highly susceptible reaction to top borer. In case of stalk borer infestation, variety CoPant 97222 (2.32%) noted moderately susceptible reaction while rest of the varieties CoS 767 and CoS 8436 showed less susceptible reaction to stalk borer.

AVT E I P: Based on cumulative incidence of shoot borer the varieties CoLk 11201 (28.28%), CoLk 11203 (19.41%), Co 0238 (21.76%) and CoJ 64 (25.00%) showed moderate susceptible reaction while the varieties CoLk 11202 (32.73%) and CoH 11262 (37.26%) showed highly susceptible reaction to shoot borer. At harvest, only the standard variety CoJ 64 (17.33%) showed moderately susceptible reaction while rest of the variety CoLk 11201 (24.00%), CoLk 11202 (36.00%), CoLk 11203 (24.00%) and CoH 11262 (38.67%) and Co 0238 (40.00%) showed highly susceptible reaction to top borer. The stalk borer infestation showed less susceptible reaction and infestation index ranged from 0.32 in CoJ 64 to 1.46 in CoH 11262.

AVT E II P: Based on cumulative incidence of shoot borer, all the varieties CoS 10231 (22.22%), CoH 10261 (28.87%), Co 10035 (29.29%), CoPant 84211 (28.81%) and CoJ 64 (27.31%) showed moderate susceptible reaction to shoot borer. At harvest, the varieties CoH 10261 (16.00%) and CoPant 84211 (13.33%) showed moderate susceptible reaction while the varieties CoS 10231 (21.33%), Co 10035 (25.33%) and CoJ 64 (33.33%) showed highly susceptible reaction to top borer. The stalk borer infestation exhibited less susceptible reaction to stalk borer and infestation index ranged from 0.83 in CoS 10231 to 1.96 in CoH 10261.

AVT ML R: Based on cumulative incidence of shoot borer all the varieties CoPb 10181 (29.77%), CoPb 10182 (27.27%), CoH 10262 (27.93%), Co 10036 (25.06%), CoS 767 (20.47%), CoS 8436 (26.03%) and CoPant 97222 (26.85%) showed moderate susceptible reaction while only one variety CoPant 10221 (36.96%) showed highly susceptible reaction to shoot borer. At harvest, the varieties CoPb 10181 (17.33%), CoPant 10221 (18.67%) and CoPant 97222 (13.33%) showed moderately susceptible while the varieties CoPb 10182 (22.67%), CoH 10262 (22.67%), Co 10036 (24.00%), CoS 767 (24.00) and CoS 8436 showed highly susceptible reaction to top borer. The standard variety CoPant 97222 (2.23%) showed moderately susceptible reaction while rest of the varieties gave less susceptible reaction to stalk borer infestation.

AVT ML R: The variety Co 10035 (14.14%) showed less susceptible reaction while rest of the varieties CoS 10231 (18.56%), CoH 10261 (24.71%), CoPant 84211 (26.66%) and CoJ 64 (23.07%) showed moderate susceptible reaction to shoot borer. At harvest, the varieties CoH 10261 (17.33%), Co 10035 (18.67%) and CoPant 84211 (17.33%) showed moderately susceptible reaction while the varieties CoS 10231 (21.33%) and CoJ 64 (26.67%) showed

highly susceptible reaction to top borer. The variety CoH 10261 (2.14) showed moderate susceptible reaction while rest of the varieties showed less susceptible reaction to stalk borer.

5. Division of Crop Protection, IISR, Lucknow (U.P.)

Seventeen genotypes comprising six under AVT E and eleven under AVT ML with respective group standard check were tested for their reaction against top borer, stalk borer and internode borer of sugarcane at Lucknow centre (Table- 4.1.4).

Salient Findings:

AVT E: The incidence of top borer III and IV brood was ranged 2.27 to 14.87 and 6.25 to 53.32 per cent, respectively. The incidence and intensity of internode borer ranged 3.33 to 14.57 and 1.60 to 6.48 per cent, respectively. The infestation index was higher (6.48%) in CoH10261. The incidence and intensity of stalk borer ranged from 0.95 to 13.48 and 1.60 to 3.58 per cent, respectively. Genotypes *viz*., CoLk11202 and CoLk11203 showed moderately susceptible reaction and rest of the genotypes showed less susceptible reaction to III brood of top borer. CoS10231 showed less susceptible reaction to IV brood of top borer and rest of the genotypes showed less susceptible reaction. CoH10261 and CoS10231 were highly susceptible and rest of the genotypes moderately susceptible to stalk borer. Genotype *viz*., CoS10231 and CoLk11201 exhibited less susceptible and rest of the genotypes showed moderately susceptible reaction to internode borer.

AVT ML: The incidence of III and IV brood of top borer was ranged 3.16 to 16.43 and 6.21 to 43.93 per cent, respectively. The incidence and intensity of internode borer ranged 3.33 to 14.57 per cent and 1.55 to 6.60, respectively. The incidence and intensity of stalk borer ranged 0.95 to 14.57 and 1.41 to 5.28 per cent, respectively. The genotype CoLk11206 noted moderately susceptible reaction and rests of the genotypes were less susceptible to top borer (III brood). All genotypes were found less susceptible to internode borer.

II. NORTH CENTRAL ZONE AND EASTERN ZONE

6. SRI, RAU, Pusa (Bihar)

Twenty four genotypes comprising of five under IVT E, three under AVT E I P, six under IVT ML, seven under IVT ML I P and three under AVT ML along with standard check were evaluated against early shoot borer, top borer, stalk borer and root borer at SRI, Pusa (Table- 4.1.5).

Salient Findings:

The cumulative incidence of early shoot borer was recorded as lowest (9.52 %) in variety CoP 11439 under AVT ML I P and highest (16.50%) in variety CoSe 95422 under

IVT E. The genotype tested under different maturity groups are graded as less to moderately susceptible reaction against early shoot borer. While, incidence of root borer was found minimum (7.15%) in variety CoP 12437 (IVT E) and maximum (10.74%) in variety CoSe 92423 graded as less susceptible reaction. The incidence of top borer was recorded as low to moderate which varied 6.85 per cent in variety BO 155 (IVT ML I P) and 9.44 per cent in variety Colk 12209 (IVT M) against III brood, while 8.36 per cent in variety CoSe 10451 (AVT E I P) and 11.35 per cent in variety Colk 12209 (IVT ML) against IV brood of top borer. All the genotypes evaluated under different maturity groups exhibited less to moderately susceptible reaction against top borer based on IV brood incidence. The stalk borer infestation index was varied from traces to 0.63 per cent and showed less susceptible reaction for all tested genotype.

7. G.S. Sugarcane Breeding and Research Station, Seorahi (U.P.)

Eleven genotypes comprising four under AVT E I P, four under AVT ML I P and three under AVT ML II P with respective group standard check were tested for their reaction against early shoot borer, top borer, stalk borer and root borer of sugarcane at Seorahi centre (Table- 4.1.6).

Salient Findings:

AVT ML I P: Based on cumulative incidence of shoot borer all the varieties including standards showed less susceptible reaction to shoot borer and ranged from 5.66 per cent in CoSe 11454 to 11.11 per cent in BO 155. The stalk borer infestation ranged from 0.05 in CoSe 11453 to 0.13 in CoSe 11455. All the genotypes including standards showed less susceptible to stalk borer and root borer.

AVT E I P: The cumulative incidence of shoot borer showed less susceptible reaction and it was minimum (7.77%) in CoP 11436 and maximum (9.80%) in CoSe 95422. At harvest, all the varieties showed less susceptible reaction to top borer and ranged from 6.25 per cent in CoP 11436 to 9.60 per cent in BO130. The stalk borer infestation showed less susceptible reaction. Moreover, all the varieties showed less susceptible to root borer.

AVT ML II P: Based on cumulative incidence of shoot borer all the varieties showed less susceptible reaction to shoot borer and it was minimum (6.81%) in CoP9301 and maximum (9.02%) in CoSe 10452. At harvest, all the varieties including standard showed less susceptible reaction to top borer and ranged from 4.72 per cent in CoSe 10453 to 6.66 per cent in BO 91. The stalk borer and root borer showed less susceptible reaction.

III. PENINSULAR ZONE

8. SRS, Dr. PDKV, Akola (M.S.)

Forty nine genotypes comprising eight under AVT E I P, three under AVT E II P, eleven under AVT ML I P, twelve under IVT E I P and fifteen under IVT ML along with respective group standard check were evaluated for their reaction against early shoot borer, scale insect and pyrilla of sugarcane at Akola centre (Table- 4.1.7).

Salient Findings:

All the genotypes showed less susceptible reaction to early shoot borer and ranged from 2.65 to 9.59 per cent. The infestation of scales was ranged from 6.03 per cent to 19.64 per cent intensity indicating less susceptible to moderately susceptible and the infestation of pyrilla in all varieties ranged from 0.30 to 0.80 per leaf indicating less susceptible reaction.

9. CSRS, MPKV, Padegaon (M.S.)

Fifty six genotypes consisting twelve under IVT E, seventeen under IVT ML, eight under AVT E I P, three under AVT E II P, thirteen under AVT ML I P and three under AVT E R with respective group standard check were tested for their reaction against early shoot borer, internode borer, mealy bug and scale insect of sugarcane at Padegaon centre (Table-4.1.8).

Salient Findings:

AVT E II P: None of the entry showed less susceptible reaction to early shoot borer, internode borer as well as mealy bug, where as only one entry Co 09004 showed less susceptible reaction to scale insect (0.00%). The entry CoN 09072 showed least incidence to early shoot borer (17.28 %), as well as internode borer (23.33%), whereas highest intensity of mealy bug (18.59%). The genotype Co 94008 showed highest incidence of early shoot borer (34.71%), whereas least incidence of mealy bug (43.33%). The cumulative per cent infestation of early shoot borer ranged from 17.28 to 34.71 per cent. The internode borer incidence ranged from 23.33 to 63.33 per cent. It was observed that, there was no incidence of top shoot borer in all entries. The mealy bug incidence ranged from 43.33 to 86.67 per cent. All test genotypes recorded highly susceptible reaction to mealy bug. In case of scale insect, the incidence ranged from 0 to 50 per cent.

AVT E I P: All tested genotypes recorded highly susceptible reaction to mealy bug. The genotypes i.e. Co 10005 (12.63%) and Co 10027 (14.34%) showed less susceptible reaction to early shoot borer. The variety Co 85004 (3.33%) showed less susceptible reaction to scale insect. The Co 10026 showed least incidence of mealy bug (46.67 %), whereas highest incidence of internode borer (70%). The variety Co 85004 showed least incidence to

internode borer (30%), where as highest incidence of mealy bug (90%). The cumulative per cent infestation of early shoot borer ranged from 12.63 to 30.23 per cent. The internode borer ranged from 30 to 70 per cent. The mealy bug incidence ranged from 46.67 to 90 per cent.

AVT ML I P: All test genotypes observed highly susceptible reaction to mealy bug. The genotypes Co 09009 recorded highest incidence of early shoot borer (32.82%) as well as scale insect (43.33%), whereas least incidence to mealy bug (40%). The genotypes Co 10015 recorded least incidence to early shoot borer (15.19%), whereas the highest incidence to scale insect (43.33%). The entry Co 10033 recorded least incidence of internode borer (36.67%), as well as scale insect. The cumulative per cent infestation of early shoot borer ranged from 15.19 to 32.82 per cent. The incidence ranged from 36.67 to 80 per cent. The mealy bug incidence ranged from 40 to 96.67 per cent. Scale insect incidence ranged from 0 to 43.33 per cent.

IVT E: All test genotypes showed highly susceptible reaction to mealy bug. The entry Co 12008 showed least incidence to early shoot borer (8.26%) as well as scale insect. The entry CoT 12367 recorded highest incidence of internode borer (76.67%), mealy bug as well as highest intensity of scale insect (5.55%). The variety Co 94008 recorded least incidence of internode borer (36.67%) as well as mealy bug (76.67%), whereas highest incidence of early shoot borer (38.28%). The cumulative per cent infestation of early shoot borer ranged from 8.26 to 38.28 per cent. The incidence ranged from 36.67 to 76.67 per cent. The mealy bug incidence ranged from 76.67 to cent per cent. The incidence of scale insect ranged from 0 to 50 per cent.

IVT ML: All test genotypes recorded highly susceptible reaction to mealy bug. The entry Co 12012 showed least infestation index to internode borer (0.86%), whereas the highest incidence to scale insect (43.33%). The entry Co 12024 recorded highest incidence to early shoot borer (33.33%), as well as mealy bug (100%). The entry CoM 12085 recorded least incidence to internode borer (36.67%), whereas of highest incidence of mealy bug (cent per cent). The cumulative per cent infestation of early shoot borer ranged from 16.02 to 33.33 per cent. The incidence ranged from 36.67 to 73.33 per cent. The mealy bug incidence ranged from 76.67 to cent per cent. The incidence of scale insect ranged from 0 to 43.33 per cent.

AVT E R: The entry CoN 09072 showed least incidence to scale insect (77.50%), whereas highest incidence to early shoot borer (12.56%), as well as mealy bug (100%). The variety Co 85004 showed least incidence to internode borer (27.50%), whereas highest incidence to mealy bug as well as scale insect (100%). The cumulative per cent infestation of early shoot

borer ranged from 9.51 to 12.56 per cent. The incidence ranged from 27.50 to 45 per cent. The mealy bug incidence ranged from 92.50 to 95.0 per cent. The scale insect incidence ranged from 77.50 to cent per cent.

10. Vasantdada Sugar Institute (VSI), Pune (M.S.)

Fifty two genotypes comprising twelve under IVT E, fifteen under IVT ML, eight under AVT E I P, three under AVT E II P, eleven under AVT ML I P and three under AVT E R along with respective group standard check were evaluated for their reaction against early shoot borer, internode borer and mealy bug of sugarcane at Pune centre (Table- 4.1.9).

Salient Findings:

IVT E: Genotypes *viz*., CoC 671, Co 12006, CoT 12367 and Co 94008 showed moderately susceptible reaction to early shoot borer, while all varieties/genotypes showed less susceptible reaction to internode borer and mealy bug.

AVT E I P: Genotypes *viz*., Co 10004, Co 10024, Co 10026 and Co 85004 showed less susceptible reaction to early shoot borer, while all varieties/genotypes showed less susceptible reaction to internode borer. The genotype Co 10006, Co 10024, Co 10026 and Co 94008 showed less susceptible reaction to mealy bug.

AVT E II P: The varieties/genotypes *viz*., Co 09007 and Co 85004 showed less susceptible reaction to early shoot borer, whereas all varieties/genotypes showed less susceptible reaction to internode borer and moderately susceptible reaction to mealy bug.

AVT E R: All genotypes showed less susceptible reaction to early shoot borer, internode borer and scale insect. Genotype *viz*., Co 09004 and Co 94008 showed less susceptible reaction to mealy bug.

IVT ML: The genotype Co 12024 found highly susceptible to early shoot borer, while all genotypes showed less susceptible reaction to internode borer and Co 12016, Co 12024 and CoN 12073 showed moderately susceptible reaction to mealy bug.

AVT ML I P: The genotypes *viz*., Co 10017, Co 10031, Co 10033, CoT 10369, Co 86032 and Co 99004 found less susceptible to early shoot borer, while all 13 varieties/genotypes showed less susceptible reaction to internode borer and Co 09009, Co 10033 and CoT 10368 were free from mealy bug infestation.

11. ZARS, JNKVV, Powarkheda (M.P.)

Thirty five genotypes comprising eight under AVT E I P, twelve under IVT E and fifteen under IVT ML along with respective group standard check were screened for their reaction against early shoot borer and pyrilla (Table- 4.1.10).

Salient Findings:

The genotypes *viz*., Co 80004 and CoJN 86-141 graded as least susceptible (LS), while all remaining were moderate susceptible. Among the midlate group entries, Co 12024, Co 12012 and Co 12019 (7.89 to 10.27%) showed less susceptible to early shoot borer as compared to all the check varieties. The pyrilla incidence ranged from 9.65 to 18.63 individuals per leaf in various tested genotypes. All the evaluated genotypes and checks were graded as moderately susceptible. In the Midlate group, the pyrilla per leaf population ranged from 9.87 to 19.10 individuals/leaf in various genotypes/ varieties. All the evaluated genotypes and checks were graded as moderately susceptible.

12. MSRS, NAU., Navsari (Gujarat)

Forty five genotypes comprising twelve under IVT E, eight under AVT E I P, three under AVT E II P, fifteen under IVT ML and seven under AVT ML I P with respective group standard check were assessed for their reaction against early shoot borer, top borer, stalk borer, internode borer, root borer, scale insect and mealy bug of sugarcane at Navsari centre [Table- 4.1.11(a) to 4.1.11(c)].

Salient Findings:

IVT E: The cumulative per cent infestation of early shoot borer ranged from 1.17 to 4.09 per cent. Thus, all the tested genotypes showed less susceptible reaction to early shoot borer. Whereas, the per cent incidence of top borer at harvest was ranged from 1.52 to 4.20 per cent. The least incidence was observed in Co 85004 (1.52 %) and maximum incidence was observed in CoM 12081 (4.20 %). Thus, all the tested genotypes exhibited susceptible reaction to top borer. The incidence of stalk borer was ranged from 4.00 to 28.00 per cent. The least per cent incidence of stalk borer was observed in Co 12001 (4.00%), while maximum incidence was observed in Co 94008 (28.00%). Thus, all the tested genotypes showed less to moderately susceptible reaction to stalk borer. The least per cent incidence of internode borer was observed in Co 12003 (0.00%), while maximum incidence was observed in Co 85004 and CoC 671 (16.00%). Thus, all the tested genotypes showed less susceptible reaction to internode borer. The least per cent incidence of root borer was observed in Co 12003 and CoN 12072 (12.00%), while maximum incidence was observed in Co 12007 (28.00%). Thus, all the tested genotypes showed less to moderately susceptible reaction to root borer. The least incidence (0.00 %) was observed in 10 genotypes out of 15 including checks, while maximum incidence was observed in Co T 12367 (36.0%). Thus, all the tested genotypes showed less susceptible reaction to scale insect. The least incidence of mealy bug

was observed in Co 12001, Co12006, Co N 12071 and Co N 12072 (16.00 %) while maximum incidence was observed in CoT 12366, CoT 12367 and Co 94008 (28.00 %). Thus, all the tested genotypes showed moderately susceptible reaction to mealy bug.

AVT E I P: Based on the cumulative per cent incidence of early shoot borer, the least incidence was observed in CoT 10366 (1.00 %) while, maximum incidence was observed in Co 10005 (6.55%). Thus, all the tested genotypes showed less susceptible reaction to early shoot borer. Based on the per cent incidence of top borer at harvest, the least per cent incidence was observed in Co 85004 (1.52 %), while maximum incidence was observed in CoT 10367 (10.35 %). Thus, all the tested genotypes showed less to moderately susceptible reaction to top borer. The least per cent incidence of stalk borer was observed in CoT 10366 (8.00%), while maximum incidence was observed in Co 10006 (20.00%). Thus, all the tested genotypes showed less to moderately susceptible reaction to stalk borer. The least per cent incidence of internode borer was observed in CoT 10366 (8.00%), while maximum incidence was observed in Co 10004 (20.25%). Thus, all the tested genotypes showed less to moderately susceptible reaction to internode borer. The least per cent incidence of root borer was observed in Co 85004, Co 94008 and CoC 671 (20.00%), while maximum incidence was observed in Co 10006 and Co 10027 (24.65%). Thus, all the tested genotypes showed moderately susceptible reaction to root borer. The per cent incidence was nil in Co 10024, Co10027, CoT 10366 and Co 671 while it was maximum (40.0%) in Co85004 and Co94008. Thus, all the tested genotypes showed less to highly susceptible reaction to scale insect. The least incidence of mealy bug was observed in Co 10006 while maximum per cent incidence was observed in Co 94008 (72 %). Thus, all the tested genotypes showed moderately to highly susceptible reaction to mealy bug.

AVT E II P: Based on the cumulative per cent incidence of early shoot borer, the minimum incidence was observed in Co 09007 (1.21 %) while, maximum incidence was observed in Co 85004 (4.09%). The per cent incidence of top borer at harvest was lowest in observed in Co 09004 (1.47 %) while highest incidence was observed in CoC 671 (1.72 %). Thus, all the tested genotypes showed less susceptible reaction to early shoot borer and top borer. The least per cent incidence of stalk borer was observed in Co 09007 and Co 94008 (12.00%), while maximum incidence was observed in Co 09004 (20.00%). Thus, all the tested genotypes showed less to moderately susceptible reaction to stalk borer. The per cent incidence of internode borer was ranged from 12.00 % to 16 % per cent. Thus, all the tested genotypes showed less susceptible reaction to internode borer. The least per cent incidence of root borer

was observed in CoN 09072, while rest of the genotype exhibited maximum incidence (20.00%). Thus, all the tested genotypes showed moderately susceptible reaction to root borer. The per cent incidence scale insect was observed as zero in Co 09004, CoN 09072 and CoC 671 while it was maximum (40.0%) in Co 85004 and Co 94008. Thus, all the tested genotypes showed less to highly susceptible reaction to scale insect. The least incidence (20.00 %) was observed in CoN 09072 and CoC 671 while the maximum per cent incidence was observed in Co 94008 (72 %). Thus, all the tested genotypes showed moderately to highly susceptible reaction to mealy bug.

IVT ML: Based on the cumulative per cent incidence of early shoot borer, the least incidence was observed in Co 86032 (0.20 %) while, maximum incidence was observed in Co 12017 (6.21 %). The per cent incidence of top borer at harvest was ranged from 0.00 to 8.00 per cent. Thus, all the tested genotypes showed less susceptible reaction to early shoot borer and top borer. The incidence of stalk borer was ranged from 16.00 to 24.00 per cent with maximum incidence in Co 12024, CoM 12086, CoT 12368 and Co 99004 (24.00%). The incidence of internode borer was ranged from 4.00 % to 12.00 % per cent. The incidence of root borer ranged from 16.00 to 24.00 per cent. The highest per cent incidence was observed in Co 12024, Co M 12086 and CoT 12368 (24.00 %). Thus, all the tested genotypes showed moderately susceptible reaction to stalk borer and root borer while it was less susceptible reaction to internode borer. The incidence of scale insect varied from 0.00 to 4.00 per cent with the maximum incidence in CoM 12085 (4.00%). The incidence of mealy bugs ranged from 20.00 to 60.00 per cent with maximum per cent incidence in Co 12017 (60.00%). Thus, all the tested genotypes showed less susceptible reaction to scale insect while it was moderately to highly susceptible reaction to mealy bug.

AVT ML: The cumulative per cent incidence was least incidence in Co 10031 (0.65 %) while it was maximum in PI 10131 (4.18 %). The incidence of top borer ranged from 0.75 to 2.16 per cent with highest incidence was observed in PI 10131 (2.16 %). Thus, all the tested genotypes showed less to moderately susceptible reaction to early shoot borer and top borer.

The per cent incidence was ranged from 16.00 to 32.00 per cent with maximum in PI 10131 (32.0%). The incidence of internode borer was ranged from 0.00 % to 16.00 % per cent.

The per cent incidence of root borer ranged from 16.00 to 24.00 per cent with highest in Co 09009, Co 10033 and PI 10131 (24.00 %). Thus, all the tested genotypes showed less to moderately susceptible reaction to stalk borer. Moreover, it was less susceptible reaction to internode borer and moderately susceptible reaction to root borer.

The incidence of scale insect varied from 0.00 to 40.00 per cent with maximum in Co 10033, Co T 10368, CoT 10369 and PI 10131 (40.00%). The incidence of mealy bug was 40.00 per cent in all the genotypes. Thus, all the tested genotypes showed less to highly susceptible reaction to scale insect while it was highly susceptible reaction to mealy bug.

13. ZARS, UAS, Mandya (Karnataka)

Forty nine genotypes consisting of twelve under IVT E, fifteen under IVT ML, eight under AVT E I P, eleven under AVT ML I P and three under AVT E II P with respective group standard check were screened for their reaction against early shoot borer, top borer and internode borer of sugarcane at Mandya centre (Table- 4.1.12).

Salient Findings:

Among the genotypes screened under different categories, all genotypes showed less susceptible reaction against early shoot borer and top shoot borer and while twenty five genotypes showed less susceptible reaction against internode borer.

14. Regional Sugarcane & Jaggery Research Station, Kolhapur (M.S.)

Report is not submitted by concern centre.

15. ICAR-SBI, Coimbatore (T.N.)

Fifty nine genotypes comprising twelve under IVT E, seventeen under IVT ML, eight under AVT E I P, three under AVT E II P, thirteen under AVT ML I P and three under AVT E R with respective group standard check were tested for their reaction against early shoot borer, internode borer, root borer and top shoot borer of sugarcane at Coimbatore centre (Table- 4.1.13).

Salient Findings:

IVT E: All the genotypes showed less susceptible reaction to early shoot borer. The lowest incidence of internode borer was noted in Co 12003 (24.0%) while it was highest in Co 12006 (52.0%). The incidence of the root borer and top borer was nil.

AVT E I P: All the entries were less susceptible to early shoot borer and incidence ranged between 2.26 per cent in Co 10004 and 12.0 per cent in Co 94008. All the genotypes/varieties showed highly susceptible reaction except genotype CoT 10367, CoC 671 and Co 85004 recorded moderately susceptible reaction to internode borer. The incidence of the root borer was nil while all the tested genotypes under the group showed less to moderately susceptible reaction to top borer.

IVT ML: All the entries showed less susceptible reaction to early shoot borer and incidence ranged from 1.43 per cent in Co 12014 to 6.11 per cent in VSI 12121. All the tested genotypes under the group showed moderately to highly susceptible reaction to internode borer. The root borer incidence was varied from 0.00 per cent in entries CoM 12084, Co 12121, Co 86032 and Co 0212, to 29.6 per cent in Co 12024. Moreover, all the entries except Co 12012 showed less susceptible reaction to the top borer.

AVT ML I P: All the entries showed less susceptible reaction to early shoot borer and varied from 0.93 (Co 10017) to 6.23 per cent (Co 86032). All the tested genotypes under the group showed moderately to highly susceptible reaction to internode borer. Moreover, it showed less to moderately susceptible reaction to top borer. The incidence of the root borer was nil.

AVT E II P: All the genotypes showed less susceptible reaction to early shoot borer. The entry CoN 09072 recorded the lowest incidence (20%) in CoN 09072 to highest in Co 94008 (73.21%) and showed less to highly susceptible reaction to internode borer. The incidence of root borer was nil while all the entries showed less susceptible reaction to the top borer.

IV. EAST COAST ZONE

16. RARS, ANGRAU, Anakapalle (A.P.)

Thirteen genotypes comprising four under IVT E, three under IVT ML and six under AVT E with respective group standard check were evaluated for their reaction against early shoot borer, internode borer and scale insect of sugarcane at Anakapalle centre (Table-4.1.14).

Salient Findings:

IVT E: The genotype Co A 13 324 recorded significantly less incidence of early shoot borer (12.23%), internode borer (33.33%) and found less susceptible to early shoot borer and moderately susceptible to internode borer whereas the entry, Co A 13 322 with 63.33 per cent incidence showed highly susceptible reaction to internode borer. However, very less incidence of scale insect was recorded on all tested entries.

IVT ML: The genotype Co A 13 327 (9.62%DH) and Co A 13 328 (10.69%DH) showed less susceptible reaction to early shoot borer and Co A 13 328 showed moderately susceptible reaction to internode borer (23.47%). Whereas, two entries Co A 13336 (0%) and Co A 13 337 (3.33%) showed less susceptible reaction to scale insect.

AVT E: The entries Co V 12 356 (6.69 % DH) and Co A 12 322 (6.82%DH) recorded lowest cumulative incidence of early shoot borer. However, all the tested entries recorded less

susceptible reaction to early shoot borer whereas all the entries showed highly susceptible reaction to internode borer (43.33 % to 76.67 %) and scale insect (30% to 83.33%).

17. Sugarcane Research Station, Vuyyuru (A.P.)

Fifty six genotypes consisting twelve under IVT E, seventeen under IVT ML, eight under AVT E I P, three under AVT E II P, thirteen under AVT ML I P and three under AVT E R with respective group standard check were tested for their reaction against early shoot borer, internode borer, mealy bug and scale insect of sugarcane at Padegaon centre (Table-4.1.15).

Salient Findings:

All the screened genotypes showed less susceptible reaction to early shoot borer. Moreover, all tested genotypes exhibited moderately to highly susceptible reaction to internode borer. Thus, all the tested genotypes noted less to highly susceptible reaction to scale insect.

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Project E. 28		
Title of Project	:	Survey and surveillance of sugarcane insect pests
Objective	:	To identify key insect pests of sugarcane in the area
Year of Start	:	2003-04
Duration	:	Long term
Location	:	All centres where entomologist are available

1. Regional Research Station, PAU., Kapurthala (Punjab)

Salient Findings:

Sugarcane fields nearby sugar factories of Punjab were surveyed for insect pests in the area. Incidence of termite ranged between 2-3 per cent in popular varieties of sugarcane *viz.*, Co 238, CoH 89003 and CoJ 64 around sugar factories at Dhuri, Faridkot and Fazilka. The incidence of early shoot borer, top borer, stalk borer and root borer ranged between 3-4, 2-3, 7-8 and 2-3 per cent, respectively, in different varieties of sugarcane *viz.*, CoJ 85, CoJ 64, CoJ 88, Co 238, CoS 8436, CoH 89003 at different cane growing areas of Punjab. The incidence of pyrilla, mite and black bug were found as 2-3, 2-3 and 3-4 per cent, respectively on different varieties *viz*. CoJ 85, Co 238, Co 89003 and CoS 8436 in cane growing area of Gurdaspur, Batala, Dhuri, Nawanshahar and Morinda. The incidence of whitefly was found in traces (Table-28.1).

2. Regional Research Station, Uchani Dist- Karnal (Haryana)

Report is not submitted by concern centre.

3. ICAR-SBI Coimbatore Regional Centre, Karnal (Haryana)

Salient Findings:

Survey work was made at Co-operative sugar mills area of Haryana *viz*., Shahabad, Karnal, Jind, Panipat, Sonipat and Palwal. The incidence of early shoot borer, top borer and root borer was below 15.0, 10.0 and 30.0 per cent, respectively. The severe incidence of red webbing mite (80.5%) was recorded in some of the plots of variety Co 89003 in Karnal area. The mean population of pyrilla was 2.2 to 12.5/ leaf in different varieties. Incidence of pink borer was recorded as 10.0 per cent in July planted sugarcane variety Co 05011. The stalk borer infestation index was less than 2 in all the varieties; Co 0238, CoH 119, Co 89003, Co 05011 and Co 89003, except CoS 8436 (2.6). The incidence of pink borer in ratoon sprouts was ranged from traces to 10.0 per cent. Internode borer was identified as new pests of sugarcane under the area. The root borer and pink borer were minor pests and now were

gained the status of major pest. Early shoot borer, top borer, stalk borer, black bug, pyrilla and white grub were identified as key pests and army worm, mealy bugs, whitefly and thrips as occasional pest of sugarcane (Table-28.2)

4. U.P. Council of Sugarcane Research, Shahjahanpur (U.P.)

Salient Findings:

Sugarcane fields around sugar factory were surveyed to know the major insect pests of the area. During hot weather, the incidence of early shoot borer was low and ranged from 6.00 per cent (Nigohi and Ajbapur factory zone) to 11.50 per cent (Sultanpur factory zone). The maximum population of pyrilla was 40 (nymph + adult) /leaf in and around Nigohi factory zones while the maximum [17.50 pyrilla (nymph + adult) / leaf] was observed around Hargaon factory zones during 2nd week of April. The occurrence of *Epiricania melanoleuca* was negligible in most of the fields. The per cent incidence of top borer was recorded low to moderate in all surveyed sugar factory zone. The minimum (8.00%) incidence of top borer was recorded around Ajbapur factory zone while maximum (15.00%) around Tilhar factory zone. The infestation of stalk borer was recorded low in all surveyed factory zone and ranged from 12.50 per cent on cane basis around Hargaon factory zone (5.55% intensity) to 18.00 per cent on cane basis around Tilhar factory zone (with 5.72% intensity) [Table-28.3].

5. SRI, RAU, Pusa (Bihar)

Salient Findings:

A survey was conducted on the insect pests of sugarcane under different village of reserved area of Hasanpur sugar factory. The percent incidence of early shoot borer (5 to 17%), root borer (3 to 8%), top borer (8 to 20%), stalk borer (below 10%), army worm (3 to 25%) and pyrilla (15 to 85) per leaf were observed as the key pests of sugar factory area of sugarcane .The incidence of other pest like plassey borer, mealy bug, termite, grass hopper, scale insect, whitefly, etc. were also recorded in traces. Besides, roving survey was also conducted at sugarcane field in and around Pusa at monthly interval. The per cent incidence of early shoot borer, root borer, top borer and stalk borer varied from 3.2 to 17.2, 2.5 to 11.6 and 3.2 to 17.2, and 1.3 to 9.7 per cent, respectively. The pyrilla was observed as 1.3-65 per leaf on sugarcane at Pusa Farm (Table- 28.4).

6. G.S. Sugarcane Breeding and Research Station, Seorahi (U.P.)

Salient Findings:

Survey was made in eight different sugar factory zones viz., Seorahi, Manakapur, Balrampur, Babhanan, Sathiaon, Dhadha, Ramkola.and Goshi for key insect pests of

sugarcane. During hot weather, the incidence of early Shoot borer was low and ranged from 2.00 per cent in Ramkola factory zone to 9.00 per cent in Seorahi factory zone. The per cent incidence of top borer was recorded as low in all surveyed factory zone. The minimum (4.00%) incidence of top borer was recorded around Mankapur and Ramkola factory zone while maximum (10.00%) around Babhnan factory zone. The infestation of stalk borer was observed low in all surveyed factory zone and ranged from 4.50 per cent around Sathiaon to 8.00 per cent on cane basis in Babhanan factory zone. The incidence of root borer was observed low and ranged from 3.50 per cent in Sathiaon factory zone to 7.00 per cent in Dhadha factory zone. The pyrilla population was recorded high during April 2015. The maximum 32.50 (nymph + adult)/leaf was recorded around Dhadha factory zone and minimum 12.50 (nymph + adult)/leaf was observed around Balrampur factory zone. No incidence of pyrilla was observed at Balrampur, Goshi and Sathiaon factory zone. Negligible occurrence of *E. melanoleuca* was observed in all surveyed factory zone (Table- 28.5).

7. SRS, Dr. PDKV, Akola (M.S.)

The results of experiment were not submitted by concern centre.

8. CSRS, MPKV, Padegaon (M.S.)

Salient Findings:

Early shoot borer is key pest of this area and per cent insect infestation was highest in *suru* planting than *adsali* and *preseasonal.* The incidence of early shoot borer ranged from 09.40 to 38.80 per cent, where as average incidence was recorded 12.60 per cent. The per cent incidence of internode borer ranged from15.20 to 24.60 and intensity ranged from 2 to 8 per cent. The incidence of mealy bug was ranged from 20.40 to 25.80 per cent, whereas intensity ranged from 2 to 5 per cent. The incidence of top shoot borer, root borer, sugarcane woolly aphid, pyrilla, whitefly, thrips, scale insects, white grub and termites were in traces to low level (Table-28.6).

9. Vasantdada Sugar Institute (VSI), Pune (M.S.)

Salient Findings:

The incidence of early shoot borer was minimum 4.10 per cent in CoM 0265 and maximum 29.40 per cent in Co VSI 9805. The incidence of ESB was more in sugarcane planted in March month. The incidence of internode borer and mealy bug was more in sugarcane planted in *adsali* season as compared to sugarcane planted in *suru* season. On

sugarcane rust disease recorded first time rust feeder larvae (*Mycodiplosis coimbatorensis)* (Table- 28.7).

10. ZARS, JNKVV, Powarkheda (M.P.)

Salient Findings:

The pyrilla and early shoot borer were reported as key pests, while the top shoot borer, root borer, pink stem borer, whitefly, mealy bug and scale insect were minor insect pests of sugarcane. Among the areas surveyed, the highest infestation of early shoot borer recorded at Salichouka sugar factory area, while maximum infestation of pyrilla observed at Kareli factory areas. The introduction of *adsali* sugarcane cultivation and trash burning might be potential reason for pyrilla severity. While, plantation of sugarcane mostly in autumn season/ late ratooning was conductive for building-up severe infestation of early shoot borer (Table- 28.8).

11. MSRS, NAU., Navsari (Gujarat)

Salient Findings:

The incidence of early shoot borer and top borer was ranged 7.0 to 12.0 per cent in Co 86032, Co 97009, CoC 671, Co 86032, Co 86002, CoM 0265, and CoSi 95071. The whitefly incidence varied from 5 to 60 per cent in planted sugarcane and in ratoon it ranged from 70 to 90 per cent. The incidence of root borer found to be increased in the area and varied from 5 to 40 per cent. The rodent damage ranged from was 5 to 10 per cent irrespective of sugarcane variety and factory area (Table- 28.9).

12. ZARS, UAS, Mandya (Karnataka)

Salient Findings:

The rowing survey was undertaken in cane growing areas at Chamundi Sugars K.M. Doddi in varieties *viz*., Co 86032, Co 62175 and Co 8371 and also at Maddur; N.S.L. Sugars Koppa, K.R. Pet in varieties Co 86032, Co 62175 and Co 99463. The incidence of early shoot borer, top shoot borer and internode borer was ranged from 12.0-17.0, 14.50-16.0, 12.0-16.0 per cent, respectively. The incidence of pyrilla, mites, woolly aphid and root grub were found to be low in certain cane growing areas (Table- 28.10).

13. ICAR-SBI, Coimbatore (T.N.)

A survey was conducted on the insect pests of sugarcane at the various locations viz., Pooluvapatti, Coimbatore, Thenamanallur, Puthur, Telungupalayam, M/s Amravathi Sugars, Udumalpet, M/s Bannari Amman Sugars, Sathyamangalam, M/s Rajshree Sugars, Mundiyampakkam, Annur, Sathyamangalam. The per cent incidence of internode borer (5.0-50.0%), top borer (0.00-5.00%), root borer (0.00-15.00%) were observed as the key pests of

sugar factory area of sugarcane. The incidence of other pest like Termite, Mealybug, Pyrilla and Rat, etc were also recorded in traces (Table- 28.11).

14. RARS, ANGRAU, Anakapalle (A.P.)

Salient Findings:

The incidence of early shoot borer incidence during the months of April to June was 6.00 to 47.00 per cent on all popular sugarcane varieties *viz*., 87 A 298, 86 V 96, 83 V15, 2001 A 63, 2003 V 46 and Co 86032. The per cent incidence of internode borer was more on early planted crop and it was ranged from 15 to 85 per cent on all popular sugarcane varieties (87 A 298, 2003 V 46, 2001 A 63 and Co 86032). The moderate to severe incidence of red mite (4 to 45%) was observed during the months of May, June and July months due to high temperature and late onset of monsoons. The incidence of scale insect ranged from 5 to 70 per cent on varieties *viz*., 87 A 298, Co 7219, 83 V 15. The pyrilla population (4-18 N &A/ leaf) was observed from August month and continued up to November month. The parasitisation of *Epiricania melanoleuca* (1-5%) was observed on adults and on eggs during the months of August-September, The remaining all other insect pests *viz*., whitefly, mealy bug, leafhoppers and grasshoppers were observed in minor status during 2015-16 (Table-28.12).

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Project E. 30		
Title of Project	**:**	Monitoring of insect pests and bioagents in sugarcane agro-ecosystem
Objective	**:**	To monitor the key insect pests and natural enemies in the area.
Year of Start	**:**	2006-07
Duration	**:**	Long term
Location	**:**	Kapurthala, Uchani, Karnal (SBI), Shahajahanpur, Lucknow, Pusa, Seorahi, Akola, Padegaon, Pune, Powarkheda, Navsari, Mandya, Kolhapur, Coimbatore and Anakapalle
Plot Size	**:**	Planting of sugarcane variety recommended for the region in 0.2 ha area

Detailed Report:

1. Regional Research Station, PAU., Kapurthala (Punjab)

Sugarcane variety CoJ 88 was planted in 0.2 ha area and the incidence of insect pests and their natural enemies was recorded. The early shoot borer incidence started from 2nd week of April and reached its peak level of 10.8 per cent in 2nd week of May which thereafter, declined to 3.0 per cent in the 2nd week of July. The parasitoid *viz.*, *Trichogramma sp*. and *Stenobracon sp*. were recorded as 4.6 and 1.3 per cent, respectively in the month of May and 2.2 and 3.1 per cent respectively in the month of June. The top borer incidence started from month of May and reached to its peak level of 9.8 per cent in 1st week of July. Thereafter, top borer incidence decreased to 2.8 per cent in the 1st fortnight of September. The bio-agents *viz.*, *Rhaconotus* sp., *Isotima javensis* and *Stenobracon* sp. were recorded as 4.3, 3.1 and 3.8 per cent in the month of July, respectively and 2.1, 1.2 and 2.6 per cent in the month of August, respectively. The stalk borer incidence started from second week of September and reached to its peak level of 9.3 per cent in the month of November and thereafter, stalk borer incidence declined. Parasitization by bio-agents *viz.*, *Sturmiopsis inference* and *Cotesia flavipes* were observed 2.8 and 3.0 percent in the month of October, respectively and again *Sturmiopsis inference* and *Cotesia flavipes* were observed 3.6 and 1.0 percent in the month of November. The activity of pyrilla on sugarcane initiated from first week of August and continued up to first fortnight of October. Activity of bio-agent *viz.*, *Epiricania melanoleuca*

3.8 per cent parasitization was observed in the month of August, 2.0 per cent was observed in the month of September and 1.4 per cent observed in month of October (Table- 30.1).

2. Regional Research Station, Uchani Dist- Karnal (Haryana)

Report is not submitted by concern centre.

3. ICAR-SBI Coimbatore Regional Centre, Karnal (Haryana)

Salient findings:

The monitoring was carried out with sugarcane variety Co 0238. The incidence of early shoot borer and top borer was below <15.0 and <10%, respectively. The stalk borer infestation index was <1.0. The incidence of root borer and termite was 35.8 and 24.0 per cent, respectively. The population of pyrilla was @ 12.0 individual/leaf. It was observed that a minor insect, pink borer damaged the crop like shoot borer, top borer and stalk borer right from the shoot stage till harvest. Black bug was reported a pre-monsoon pest of sugarcane ratoon crop but its severe incidence was observed in the plant crop during post monsoon period July to October also. Further, it was also noticed that grass hopper has changed its egg laying behavior and laid their eggs on sugarcane leaves. *Epiricania melanoleuca* was identified as effective parasitoid of pyrilla adult's and nymphs (27.2%) and *Tetrasticus pyrillae* was identified as eggs parasitoid of pyrilla (3.6%). The parasitoid, *Cotesia flavipes* was also identified as an effective parasitoid of stalk borer larvae (4.6%) [Table- 30.2].

4. U.P. Council of Sugarcane Research, Shahjahanpur (U.P.)

Salient findings:

An experiment was conducted on sugarcane crop planted in 0.2 ha area with CoS 08272 cultivars at Shahjahanpur to monitor the key insect pests and their bio-agents. The incidence of early shoot borer was recorded maximum 9.20 per cent during 24th SMW followed by 6.20, 5.00 and 4.60 per cent during 20th, 29th and 16th SMW, respectively. The incidence of top borer was recorded maximum 15.00 per cent during 35th SMW followed by 6.50, 5.40, 3.00 and 2.15 per cent during 31st, 26th, 22nd and 38th SMW, respectively. The per cent incidence of stalk borer (on cane basis) was observed to be maximum 18.50 per cent during 43rd followed by 12.20 per cent during 38th SMW, respectively. The population of pyrilla was started 15.00 (nymph + adult)/leaf during 16th SMW which increases 55 (nymph + adult)/leaf during 32nd SMW. Then, population was sharply declined up to 8.50 (nymph + adult)/ leaf during 35th SMW due to parasitisation of *E. melanoleuca* and *Tetrastichus pyrillae*. The bioagents viz., *Isotima javensis, Telenomus beneficiens, Rhaconotus*

scirpophagae and *Stenobracon deesae* were recorded as major parasitoids of top borer. The parasitoid, *Cotesia flavipes*, a larval parasitoid of stalk borer was also recorded from fields. The peak activity of egg-parasitoid, *T. beneficiens* was observed to be 16.20 per cent during 31st SMW and declined up to 7.15 per cent during 35th SMW. A parasitisation of larvae by *Isotima javensis* was observed from 22nd SMW (2.00%) and increases up to 12.25 per cent during 35th SMW thereafter decreases up to 6.30 per cent during 38th SMW. The parasitisation of top borer by *Rhaconotus scirpophagae* was recorded minimum (3.15%) during 26th SMW which increased up to 9.00 per cent during 35th SMW. The parasitisation of *Stenobracon deesae* was ranged from 4.30 per cent during 31st SMW to 7.60 per cent during 38th SMW. The parasitization of stalk borer larvae by *Cotesia flavipes* was recorded maximum 11.50 per cent during 43rd SMW. The parasitism of pyrilla by *E. melanoleuca* was recorded 15.0 per cent and parasitism of pyrilla eggs was observed by 40-50% by egg-parasitoid *T. pyriallae* during 32nd SMW. The parasitism of pyrilla was observed to be maximum 60-65% while the population of egg-parasitoid (*T. pyrillae)* decreases up to 30% during 35th SMW [Table- 30.3 (a) to 30.3 (c)].

5. Division of Crop Protection, IISR, Lucknow (U.P.)

Salient findings:

The variety CoLk 8102 was planted by cutter planter in February, 2015. Recommended agronomic practices were followed to raise a good crop. The periodic observations on incidence of insect pests and parasitoids of pests were recorded. The germination was 33.33 to 50.00 per cent. The incidence of termite was in traces. The incidence of top borer II, III and IV brood was 5.50, 23.85 and 44.44 per cent, respectively. The incidence of root borer at shoot stage was 5.45 per cent and in the month of September it was 45.27 per cent. The incidence of internode borer was 21.63 and the incidence of stalk borer was 7.96 per cent. The incidence of *Pyrilla perpusilla* was very high which was suppressed in the month of October by its parasite, *Epiricania melanoleuca*. The incidence of mealy bug was cent per cent. No incidence of whitefly was observed. The population of black bug varied from 2-50/cane. The parasitisation by *Telenomus beneficiens* (44% on egg mass basis), *Stenobracon sp*. (1.5-4.0 per cent), *Rhaconotus sp*. (3.5-11 %), *Isotima javensis* (3.4-4.0 %) was observed. The cocoons of *Epiricania melanoleuca* on per leaf basis varied from 7-20 in the month of August and 20-80 in the month of October. The predatory fauna

comprising of coccinellids, spiders and ants were noticed in the field at different stages of the crop [Table- 30.4 (a) to 30.4 (d)].

6. SRI, RAU, Pusa (Bihar)

Salient findings:

The sugarcane variety BO 141was planted in 0.2 hectare area. The mean per cent incidence of root borer, shoot borer , top borer and stalk borer varied from 2.5-11.5, 3.2-15.6, 1.3-17.2 and 1.3- 9.7 per cent, respectively. The incidence of sugarcane pyrilla was recorded as 1.3 to 65 per leaf. The bio-agents of root and early shoot borer were not observed during cropping season 2015-16. While, parasitization of bio-agents such as, *Apantelis flavipes, Rhaconotus scirpophagae* and *Stenobracon deesae* were recorded against top borer. The population of *S. deesae* varied from 2.7 to 13.7 per cent during May to October. Thereafter, a peak (13.7%) was noticed in September. The population of *Apantelis flavipes* was ranged between 3.1 to 15.9 per cent during May to November with its highest population (15.9%) was recorded in month of September. The activity of *R. scirpophagae* was recorded from July to November with its peak (7.8%) in month of September. The parasitization of *T. pyrillae* and *E. melanoleuca* were recorded from May to November and their highest parasitization per cent was recorded 42.7 per cent and cent per cent in the month of August and October, respectively. In case of stalk borer, the parasitization of *Apantalis flavipes* was recorded from 4.1 to 18.1 per cent [Table 30.5 (a) to 30.5 (b)].

7. G.S. Sugarcane Breeding and Research Station, Seorahi (U.P.)

Salient findings:

The experiment was conducted on 0.2 ha area with CoSe 01434 cultivars at Seorahi for monitoring the key insect-pests and their natural enemies. The incidence of shoot borer was recorded maximum 9.75 per cent during 24th SMW followed by 9.21 per cent, 8.75 per cent and 5.26 per cent during 20th, 29th and 16th SMW, respectively. The incidence of top borer was recorded maximum 5.07 per cent during 31st SMW followed by 4.53 per cent, 3.75 per cent, 2.63 per cent and 1.25 per cent during 35th, 26th, 22nd and 38th SMW, respectively. The per cent incidence of stalk borer (on cane basis) was observed to be maximum 8.72 per cent during 43rd SMW followed by 7.55 per cent during 38th. The bio-agents viz. *Isotima javensis, Stenobracon sp., Elasmus zehnteri* and *Rhaconotus scirpophagae* were recorded major parasitoid of top borer and *Cotesia flavipes* , a larval parasitoid of stalk borer was also recorded from the field . A parasitisation of larvae by *Isotima javensis* was recorded

minimum 2.50 per cent during 22th SMW and increases up to 16.00 per cent during 35th SMW there after decreases up to 5.00 per cent during 38th SMW. The parasitisation of *Stenobracon sp.* was observed with minimum 2.85 per cent during 22nd SMW and increases up to 16.00 per cent during 35th SMW there after decreases up to 3.33 per cent during 38th SMW. The parasitisation of top borer by *Elasmus zehnteri* was observed with 4.16 per cent during 26th SMW and increases up to 13.63 per cent during 35th SMW there after decreases up to 3.33 per cent during 38th SMW. *Rhaconotus scirpophagae* was observed minimum 3.33 per cent during 26th SMW and increases up to 12.50 per cent during 35th SMW there after decreases up to 4.44 per cent during 38th SMW. *Cotesia flavipes* parasitizes maximum 13.63 per cent stalk borer larvae during 38rd SMW and also decreases up to 6.33 per cent during 47th SMW (Table- 30.6).

8. SRS, Dr. PDKV, Akola (M.S.)

Under Project E. 30, results were not reported by concern centre.

9. CSRS, MPKV, Padegaon (M.S.)

Salient findings:

The incidence of early shoot borer ranged from 0.79 to 8.87 per cent. The peak incidence of early shoot borer was observed in 20 SMW (14-20 May). The incidence of pyrilla per leaf was ranged from 1 to 7. The first incidence of woolly aphid was observed in 29 SMW (16 – 22 July) and it was 0.40 woolly aphid per 2.5 cm^2 leaf area per three leaves. However, the peak incidence was observed in 33 SMW and it was 2.05 woolly aphid per 2.5 cm^2 leaf area per three leaves. The parasitoid, *Encarsia flavoscutellum* was ranged from 0.33 to 2.67 per leaf. The predator, *Micromus igorotus* was ranged from 0.33 to 2.67 per leaf and peak was observed in 35 SMW. The mealy bug incidence was ranged from 1 to 9 per cent and peak activity was noticed in 38 SMW [Table- 30.7 (a) to 30.7 (d)].

10. Vasantdada Sugar Institute (VSI), Pune (M.S.)

Salient findings:

The per cent incidence of early shoot borer noticed maximum (2.39%) in March 2015. The per cent incidence, intensity and infestation index of internode borer was noticed maximum 10 per cent, 0.56 per cent and 0.06, respectively. The incidence and intensity of mealy bug was observed maximum (14.0 %) and (2.35%) [Table-30.8]

11. ZARS, JNKVV, Powarkheda (M.P.)

Salient findings:

The cumulative infestation of early shoot borer remained 21.40 per cent. The infestation initiated at 1st week of February. The peak activity (>2% per week) observed during 13th to 15th SMW i.e. last week of March to mid of April. The pyrilla infestation initiated at 10th SMW (2nd week of March) and reached to its peak (3.6 per leaf) at 18th SMW (1st week of May). *Epiricania melanoleuca* up to 6.00 per cent and *Tetrastichus pyrillae* up to 21.10 per cent also recorded. The maximum parasitism of *E. malanoleuca* (34.40%) recorded one week after (34th SMW). While, maximum egg masses/ live cocoons of *E. melanoleuca* (12.70 per leaf) and *T. pyrillae* (75% parasitism) observed at 36th SMW i.e. two weeks after the peak pyrilla infestation [Table-30.9(a) to 30.9(b)].

12. MSRS, NAU., Navsari (Gujarat)

Salient findings:

The incidence of early shoot borer in 7, 11 and 16 SMW was 3.79, 3.49 and 1.71, respectively. During period of study, only *T. chilonis* was found to parasitize early shoot borer. Parasitism ranged from 8.59 to 13.19 per cent. The incidence of top shoot bore in 20, 28 and 50th SMW was 2.51, 2.29 and 3.41 respectively. During period of study per cent parasitism by *T. japonicum* was 7.97, 6.55 and 2.93, respectively. Whereas *T. chilonis* found to be parasitizing at the rate of 3.98, 4.37 and 2.34 per cent, The parasitism done by *Apanteles flavipes* was ranged from 2.01 to 4.12 per cent. The average incidence of stalk borer was 17.09 per cent and found parasitizing it during the period of study. Among them parasitism done by *Apanteles flavipes* was 3.42 per cent. Average of root borer incidence at harvest (50th STW) was 19.55 per cent and only two parasites found to be parasitizing it during the period of study. Among them, parasitism of *G. indicus* was 12.78 per cent [Table-30.10 (a) to 30.10 (d)].

13. ZARS, UAS, Mandya (Karnataka)

The cumulative incidence of early shoot borer in Co 86032 sugarcane variety was 6.68 per cent in the first four months after planting. Seven months after planting, the incidence of top shoot borer was 3.81 per cent. Moreover, aphid, whitefly and pyrilla appeared in very small numbers but failed to establish and spread. *Encarsia* spp. (1-3 adults/leaf) kept the woolly aphid under control. Unusual heavy rainfall made during the months of May, August to October and also recorded rainfall during the month of November resulted in to lower down the activity of early shoot borer and top shoot borer and higher incidence of internode borer in Mandya area (Table-30.11)

13. Regional Sugarcane & Jaggery Research Station (MPKV), Kolhapur (M.S.)

The results were not submitted by concern centre.

14. ICAR-SBI, Coimbatore (T.N.)

The per cent incidence of early shoot borer ranged from 1.32 to 5.82 per cent. The other pests incidence *viz.*, top borer (0.44-0.51%), internode borer (0.51-35%), root borer (47.6%), woolly aphid (1.77/leaf), mealy bug (1.79%), whitefly (0.77%), termite (traces) were reported during the present investigation. *Encarsia flavoscutellum* and *Micromus* were reported to feed on sugarcane wooly aphid in the area during November month (Table-30.12).

15. RARS, ANGRAU, Anakapalle (A.P.)

Salient findings:

The incidence of early shoot borer was ranged from 8.60 to 38.60 per cent and peak incidence (38.60%) was noticed in 21st SMW (3rd week of May). The low to moderate incidence of red mite (3.0 to 42.60%) was observed from 12th SMW (2nd week of March) to 25th SMW (4th week of June). The incidence of internode borer was noticed from 26th SMW (2.6%) and the peak incidence was noticed in 35th SMW i.e., last week of August (52.0%). The low to moderate incidence of scale insect was observed during September – December months (5- 50%). The peak incidence of scale insect was observed in 44th SMW (50%). The peak incidence of *Pyrilla* was observed during 43rd SMW and maximum parasitisation of *Epiricanea* was observed during 48th SMW.

The parasitisation of *T. chilonis* was ranged between 1.0-4.2 per cent on the eggs of C. *infuscatellus* and parasitisation of *Sturmiopsis inferens* on larvae of *C. infuscatellus* ranged between 0.6 and 3.80 per cent from April to July months. The higher activity of *Euborellia annulipes* (5-6/clump) was observed during April month. On internode borer, parasitisation of *T. chilonis* (1-3.6%), *Sturmiopsis inferens* (0.4 -3.3%) and *Cotesia flavipes* (0.60-5.40%) were observed during the months of September- January, 2016. The higher activity of the parasitoid, *Encarsia flavoscutellum* was observed during the month of January [Table-30.13 (a) to 30.13 (c)].

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Project E. 34		
Title of Project	**:**	Standardization of simple and cost effective techniques for mass multiplication of sugarcane bio-agent.
Objective	**:**	To develop simple and cost effective mass-multiplication techniques of promising bio-agents of the area.
Year of Start	**:**	2012-2013
Duration	**:**	Three years
Location	**:**	Locations and bio-agents to be multiplied.
Anakapalle	**:**	*Beauveria bassiana*
Uchani	**:**	*Encarsia spp*.
Lucknow	**:**	*Metarhizium anisopliae, Beauveria bassiana and Chrysoperla carnea.*
Padegaon	**:**	*Chrysoperla carnea*
Coimbatore		Centre will decide
Pune	**:**	Centre will decide

Detailed Report

1. Division of Crop Protection, IISR, Lucknow (U.P.)

Green-lace wing, *Chrysoperla carnea* is a predatory insect as its grubs are voracious feeders and feed upon a number of soft bodied insects, eggs and newly emerged borer larvae. Laboratory rearing of this predatory insect was carried out.

It was abundant in monsoon period therefore; nucleus culture (adults) of the insect was collected from sugarcane fields in the month of September. Collected male and female insects were allowed for mating in egg laying tray. Egg laying trays were wrapped with black paper on inner surface and covered with black cloth (Fig. 1). Egg laying trays were supplied with promising protein rich diets combinations and single female laid about 400 to 600 stalked eggs on black cloth (Fig. 2). Eggs were greenish white in colour and appeared contrast on black colour of the cloth (Fig. 3). At black head stage, eggs were separated by cutting their stalks and transferred in to glass vials containing freshly laid eggs of *Corcyra cephalonica* (rice moth) and kept at 27 ^{o}C in BOD incubator for the hatching the larvae (grubs). Newly hatched grubs fed on *C. cephalonica* eggs and larval (grub) stage lasted 14-19 days and adult insects emerged from the pupae in 3-4 days (Fig. 4). Pupae were polygonal in shape (Fig. 4).

For the development of grubs, dried goat liver powder and yolk of hen egg based diets were accepted by the grubs and they completed their stage successfully and converted to pupae. For mass rearing of the insect, plastic cages, glass jars and tissue culture plates with multi wells were also used. Egg, grub, pupal and adult period was 3-4, 14-19, 6-7 and 15-20 days, respectively when multiplied on artificial diets.

Rearing of *Chrysoperla carnea*

Fig. 1: Egg laying Tray

Fig. 2: Artificial diet for adult insects

Fig. 3: Stalked eggs on black cloth

Fig. 4: Grubs of Chrysoperla

Note: New scientific name of the Chrysoperla is *Chrysoperla zastrowi sillemi.* Tabular data were not submitted by the concern centre.

2. RARS, ANGRAU, Anakapalle (A.P.)

The mass culturing of *Beauveria bassiana* on different solid media was tried and the results indicated that among the solid media, par boiled rice produced highest spore count of 13 x 10^8 per ml with less biomass (0.13g/ 100gm) followed by maize (12.1 x 10^8 /ml), rice (12 x 10^8 /ml) and found as the best suitable media for mass culturing of *Beauveria bassiana*. No fungal spores of *B. bassiana* were found in sugarcane bagasse + 1.0g dextrose whereas in press mud + 1g dextrose found considerably low spore yields as compared to food grains. Based on cost incurred for the production of spores, *Corcyra cephalonica* rearing waste (Rs. 0.20) and press mud + 1.0 dextrose (Rs. 0.26) were the best low cost substrates compared to PDA medium (Rs.0.45). Among *in vitro* produced cereal media for the production of spores, parboiled rice + 1.0g dextrose (Rs. 0.32), ragi + 1.0g dextrose (Rs. 0.33), rice + 1.0g dextrose (Rs. 0.36) and maize + 1.0g dextrose (Rs. 0.36) were the best low cost substrates for 1 x 10^8 spore production compared to PDA medium (Rs. 0.45) (Table-34.1).

3. Regional Research Station, Uchani Dist- Karnal (Haryana)

Report is not submitted by concern centre.

4. Vasantdada Sugar Institute (VSI), Pune (M.S.)

During the year 2015-16, Entomology Section has produced 605.90 cc (121.18 lac) eggs of *Corcyra cephalonica* and 448 cards (89.60 lac parasites) of *Trichogramma chilonis* parasites. Total supply made during the year was 204.50 Trichocards for the management of sugarcane borer on 13.63 ha area [Table- 34.2(a) to 34.2 (b)].

5. CSRS, MPKV, Padegaon (M.S.)

The allotted bio-agent for multiplication is *Chrysoperla carnae*. This bio-agent was tried to multiply on sugarcane woolly aphid in field. The experiment was planted on 21.03.2015 with regular variety Co 86032. This year (2015-16), the incidence of woolly aphid was occurred in 29 SMW i.e. 16-22 July (0.40 woolly aphid / 2.5 cm^2 / 3 leaves) and it was continued up to 36 SMW. There was no incidence of woolly aphid since 37 to 50 SMW. However, the artificial releases of woolly aphid were done with sufficient application of urea. The incidence was again started in 51 SMW of 2015 and continued up to 2 SMW of 2016.

The bio-agent was released in field. However, it was developed at low level in the experimental field. This might be due to presence of other predator's *viz.*, *Micromus igorotus* and *Encarsia flavoscutellum.*

As per suggestion by the Principal Investigator (Entomology) during last workshop (14-16 Dec. 2015 at Pusa – Bihar), the laboratory study of feeding potential of *Chrysoperla carnea* against sugarcane woolly aphid was started in last week of December, 2015. The neonate larvae of chrysopids were collected from the field and they were started feeding of woolly aphids from 1st week of January, 2016 under laboratory condition. However, the incidence of woolly aphid was very less during I fortnight of January, 2016 and it was vanished completely in third week of January, 2016.

Note: New scientific name of the Chrysoperla is *Chrysoperla zastrowi sillemi.* Tabular data were not submitted by the concern centre.

6. ICAR-SBI, Coimbatore

The results pertaining to Project E. 34 were not submitted by concern centre.

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Project E. 36		
Title of Project	**:**	Management of borer complex of sugarcane through lures
Objective	**:**	To manage sugarcane borers (early shoot borer, top borer, internode borer and stalk borer) through pheromone traps.
Year of Start	**:**	2012-13
Variety	**:**	Recommended variety of the location
Location		As hereunder
1. Peninsular Zone	**:**	Mandya, Akola, Pune, Navsari, Powarkheda and Padegaon
2. East Coast Zone	**:**	Anakapalle
3. North West Zone	**:**	Kapurthala, Uchani, Shahjahanpur and Lucknow
4. North Central Zone	**:**	Seorahi and Pusa
Treatments	**:**	Pheromone lures of sugarcane early shoot borer, top borer and stalk borer
Plot Size	**:**	Two blocks, each of minimum 1 acre. In first block, trap @ 11/ha should be installed and the second be kept one acre sugarcane crop should be taken to avoid the pheromone effect (control). (Refer the revised methodology as per proceeding of group meeting held during 2013.

Detailed Report:

1. Regional Research Station, PAU., Kapurthala (Punjab)

Salient findings:

The activity of early shoot borer started from first week of May to last week of August. The highest numbers of early shoot borer were trapped in third week of May. Incidence of early shoot borer in treatment and control plots was 6.57 and 9.79 per cent, respectively, Thus there was reduction of 32.89 per cent by lure alone. The activity of top borer was started from third week of May to last week August. The highest numbers of top borer were trapped in second week of June. Incidence of top borer in treatment and control

plots was 7.95 and 12.16 per cent, respectively, Thus there was reduction of 34.62 per cent in the incidence of top borer by lure. The activity of stalk borer started from last week of September to first week of January. The highest numbers of stalk were trapped in third week of November. Incidence of stalk borer in treatment and control plots was 6.05 and 10.63 per cent, respectively, Thus there was reduction of 43.08 per cent in the incidence of stalk borer [Table-36.1(a) to 36.1(c)].

2. Regional Research Station, Uchani Dist- Karnal (Haryana)

The report is not submitted by concern centre.

3. U.P. Council of Sugarcane Research, Shahjahanpur (U.P.)

Salient findings:

An experiment was conducted with CoS 08272 cultivar at Shahjahanpur to study the management of borer complex of sugarcane (early shoot, top and stalk borer) through pheromone trap and to know the influence of weather parameters on moth catches. The present investigation revealed that highest number of shoot borer (6.67 moths/trap) was recorded during 18th SMW followed by 17th SMW (5.00 moths/trap), 16th and 19th SMW (3.33 moths/trap). Top borer moth catches were recorded maximm (7.33 moths /trap) during 28th SMW followed by 19th SMW (6.33 moths/trap), 18th SMW (5.67 moths/trap) and 11th SMW (4.00 moths/trap). The highest moth catches (5.00 moths/trap) of stalk borer was observed during 37th SMW followed by 24th SMW (4.67 moths/trap) and 38th SMW (3.67 moths/trap). Moth catches of shoot borer was positively corelated with maximum (r=0.4977) and minimum temperature (r=0.1216) while negatively correlated with morning and evening humidity (r=-0.4934; r= -0.5138). Top borer moth catches were found to be positively correlated with maximum (r=0.2443) and minimum temperature (r=0.0668) while negatively correlated with morning and evening humidity (r=-0.0380; r=-0.2159). The moth catches of stalk borer was observed positively correlated with maximum (r=0.2264) and minimum temperature (r=0.1060) while negatively correlated with morning and evening humnidity (r=-0.1251 and r=-0.1373).

The incidence was also observed in treated (application of pheromone trap). The per cent incidence of shoot borer (10.50%), top borer 2nd brood (3.50%), 3rd brood (5.15%) and at harvest (13.00%) and infestation index of stalk borer was recorded as 1.20 in treated plot. While, the corresponding parameters were 14.00, 5.00, 7.00, 16.60 per cent and 2.00 infestatioin index in untreated plots, respectively [Table-36.2(a) to 36.2(c)].

4. Division of Crop Protection, IISR, Lucknow (U.P.)

Salient findings:

To evaluate the effect of sex pheromones on incidence of borer pests of sugarcane a field experiment was conducted in one acre of sugarcane field. Planting was done in the month of February, 2015. In half of the area, 6 sex pheromone traps at the distance of 20 meter apart were placed when the top borer moth was seen in the field. Moth catches were recorded daily. Trapped moths were removed from the trap after recording their number. No sex pheromones for other borers were available. Six sex pheromone traps were installed in 0.5 acre sugarcane field and half of the acre field was kept without traps for comparison. Trapped moths were removed from the trap after recording their numbers. In second and third brood catches were observed while in fourth brood low catches were observed. Total number of male moths of top borer (II brood) caught in traps was 337 (56.17 moths/trap), total catch of top borer moth (III brood) was 166 (27.67 moths /trap) and of IV brood was only 77 (12.83/trap).

Incidence of top borer (II brood) in plot with traps ranged from 3.45-5.62 % (average 4.77%) as against 4.39-8.89 % (average 6.74%) in without traps. Incidence of top borer (III brood) in plots with traps and without traps were 5.20-16.30 per cent (Av. 11.69 %) and 7.78-23.33 per cent (Av.14.80 %), respectively. Incidence of IV brood was severe 28.62-48.57 per cent (Av.38.13 %) incidence in plot without trap was 25.00-45.00 per cent (Av. 32.89 %). No significant difference in top borer incidence was recorded in plots with and without sex pheromone traps [Table-36.3(a) to 36.3 (b)].

5. SRI, RAU, Pusa (Bihar)

The experiment was conducted with variety CoP 2061 at Pusa to study the management of borer complex of sugarcane (ESB, TB and SB) through lures. The activity of ESB started from 1st fortnight of March to 1st fortnight of July and its maximum 5.66/trap of moths were catches in 2nd fortnight of May. The incidence of ESB in treated plot and untreated plots were 11.63 and 15.87 per cent, respectively. The activity of TB started from 2nd fortnight of March to 1st fortnight with maximum 7.33 moth/trap catch in 1st fortnight of June. However, their incidences in treated and untreated plot were 15.71 and 18.44 per cent, respectively. The activity of stalk borer started from 1st fortnight of July to 1st fortnight of October with maximum 1.66 moth/trap catch in 2nd fortnight of August. The incidence of stalk borer in treated and untreated plots were 5.56 and 7.23 per cent, respectively [Table-36.4 (a) to 36.4 (c)].

6. G.S. Sugarcane Breeding and Research Station, Seorahi (U.P.)

Salient findings:

The experiment was conducted on 0.4 ha area with Co 0238 cultivar at Seorahi for the present investigation. Three pheromone traps for each pest were installed in 2nd fortnight of February up to harvest of the crop. Moth trapped was recorded at weekly intervals and pheromone lure was changed at monthly intervals. The highest number of shoot borer (9.66 moths/ trap) was recorded during 17th SMW followed by (6.66 moths/ trap) during 16th, and 23th SMW and (3.66 moths/trap) during 22th SMW. Top borer moth catches were recorded (8.33 moths /trap) during 12th SMW followed by (7.33moths /trap) during 19th SMW followed by 6.00 moths/trap during 27th SMW. The stalk borer moth catches were observed (10.00 moths /trap) during 25th SMW followed by 7.33 moths /trap, 7.00 moths /trap and 6.00 moths /trap during 19th, 24th and 31st SMW, respectively.

The moth catches of shoot borer was positively associated with maximum (r= 0.257) and minimum temperature (r=0.062) while negatively correlated with morning and evening humidity (r= -0.400, r= 0.252) and rainfall (r= -0.054). Top borer moth catches were found to be negatively correlated with maximum (r= -0.156) and minimum temperature (r=-0.196) with morning and evening humidity (r= -0.003, r= 0.157) and positively with rainfall (r= +0.104). The moth catches of stalk borer was positively correlated with weather parameter *viz*., maximum temperature (r= 0.253) and minimum temperature (r=0.292) while negatively correlated with morning and evening humidity (r= -0.185, r= 0.103) and rain fall (r= -0.192).

The per cent incidence was also observed in treated (application of pheromone trap) and untreated plot (without pheromone trap). The incidence of shoot borer was 5.65 per cent. Top borer in 2nd brood was 2.00 per cent, 3rd brood was 3.75 per cent and at harvest (4.15%). The infestation of stalk borer on cane basis was 5.00 per cent in treated plot. While the corresponding parameters were 8.95, 3.76, 5.07, 7.15 and 8.45 per cent in untreated plots, respectively [Table-36.5(a) to 36.5 (c)]. **Note: The concern centre has submitted the results of Project E. 36 in the format of concluded Project E. 32.**

7. SRS, Dr. PDKV, Akola (M.S.)

The results of experiment were not submitted by concern centre.

8. CSRS, MPKV, Padegaon (M.S.)

Salient findings:

The highest number of moth catches in case of early shoot borer (10 numbers/ 3 traps), internode borer (6 numbers per 3 traps) and top shoot borer (2 numbers per 3 traps)

were trapped in 18, 19 and 22 SMW, respectively. The installation of pheromone traps @ 15 per ha reduced the incidence of 57.51 and 34.07 per cent of early shoot borer and internode borer, respectively and increased 11.11 per cent sugarcane yield over untreated control [Table-36.6(a) to 36.6 (c)].

9. Vasantdada Sugar Institute (VSI), Pune (M.S.)

In pheromone traps, negligible adults of early shoot borer and internode borer were captured. Top shoot borer adults were not captured. The per cent incidence of ESB was maximum (4.09 %) in April 2015 in treated plot, while it was maximum (4.46%) in May 2015 in control plot. The per cent incidence of internode borer was noticed as maximum (4.0 %) in June 2015 and Dec 2015, while it was 16.0 per cent in July 2015 in control plot. Treated and control plots were free from top borer infestation [Table-36.7(a) to 36.7 (b)].

10. ZARS, JNKVV, Powarkheda (M.P.)

Salient findings:

During the season, early shoot borer (dead hearts) and ESB moth captures at pheromone traps observed from 6th SMW i.e., 2nd last week of February. The maximum ESB infestation in control block recorded at 13th SMW (1st week of April), while the peak field infestation was observed from 12nd to 15th SMW i.e. last week of March to 3rd week of April, while moth captures at pheromone trap captures were maximum from 11th to 17th SMW (3rd week of March to last week of April. The cumulative ESB infestation in the control block remained 26.60 per cent, while it was 16.60 per cent in lure managed block i.e., 25.22 per cent lower as compared to control block (Table-36.8).

11. RSRS, NAU., Navsari (Gujarat)

Salient findings:

The maximum (4.00) moths of early shoot borer were catches in 31th SMW. The significantly negative correlation was seen between early shoot borer and maximum temperature (-0.5758), minimum temperature (-0.7177), relative humidity % at morning (-0.4735) and evening (-0.6075). ESB showed negative non significant correlation with number of rainy days (-0.0715) and sunshine hours (-01451), and positive significant correlation with rainfall (0.7088). The maximum moths (28) of top borer were catches during 23rd SMW. The results raveled that there was positive significant correlation between top borer and maximum temperature (0.4882), minimum temperature (0.7273) and evening relative humidity. Moreover, it had positive non significant correlation with rainfall (0.0312), rainy days (0.0308) and Sunshine hours (0.1412). Morning relative humidity (-0.1895) shows negative

non significant correlation. The highest number of internode borer moth (20) was caught during 37th SMW. Positive non-significant correlation existed between internode borer moth catches and most of the parameters i.e. maximum temperature (0.2131), minimum temperature (0.1893), evening relative humidity (0.0575) and rainfall (0.0414). Only morning relative humidity (0.3235) and sunshine hours (0.2549) exhibit positive significant correlation. Whereas, number of rainy days (-0.2079) showed negative non-significant correlation [Table-36.9(a) to 36.9(b)].

12. ZARS, UAS, Mandya (Karnataka)

The early shoot borer and top shoot borer moths were active throughout the year. The significant peak of ESB was absent during 20th SMW. Top shoot borer activity was also very low during the month of November. The internode borer moth activity was low throughout the season. The cumulative ESB incidence in the control block remained at 4.05 per cent while it was 3.47 per cent in the lure managed block. Top shoot borer incidence was 2.84 per cent in lure managed block and it remained at 2.20 per cent in the control block. The incidence of internode borer was 27.25 per cent in lure managed block. Whereas, it was 29.75 per cent in the control block. The peak activity of ESB (2.5moths/trap/week), TSB (6.55moths/trap/week) and INB (1.755moths/trap/week) was observed during 22nd ,30th and 11th SMW, respectively. The correlation studies on pheromone trap catch of ESB and meteorological variables revealed a positive and significant relationship between maximum temperature (r = 0.46) and mean temperature (r = 0.42). However, morning relative humidity (r = -0.36), evening relative humidity (r= -0.36) and mean relative humidity (r=-0.42) revealed a negative and significant relationship with ESB trap catches and meteorological variables. The results of pheromone trap catches of TSB and meteorological variables revealed a negative and significant relationship with morning relative humidity (r=-0.28) [Table-36.10(a) to 36.10(b)].

13. RARS, ANGRAU, Anakapalle (A.P.)

Salient findings:

The early shoot borer moth catch was highest during 17th SMW (122 moths / 5 traps / week) whereas internode borer moth catches were highest during 24th SMW (119 moths/ 5 traps/week). The maximum temperature showed negative correlation (r = -0.48) and morning relative humidity showed positive correlation (r = 0.48) with ESB moth catches whereas maximum temperature (r= 0.58), morning RH (r=0.46) and evening RH (r=0.60) showed positive correlation with INB moth catches in pheromone traps. The plot with

pheromone traps @ 25 /ha reduced the incidence of early shoot borer and internode borer to an extent of 72.04 per cent and 49.60 per cent, respectively and recorded highest per cent juice sucrose (20%) and cane yield (82.44t/ha) which resulted into 7.34 per cent increase of cane yield over control (76.80t/ha) [Table-36.11(a) to 36.11(c)].

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Project E. 37		
Title of Project	**:**	Bio-efficacy of new insecticides for the control of sugarcane early shoot borer.
Objective	**:**	To find out effective strategy for the management of sugarcane early shoot borer
Year of Start	**:**	2013-14
Location	**:**	Kapurthala, Shahjahanpur, Pusa, Powarkheda, Mandya, Padegaon, Pune, Navsari and Anakapalle
Design	**:**	RBD (Randomized Block Design)
Number of treatments	**:**	08 (Eight)
Number of repetition	**:**	03 (Three)
Plot size	**:**	Gross: 6.0 x 6.3 m Net: 6.0 x 5.4 m
List of treatments	**:**	As per mentioned hereunder

Treat. No.	**Details of treatments**
T_1	Soil application of Fipronil 0.3 G @ 25 kg a.i./ha at the time of planting and 60 DAP
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/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 45 SC @ 90 ml/ha at 30 and 60 DAP
T_5	Spraying of Flubendiamide @ 250 ml/ ha at 30 and 60 DAP
T_6	Soil application of Phorate 10 G @ 15 kg /ha at the time of planting and 60 DAP
T_7	Soil application of Carbofuran 3 G @ 33 kg /ha at the time of planting and 60 DAP
T_8	Untreated control

Detailed report:

1. Regional Research Station, PAU., Kapurthala (Punjab)

The efficacy of different insecticidal treatments tested against sugarcane early shoot borer revealed that cumulative per cent incidence of early shoot borer observed at 30, 60, 90 and 120 days after planting was least for the treatment of Chlorantraniliprole 18.5 SC @ 375 ml/ha thereby resulting in increase in other economic parameters like cane yield, total cane height, sucrose (% in juice) and CCS (%) closely followed by the insecticides, chlorantraniliprole 0.4G @ 22.5 kg, flubendiamide 39.35 SC @ 125 ml/ha, spinosad 45 SC @

90 ml/ha, fipronil 0.3 G@ 25 kg, carbofuron 3G @ 33 kg/ha and phorate 10 G @ 15 kg/ha as compared to control for management of early shoot borer in sugarcane [Table-37.1].

2. U.P. Council of Sugarcane Research, Shahajahanpur (U.P.)

Among the tested insecticides, spraying of chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 and 60 DAP recorded least cumulative incidence of ESP (4.43%) followed by soil application of chlorantraniliprole 0.4G @ 22.5 kg/ha at the time of planting and 60 DAP (4.81%) as compared to utreated control (8.61%). The cane girth was highest in spraying of flubendiamide @ 125 ml/ha at 30 and 60 DAP (2.61cm/cane) followed by soil application of carbofuran 3G @ 33 kg/ha (2.48 cm/cane). Whereas, the cane height was maximum with spraying of chlorantraniliprole 18.5SC @ 375 ml/ha at 30 and 60 DAP (2.18 mt/ha) followed by spraying of flubendiamide 45SC @ 250 ml/ha at 30 and 60 DAP (2.05 mt/cane) and soil application of fipronil 0.3 G @ 25 kg/ha at the time of planting and 60 DAP (2.01 mt/cane). The maximum cane yield was recorded in spraying of chlorantraniliprole 18.5 SC @ 90 ml (105t/ha) followed by soil application of fipronil 0.3 G @ 25 kg/ha at the time of planting and 60 DAP (103 t/ha) and spraying of flubendiamide @ 125 ml/ha at 30 and 60 DAP (102 t/ha) (Table-37.2).

3. SRI, RAU, Pusa (Bihar)

The treatment of chlorantraniliprol 18.5 SC @ 375ml/ha was superior when it was sprayed at 30 DAP and 60 DAP as recorded maximum germination (33.7 %), least cumulative incidence of ESB (5.28%) and highest yield (85.8 t/ha) followed by chlorantraniliprol 0.4 G and flubendiamide had 32.3 per cent, 6.05 per cent, 84.5t/ha and 30.9 per cent, 6.78 per cent and 83.3t/ha, respectively. However, all the remaining treatments were significantly superior over control. The per cent incidence, yield and quality parameter were in order of performance were chlorantraniliprole 18.5SC > chlorantraniliprole 0.4G > flubendiamide 39.35 SC > Fipronil 0.3G> Carbofuran 3 G> Phorate 10 G> Spinosad 45SC (Table-37.3).

4. CSRS, MPKV, Padegaon (M.S.)

The bioefficacy of newer insecticides for the management of sugarcane early shoot borer revealed that the treatment with soil application of chlorantraniliprole 0.4 G @ 22.5 kg / ha at the time of planting and 60 DAP was found most effective against early shoot borer on sugarcane with least cumulative incidence of early shoot borer (18.36 per cent) and recorded highest yield (128.89 t / ha) over rest of the treatments (Table-37.4).

5. Vasantdada Sugar Institute (VSI), Pune (M.S.)

The treatment of soil application of chlorantranilliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP or spraying of chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 and 60 DAP or soil application of fipronil 0.3 G @25 kg/ha at the time of planting and 60 DAP or spraying of spinosad 45% SC @ 90ml/ha at 30 and 60 DAP were found best for management of early shoot borer. Moreover, soil application of chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP or spraying of chlorantraniliprole 18.5 SC @ 375 ml/ha at 30 and 60 DAP or Spraying of Spinosad 45% SC @ 90 ml/ha at 30 and 60DAP or Fipronil 0.3 G @25 kg/ha at the time of planting and 60 DAP or spraying of flubendiamide 39.35% @ 250ml/ha at 30 and 60DAP were found best for the management of early shoot borer in sugarcane (Table-37.5).

6. ZARS, JNKVV, Powarkheda (M.P.)

The treatment of chlorantraniliprole 0.4 G @ 22.5 kg /ha at the time of planting and 60 DAP (SA) and chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (S) found to reduced the natural infestation of ESB effectively (82.11 and 80.74%, respectively) with increased cane yield by 21.89 and 19.61 per cent, respectively (Table-37.6).

7. MSRS, NAU., Navsari (Gujarat)

The treatment of soil application of chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP recorded the minimum cumulative per cent incidence (13.82%) with highest millable cane yield (125.49 t/ha) and it was at par with spraying of chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (122.54 t/ha), soil application of fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (117.74), spraying of flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (115.90 t/ha) and spraying of spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (114.79 t/ha). The maximum cumulative per cent incidence of early shoot borer (34.54%) with lowest cane yield (76.25t/ha) was recorded in untreated control. The brix per cent, sucrose per cent, purity per cent and C.C.S per cent were found non- significant [Table-37.7 (a) to 37.7 (b)].

8. ZARS, UAS, Mandya (Karnataka)

Among the five new insecticides tested against sugarcane early shoot borer, soil application of chlorantraniliprole 0.4G @ 22.5kg/ha at the time of planting and 60 DAP, spray application of chlorantraniliprole 18.5SC @ 375ml/ha and flubendiamide 39.35SC at 30 and 60 DAP were found effective in management of early shoot borer (Table- 37.8).

9. RARS, ANGRAU, Anakapalle (A.P.)

Among eight treatments, soil application of chlorantraniliprole 0.4G @ 22.5kg/ha (2.31%DH), fipronil 0.3G @ 25kg/ha (5.40 %DH) at planting and 60 days after planting (DAP) significantly reduced the incidence of early shoot borer compared to untreated control (30.66%) and were statistically at par with each other. The next best treatments in reducing the incidence of early shoot borer were spraying of chlorantraniprole18.5SC @ 375ml/ha (7.15%) and flubendiamide 39.35SC @ 125ml/ha (7.52%) at 30 and 60 DAP. The highest number of millable canes were recorded in soil application of chlorantraniliprole 0.4 G @ 22.5kg/ha (58951/ha) compared to untreated control (52778/ha). The highest cane yield was recorded in chlorantraniliprole 0.4G @ 22.5kg/ha (86.46 t/ha) compared to untreated control (75.65t/ha) and was statistically at par with fipronil 0.3G @ 25kg/ha (85.82 t/ha), chlorantraniliprole 18.5SC @ 375ml/ha (84.92 t/ha) and flubendiamide 39.35SC @ 125ml/ha (84.00/ha). However, no significant differences were observed among various growth parameters (Table-37.9).

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Table-4.1.1: Reaction of zonal varieties/genotypes against borer pests of sugarcane at Kapurthala (Punjab) (2015-16)

Sr. No.	Varieties/ Genotypes	Early shoot borer (%)		Top borer incidence (%)				Stalk borer			
		Cumulative per cent incidence	Reaction	III Brood	IV Brood	Cumulative	Reaction	Incidence (%)	Intensity (%)	Infestation index	Reaction
	IVT E (Initial Varietal Trial Early)										
1	CoH 12026	9.93	LS	4.21	3.88	8.09	LS	12.00	1.13	0.14	LS
2	Co 12027	7.12	LS	5.50	5.88	11.39	MS	9.33	1.15	0.11	LS
3	CoH 12261	8.98	LS	3.26	4.35	7.61	LS	13.33	1.11	0.15	LS
4	CoLk 12201	10.16	LS	8.75	1.18	9.93	LS	12.00	1.50	0.18	LS
5	CoLk 12202	2.81	LS	8.43	1.20	9.64	LS	12.00	1.17	0.14	LS
6	CoLk 12203	9.73	LS	5.56	5.26	10.82	MS	10.67	1.58	0.17	LS
7	CoLk 12204	15.11	MS	8.64	3.30	11.94	MS	12.00	1.17	0.14	LS
8	CoPant 12221	17.47	MS	8.14	1.16	9.30	LS	8.00	1.25	0.10	LS
9	CoPant 12222	9.80	LS	6.17	2.47	8.64	LS	6.67	1.00	0.07	LS
10	CoS 12231	11.51	LS	6.25	3.75	10.00	MS	10.67	1.08	0.12	LS
CK	Co 64	10.37	LS	7.50	3.26	10.76	MS	10.67	1.17	0.12	LS
	CoPant 84211	12.24	LS	7.14	2.11	9.25	LS	10.67	1.25	0.13	LS
	Co 238	10.00	LS	9.47	6.32	15.79	MS	12.00	1.00	0.12	LS
	AVT E I P (Advanced Varietal Trial Early I Plant)										
1	CoH 11262	9.52	LS	2.25	8.34	5.56	LS	12.00	1.17	0.14	LS
2	CoLk 11201	10.28	LS	4.94	8.78	3.45	LS	16.00	1.33	0.21	LS
3	CoLk 11202	7.81	LS	5.26	12.76	6.67	LS	13.33	1.42	0.19	LS
4	CoLk 11203	8.39	LS	3.37	8.37	5.75	LS	16.00	1.17	0.19	LS
CK	CoJ 64	9.76	LS	4.12	10.01	4.60	LS	9.33	1.33	0.12	LS
	CoPant 84211	11.95	LS	4.88	10.98	8.75	LS	13.33	1.25	0.17	LS
	Co 238	10.29	LS	5.26	14.46	5.56	LS	12.00	1.42	0.17	LS
	AVT E II P (Advanced Varietal Trial Early II Plant)										
1	Co 10035	10.00	LS	5.56	3.33	8.89	LS	12.00	1.08	0.13	LS
2	CoH 10261	8.25	LS	3.45	3.45	6.90	LS	10.67	1.17	0.12	LS
3	CoS 10231	9.17	LS	6.67	2.38	9.05	LS	18.67	1.50	0.28	LS

CK	CoJ 64	10.37	LS	5.75	5.56	11.30	MS	12.00	1.17	0.14	LS
	CoPant 84211	11.04	LS	4.60	5.00	9.60	LS	13.33	1.17	0.16	LS
	Co 238	9.18	LS	8.75	8.64	17.39	MS	9.33	1.58	0.15	LS
	IVT ML (Initial Varietal Trial Midlate)										
1	Co 12028	9.41	LS	4.60	3.49	8.09	LS	12.00	1.17	0.14	LS
2	Co 12029	9.09	LS	4.82	2.41	7.23	LS	10.67	0.92	0.10	LS
3	CoH 12262	15.19	MS	6.33	3.37	9.70	LS	9.33	1.08	0.10	LS
4	CoH 12263	7.48	LS	7.37	3.53	10.90	MS	8.00	0.83	0.07	LS
5	CoLk 12205	10.66	LS	5.41	2.78	8.18	LS	12.00	1.17	0.14	LS
6	CoLk 12206	14.48	LS	4.55	4.88	9.42	LS	13.33	1.00	0.13	LS
7	CoPant 12223	15.51	MS	4.71	5.32	10.03	MS	12.00	1.33	0.16	LS
8	CoPant 12224	4.68	LS	4.82	4.82	9.64	LS	14.67	1.08	0.16	LS
9	CoPant 12225	16.67	MS	5.56	2.22	7.78	LS	12.00	1.25	0.15	LS
10	CoPant 12226	6.81	LS	6.32	3.16	9.47	LS	10.67	1.33	0.14	LS
11	CoPb 12181	13.21	LS	7.06	1.14	8.20	LS	17.33	1.08	0.19	LS
12	CoPb 12182	9.43	LS	9.38	0.00	9.38	LS	9.33	1.50	0.14	LS
13	CoPb 12211	12.01	LS	5.75	4.08	9.83	LS	16.00	1.25	0.20	LS
14	CoPb 12212	9.12	LS	5.56	0.00	5.56	LS	10.67	1.17	0.12	LS
15	CoS 12232	8.61	LS	3.33	5.56	8.89	LS	14.67	1.42	0.21	LS
CK	CoS 767	10.54	LS	4.88	2.74	7.62	LS	12.00	0.92	0.11	LS
	CoS 8436	9.84	LS	5.32	3.57	8.89	LS	9.33	1.08	0.10	LS
	CoPant 97222	9.48	LS	4.17	5.21	9.38	LS	13.33	1.08	0.14	LS
	AVT ML I P (Advanced Varietal Trial Midlate I Plant)										
1	Co 11027	12.54	LS	6.38	3.57	9.95	LS	14.67	1.25	0.18	LS
2	CoH 11263	10.58	LS	6.82	3.41	10.23	MS	12.00	1.33	0.16	LS
3	CoLk 11204	9.69	LS	6.49	1.30	7.79	LS	13.33	1.25	0.17	LS
4	CoLk 11206	9.80	LS	6.67	3.70	10.37	MS	16.00	1.25	0.20	LS
5	CoPb 11214	13.25	LS	5.56	3.49	9.04	LS	10.67	1.33	0.14	LS
6	CoPb 11232	9.59	LS	5.95	3.61	9.57	LS	13.33	1.00	0.13	LS
CK	CoS 767	9.76	LS	5.32	2.53	7.85	LS	10.67	1.00	0.11	LS
	CoS 8436	9.27	LS	4.17	4.71	8.87	LS	13.33	1.25	0.17	LS

	CoPant 97222	8.85	LS	5.05	2.17	7.22	LS	12.00	1.33	0.16	LS
	AVT ML II P (Advanced Varietal Trial Midlate II Plant)										
1	Co 10036	12.20	LS	5.68	2.27	7.95	LS	12.00	1.25	0.15	LS
2	CoH 10262	4.61	LS	6.49	2.22	8.72	LS	14.67	1.17	0.17	LS
3	CoPant 10221	13.92	LS	7.84	2.15	9.99	LS	12.00	1.08	0.13	LS
4	CoPb 10181	2.40	LS	3.41	3.41	6.82	LS	6.67	1.33	0.09	LS
5	CoPb 10182	7.50	LS	3.90	3.90	7.79	LS	12.00	1.00	0.12	LS
CK	CoS 767	9.83	LS	4.90	4.94	9.84	LS	13.33	1.17	0.16	LS
	CoS 8436	10.30	LS	6.82	4.65	11.47	MS	10.67	1.00	0.11	LS
	CoPant 97222	9.48	LS	3.90	4.82	8.72	LS	14.67	1.25	0.18	LS

Table-4.1.2: Reaction of zonal varieties/genotypes against insect pests of sugarcane at SBI-Karnal (2015-16)

Sr. No.	Genotypes	Shoot Borer incidence (%)	Reaction	Top Borer incidence (%)	Reaction	Root borer incidence (%)	Reaction	Stalk borer intensity (%)	Stalk borer infestation index	Reaction
	AVT E I P									
1	Co 05011	1.1	LS	0.1	LS	27.5	MS	3.1	0.4	LS
2	CoS 11232	1.7	LS	0.2	LS	51.4	HS	5.6	0.2	LS
3	CoPb 11214	1.4	LS	0.0	LS	45.1	HS	7.2	0.7	LS
4	CoLk 11206	1.9	LS	0.7	LS	37.4	HS	13.2	1.1	LS
5	CoLk 11204	2.0	LS	0.1	LS	21.2	MS	2.6	0.1	LS
6	CoH 11263	1.5	LS	0.0	LS	22.2	MS	18.3	1.5	LS
7	Co 11027	1.8	LS	0.0	LS	16.9	MS	13.3	0.6	LS
8	Co 0238	1.1	LS	0.7	LS	29.5	MS	6.2	0.6	LS
9	CoLk 11203	1.3	LS	0.2	LS	34.4	HS	11.4	1.5	LS
10	CoLk 11202	1.6	LS	0.0	LS	18.2	MS	3.3	0.1	LS
11	CoLk 11201	1.0	LS	0.2	LS	33.3	HS	6.7	0.1	LS
12	CoH 11262	1.4	LS	0.0	LS	37.6	HS	7.2	0.7	LS
	AVT E II P									
1	CoS 8436	0.91	LS	0.25	LS	50.0	HS	6.9	1.2	LS
2	CoPb 10182	1.00	LS	0.16	LS	50.0	HS	6.1	0.2	LS
3	CoPb 10181	1.57	LS	0.00	LS	43.3	HS	11.6	3.1	MS
4	CoPant 10221	0.95	LS	0.00	LS	20.0	MS	7.1	0.9	LS
5	CoH 10262	0.96	LS	0.00	LS	43.3	HS	5.9	1.0	LS
6	Co 10036	1.14	LS	0.25	LS	33.3	HS	4.6	0.3	LS
7	CoS 10231	1.28	LS	0.00	LS	43.3	HS	12.4	2.9	MS
8	CoH 10261	1.49	LS	0.00	LS	43.3	HS	11.1	1.5	LS
9	Co 0238	0.53	LS	1.34	LS	20.5	MS	6.5	0.4	LS
10	Co 10035	1.65	LS	0.27	LS	56.7	HS	2.5	0.2	LS
	Ratoon									
1	Co 10035	2.6	LS	3.2	LS	38.6	HS	0.0	0.0	LS
2	Co 0238	2.0	LS	6.5	LS	31.5	HS	9.7	0.3	LS
3	CoH 10261	0.9	LS	3.1	LS	42.3	HS	4.2	0.1	LS
4	CoS 10231	3.2	LS	5.2	LS	33.1	HS	0.0	0.0	LS

5	Co 10036	2.7	LS	2.1	LS	29.3	HS	9.2	0.6	LS
6	CoH 10262	3.4	LS	3.1	LS	34.3	HS	8.7	0.9	LS
7	CoPant 10221	2.6	LS	4.3	LS	43.2	HS	14.4	1.8	LS
8	CoPb 10181	3.0	LS	6.2	LS	37.6	HS	11.3	1.7	LS
9	CoPb 10182	2.5	LS	2.3	LS	31.4	HS	11.1	0.2	LS
10	CoS 8436	2.2	LS	3.3	LS	33.3	HS	12.6	2.1	MS

Table-4.1.3: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Shahjahanpur (2015-16)

Sr. No.	Varieties/ Genotype	Early shoot borer (% incidence)		Top borer (% incidence)		Stalk borer	
		Cumulative	Reaction	At harvest	Reaction	Infestation index	Reaction
	AVT E I P						
1	CoLk 11201	28.28	MS	24.00	HS	1.09	LS
2	CoLk 11202	32.73	HS	36.00	HS	0.95	LS
3	CoLk 11203	19.41	MS	24.00	HS	0.60	LS
4	CoH 11262	37.26	HS	38.67	HS	1.46	LS
CK	Co 0238	21.76	MS	40.00	HS	1.08	LS
	CoJ 64	25.00	MS	17.33	MS	0.32	LS
	AVT E II P						
1	CoS 10231	22.22	MS	21.33	HS	0.83	LS
2	CoH 10261	28.87	MS	16.00	MS	1.96	LS
3	Co 10035	29.29	MS	25.33	HS	1.33	LS
CK	CoPant 84211	28.81	MS	13.33	MS	1.54	LS
	CoJ 64	27.31	MS	33.33	HS	1.34	LS
	AVT E R						
1	CoS 10231	18.56	MS	21.33	HS	1.16	LS
2	CoH 10261	24.71	MS	17.33	MS	2.14	MS
3	Co 10035	14.14	LS	18.67	MS	1.62	LS
CK	CoS 8436	26.66	MS	17.33	MS	1.80	LS
	CoPant 97222	23.07	MS	26.67	HS	1.73	LS
	AVT ML I P						
1	Co 11027	8.50	LS	12.00	MS	0.83	LS
2	CoH 11263	17.33	MS	25.33	HS	0.76	LS
3	CoPb11214	22.48	MS	28.00	HS	0.54	LS
4	CoLk 11204	17.74	MS	14.67	MS	0.57	LS
5	CoLk 11206	22.27	MS	17.33	MS	0.41	LS
6	CoS 11232	17.18	MS	32.00	HS	1.26	LS
CK	CoS 767	25.97	MS	21.33	HS	0.86	LS
	CoS 8436	19.45	MS	21.33	HS	0.84	LS
	CoPant 97222	17.22	MS	14.67	MS	1.36	LS

	AVT ML II P						
1	CoPb 10181	39.63	HS	16.00	MS	0.94	LS
2	CoPb 10182	22.16	MS	18.67	MS	1.32	LS
3	CoH 10262	29.71	MS	21.33	HS	0.29	LS
4	CoPant 10221	26.69	MS	26.67	HS	0.89	LS
5	Co10036	26.44	MS	26.67	HS	0.97	LS
CK	CoS 767	25.76	MS	26.67	HS	0.80	LS
	CoS 8436	30.27	HS	21.33	HS	1.63	LS
	CoPant 97222	34.36	HS	13.33	MS	2.32	MS
	AVT ML R						
1	CoPb 10181	29.77	MS	17.33	MS	0.78	LS
2	CoPb 10182	27.27	MS	22.67	HS	1.68	LS
3	CoH 10262	27.93	MS	22.67	HS	0.47	LS
4	CoPant 10221	36.96	HS	18.67	MS	1.02	LS
5	Co 10036	25.06	MS	24.00	HS	1.32	LS
CK	CoS 767	20.47	MS	24.00	HS	0.87	LS
	CoS 8436	26.03	MS	24.00	HS	1.91	LS
	Co Pant 97222	26.85	MS	13.33	MS	2.23	MS

Table-4.1.4: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Lucknow (2015-16)

S.N	Genotypes	Top borer			Stalk borer				Internode Borer			
		III Brood incidence	IV Brood incidence	Reaction*	Incidence (%)	Intensity (%)	Infestation index	Reaction	Incidence (%)	Intensity (%)	Infestation index	Reaction
	AVT E											
1	Co10035	4.67	22.50	HS	4.20	1.98	0.08	LS	10.80	3.96	0.42	LS
2	CoH10261	5.27	37.25	HS	8.80	3.24	0.28	LS	14.82	6.48	0.96	LS
3	CoS10231	8.03	8.37	LS	5.65	3.58	0.19	LS	7.68	3.58	0.24	LS
4	CoLk11201	7.55	21.00	HS	2.90	1.82	0.05	LS	2.09	1.82	0.04	LS
5	CoLk11202	13.29	21.06	HS	3.26	1.73	0.06	LS	10.61	5.19	0.54	LS
6	CoLk11203	14.87	27.24	HS	2.25	2.07	0.05	LS	10.46	6.21	0.65	LS
CK	CoJ64	2.27	28.80	HS	2.36	1.60	0.04	LS	5.73	1.60	0.09	LS
	AVT ML											
1	Co10036	5.51	43.93	HS	1.64	1.97	0.03	LS	4.11	1.97	0.08	LS
2	CoPant10221	3.16	43.22	HS	6.39	1.74	0.11	LS	6.5	3.48	0.23	LS
3	CoH10262	7.31	6.21	LS	13.48	5.28	0.71	LS	14.57	3.52	0.51	LS
4	CoPb10182	8.79	27.10	HS	3.03	1.97	0.06	LS	9.01	5.91	0.53	LS
5	CoLk11204	5.14	32.48	HS	1.58	1.65	0.03	LS	8.35	6.60	0.55	LS
6	CoPb10181	5.91	33.47	HS	0.95	1.81	0.02	LS	4.44	1.81	0.08	LS
7	CoH11263	6.24	39.29	HS	1.45	1.55	0.02	LS	3.76	1.55	0.06	LS
8	CoLk11206	16.63	35.14	HS	8.34	3.68	0.31	LS	12.42	7.36	0.91	LS
9	CoPb11214	3.75	26.74	HS	1.94	1.85	0.03	LS	3.33	1.85	0.06	LS
10	CoS11232	6.79	18.82	MS	7.36	1.41	0.10	LS	5.29	2.82	0.15	LS
11	CoPant 97222	3.64	25.34	HS	4.30	1.93	0.08	LS	4.24	3.86	0.16	LS
CK	CoS767	6.71	33.82	HS	4.03	2.26	0.09	LS	7.15	4.52	0.32	LS
Figures in parentheses are arcsine transformed values while those outside are original values									***Reaction based on IV brood incidence.**			

Table-4.1.5: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Pusa (2015-16)

Sr. No	Varieties/ genotypes	Early shoot borer (% incidence)						Top borer (% incidence)			Stalk borer				Root borer	
		30 DAP	60 DAP	90 DAP	120 DAP	Cum	Reaction*	III Brood	IV Brood	Reaction **	% incidence	% intensity	Infestation index	Reaction	% incidence	Reaction
	IVT E															
1	Colk 1207	0.00	13.88	7.14	3.33	10.76	LS	8.70	9.14	LS	4.00	0.00	0.19	LS	7.46	LS
2	Colk 1208	0.00	13.09	8.08	3.93	13.66	LS	8.94	10.63	MS	0.00	0.00	0.00	LS	7.98	LS
3	CoP 12436	0.00	7.73	6.36	3.77	10.52	LS	8.13	9.47	LS	5.33	0.41	0.20	LS	7.45	LS
4	CoP 12437	11.20	8.11	6.51	5.06	13.79	LS	8.02	8.84	LS	0.00	0.00	0.00	LS	7.15	LS
5	CoSe 12451	7.72	8.37	8.95	4.87	15.52	MS	8.42	9.14	LS	2.66	0.00	0.13	LS	8.35	LS
CK	BO 130	5.73	6.50	5.35	4.76	14.21	LS	6.64	8.56	LS	0.00	0.00	0.00	LS	8.18	LS
	CoSe 95422	6.56	7.85	8.70	5.65	16.50	MS	8.46	10.24	MS	0.00	0.00	0.00	LS	8.89	LS
	AVT E I P															
1	CoSe 10451	0.00	7.78	6.63	2.10	13.04	LS	7.76	8.36	LS	0.00	0.00	0.00	LS	7.71	LS
2	CoSe 10452	10.19	8.23	8.95	4.32	15.89	MS	8.80	10.24	MS	2.66	3.99	0.10	LS	8.27	LS
3	CoSe 10453	0.00	7.75	6.61	2.43	9.77	LS	8.33	9.43	LS	0.00	0.00	0.00	LS	9.44	LS
CK	BO 91	0.00	9.40	8.72	3.57	12.50	LS	7.41	9.36	LS	0.00	0.00	0.00	LS	9.34	LS
	CoP 9301	10.53	7.93	7.74	4.10	14.17	LS	7.69	9.88	LS	4.00	8.03	0.32	LS	9.61	LS
	CoSe 92423	13.68	14.80	7.56	3.31	15.78	MS	8.65	10.46	MS	5.33	9.11	0.48	LS	10.74	LS
	IVT ML															
1	Colk 09204	0.00	8.37	8.74	2.64	12.69	LS	9.09	10.46	MS	1.33	4.12	0.05	LS	8.56	LS
2	Colk 12209	14.48	8.66	8.69	3.49	15..07	MS	9.44	11.35	MS	6.66	9.57	0.63	LS	8.70	LS
3	CoP 12438	11.20	9.22	7.47	2.66	14.06	LS	7.32	8.74	LS	0.00	0.00	0.00	LS	7.75	LS
4	CoP 12439	10.06	6.15	7.21	3.90	11.62	LS	8.41	9.38	LS	0.00	0.00	0.00	LS	8.51	LS
5	CoP 12452	0.00	11.66	7.86	2.74	10.83	LS	8.59	9.48	LS	5.33	9.25	0.49	LS	7.66	LS

6	CoSe 12453	0.00	9.78	6.53	2.87	11.4	LS	8.44	9.39	LS	0.00	0.00	0.00	LS	7.62	LS
CK	BO 91	0.00	9.40	8.72	3.57	12.50	LS	7.41	9.36	LS	0.00	0.00	0.00	LS	9.34	LS
	CoP 9301	10.53	7.93	7.74	4.10	14.17	LS	7.69	9.88	LS	4.00	8.03	0.32	LS	9.61	LS
	CoSe 92423	13.68	14.80	7.56	3.31	15.78	MS	8.65	10.46	MS	5.33	9.11	0.48	LS	10.74	LS
	IVT ML I P															
1	BO 155	6.56	9.03	6.16	2.23	12.84	LS	6.84	8.60	LS	0.0	0.00	0.00	LS	7.47	LS
2	CoP 11439	0.00	7.63	6.56	2.58	9.52	LS	7.74	9.09	LS	1.33	4.54	0.06	LS	8.61	LS
3	CoP 11440	8.37	5.23	6.21	3.19	12.35	LS	8.26	9.32	LS	0.00	0.00	0.00	LS	8.30	LS
4	CoSe 11453	0.00	10.24	8.86	2.72	12.50	LS	8.87	10.38	MS	4.00	5.67	0.22	LS	8.45	LS
5	CoSe 11454	0.00	8.88	8.18	5.08	10.76	LS	8.80	9.42	LS	0.00	0.00	0.00	LS	8.82	LS
6	CoSe 11455	0.00	10.74	8.42	3.23	11.36	LS	8.84	9.48	LS	0.00	0.00	0.00	LS	9.40	LS
7	CoSe 11456	13.66	9.73	6.68	4.76	15.06	MS	8.72	9.31	LS	0.00	0.00	0.00	LS	9.36	LS
CK	BO 91	0.00	9.40	8.72	3.57	12.50	LS	7.41	9.36	LS	0.00	0.00	0.00	LS	9.34	LS
	CoP 9301	10.53	7.93	7.74	4.10	14.17	LS	7.69	9.88	LS	4.00	8.03	0.32	LS	9.61	LS
	CoSe 92423	13.68	14.80	7.56	3.31	15.78	MS	8.65	10.46	MS	5.33	9.11	0.48	LS	10.74	
	AVT ML															
1	CoSe 10451	7.49	7.78	6.63	2.10	13.04	LS	8.25	9.56	MS	2.66	5.33	0.14	LS	10.50	LS
2	CoSe 10452	10.19	8.23	8.95	4.32	15.89	MS	8.05	9.22	LS	0.00	0.00	0.00	LS	10.33	LS
3	CoSe 10453	0.00	7.75	6.61	2.43	9.77	LS	8.86	10.41	LS	0.00	0.00	0.00	LS	10.67	LS
CK	BO 91	0.00	9.40	8.72	3.57	12.50	LS	7.41	9.36	LS	0.00	0.00	0.00	LS	9.34	LS
	CoP 9301	10.53	7.93	7.74	4.12	14.17	LS	7.69	9.88	LS	4.00	8.03	0.32	LS	9.61	LS
	CoSe 92423	13.68	14.80	7.56	3.32	15.78	MS	8.65	10.46	MS	5.33	9.11	0.48	LS	10.74	LS
***Reaction is based on cumulative per cent incidence.** ****Reaction based on IV brood incidence**																

Table-4.1.6: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Seorahi (2015-16)

Sr. No.	Varieties/ Genotype	Early shoot borer (% Incidence)		Top borer (% Incidence)		Root borer		Stalk borer	
		Cumulative	Reaction	At harvest	Reaction	Per cent incidence	Reaction	Infestation index	Reaction
1	2	3	4	5	6	7	8	9	10
	AVT E I P								
1	CoP11436	7.77	LS	6.25	LS	4.36	LS	0.18	LS
2	CoP11437	7.89	LS	7.31	LS	3.67	LS	0.17	LS
3	CoP11438	8.43	LS	8.92	LS	3.57	LS	0.12	LS
4	CoSe 11451	8.98	LS	7.33	LS	3.57	LS	0.10	LS
CK	BO130	9.15	LS	8.41	LS	3.65	LS	0.11	LS
	CoSe95422	9.80	LS	9.60	LS	4.05	LS	0.16	LS
	AVT ML I P								
1	BO155	11.11	LS	6.08	LS	3.79	LS	0.09	LS
2	CoSe11453	8.66	LS	4.95	LS	2.50	LS	0.05	LS
3	CoSe11454	5.66	LS	6.71	LS	3.49	LS	0.08	LS
4	CoSe11455	6.91	LS	6.25	LS	2.37	LS	0.13	LS
CK	BO91	8.60	LS	5.63	LS	2.91	LS	0.07	LS
	CoP9301	8.16	LS	7.20	LS	3.23	LS	0.12	LS
	CoSe92423	7.51	LS	4.95	LS	2.50	LS	0.08	LS
	AVT ML II P								
1	CoSe10451	8.49	LS	5.12	LS	4.36	LS	0.10	LS
2	CoSe10452	9.02	LS	5.21	LS	3.67	LS	0.15	LS
3	CoSe10453	8.84	LS	4.72	LS	3.57	LS	0.08	LS
CK	BO91	8.13	LS	6.66	LS	3.57	LS	0.12	LS
	CoP9301	6.81	LS	5.83	LS	3.65	LS	0.15	LS
	CoSe92423	8.69	LS	5.26	LS	4.05	LS	0.10	LS

Table-4.1.7: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Akola (2015-16)

Sr. No.	Varieties/ Genotype	Early shoot borer		Scale insect			Pyrilla	
		Per cent incidence	Reaction	Per cent incidence	Per cent intensity	Reaction	Per cent incidence	Reaction
1	2	3	4	5	6	7	8	9
	AVT E I P							
1	Co10004	2.65	LS	58	18.36	MS	0.30	LS
2	Co10005	5.03	LS	62	15.31	MS	0.65	LS
3	Co10006	9.59	LS	68	7.54	LS	0.33	LS
4	Co10024	4.60	LS	50	6.67	LS	0.48	LS
5	Co10026	3.10	LS	44	6.03	LS	0.38	LS
6	Co10027	3.89	LS	52	7.02	LS	0.65	LS
7	CoT10366	5.36	LS	62	19.64	MS	0.48	LS
8	CoT10367	3.13	LS	62	16.33	MS	0.73	LS
CK	Co 85004	4.96	LS	64	17.59	MS	0.65	LS
	Co 94008	4.99	LS	58	8.06	LS	0.65	LS
	CoC 671	4.21	LS	64	12.02	MS	0.60	LS
	AVT E II P							
1	Co09004	4.25	LS	50.67	6.96	LS	0.39	LS
2	Co09007	5.14	LS	49.33	7.37	LS	0.43	LS
3	CoN09072	5.23	LS	50.67	7.79	LS	0.30	LS
CK	Co85004	5.00	LS	61.33	14.96	MS	0.38	LS
	Co94008	5.47	LS	60.00	9.09	LS	0.38	LS
	CoC671	4.81	LS	60.00	9.78	LS	0.30	LS
	AVT ML I P							
1	Co09009	5.51	LS	72.00	16.83	MS	0.30	LS
2	Co10015	10.91	LS	68.00	13.27	MS	0.65	LS
3	Co10017	5.34	LS	82.00	24.09	MS	0.33	LS
4	Co10031	6.32	LS	68.00	23.84	MS	0.48	LS
5	Co10033	7.17	LS	68.00	14.01	MS	0.38	LS
6	CoM10083	12.05	LS	62.00	11.08	MS	0.65	LS
7	CoT10368	7.15	LS	88.00	19.21	MS	0.48	LS
8	CoT10369	6.66	LS	56.00	8.74	LS	0.73	LS
9	CoVC10061	8.06	LS	30.00	5.04	LS	0.65	LS

10	PI 10131	9.46	LS	36.00	5.38	LS	0.65	LS
11	PI 10132	8.99	LS	30.00	4.61	LS	0.60	LS
CK	Co86032	7.65	LS	42.00	5.90	LS	0.35	LS
	Co99004	6.26	LS	34.00	6.12	LS	0.28	LS
	IVT E I P							
1	Co12001	4.99	LS	40.00	6.86	LS	0.38	LS
2	Co12003	3.90	LS	36.00	5.96	LS	0.50	LS
3	Co12006	5.28	LS	36.00	6.58	LS	0.40	LS
4	Co12007	3.07	LS	40.00	10.47	MS	0.43	LS
5	Co12008	6.22	LS	36.00	7.44	LS	0.35	LS
6	CoM12081	4.92	LS	56.00	12.29	MS	0.35	LS
7	CoM12082	3.60	LS	72.00	29.02	MS	0.30	LS
8	CoM12083	2.00	LS	92.00	29.98	MS	0.30	LS
9	CoN12071	5.12	LS	52.00	6.04	LS	0.30	LS
10	CoN12072	4.23	LS	44.00	5.41	LS	0.30	LS
11	CoT12366	4.06	LS	36.00	3.23	LS	0.28	LS
12	CoT12367	3.48	LS	56.00	10.98	MS	0.35	LS
CK	Co 85004	2.93	LS	68.00	15.98	MS	0.35	LS
	Co 94008	3.50	LS	60.00	5.51	LS	0.33	LS
	CoC 671	3.65	LS	40.00	5.17	LS	0.25	LS
	IVT ML							
1	Co12009	5.06	LS	40.00	7.30	LS	0.33	LS
2	Co12012	2.90	LS	52.00	9.70	LS	0.40	LS
3	Co12014	2.69	LS	40.00	8.05	LS	0.35	LS
4	Co12016	3.08	LS	36.00	6.70	LS	0.35	LS
5	Co12017	1.93	LS	48.00	8.86	LS	0.40	LS
6	Co12019	3.08	LS	44.00	9.09	LS	0.43	LS
7	Co12021	2.54	LS	44.00	10.47	MS	0.40	LS
8	Co12024	3.87	LS	36.00	7.78	LS	0.43	LS
9	CoM12084	5.29	LS	40.00	8.05	LS	0.40	LS
10	CoM12085	5.21	LS	28.00	6.05	LS	0.35	LS
11	CoM12086	4.28	LS	44.00	9.26	LS	0.38	LS
12	CoN12073	2.21	LS	24.00	4.54	LS	0.35	LS
13	CoN12074	2.96	LS	32.00	8.12	LS	0.30	LS

14	CoT12368	3.81	LS	36.00	7.31	LS	0.30	LS
15	VSI12121	3.00	LS	48.00	10.70	MS	0.33	LS
CK	Co86032	3.42	LS	56.00	12.94	MS	0.38	LS
	Co99004	3.70	LS	48.00	7.97	LS	0.35	LS

Table-4.1.8: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Padegaon (2015-16)

Sr. No.	Genotypes/ Varieties	Early shoot borer		Internode borer				Mealy bug			Scale insect		
		Cumulative incidence	Reaction	% Incidence	% Intensity	% Infestation index	Reaction	% Incidence	% Intensity	Reaction	% Incidence	% Intensity	Reaction
	IVT E												
1	Co 12001	17.76	MS	40.00 (39.15)	2.82	1.13	MS	100.00 (90.00)	15.12	HS	23.33 (24.15)	2.10	MS
2	Co 12003	22.00	MS	66.67 (54.78)	5.78	3.85	HS	76.67 (66.15)	9.22	HS	26.67 (26.15)	3.55	MS
3	Co 12006	27.36	MS	53.33 (47.22)	3.74	1.99	HS	90.00 (78.93)	14.22	HS	10.00 (11.07)	1.42	LS
4	Co 12007	19.73	MS	46.67 (42.99)	3.89	1.81	HS	93.33 (77.71)	13.01	HS	03.33 (06.15)	0.50	LS
5	Co 12008	8.26	LS	46.67 (43.08)	3.05	1.42	HS	93.33 (81.15)	12.96	HS	00.00 (00.00)	0.00	LS
6	CoM 12081	16.62	MS	46.67 (43.08)	3.87	1.81	HS	100.00 (90.00)	10.90	HS	30.00 (28.07)	3.37	MS
7	CoM 12082	21.43	MS	43.33 (41.07)	3.09	1.34	HS	96.67 (83.85)	16.10	HS	26.67 (26.15)	3.47	MS
8	CoM 12083	27.03	MS	43.33 (41.07)	2.80	1.21	HS	93.33 (77.71)	13.67	HS	23.33 (24.15)	2.75	MS
9	CoN 12071	26.72	MS	63.33 (52.86)	4.45	2.82	HS	93.33 (81.15)	11.35	HS	13.33 (13.08)	1.57	MS
10	CoN 12072	19.44	MS	43.33 (40.86)	3.41	1.48	HS	83.33 (70.08)	14.53	HS	50.00 (45.00)	5.27	HS
11	CoT 12366	22.57	MS	60.00 (51.93)	4.84	2.90	HS	90.00 (78.93)	11.90	HS	16.67 (15.00)	1.79	MS
12	CoT 12367	27.64	MS	76.67 (61.22)	5.72	4.38	HS	100.00 (90.00)	17.08	HS	43.33 (41.15)	5.55	HS
CK	Co 85004	33.62	HS	50.00 (44.71)	2.86	1.43	HS	96.67 (83.85)	15.36	HS	40.00 (39.15)	3.93	HS
	Co 94008	38.28	HS	36.67 (36.85)	3.31	1.21	MS	76.67 (61.22)	8.08	HS	30.00 (28.08)	4.84	MS
	CoC 671	19.40	MS	43.33 (41.07)	3.05	1.32	HS	83.33 (75.00)	8.54	HS	20.00 (21.93)	2.68	MS
	IVT ML												
1	Co 12009	25.12	MS	36.67	2.58	0.94	MS	96.67	23.10	HS	20.00	2.32	MS

				(31.15)				(83.85)			(22.14)		
2	Co 12012	23.50	MS	40.00 (38.85)	2.16	0.86	MS	90.00 (78.93)	14.87	HS	43.33 (41.15)	4.29	HS
3	Co 12014	20.15	MS	46.67 (43.08)	4.42	2.06	HS	93.31 (81.15)	14.69	HS	13.33 (13.08)	1.97	MS
4	Co 12016	18.75	MS	40.00 (38.85)	2.78	1.11	MS	100.00 (90.00)	28.85	HS	00.00 (00.00)	0.00	LS
5	Co 12017	30.04	HS	56.67 (48.93)	3.14	1.78	HS	100.00 (90.00)	35.02	HS	26.67 (26.07)	3.44	MS
6	Co 12019	28.22	MS	50.00 (42.29)	3.52	1.76	HS	96.67 (83.85)	17.97	HS	00.00 (00.00)	0.00	LS
7	Co 12021	21.46	MS	40.00 (38.85)	3.26	1.30	MS	96.67 (83.85)	21.99	HS	16.67 (15.00)	1.97	MS
8	Co 12024	33.33	HS	56.67 (49.92)	5.09	2.88	HS	100.00 (90.00)	31.52	HS	16.67 (15.00)	2.34	MS
9	CoM 12084	30.92	HS	73.33 (59.71)	5.27	3.86	HS	83.33 (70.78)	18.11	HS	16.67(15.00)	1.78	MS
10	CoM 12085	29.65	MS	36.67 (37.22)	2.77	1.02	MS	100.00 (90.00)	14.39	HS	20.00 (16.92)	2.45	MS
11	CoM 12086	19.17	MS	43.33 (40.78)	3.37	1.46	HS	100.00 (90.00)	24.31	HS	13.33 (13.08)	1.66	MS
12	CoN 12073	16.85	MS	50.00 (45.00)	3.03	1.51	HS	100.00 (90.00)	22.18	HS	00.00 (00.00)	0.00	LS
13	CoN 12074	16.02	MS	46.67 (42.78)	3.07	1.43	HS	96.67 (83.85)	11.87	HS	13.39 (13.08)	1.43	MS
14	CoT 12368	21.37	MS	46.67 (42.99)	2.76	1.29	HS	96.67 (83.85)	18.87	HS	43.33 (41.15)	5.16	HS
15	VSI 12121	19.52	MS	53.33 (46.92)	4.36	2.32	HS	76.67 (62.71)	8.83	HS	00.00 (00.00)	0.00	LS
16	Co 86032	29.51	MS	40.00 (39.15)	2.24	0.89	MS	93.33 (81.15)	13.43	HS	00.00 (00.00)	0.00	LS
17	Co 99004	26.47	MS	60.00 (50.85)	4.36	2.61	HS	100.00 (90.00)	18.17	HS	13.39 (13.08)	1.08	MS
	AVT E I P												
1	Co 10004	26.76	MS	40.00 (39.06)	2.67	1.06	MS	76.67 (65.85)	7.73	HS	23.33 (24.15)	2.46	MS
2	Co 10005	12.63	LS	53.33 (47.01)	3.52	1.88	HS	56.67 (48.93)	4.75	HS	36.67 (37.14)	4.56	HS

3	Co 10006	24.39	MS	66.67 (54.78)	6.34	4.23	HS	60.00 (50.77)	5.96	HS	13.33 (13.08)	2.45	MS
4	Co 10024	20.00	MS	66.67 (55.08)	5.32	3.55	HS	50.00 (45.00)	4.91	HS	46.67 (43.08)	9.29	HS
5	Co 10026	20.21	MS	70.00 (62.01)	5.17	3.62	HS	46.67 (43.08)	3.89	HS	43.33 (41.15)	4.98	HS
6	Co 10027	14.34	LS	50.00 (44.92)	4.72	2.36	HS	83.33 (70.08)	10.76	HS	23.33 (24.15)	2.82	MS
7	CoT 10366	18.66	MS	50.00 (45.00)	3.93	1.96	HS	63.33 (52.86)	5.44	HS	63.33 (53.07)	11.56	HS
8	CoT 10367	25.10	MS	50.00 (45.08)	4.75	2.37	HS	50.00 (45.00)	4.53	HS	40.00 (39.23)	5.20	HS
CK	Co 85004	23.38	MS	30.00 (32.22)	2.30	0.69	MS	90.00 (75.00)	12.44	HS	03.33(06.15)	0.32	LS
	Co 94008	30.23	HS	56.67 (48.93)	4.21	2.39	HS	56.67 (50.01)	5.52	HS	26.67 (26.07)	3.22	MS
	CoC 671	22.96	MS	56.67 (48.93)	4.25	2.41	HS	56.67 (48.85)	5.31	HS	40.00 (39.15)	3.89	HS
	AVT E II P												
1	Co 09004	21.33	MS	43.33 (40.86)	5.23	2.62	HS	63.33 (53.07)	7.12	HS	00.00 (00.00)	0.00	LS
2	Co 09007	28.46	MS	46.67 (43.08)	3.28	1.53	HS	53.33 (47.22)	5.28	HS	50.00 (45.00)	6.20	HS
3	CoN 09072	17.28	MS	23.33 (28.29)	1.71	0.40	MS	80.00 (68.07)	18.59	HS	26.67 (26.07)	3.97	MS
CK	Co 85004	17.65	MS	33.33 (35.22)	3.19	1.06	MS	86.67 (72.78)	16.54	HS	36.67 (31.92)	5.71	HS
	Co 94008	34.71	HS	43.33 (41.07)	3.99	1.73	HS	43.33 (40.78)	3.01	HS	20.00 (22.14)	2.37	MS
	CoC 671	27.23	MS	63.33 (53.15)	5.74	3.63	HS	46.67 (43.08)	6.32	HS	33.33 (30.00)	4.32	MS
	AVT ML I P												
1	Co 09009	32.82	HS	70.00 (57.78)	6.29	4.40	HS	40.00 (38.07)	3.81	HS	43.33 (41.15)	5.78	HS
2	Co 10015	15.19	MS	43.33 (40.08)	2.67	1.16	HS	76.67 (65.85)	8.45	HS	43.33 (36.15)	9.22	HS
3	Co 10017	19.33	MS	53.33 (47.01)	3.91	2.07	HS	76.67 (61.92)	9.48	HS	33.33 (30.00)	3.97	MS

4	Co 10031	29.36	MS	60.00 (51.15)	4.10	2.46	HS	80.00 (68.07)	11.58	HS	00.00 (00.00)	0.00	LS
5	Co 10033	21.79	MS	36.67 (36.93)	3.01	1.10	MS	76.67 (66.15)	9.43	HS	00.00 (00.00)	0.00	LS
6	CoM 10083	25.76	MS	56.67 (49.63)	5.02	2.84	MS	93.33 (81.15)	18.61	HS	00.00 (00.00)	0.00	LS
7	CoT 10368	27.08	MS	50.00 (45.00)	3.96	1.98	HS	96.67 (83.85)	14.94	HS	26.67 (26.15)	3.83	MS
8	CoT 10369	23.95	MS	60.00 (51.15)	4.73	2.84	HS	76.67 (66.15)	9.32	HS	16.67 (15.00)	2.12	MS
9	CoVC 10061	26.84	MS	56.67 (49.22)	4.49	2.54	HS	63.33 (53.07)	7.82	HS	20.00 (22.14)	2.79	MS
10	PI 10131	29.20	MS	80.00 (63.93)	7.67	6.43	HS	76.67 (65.85)	7.72	HS	10.00 (11.07)	1.12	LS
11	PI 10132	31.53	HS	46.67 (43.08)	2.87	1.34	HS	86.67 (72.78)	11.84	HS	00.00 (00.00)	0.00	LS
12	Co 86032	24.58	MS	66.67 (60.00)	7.53	5.02	HS	73.33 (59.22)	7.44	HS	00.00 (00.00)	0.00	LS
13	Co 99004	30.32	HS	40.00 (38.85)	3.26	1.30	MS	70.00 (57.00)	8.57	HS	16.67 (15.00)	1.76	MS
	AVT E R												
1	Co 09004	12.03	LS	32.50 (34.71)	1.58	0.51	MS	95.00 (83.36)	25.24	HS	87.500 (72.11)	23.12	HS
2	Co 09007	10.83	LS	35.00 (36.00)	1.54	0.53	MS	92.50 (78.75)	13.62	HS	97.50 (85.39)	31.43	HS
3	CoN 09072	12.56	LS	30.00 (33.05)	1.85	0.55	MS	100.00 (90.00)	25.97	HS	77.50 (62.30)	15.95	HS
CK	Co 85004	10.73	LS	27.50 (31.39)	1.47	0.40	MS	100.00 (90.00)	33.86	HS	100.00 (90.00)	39.06	HS
	Co 94008	11.20	LS	45.00 (42.11)	2.47	1.11	HS	95.00 (80.78)	12.30	HS	82.50 (65.84)	15.83	HS
	CoC 671	9.51	LS	42.50 (40.67)	2.91	1.24	HS	97.50 (85.39)	15.89	HS	87.50 (75.88)	25.22	HS
Figures in parentheses are arcsine transformed values while those outside are original values													

Table-4.1.9: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Pune (2015-16)

Sr. No	Varieties/ genotype	Early shoot borer (% incidence)							Internode borer				Mealy bug		
		30 DAP	60 DAP	90 DAP	120 DAP	Cum	No. of bored plants/ha	Reaction*	% incidence	% intensity	Infestation index	Reaction	% incidence	% intensity	Reaction
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	IVT E														
1	Co 12001	0.00	0.00	2.78	6.00	5.56 (2.06)	11111	LS	10(2.62)	0.55	0.11	LS	2 (1.41)	0.11	LS
2	Co 12003	0.00	0.00	10.71	0.00	5.56 (2.06)	8333	LS	2 (1.41)	0.12	0.01	LS	0(0.71)	0.00	LS
3	Co 12006	0.00	3.57	0.00	15.38	17.11 (4.13)	30556	MS	8(2.83)	0.53	0.06	LS	2(1.41)	0.14	LS
4	Co 12007	0.00	0.00	0.00	5.66	5.00 (1.97)	8333	LS	4(2.12)	0.23	0.01	LS	0 (0.71)	0.00	LS
5	Co 12008	0.00	3.45	4.69	8.20	13.51 (3.72)	25000	LS	8(2.91)	0.63	0.05	LS	0 (0.71)	0.00	LS
6	CoM 12081	0.00	0.00	5.26	5.88	12.10 (3.52)	25000	LS	2(1.41)	0.12	0.01	LS	0 (0.71)	0.00	LS
7	CoM 12082	0.00	0.00	1.92	6.25	8.44 (2.88)	11111	LS	6(2.52)	0.36	0.03	LS	0 (1.41)	0.00	LS
8	CoM 12083	0.00	0.00	0.00	1.72	1.92 (1.40)	2778	LS	12(3.54)	0.99	0.12	LS	0(0.71)	0.00	LS
9	CoN 12071	0.00	0.00	0.00	8.77	8.83 (3.05)	13889	LS	2(1.41)	0.10	0.01	LS	0(0.71)	0.00	LS
10	CoN 12072	0.00	0.00	3.28	7.89	10.12 (3.25)	22222	LS	8(2.91)	0.46	0.04	LS	2(1.41)	0.12	LS
11	CoT 12366	0.00	0.00	1.89	2.86	4.11 (2.14)	8333	LS	4(2.12)	0.26	0.01	LS	2(1.41)	0.13	LS
12	CoT 12367	4.76	0.00	5.56	17.65	20.63 (4.56)	41667	MS	4(1.81)	0.23	0.02	LS	0(0.71)	0.00	LS
CK	Co 85004	0.00	0.00	0.00	4.17	5.76 (2.33)	11111	LS	2(1.41)	0.12	0.01	LS	0(0.71)	0.00	LS
	Co 94008	0.00	0.00	10.00	22.22	26.88 (5.23)	50000	MS	4(2.12)	0.25	0.01	LS	0(0.71)	0.00	LS
	CoC 671	0.00	0.00	9.09	7.55	17.06 (3.93)	22222	MS	2(1.41)	0.12	0.01	LS	0(0.71)	0.00	LS

	IVT ML														
1	Co 12009	0.00	0.00	2.94	8.93	9.22 (3.08)	16667	LS	8 (2.91)	0.50	0.04	LS	4.0 (2.12)	0.74	LS
2	Co 12012	0.00	2.50	6.58	9.70	13.67 (3.76)	52778	LS	2 (1.41)	0.28	0.01	LS	0.0 (0.71)	0.00	LS
3	Co 12014	0.00	0.00	0.00	5.26	8.33 (2.42)	8333	LS	8 (2.91)	0.54	0.04	LS	0.0 (0.71)	0.00	LS
4	Co 12016	0.00	0.00	0.00	14.81	13.75 (3.52)	22222	LS	18 (4.29)	1.49	0.27	LS	6.0 (2.52)	0.96	MS
5	Co 12017	0.00	0.00	0.00	8.45	8.74 (3.03)	16667	LS	4 (2.12)	0.26	0.03	LS	0.0 (0.71)	0.00	LS
6	Co 12019	0.00	0.00	0.00	5.26	5.16 (2.38)	8333	LS	2 (1.41)	0.15	0.01	LS	0.0 (0.71)	0.00	LS
7	Co 12021	0.00	12.12	0.00	5.71	11.10 (3.40)	22222	LS	18 (4.29)	1.66	0.3	LS	0.0 (0.71)	0.00	LS
8	Co 12024	0.00	0.00	8.57	37.50	37.09 (5.98)	58333	HS	6 (2.52)	0.38	0.03	LS	10.0 (2.62)	0.78	MS
9	Co 12084	0.00	0.00	5.77	9.09	13.60 (3.75)	22222	LS	4 (1.81)	0.28	0.02	LS	0.0 (0.71)	0.00	LS
10	CoM 12085	0.00	0.00	16.00	18.18	22.62 (4.35)	50000	MS	14 (3.80)	1.33	0.19	LS	6.0 (2.52)	0.84	MS
11	CoM 12086	0.00	0.00	2.38	25.00	21.42 (4.27)	41667	MS	10 (3.23)	0.63	0.07	LS	0.0 (0.71)	0.00	LS
12	CoN 12073	0.00	0.00	0.00	5.17	7.14 (2.28)	8333	LS	6 (2.52)	0.36	0.03	LS	10.0 (3.23)	1.44	MS
13	CoN 12074	0.00	3.57	2.94	12.50	17.41 (4.22)	19444	MS	6 (2.52)	0.49	0.04	LS	2.0 (1.41)	0.12	LS
14	CoT 12368	0.00	0.00	17.86	7.69	17.61 (4.00)	25000	MS	4 (1.81)	0.29	0.03	LS	0.0 (0.71)	0.00	LS
15	VSI 12121	0.00	0.00	2.13	11.11	11.56 (3.39)	25000	LS	10 (3.23)	0.60	0.06	LS	0.0 (0.71)	0.00	LS
CK	Co 86032	0.00	2.38	12.12	10.39	18.42 (4.26)	36111	MS	16 (4.03)	1.29	0.21	LS	4.0 (1.81)	0.26	LS
	Co 99004	0.00	0.00	0.00	5.26	4.76 (1.94)	5556	LS	2 (1.41)	0.13	0.01	LS	0.0 (0.71)	0.00	LS
	AVT E I P														
1	Co 10004	0.00	0.00	4.00	10.17	12.33	22222	LS	4	0.28	0.02	LS	8	0.68	MS

						(20.26)			(1.81)				(2.38)		
2	Co 10005	0.00	0.00	3.70	13.11	16.30 (23.58)	30556	MS	4 (1.81)	0.25	0.02	LS	6 (2.12)	0.63	MS
3	Co 10006	0.00	0.00	39.53	21.43	38.62 (38.32)	88889	HS	4 (1.81)	0.27	0.02	LS	2 (1.41)	0.33	LS
4	Co 10024	0.00	0.00	6.15	1.69	7.86 (15.53)	13889	LS	2 (1.41)	0.14	0.01	LS	0 (0.71)	0.00	LS
5	Co 10026	0.00	0.00	10.39	1.85	14.79 (21.68)	25000	LS	12 (3.54)	0.75	0.09	LS	0 (0.71)	0.00	LS
6	Co 10027	0.00	0.00	8.22	7.14	15.97 (23.53)	27778	MS	4 (2.12)	0.30	0.01	LS	12 (3.32)	1.79	MS
7	CoT 10366	0.00	0.00	8.47	9.09	18.45 (25.44)	25000	MS	4 (1.81)	0.28	0.02	LS	6 (2.52)	0.68	MS
8	CoT 10367	5.00	0.00	25.00	10.64	29.09 (32.23)	44444	MS	14 (3.80)	0.92	0.14	LS	10 (2.62)	1.81	MS
CK	Co 85004	0.00	0.00	6.56	6.49	11.15 (19.50)	25000	LS	4 (1.81)	0.30	0.03	LS	10 (3.09)	1.07	MS
	Co94008	0.00	0.00	20.00	7.69	19.64 (26.05)	36111	MS	4 (1.81)	0.29	0.03	LS	4 (1.81)	0.43	LS
	CoC 671	0.00	0.00	24.14	5.56	15.27 (22.33)	27778	MS	12 (3.49)	0.79	0.11	LS	8 (2.38)	1.66	MS
	AVT E II P														
1	Co 09004	0.00	2.50	9.30	12.09	20.61 (26.49)	13889	MS	2.0 (1.26)	0.14	0.01	LS	6 (2.02)	1.06	MS
2	Co 09007	0.00	0.00	14.15	6.35	16.98 (23.57)	15972	MS	3.0 (1.61)	0.20	0.01	LS	4 (1.81)	0.56	LS
3	CoN 09072	0.00	0.00	19.30	8.13	20.00 (25.83)	24306	MS	5.0 (2.16)	0.44	0.03	LS	12 (3.31)	1.74	MS
CK	Co 85004	0.00	1.89	4.08	8.93	14.28 (22.01)	11806	LS	6.0 (2.10)	0.58	0.08	LS	10 (3.16)	1.24	MS
	Co 94008	0.00	2.38	28.07	15.70	33.21 (34.90)	36111	HS	6.0 (2.10)	0.72	0.09	LS	2 (1.41)	0.20	LS
	CoC 671	0.00	0.00	5.56	12.40	17.69 (24.24)	15278	MS	15.0 (3.91)	1.04	0.16	LS	19 (4.18)	2.76	MS
	AVT ML I P														
1	Co 09009	0.00	0.00	29.69	9.80	34.56 (5.91)	66667	HS	4 (1.81)	0.28	0.02	LS	0.0 (0.71)	0.00	LS
2	Co 10015	0.00	0.00	16.36	7.02	19.72	36111	MS	2	0.15	0.01	LS	6.0(1.81)	0.90	MS

						(4.50)			(1.41)						
3	Co 10017	0.00	0.00	4.40	6.25	10.43 (3.30)	25000	LS	10 (3.23)	0.62	0.07	LS	2.0(1.41)	0.13	LS
4	Co 10031	0.00	0.00	10.42	2.86	10.94 (2.72)	19444	LS	2 (1.41)	0.16	0.01	LS	4.0(2.12)	0.31	LS
5	Co 10033	0.00	0.00	1.72	4.35	6.43 (2.60)	8333	LS	4 (2.12)	0.27	0.01	LS	0.0(0.71)	0.00	LS
6	CoM 10083	0.00	0.00	22.92	15.38	25.96 (4.81)	52778	MS	2 (1.41)	0.14	0.01	LS	18.0(4.29)	2.39	MS
7	CoT 10368	0.00	0.00	8.00	14.04	18.79 (4.30)	33333	MS	8 (2.83)	0.74	0.08	LS	0.0(0.71)	0.00	LS
8	CoT 10369	0.00	0.00	7.45	3.75	11.95 (3.48)	30556	LS	6 (2.52)	0.40	0.03	LS	2.0(1.41)	0.14	LS
9	Co Vc 10061	0.00	0.00	4.26	12.24	16.45 (4.09)	22222	MS	10 (2.52)	0.77	0.09	LS	8.0(2.52)	0.75	MS
10	PI 10131	0.00	0.00	3.85	12.28	16.13 (4.03)	25000	MS	4 (2.12)	0.26	0.01	LS	12.0(3.32)	1.08	MS
11	PI 10132	0.00	4.17	7.32	9.68	16.68 (4.09)	27778	MS	10 (2.62)	1.00	0.2	LS	2.0(1.41)	0.30	LS
CK	Co 86032	0.00	4.17	0.00	1.89	3.57 (1.74)	5556	LS	2 (1.41)	0.26	0.01	LS	2.0(1.41)	0.49	LS
	Co 99004	0.00	0.00	3.33	9.09	11.11 (2.74)	11111	LS	4 (1.81)	0.42	0.04	LS	8.0(2.83)	0.56	MS
	AVT E R														
1	Co 09004	0.00	7.61	4.05	1.23	8.08 (16.10)	10417	LS	3 (1.62)	0.17	0.01	LS	3.0 (0.71)	0.28	LS
2	Co 09007	4.92	2.65	4.44	0.42	6.00 (14.10)	10417	LS	16 (2.57)	0.88	0.23	LS	8.0 (1.06)	0.86	MS
3	CoN 09072	7.58	4.94	4.30	1.83	9.94 (16.55)	22222	LS	7 (2.77)	0.44	0.05	LS	9.0 (0.71)	1.19	MS
CK	Co85004	0.00	4.23	3.47	3.18	8.15 (16.26)	16667	LS	8 (2.77)	0.50	0.06	LS	12.0 (1.06)	1.38	MS
	Co 94008	1.47	1.74	4.86	1.03	7.14 (14.67)	9722	LS	14 (1.26)	0.90	0.14	LS	2.0 (0.71)	0.11	LS
	CoC 671	0.00	5.00	5.43	1.27	9.62 (15.94)	17361	LS	6 (3.12)	0.76	0.06	LS	13.0 (2.65)	1.33	MS

Figures in parenthesis are arcsine transformed values while those outside are original values. *Reaction based on cumulative per cent incidence.

Table-4.1.10: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Powarkheda (2015-16)

Sr. No.	Genotypes/varieties	ESB (% Infestation)	Reaction	Pyrilla/leaf	Reaction
	AVT E I P				
1	Co 10004	34.83	MS	9.73	MS
2	Co 10005	10.33	LS	18.63	MS
3	Co 10006	30.57	MS	10.9	MS
4	Co 10024	12.62	LS	15.88	MS
5	Co 10026	25.53	MS	16.3	MS
6	Co 10027	16.29	MS	15.07	MS
7	COT 10366	22.52	MS	14.23	MS
8	COT 10367	35.84	HS	9.77	MS
	IVT E				
1	Co 12001	24.29	MS	10.22	MS
2	Co 12003	26.02	MS	10.63	MS
3	Co 12006	23.08	MS	12.5	MS
4	Co 12007	19.59	MS	13.73	MS
5	Co 12008	16.68	MS	9.65	MS
6	CoM 12081	9.07	LS	10.37	MS
7	CoM 12082	23.63	MS	11.8	MS
8	CoM 12083	30.13	MS	10.03	MS
9	CoN 12071	14.23	LS	10.63	MS
10	CoN 12072	12.92	LS	13.25	MS
11	CoT 12366	13.02	LS	15.23	MS
12	CoT 12367	6.30	LS	10.43	MS
CK	Co 85004	12.77	LS	15.37	MS

	Co94008	21.26	MS	15.44	MS
	CoC 671	23.18	MS	16.23	MS
	Co JN 86-141	14.12	LS	9.68	MS
	IVT ML				
1	Co 12009	28.97	MS	14.60	MS
2	Co 12012	9.40	LS	15.72	MS
3	Co 12014	26.3	MS	12.58	MS
4	Co 12016	27.03	MS	10.18	MS
5	Co 12017	23.98	MS	10.78	MS
6	Co 12019	10.27	LS	16.82	MS
7	Co 12021	18.34	MS	18.23	MS
8	Co 12024	7.89	LS	19.10	MS
9	CoM 12084	19.94	MS	14.05	MS
10	CoM 12085	25.03	MS	9.87	MS
11	CoM 12086	13.75	LS	15.78	MS
12	CoN 12073	23.29	MS	11.25	MS
13	CoN 12074	23.07	MS	11.05	MS
14	CoT 12368	25.65	MS	10.35	MS
15	VSI 12121	20.92	MS	10.40	MS
CK	Co JN 86-600	16.35	MS	16.07	MS
	Co 86032	21.33	MS	10.52	MS
	Co 99004	22.68	MS	12.53	MS

Table-4.1.11(a): Reaction of zonal varieties/genotypes against insect pests of sugarcane at Navsari (2015-16)

Sr. No.	Varieties/ Genotype	Early shoot borer (% Incidence)						Reaction	Top borer (% Incidence)			Reaction*
		30 DAP	60 DAP	90 DAP	120 DAP	Cum	No. of bored plants/ha		5th month	7th month	At harvest	
1	2	3	4	5	6	7	8	9	10	11	12	13
	IVT E											
1	Co 12001	0.00	1.18 (6.24)	0.93 (5.53)	0.84 (5.26)	2.11	3525	LS	2.70 (9.46)	2.91 (9.82)	3.09 (10.12)	LS
2	Co 12003	0.00	0.00 (0.00)	0.00 (0.00)	0.73 (4.90)	1.33	2222	LS	1.61 (7.29)	1.69 (7.47)	2.65 (9.37)	LS
3	Co 12006	0.00	3.06 (10.07)	1.55 (7.15)	0.72 (4.87)	1.32	2194	LS	2.34 (8.80)	3.20 (10.30)	2.56 (9.21)	LS
4	Co 12007	0.00	0.00 (0.00)	0.00 (0.00)	0.88 (5.38)	1.41	2347	LS	1.94 (8.01)	1.94 (8.01)	3.03 (10.02)	LS
5	Co 12008	0.00	0.00 (0.00)	0.00 (0.00)	1.09 (5.99)	1.52	2525	LS	3.49 (10.77)	1.15 (6.16)	3.70 (11.09)	LS
6	Co M 12081	0.00	0.00 (0.00)	1.50 (7.03)	1.44 (6.89)	2.03	3421	LS	1.56 (7.17)	1.59 (7.24)	4.20 (11.83)	LS
7	Co M 12082	0.00	0.00 (0.00)	1.67 (7.43)	0.78 (5.07)	2.50	4167	LS	1.71 (7.51)	0.87 (5.35)	1.83 (7.77)	LS
8	Co M 12083	0.00	0.00 (0.00)	0.00 (0.00)	0.76 (5.00)	1.40	2331	LS	1.63 (7.34)	1.67 (7.43)	2.63 (9.33)	LS
9	Co N 12071	0.00	4.48 (12.22)	2.00 (8.13)	0.91 (5.47)	1.62	2697	LS	2.00 (8.13)	2.04 (8.21)	2.13 (8.39)	LS
10	Co N 12072	0.00	3.89 (11.38)	1.65 (7.38)	0.85 (5.29)	1.47	2697	LS	1.94 (8.01)	1.67 (7.43)	1.83 (7.77)	LS
11	Co T 12366	0.00	3.19 (10.29)	0.00 (0.00)	0.00 (0.00)	1.17	1956	LS	1.63 (7.34)	1.60 (7.27)	2.56 (9.21)	LS
12	Co T 12367	0.00	4.51 (12.26)	2.58 (9.24)	0.61 (4.48)	1.23	2058	LS	1.33 (6.62)	1.38 (6.75)	2.26 (8.65)	LS
CK	Co 85004	0.00	3.13 (10.19)	5.37 (13.40)	1.29 (6.52)	4.09	38889	LS	0.70 (4.80)	1.45 (6.92)	1.52 (7.08)	LS
	Co 94008	0.00	0.95 (5.59)	5.30 (13.31)	2.17 (8.47)	2.56	20370	LS	1.57 (7.20)	0.78 (5.07)	1.63 (7.34)	LS

	Co C 671	0.00	7.45 (15.84)	0.81 (5.16)	1.50 (7.03)	2.43	18520	LS	1.67 (7.43)	1.65 (7.38)	1.72 (7.54)	LS
	AVT E I P											
1	Co 10004	0.00	11.15 (19.51)	10.20 (18.63)	9.94 (18.38)	6.02	7407	LS	7.25 (15.62)	9.40 (17.85)	10.25 (18.67)	MS
2	Co 10005	0.00	12.35 (20.57)	11.60 (19.91)	10.25 (18.67)	6.55	9259	LS	11.39 (19.72)	9.65 (18.10)	9.80 (18.24)	LS
3	Co 10006	0.00	9.40 (17.85)	8.75 (17.21)	7.90 (16.32)	5.80	5556	LS	9.45 (17.90)	9.80 (18.24)	10.15 (18.58)	MS
4	Co 10024	0.00	4.65 (12.45)	5.92 (14.08)	0.61 (4.48)	2.99	29630	LS	0.66 (4.66)	0.68 (4.73)	1.55 (7.15)	LS
5	Co 10026	0.00	9.45 (17.90)	7.84 (16.26)	9.25 (17.71)	2.56	20370	LS	7.60 (16.00)	8.00 (16.43)	7.95 (16.38)	LS
6	Co 10027	0.00	2.80 (9.63)	0.00 (0.00)	0.00 (0.00)	2.00	16667	LS	0.79 (5.10)	1.72 (7.54)	1.82 (7.75)	LS
7	CoT 10366	0.00	0.00 (0.00)	2.52 (9.13)	0.78 (5.07)	1.00	7407	LS	0.84 (5.26)	0.87 (5.35)	1.83 (7.77)	LS
8	CoT 10367	0.00	10.35 (18.77)	11.55 (19.87)	10.12 (18.55)	1.11	11112	LS	10.25 (18.67)	9.35 (17.80)	10.35 (18.77)	MS
CK	Co 85004	0.00	3.13 (10.19)	5.37 (13.40)	1.29 (6.52)	4.09	38889	LS	0.70 (4.80)	1.45 (6.92)	1.52 (7.08)	LS
	Co 94008	0.00	0.95 (5.59)	5.30 (13.31)	2.17 (8.47)	2.56	20370	LS	1.57 (7.20)	0.78 (5.07)	1.63 (7.34)	LS
	CoC 671	0.00	7.45 (15.84)	0.81 (5.16)	1.50 (7.03)	2.43	18520	LS	1.67 (7.43)	1.65 (7.38))	1.72 (7.54)	LS
	AVT E II P											
1	Co 09004	0.00	12.98 (21.12)	1.33 (6.62)	0.64 (4.59)	3.81	37037	LS	1.37 (6.72)	0.00 (0.00)	1.47 (6.96)	LS
2	Co 09007	0.00	0.83 (5.23)	2.13 (8.39)	1.35 (6.67)	1.21	11112	LS	1.53 (7.11)	0.78 (5.07)	1.68 (7.45)	LS
3	CoN 09072	0.00	5.05 (12.99)	1.23 (6.37)	1.20 (6.29)	1.77	18519	LS	0.69 (4.76)	0.72 (4.87)	1.52 (7.08)	LS
CK	Co 85004	0.00	3.13 (10.19)	5.37 (13.40)	1.29 (6.52)	4.09	38889	LS	0.70 (4.80)	1.45 (6.92)	1.52 (7.08)	LS
	Co 94008	0.00	0.95	5.30	2.17	2.56	20370	LS	1.57	0.78	1.63	LS

			(5.59)	(13.31)	(8.47)				(7.20)	(5.07)	(7.34)	
	CoC 671	0.00	7.45 (15.84)	0.81 (5.16)	1.50 (7.03)	2.43	18520	LS	1.67 (7.43)	1.65 (7.38)	1.72 (7.54)	LS
	IVT ML											
1	Co 12009	0.00	0.00 (0.00)	2.83 (8.25)	1.74 (7.58)	1.43	9259	LS	0.00 (0.00)	2.83 (9.68)	4.00 (11.54)	LS
2	Co 12012	0.00	0.00 (0.00)	0.81 (0.00)	0.75 (4.97)	0.49	3704	LS	0.00 (0.00)	0.81 (5.16)	8.00 (16.43)	LS
3	Co 12014	0.00	8.60 (17.05)	4.00 (9.68)	1.46 (6.94)	3.62	27778	LS	8.60 (17.05)	4.00 (11.54)	8.00 (16.43)	LS
4	Co 12016	0.00	8.26 (16.70)	4.29 (5.16)	1.35 (6.67)	3.66	31481	LS	8.26 (16.70)	4.29 (11.95)	4.00 (11.54)	LS
5	Co 12017	0.00	9.72 (18.17)	8.91 (11.54)	3.64 (11.00)	6.21	37037	LS	9.72 (18.17)	8.91 (17.37)	8.00 (16.43)	LS
6	Co 12019	0.00	4.17 (11.78)	1.89 (11.95)	0.88 (5.38)	0.89	5556	LS	4.17 (11.78)	1.89 (7.90)	4.00 (11.54)	LS
7	Co 12024	0.00	11.34 (19.68)	3.31 (17.37)	1.50 (7.03)	4.02	31481	LS	11.34 (19.68)	3.31 (10.48)	8.00 (16.43)	LS
8	Co M 12084	0.00	1.22 (6.34)	0.00 (7.90)	0.88 (5.38)	0.57	3704	LS	1.22 (6.34)	0.00 (0.00)	4.00 (11.54)	LS
9	Co M 12085	0.00	0.00 (0.00)	0.00 (10.48)	0.85 (5.29)	0.28	1852	LS	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	LS
10	Co M 12086	0.00	0.00 (0.00)	1.64 (0.00)	0.76 (5.00)	0.88	5556	LS	0.00 (0.00)	1.64 (7.36)	8.00 (16.43)	LS
11	Co N 07072	0.00	1.30 (6.55)	2.75 (0.00)	0.87 (5.35)	1.44	9259	LS	1.30 (6.55)	2.75 (9.55)	8.00 (16.43)	LS
12	CoN 12073	0.00	6.25 (14.48)	0.00 (7.36)	0.88 (5.38)	3.28	20370	LS	6.25 (14.48)	0.00 (0.00)	8.00 (16.43)	LS
13	CoN 12074	0.00	3.70 (11.09)	7.50 (9.55)	1.57 (7.20)	3.65	25926	LS	3.70 (11.09)	7.50 (15.89)	4.00 (11.54)	LS
14	CoT 12368	0.00	2.80 (9.63)	3.91 (0.00)	2.22 (8.57)	2.54	20370	LS	2.80 (9.63)	3.91 (11.40)	8.00 (16.43)	LS
15	VSI 12121	0.00	3.90 (11.39)	0.00 (15.89)	1.83 (7.77)	1.49	9259	LS	3.90 (11.39)	0.00 (0.00)	8.00 (16.43)	LS
CK	Co 99004	0.00	9.17	3.27	0.00	3.34	31481	LS	2.03	2.03	8.00	LS

			(17.63)	(11.40)	(0.00)				(8.19)	(8.19)	(16.43)	
	Co 86032	0.00	2.06 (8.25)	0.74 (0.00)	0.72 (4.87)	0.20	7407	LS	1.54 (7.13)	1.56 (7.17)	8.00 (16.43)	LS
	AVT ML I P											
1	Co 09009	0.00	0.00 (0.00)	6.38 (14.63)	1.33 (6.62)	2.23	20370	LS	1.48 (6.99)	0.75 (4.97)	0.78 (0.78)	LS
2	Co 10031	0.00	0.00 (0.00)	1.44 (6.89)	0.68 (4.73)	0.65	5556	LS	0.75 (4.97)	1.52 (7.08)	2.46 (2.46)	LS
3	Co 10033	0.00	1.96 (8.05)	0.00 (0.00)	1.49 (7.01)	0.95	7407	LS	0.84 (5.26)	1.69 (7.47)	1.75 (1.75)	LS
4	Co T 10368	0.00	7.78 (16.20)	1.59 (7.24)	0.75 (4.97)	2.49	18520	LS	1.67 (7.43)	1.68 (7.45)	0.88 (0.88)	LS
5	Co T 10369	0.00	0.78 (5.07)	2.03 (8.19)	0.00 (0.00)	1.20	11112	LS	2.24 (8.61)	1.53 (7.11)	1.59 (1.59)	LS
6	PI 10131	0.00	3.39 (10.61)	9.59 (18.04)	1.94 (8.01)	4.18	38889	LS	0.71 (4.83)	2.16 (8.45)	0.76 (0.76)	LS
7	PI 10132	0.00	4.76 (12.60)	5.36 (13.39)	1.65 (7.38)	2.74	22222	LS	1.79 (7.69)	1.80 (7.71)	1.89 (1.89)	LS
CK	Co 99004	0.00	2.06 (8.25)	0.74 (4.93)	0.71 (4.83)	0.92	7407	LS	1.54 (7.13)	1.56 (7.17)	1.65 (1.65)	LS
	Co 86032	0.00	9.17 (17.63)	3.27 (10.42)	0.63 (4.55)	3.34	31481	LS	2.03 (8.19)	2.03 (4.97)	0.78 (1.41)	LS
Figures in parentheses are arcsine transformed values while those outside are original values * Reaction based on at harvest												

Table-4.1.11(b): Reaction of zonal varieties/genotypes against insect pests of sugarcane at Navsari (2015-16)

Sr. No.	Varieties/ Genotype	Stalk borer			Internode borer			Root borer	
		Per cent incidence	Per cent Infestation index	Reaction	Per cent incidence	Per cent intensity	Reaction	Per cent incidence	Reaction
1	2	3	4	5	6	7	8	9	10
	IVT E								
1	Co 12001	4.00	0.02	LS	4.00	0.45	LS	16.0 (23.58)	MS
2	Co 12003	16.00	0.32	MS	0.00	0.00	LS	12.0 (20.27)	LS
3	Co 12006	12.00	0.18	LS	8.00	1.01	LS	24.0 (29.33)	MS
4	Co 12007	12.00	0.16	LS	12.00	1.34	LS	28.0 (31.95)	MS
5	Co 12008	12.00	0.20	LS	8.00	1.10	LS	16.0 (23.58)	MS
6	Co M 12081	16.00	0.31	MS	8.00	0.96	LS	20.0 (26.57)	MS
7	Co M 12082	12.00	0.20	LS	12.00	1.68	LS	16.0 (23.58)	MS
8	Co M 12083	8.00	0.10	LS	8.00	1.19	LS	20.0 (26.57)	MS
9	Co N 12071	16.00	0.39	MS	12.00	1.82	LS	12.0 (20.27)	LS
10	CoN 12072	8.00	0.11	LS	4.00	0.83	LS	12.0 (20.27)	LS
11	Co T 12366	12.00	0.17	LS	12.00	1.40	LS	16.0 (23.58)	MS
12	Co T 12367	20.00	0.52	MS	8.00	1.05	LS	16.0 (23.58)	MS
CK	Co 85004	16.00	0.34	MS	16.00	2.12	LS	20.0 (26.57)	MS
	Co 94008	28.00	1.01	MS	12.00	1.54	LS	20.0	MS

								(26.57)	
	Co C 671	20.00	0.47	MS	16.00	1.86	LS	20.0 (26.57)	MS
	AVT E I P								
1	Co 10004	12.00	0.19	LS	20.25	10.65	MS	23.65 (29.10)	MS
2	Co 10005	16.00	0.36	MS	16.30	7.85	LS	21.45 (27.59)	MS
3	Co 10006	20.00	0.56	MS	17.70	9.10	LS	24.56 (29.71)	MS
4	Co 10024	16.00	0.34	MS	16.00	2.12	LS	23.65 (29.10)	MS
5	Co 10026	12.00	0.20	LS	16.30	2.78	LS	21.45 (27.59)	MS
6	Co 10027	16.00	0.33	MS	16.00	2.05	LS	24.56 (29.71)	MS
7	CoT 10366	8.00	0.07	LS	8.00	0.93	LS	23.65 (29.10)	MS
8	CoT 10367	12.00	0.17	LS	9.00	5.85	LS	22.75 (29.10)	MS
CK	Co 85004	16.00	0.31	MS	16.00	2.12	LS	20.0 (26.57)	MS
	Co 94008	12.00	0.16	LS	12.00	1.54	LS	20.0 (26.57)	MS
	CoC 671	16.00	0.37	MS	16.00	1.86	LS	20.0 (26.57)	MS
	AVT E II P								
1	Co 09004	20.00	0.64	MS	12.00	1.91	LS	20.0 (26.57)	MS
2	Co 09007	12.00	0.16	LS	12.00	1.33	LS	20.0 (26.57)	MS
3	CoN 09072	16.00	0.35	MS	16.00	1.54	LS	16.0 (23.58)	MS
CK	Co 85004	16.00	0.31	MS	16.00	2.12	LS	20.0 (26.57)	MS

	Co 94008	12.00	0.16	LS	12.00	2.20	LS	20.0 (26.57)	MS
	Co C 671	16.00	0.37	MS	16.00	1.86	LS	20.0 (26.57)	MS
	IVT ML								
1	Co 12009	16.00	0.31	MS	8.00	0.97	LS	16.00 (23.58)	MS
2	Co 12012	20.00	0.48	MS	12.00	1.44	LS	20.00 (26.57)	MS
3	Co 12014	16.00	0.29	MS	4.00	0.46	LS	16.00 (23.58)	MS
4	Co 12016	20.00	0.51	MS	12.00	1.54	LS	20.00 (26.57)	MS
5	Co 12017	16.00	0.32	MS	16.00	2.00	LS	16.00 (23.58)	MS
6	Co 12019	16.00	0.34	MS	8.00	1.08	LS	16.00 (23.58)	MS
7	Co 12024	24.00	0.68	MS	12.00	1.42	LS	24.00 (29.33)	MS
8	Co M 12084	16.00	0.33	MS	8.00	1.03	LS	16.00 (23.58)	MS
9	Co M 12085	16.00	0.30	MS	8.00	0.93	LS	16.00 (23.58)	MS
10	Co M 12086	24.00	0.74	MS	12.00	1.54	LS	24.00 (29.33)	MS
11	Co N 07072	16.00	0.35	MS	16.00	2.19	LS	16.00 (23.58)	MS
12	CoN 12073	16.00	0.28	MS	8.00	0.88	LS	16.00 (23.58)	MS
13	CoN 12074	16.00	0.32	MS	8.00	1.01	LS	16.00 (23.58)	MS
14	CoT 12368	24.00	0.66	MS	12.00	1.38	LS	24.00 (29.33)	MS
15	VSI 12121	16.00	0.28	MS	4.00	0.44	LS	16.00 (23.58)	MS

CK	Co 99004	24.00	0.74	MS	4.00	0.51	LS	20.00 (26.57)	MS
	Co 86032	20.00	0.48	MS	12.00	1.45	LS	20.00 (26.57)	MS
	AVT ML I P								
1	Co 09009	24.00	0.73	MS	16.00	7.88	LS	24.00 (29.33)	MS
2	Co 10031	20.00	0.53	MS	16.00	7.48	LS	20.00 (26.57)	MS
3	Co 10033	12.00	0.20	LS	16.00	7.20	LS	24.00 (29.33)	MS
4	Co T 10368	16.00	0.35	MS	8.00	3.70	LS	20.00 (26.57)	MS
5	Co T 10369	16.00	0.29	MS	0.00	0.00	LS	16.00 (23.58)	MS
6	PI 10131	32.00	1.09	HS	8.00	4.70	LS	24.00 (29.33)	MS
7	PI 10132	16.00	0.34	MS	8.00	3.78	LS	20.00 (26.57)	MS
CK	Co 99004	24.00	0.74	MS	4.00	1.95	LS	20.00 (26.57)	MS
	Co 86032	20.00	0.48	MS	12.00	6.21	LS	20.00 (26.57)	MS
Figures in parentheses are arcsine transformed values while those outside are original values									

Table-4.1.11(c): Reaction of zonal varieties/genotypes against insect pests of sugarcane at Navsari (2015-16)

Sr. No.	Varieties/ Genotype	Scale insect			Mealy bug		
		Per cent incidence	Per cent intensity	Reaction	Per cent incidence	Per cent intensity	Reaction
1	2	3	4	5	6	7	8
	IVT E						
1	Co 12001	0.00 (0.00)	0.00 (0.00)	LS	16.00 (23.58)	18.47 (25.45)	MS
2	Co 12003	0.00 (0.00	0.00 (0.00)	LS	20.00 (26.57)	19.90 (26.49)	MS
3	Co 12006	4.00 (11.54)	0.50 (4.05)	LS	16.00 (23.58)	20.10 (26.64)	MS
4	Co 12007	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	17.41 (24.66)	MS
5	Co 12008	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	15.47 (23.16)	MS
6	Co M 12081	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	13.40 (21.47)	MS
7	Co M 12082	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	21.23 (27.44)	MS
8	Co M 12083	0.00 (0.00)	0.00 (0.00)	LS	24.00 (29.33)	15.48 (23.17)	MS
9	Co N 12071	0.00 (0.00)	0.00 (0.00)	LS	16.00 (23.58)	16.97 (24.33)	MS
10	Co N 12072	0.00 (0.00)	0.00 (0.00)	LS	16.00 (23.58)	16.97 (24.33)	MS
11	Co T 12366	0.00 (0.00)	0.00 (0.00)	LS	28.00 (31.95)	11.68 (19.98)	MS
12	Co T 12367	36.00 (36.87)	4.71 (12.53)	HS	28.00 (31.95)	11.52 (19.84)	MS
CK	Co 85004	20.00 (26.57)	46.34 (42.90)	MS	24.00 (29.33)	14.15 (22.10)	MS
	Co 94008	20.00 (26.57)	40.18 (39.34)	MS	28.00 (31.95)	13.39 (21.46)	MS

	Co C 671	20.00 (26.57)	0.00 (0.00)		20.00 (26.57)	16.86 (24.24)	MS
	AVT E I P						
1	Co 10004	24.00 (29.33)	3.16 (10.24)	MS	16.00 (23.58)	2.11 (8.35)	MS
2	Co 10005	24.00 (29.33)	3.35 (10.55)	MS	16.00 (23.58)	2.23 (8.59)	MS
3	Co 10006	20.00 (26.57)	2.78 (9.60)	MS	12.00 (20.27)	1.67 (7.43)	MS
4	Co 10024	0.00 (0.00)	2.65 (9.37)	LS	40.00 (39.23)	5.29 (13.30)	HS
5	Co 10026	12.00 (20.27)	1.67 (7.43)	MS	20.00 (26.57)	2.78 (9.60)	MS
6	Co 10027	0.00 (0.00)	0.00 (0.00)	LS	60.00 (50.77)	7.69 (16.10)	MS
7	CoT 10366	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	4.65 (12.45)	HS
8	CoT 10367	12.00 (20.27)	1.44 (6.89)	MS	16.00 (23.58)	1.92 (7.96)	MS
CK	Co 85004	40.00 (39.23)	4.88 (12.76)	HS	60.00 (50.77)	7.32 (15.70)	HS
	Co 94008	40.00 (39.23)	4.46 (12.19)	HS	72.00 (58.05)	8.04 (16.47)	HS
	CoC 671	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	2.91 (9.82)	MS
	AVT E II P						
1	Co 09004	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	6.37 (14.62)	HS
2	Co 09007	4.00 (11.54)	0.44 (3.80)	LS	40.00 (39.23)	4.42 (12.14)	HS
3	CoN 09072	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	2.75 (9.55)	MS
CK	Co 85004	40.00 (39.23)	4.88 (12.76)	HS	60.00 (50.77)	7.32 (15.70)	HS
	Co 94008	40.00	4.46	HS	72.00	8.04	HS

		(39.23)	(12.19)		(58.05)	(16.47)	
	Co C 671	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	2.91 (9.82)	MS
	IVT ML						
1	Co 12009	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	2.43 (8.97)	MS
2	Co 12012	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	4.81 (12.67)	HS
3	Co 12014	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	4.59 (12.37)	HS
4	Co 12016	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.13 (13.09)	HS
5	Co 12017	0.00 (0.00)	0.00 (0.00)	LS	60.00 (50.77)	7.50 (15.89)	HS
6	Co 12019	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.38 (13.41)	HS
7	Co 12024	0.00 (0.00)	0.00 (0.00)	LS	20.00 (26.57)	2.37 (8.86)	MS
8	Co M 12084	0.00 (0.00)	0.00 (0.00)	LS	36.00 (36.87)	4.64 (12.44)	HS
9	Co M 12085	4.00 (11.54)	0.47 (3.93)	LS	40.00 (39.23)	4.65 (12.45)	HS
10	Co M 12086	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.13 (13.09)	HS
11	Co N 07072	0.00 (0.00)	0.00 (0.00)	LS	36.00 (36.87)	4.92 (12.82)	HS
12	CoN 12073	0.00 (0.00)	0.00 (0.00)	LS	28.00 (31.95)	3.08 (10.11)	MS
13	CoN 12074	0.00 (0.00)	0.00 (0.00)	LS	28.00 (31.95)	3.52 (10.81)	MS
14	CoT 12368	0.00 (0.00)	0.00 (0.00)	LS	32.00 (34.45)	3.69 (11.07)	HS
15	VSI 12121	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	4.44 (12.16)	HS
CK	Co 99004	0.00	0.00	LS	40.00	5.13	HS

		(0.00)	(0.00)		(39.23)	(13.09)	
	Co 86032	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	4.83 (12.70)	HS
	AVT ML I P						
1	Co 09009	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.08 (13.03)	HS
2	Co 10031	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.35 (13.37)	HS
3	Co 10033	40.00 (39.23)	5.56 (13.64)	HS	40.00 (39.23)	5.56 (13.64)	HS
4	Co T 10368	40.00 (39.23)	5.41 (13.45)	HS	40.00 (39.23)	5.41 (13.45)	HS
5	Co T 10369	40.00 (39.23)	4.48 (12.22)	HS	40.00 (39.23)	4.48 (12.22)	HS
6	PI 10131	40.00 (39.23)	4.26 (11.91)	HS	40.00 (39.23)	4.26 (11.91)	HS
7	PI 10132	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.29 (13.30)	HS
CK	Co 99004	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	5.13 (13.09)	HS
	Co 86032	0.00 (0.00)	0.00 (0.00)	LS	40.00 (39.23)	4.83 (12.70)	HS
Figures in parentheses are arcsine transformed values while those outside are original values							

Table-4.1.12: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Mandya (2015-16)

Sr. No	Varieties/ genotypes	Early shoot borer (%Incidence)		No. of bored plants /ha	Top Shoot borer (%Incidence)		Internode borer			
		Cumulative	Reaction		Cumulative	Reaction	% (Incidence)	% (Intensity)	Infestation Index	Reaction
1	2	3	4	5	6	7	8	9	10	11
	IVT E									
1	Co 12001	4.50(12.23)	LS	2708	1.66 (7.37)	LS	30.30 (33.40)	1.83	0.55	MS
2	Co 12003	0.58(4.35)	LS	349	0.38 (3.46)	LS	20.13 (26.58)	2.38	0.48	MS
3	Co 12006	6.00(14.13)	LS	3611	1.65 (7.34)	LS	29.50 (32.89)	1.92	0.57	MS
4	Co 12007	4.20(11.83)	LS	2527	0.80 (5.09)	LS	29.90 (33.15)	3.30	0.99	MS
5	Co 12008	4.00(11.54)	LS	2407	0.43(3.67)	LS	40.75 (39.67)	3.50	1.43	HS
6	CoM 12081	4.00(11.49)	LS	3156	0.70 (4.69)	LS	45.00 (42.12)	9.45	4.25	HS
7	CoM 12082	5.13(12.87)	LS	3087	1.15 (6.15)	LS	08.75 (17.16)	0.60	0.05	LS
8	CoM 12083	1.50(6.94)	LS	902	1.00 (5.74)	LS	29.60 (32.96)	3.97	1.17	MS
9	CoN 12071	4.70(12.49)	LS	2828	1.35 (6.47)	LS	38.90 (38.59)	2.91	1.13	MS
10	CoN 12072	4.33(11.92)	LS	2606	0.40 (3.60)	LS	40.00 39.11)	2.90	1.16	MS
11	CoT 12366	2.50(8.64)	LS	1504	0.38 (3.46)	LS	49.75 (44.86)	3.40	1.69	HS
12	CoT 12367	1.63(7.28)	LS	981	0.38 (3.46)	LS	49.00 (44.43)	4.17	2.04	HS
CK	Co 85004	6.25(14.45)	LS	3761	0.55 (4.25)	LS	50.00 (45.00)	3.94	1.97	HS
	Co 94008	7.13(15.46)	LS	4291	0.52 (4.11)	LS	47.75 (43.71)	4.28	2.04	HS
	CoC 671	4.50(18.69)	LS	2708	2.35 (8.79)	LS	29.75 (33.04)	2.02	0.60	MS
	IVT ML									
1	Co 12009	5.50 (13.51)	LS	3564	0.55 (4.25)	LS	20.63 (26.99)	1.61	0.33	MS
2	Co 12012	5.44 (13.49)	LS	3525	0.88 (5.36)	LS	21.38 (27.51)	1.55	0.33	MS
3	Co 12014	4.84 (12.54)	LS	3137	0.38 (3.46)	LS	11.13 (19.47)	0.58	0.06	LS
4	Co 12016	5.25 (13.16)	LS	3402	0.38 (3.46)	LS	00.00 (00.00)	0.00	0.00	LS
5	Co 12017	4.50 (12.23)	LS	2916	0.00 (0.00)	LS	20.45 (26.89)	1.61	0.33	MS
6	Co 12019	4.13 (11.66)	LS	2676	0.00 (0.00)	LS	09.75 (18.19)	0.56	0.05	LS
7	Co 12021	6.63 (14.90)	LS	4297	0.50 (3.92)	LS	19.00 (25.81)	1.72	0.33	LS
8	Co 12024	3.95 (11.38)	LS	2560	0.00 (0.00)	LS	00.00 (00.00)	0.00	0.00	LS
9	CoM 12084	2.63 (9.26)	LS	1704	0.43 (3.67)	LS	28.50 (32.24)	2.26	0.64	MS
10	CoM 12085	4.00 (11.45)	LS	2592	0.80 (5.09)	LS	18.63 (25.56)	2.03	0.38	LS
11	CoM 12086	4.63 (12.41)	LS	3000	0.00 (0.00)	LS	00.00 (00.00)	0.00	0.00	LS

12	CoN 12073	6.33 (14.53)	LS	4102	0.80 (5.09)	LS	00.00 (00.00)	0.00	0.00	LS
13	CoN 12074	3.88 (11.36)	LS	2514	0.40 (3.59)	LS	00.00 (00.00)	0.00	0.00	LS
14	CoT 12368	9.38 (17.83)	LS	6079	0.75 (4.65)	LS	20.00 (26.55)	0.97	0.19	LS
15	VSI 12121	5.13 (13.04)	LS	3325	0.88 (5.36)	LS	18.88 (25.73)	1.97	0.37	LS
CK	Co 86032	8.75 (17.19)	LS	5671	1.00 (5.69)	LS	29.63 (32.97)	1.82	0.54	MS
	Co 99004	7.25 (15.59)	LS	4699	1.88 (7.87)	LS	18.31 (09.88)	0.61	0.06	LS
	AVT E I P									
1	Co 10004	2.61 (9.28)	LS	1305	0.90 (7.26)	LS	19.75 (26.38)	1.25	0.25	MS
2	Co 10005	3.82 (11.26)	LS	1910	0.90 (9.27)	LS	10.00 (18.29)	0.59	0.06	LS
3	Co 10006	5.70 (13.79)	LS	2850	4.53 (8.95)	LS	18.92 (25.75)	1.39	0.26	MS
4	Co 10024	6.45 (14.58)	LS	3225	3.17 (7.19)	LS	09.50 (17.88)	0.73	0.07	LS
5	Co 10026	3.33 (10.40)	LS	1650	0.63(7.65)	LS	27.75 (31.76)	2.05	0.57	MS
6	Co 10027	5.31 (13.31)	LS	2655	2.42 (6.71)	LS	10.00 (18.39)	0.63	0.06	LS
7	Co T10004	2.54 (09.14)	LS	1270	2.00 (6.54)	LS	19.00 (25.82)	1.18	0.22	MS
8	Co T10004	4.23 (11.87)	LS	2115	0.58 (6.16)	LS	67.75 (55.44)	3.83	2.59	HS
CK	Co 85004	5.98) (13.99	LS	2990	1.48 (3.09)	LS	19.25 (25.99)	1.21	0.23	MS
	Co 94008	5.00 (12.81)	LS	2500	0.65 (3.28)	LS	59.00 (50.22)	3.29	1.94	HS
	CoC 671	5.33 (13.29)	LS	2665	1.83 (4.05)	LS	36.25 (37.01)	2.38	0.86	MS
	AVT ML I P									
1	Co 10015	4.88 (12.75)	LS	3072	1.00 (5.54)	LS	20.00 (26.53)	5.10	1.02	MS
2	Co 10017	3.63 (10.78)	LS	2285	2.50 (9.05)	LS	45.00 (50.00)	12.96	6.48	HS
3	Co 10031	1.75 (07.42)	LS	1101	1.38 (6.73)	LS	30.00 (33.21)	7.69	2.31	MS
4	Co 10033	3.38 (10.50)	LS	2128	1.50 (6.94)	LS	26.13 (30.73)	7.89	2.06	MS
5	CoM 10083	3.75 (11.01)	LS	2361	0.00 (0.00)	LS	00.00 (00.00)	0.00	0.00	LS
6	PI 10131	1.45 (06.79)	LS	912	1.25 (6.09)	LS	29.13 (32.64)	5.55	1.62	MS
7	PI 10132	1.70 (07.47)	LS	1070	2.13 (8.38)	LS	48.38 (44.07)	10.64	5.15	HS
8	CoVC 10061	2.43 (08.59)	LS	1529	0.00 (0.00)	LS	00.00 (00.00)	0.0	0.00	LS
9	CoT 10369	4.88 (12.73)	LS	3072	2.13 (8.38)	LS	47.75 (43.71)	11.11	5.30	HS
10	CoT 10368	1.38 (06.73)	LS	868	0.00 (0.00)	LS	00.00 (00.00)	0.00	0.00	LS
11	Co09009	1.40 (06.63)	LS	881	1.55 (6.77)	LS	25.75 (30.47)	8.82	2.27	MS

CK	Co99004	2.83 (09.63)	LS	1781	1.55 (7.15)	LS	28.63 (32.34)	7.14	2.04	MS
	Co 86032	3.00 (09.84)	LS	1888	1.00 (5.69)	LS	19.00 (25.81)	5.71	1.08	MS
	AVT E II P									
1	Co 09004	2.67 (2.39)	LS	1495	0.24 (2.38)	LS	9.75 (18.18)	0.50	0.05	LS
2	Co 09072	5.45 (3.98)	LS	3052	0.50 (3.98)	LS	5.00 (12.89)	0.32	0.02	LS
3	Co 09007	3.92 (3.91)	LS	2195	0.00 (0.00)	LS	15.00 (22.72)	1.31	0.19	LS
CK	Co85004	6.01 (3.49)	LS	3366	0.38 (3.49)	LS	4.59 (12.35)	0.26	0.01	LS
	Co 94008	4.75 (3.69)	LS	2660	0.44 (3.69)	LS	9.50 (17.95)	1.59	0.15	LS
	CoC 671	1.64(3.84)	LS	2151	0.17 (1.64)	LS	00.00(0.00)	0.00	0.00	LS
Figures inside parenthesis are arcsine transformed values and those outside are original values										

Table-4.1.13: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Coimbatore (2015-16)

Sr. No	Varieties/ genotype	Early shoot borer		Internode borer				Root borer		Top shoot borer		
		Cumulative % incidence	Reaction	% Incidence	% Intensity	Infestation Index	Reaction	Root borer incidence (%)	Reaction	6th Month	At harvest	Reaction
	IVT E											
1	Co 12001	1.71	LS	40.00	1.85	0.74	MS	--	--	--	--	--
2	Co 12003	3.88	LS	24.00	1.01	0.24	MS	--	--	--	--	--
3	Co 12006	4.69	LS	52.00	2.92	1.52	HS	--	--	--	--	--
4	Co12007	4.49	LS	26.00	1.27	0.33	MS	--	--	--	--	--
5	Co 12008	2.99	LS	50.00	2.61	1.31	HS	--	--	--	--	--
6	CoM 12081	9.00	LS	36.00	1.46	0.53	MS	--	--	--	--	--
7	CoM 12082	3.29	LS	30.00	1.63	0.49	MS	--	--	--	--	--
8	CoM 12083	8.30	LS	46.00	3.28	1.51	HS	--	--	--	--	--
9	CoN 12071	6.07	LS	38.00	2.05	0.78	MS	--	--	--	--	--
10	CoN 12072	5.79	LS	28.00	1.10	0.31	MS	--	--	--	--	--
11	CoT 12366	2.58	LS	38.00	2.22	0.84	MS	--	--	--	--	--
12	CoT 12367	3.78	LS	40.00	2.21	0.88	MS	--	--	--	--	--
CK	CoC 671	2.02	LS	40.00	1.94	0.78	MS	--	--	--	--	--
	Co 94008	3.85	LS	30.00	1.35	0.41	MS	--	--	--	--	--
	Co 85004	3.45	LS	36.00	2.13	0.77	MS	--	--	--	--	--
	AVT E I P											
1	Co 10004	2.26	LS	48.00	2.94	1.41	HS	--	--	0.00	0.00	LS
2	Co 10005	7.69	LS	46.67	2.61	1.22	HS	--	--	0.00	0.00	LS
3	Co 10006	7.77	LS	45.33	2.62	1.19	HS	--	--	0.57	0.62	LS
4	Co 10024	4.32	LS	52.00	3.60	1.87	HS	--	--	0.00	0.46	LS

5	Co 10026	4.29	LS	50.67	2.67	1.35	HS	--	--	3.33	4.44	LS
6	Co 10027	5.44	LS	41.33	3.64	1.50	HS	--	--	0.78	1.08	LS
7	CoT 10367	8.58	LS	36.00	1.93	0.69	MS	--	--	0.00	2.90	LS
8	CoT 10366	7.28	LS	46.67	2.67	1.25	HS	--	--	5.09	10.42	MS
CK	CoC 671	3.94	LS	36.00	1.98	0.71	MS	--	--	0.00	0.00	LS
	Co 85004	3.69	LS	34.67	1.99	0.69	MS	--	--	0.51	1.71	LS
	Co 94008	12.00	LS	49.33	2.90	1.43	HS	--	--	0.00	0.81	LS
	IVT ML											
1	Co 12009	4.76	LS	44.00	2.79	1.23	HS	--	--	3.57	8.40	LS
2	Co 12012	2.87	LS	32.00	1.53	0.49	MS	4.00	LS	4.29	11.88	MS
3	Co 12014	1.43	LS	48.00	4.00	1.92	HS	4.00	LS	0.00	0.71	LS
4	Co 12016	3.78	LS	44.00	2.38	1.05	HS	1.90	LS	0.86	2.56	LS
5	Co 12017	4.99	LS	44.00	2.83	1.25	HS	4.00	LS	0.94	1.09	LS
6	Co 12019	5.10	LS	60.00	3.33	2.00	HS	16.00	MS	0.00	0.86	LS
7	Co 12021	3.94	LS	44.00	3.21	1.41	HS	--	--	0.98	1.19	LS
8	Co 12024	2.82	LS	20.00	0.86	0.17	LS	29.60	MS	0.00	0.00	LS
9	CoM 12084	3.37	LS	32.00	2.30	0.74	MS	0.00	LS	--	--	--
10	CoM 12085	2.54	LS	28.00	1.61	0.45	MS	16.00	MS	0.00	2.41	LS
11	CoM 12086	5.64	LS	64.00	4.57	2.92	HS	11.54	LS	0.00	0.70	LS
12	CoN 12073	4.66	LS	36.00	1.71	0.62	MS	4.17	LS	--	--	--
13	CoN 12074	3.07	LS	32.00	1.42	0.45	MS	--	--	0.89	2.94	LS
14	CoT 12368	5.74	LS	32.00	2.50	0.80	MS	--	--	0.98	1.00	LS
15	VSI 12121	6.11	LS	28.00	1.79	0.50	MS	3.85	LS	2.73	4.56	LS
CK	Co 99004	3.67	LS	28.00	1.89	0.53	MS	8.33	LS	0.00	2.93	LS
	Co 86032	3.58	LS	44.00	2.05	0.90	HS	0.00	LS	1.45	0.00	LS
	Co 0212	4.90	LS	--	--	--	--					

	AVT ML I P											
1	Co 09009	2.60	LS	50.00	1.33	0.67	HS	--	--	0.00	1.40	LS
2	Co 10015	2.07	LS	44.00	1.93	0.85	HS	--	--	0.00	0.85	LS
3	Co 10017	0.93	LS	36.00	1.43	0.51	MS	--	--	10.42	15.07	MS
4	Co 10031	2.81	LS	34.00	1.62	0.55	MS	--	--	0.00	0.00	LS
5	Co 10033	5.20	LS	30.00	1.47	0.44	MS	--	--	0.96	2.68	LS
6	CoM 10083	5.25	LS	54.00	3.27	1.76	HS	--	--	1.72	1.79	LS
7	CoT 10368	2.84	LS	50.00	2.03	1.02	HS	--	--	0.00	1.98	LS
8	CoT 10369	4.13	LS	46.00	1.93	0.89	HS	--	--	0.00	0.77	LS
9	CoVc 10061	1.91	LS	44.00	1.90	0.84	HS	--	--	1.65	5.41	LS
10	PI 10131	3.85	LS	30.00	1.60	0.48	MS	--	--	0.00	1.22	LS
11	PI 10132	5.67	LS	22.00	1.02	0.22	MS	--	--	0.00	2.33	LS
CK	Co 86032	6.23	LS	30.00	1.34	0.40	MS	--	--	0.00	1.54	LS
	Co 99004	5.14	LS	32.00	1.66	0.53	MS	--	--	0.00	0.00	LS
	AVT E II P											
1	Co 09004	--	--	38.67	2.11	0.82	MS	--	--	0.00	0.74	LS
2	Co 09007	--	--	26.67	1.42	0.38	MS	--	--	0.00	1.36	LS
3	CoN 09072	--	--	20.00	1.18	0.24	LS	--	--	0.58	1.25	LS
CK	CoC 671	--	--	30.67	1.51	0.46	MS	--	--	0.81	0.81	LS
	Co 94008	--	--	73.21	2.95	2.16	HS	--	--	0.00	0.72	LS
	Co 85004	--	--	25.33	1.68	0.43	MS	--	--	0.00	1.91	LS

Table-4.1.14: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Anakapalle (2015-16)

Sr. No.	Varieties/ Genotype	Early shoot borer (% Incidence)							Internode borer				Scale insect			
		30 DAP	60 DAP	90 DAP	120 DAP	Cum	No. of bored plants / ha	Reaction	Per cent incidence	Per cent intensity	Infestation index	Reaction	Per cent incidence	Per cent intensity	Infestation index	Reaction
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	IVT E															
1	Co A 13 321	11.02	3.86	3.07	0	15.95	15.95	MS	52.83	3.80	2.01	HS	3.03	0.12	0.004	LS
2	Co A 13 322	4.29	4.31	3.40	0	12.84	12.84	LS	63.33	4.78	3.03	HS	6.67	0.29	0.19	LS
3	Co A 13 323	7.57	4.55	3.20	0	14.74	14.74	LS	35.76	2.49	0.89	MS	3.33	0.14	0.005	LS
4	Co A 13 324	3.89	4.66	2.88	0	12.23	12.23	LS	33.33	1.87	0.62	MS	0.00	0.00	0	LS
	IVT ML															
1	Co A 13 326	6.38	4.07	3.06	0	17.05	17.05	MS	43.33	2.99	1.30	HS	0.00	0.00	0	LS
2	Co A 13 327	2.93	4.32	2.25	0	9.62	9.62	LS	51.82	3.32	1.72	HS	3.33	0.56	0.19	LS
3	Co A 13 328	3.61	5.40	3.11	0	10.69	10.69	LS	23.47	1.99	0.47	MS	49.63	8.17	4.05	HS
CK	Co A 99082*	13.87	3.72	4.44	0	23.29	23.29	MS	56.67	3.91	2.22	HS	18.79	2.65	0.50	MS
	Co A 92081**	3.84	4.76	4.08	0	11.20	11.20	LS	53.33	4.50	2.40	HS	96.67	20.14	19.47	HS
	AVT E															
1	Co A 12 321	1.68	1.84	4.66	0	9.95	9970	LS	43.33	2.48	1.07	HS	60.00	2.48	1.49	HS
2	Co A 12 322	1.66	0.93	1.43	0	6.82	6925	LS	76.67	4.01	3.07	HS	30.00	4.01	1.20	HS
3	Co A 12 323	1.70	1.40	2.89	0	10.28	9609	LS	76.67	7.09	5.43	HS	43.33	7.09	3.07	HS
4	Co V 12 356	1.13	2.07	1.34	0	6.69	6757	LS	43.33	3.08	1.33	HS	83.33	3.08	2.57	HS
5	Co 6907	3.44	4.92	4.45	0	11.5	9922	LS	80.00	3.76	3.01	HS	24.24	2.39	0.58	HS

						7										
6	CoC0106 1	1.88	1.77	1.03		5.98	5691	LS	66.67	4.66	3.11	HS	23.33	3.72	0.87	HS
C K	Co A 99082*	6.09	6.00	3.95	0	18.0 9	18125	MS	80.00	4.78	3.82	HS	33.33	2.69	0.90	HS
	Co A 92081**	3.84	4.76	4.08	0	11.2 0	8284	LS	53.33	4.50	2.40	HS	96.67	20.14	19.47	HS

Table-4.1.15: Reaction of zonal varieties/genotypes against insect pests of sugarcane at Vuyyuru (A.P.) (2015-16)

Sr. No	Varieties/ genotype	Early shoot borer (% incidence)						Internode borer				Scale insect		
		45 DAP	60 DAP	90 DAP	120 DAP	Cum.	Reaction	% incidence	% intensity	Infestation index	Reaction	% incidence	% intensity	Reaction
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	CoC 10-337	3.49	1.26	1.81	1.96	7.75	LS	70.00	7.45	5.22	HS	80.00	21.55	HS
2	CoC 10-336	3.72	2.29	2.02	1.58	9.07	LS	80.00	7.66	6.13	HS	82.50	20.65	HS
3	CoA 10-321	3.28	1.25	1.74	1.60	7.47	LS	60.00	4.30	2.58	HS	97.50	17.79	HS
4	CoC 11-336	4.84	0.94	2.49	1.65	10.33	LS	62.00	4.88	3.05	HS	90.00	13.21	HS
5	CoC 11-321	4.05	2.09	1.84	1.61	8.79	LS	50.00	3.95	1.98	HS	82.50	11.71	HS
6	CoA 11-323	4.34	8.03	1.99	1.92	16.12	LS	65.00	6.86	4.46	HS	40.00	5.03	HS
7	Co 6907	3.61	3.27	1.67	1.85	14.01	LS	70.00	6.48	4.54	HS	67.50	13.62	HS
8	CoA 12-323	6.28	4.22	2.21	1.57	13.38	LS	70.00	5.55	3.89	HS	72.50	2.49	HS
9	Co A 12-356	4.54	4.23	2.06	1.39	9.90	LS	40.00	3.78	1.51	HS	80.00	26.60	HS
10	2010V 35	1.56	2.41	3.53	1.08	12.78	LS	75.00	9.15	6.86	HS	50.00	11.27	HS
11	CoA12-322	6.22	5.38	1.59	1.74	9.34	LS	52.50	4.52	2.37	HS	42.50	4.89	HS
12	Co A 12-321	4.45	2.52	1.57	1.38	7.03	LS	45.00	4.22	1.89	HS	7.50	0.48	LS
13	CoR 12-346	3.79	2.08	1.74	1.11	7.25	LS	35.00	3.33	1.17	MS	27.50	2.76	MS
14	Co 7219	4.81	3.20	1.08	1.39	18.75	LS	62.50	5.59	3.49	HS	97.50	15.88	HS

Table-28.1: Survey and surveillance of insect pests of sugarcane at Kapurthala (Punjab) (2015-16)

Sr. No.	Varieties	Location	Name of Pest	Per cent incidence	Remark
1.	Co 238 CoH 89003 CoJ 64	Dhuri, Faridkot Fazilka	Termite (*Odontotermes obesus*)	2-3	-
2.	CoJ 85 CoJ 64 CoJ 88 Co 238 CoH 89003	Ajnala, Dhuri, Kapurthala Phagwara, Morinda Fazilka, Gurdaspur, Dasuya	Early shoot borer (*Chilo infuscatellus*)	3-4	Late planting of sugarcane showed more incidence of early shoot borer
3.	Co 238 CoJ 85 CoJ 88 CoS 8436 Co 89003	Phagwara, Fazilka, Dhuri, Nakodar, Morinda, Budhewal, Bhogpur, Ajnala, Gurdaspur, Mukerian	Top borer (*Scirpophaga excerptalis*)	2-3	-
4.	CoJ 85 Co 238 CoS 8436	Gurdaspur, Batala, Dhuri, Nawanshahar, Morinda	Pyrilla (*Pyrilla perpusilla*)	2-3	-
5.	CoJ 85 Co 238	Fazilka, Nakodar, Mukerian, Budhewal	Whitefly (*Aleurolobus barodensis*)	Traces	-
6.	CoJ 64 Co 238 Co 89003	Kapurthala, Faridkot, Abohar, Dhuri	Mite (*Oligonychus indicus*)	4-5/cm square (2-3%)	-
7.	CoJ 85 Co 238 CoS 8436 Co 89003	Faridkot, Phagwara, Gurdaspur, Ajnala, Mukerian, Dhuri, Nawanshahar, Budhewal, Nakodar	Black bug (*Cavelerious excavatus*)	3-4	Black bug incidence more in sugarcane ratoon crop
8	CoS 8436	Phagwara, Dhuri,	Root borer	2-3	-

	Co 89003	Kapurthala, Gurdaspur, Batala	(*Emmalocera depressella*)		
9.	CoJ 85 CoJ 64 Co 238 CoS 8436 Co 89003	Nawanshahar, Nakodar, Ajnala, Morinda, Phagwara, Gurdaspur, Budhewal, Mukerian, Dasuya, Dhuri	Stalk borer (*Chilo auricilius*)	7-8	-

Table-28.2: Survey and surveillance of insect pests of sugarcane at SBI-Karnal (2015-16)

Sr. No.	Major Varieties	Incidence (%)				Population/ leaf	Infestation Index
		Early Shoot borer	Top borer	Root borer	Red mite	Pyrilla	Stalk borer
1	Co 89003	T to 14.4	T to 3.5	T to 12.3	T to 80.5	T to 08.0	1.9
2	CoS 8436	T to 11.3	T to 5.6	T to 09.2	T to 9.0	T to 06.0	2.6
3	CoH119	T to 10.6	T to 6.5	T to 13.3	T to 10.3	T to 12.5	1.3
4	Co 0118	T to 10.1	T to 4.3	T to 09.5	T to 8.6	T to 09.3	1.6
5	Co 0238	T to 12.0	T to 7.6	T to 10.0	T to 3.6	T to 08.0	1.2
6	Co 05011	T to 11.6	T to 3.5	T to 11.6	T to 5.3	T to 02.2	1.8
T = Traces							

Table-28.3: Survey and surveillance of insect pests of sugarcane at Shahjahanpur (2015-16)

Sr. No.	Varieties	Location	Name of pest	Per cent incidence/population			Remark
				Minimum	Maximum	Average	
1	Co 0238, Co 0118, CoSe01434 Co 98014	Ajbapur (Kheri)	Early shoot borer (% incidence)	3.0	9.00	6.00	Negligible
			Top shoot borer (% incidence)	6.00	10.00	8.00	
			Stalk borer (% incidence)	10.00	17.00	13.50	
			(% Intensity)	4.20	5.00	4.60	
			Pyrilla/leaf	20	30	25	
			Epiricania melanoleuca	-	-	-	
2	CoS 8436, Co 0238, CoSe 01434, CoS 767 CoS 078272 CoS 08279	Hargaon (Sitapur)	Early shoot borer (% incidence)	6.00	11.00	8.50	1-2 cocoon/ plot
			Top shoot borer (% incidence)	8.00	12.00	10.00	
			Stalk borer (% incidence)	10.00	15.00	12.50	
			(% Intensity)	3.76	7.33	5.55	
			Pyrilla/leaf	15	20	17.50	
			Epiricania melanoleuca	-	-	-	
3	Co 0238 Co 0118 CoS 8436 CoS 97264 CoLk 94184 CoS 97261	Nigohi (Shahjahanpur)	Early shoot borer (% incidence)	4.00	8.00	6.00	2-3 cocoon/ plot
			Top shoot borer (% incidence)	9.00	13.00	11.00	
			Stalk borer (% incidence)	9.00 3.30	17.00	13.00	
			(% Intensity)	35			
			Pyrilla/leaf	-			
			Epiricania melanoleuca		5.50	4.40	
					45	40	
					-	-	

4	CoS 8436, CoSe 01434 Co 0238 Co 0118 CoS 08279 CoS 08272	Tilhar (Shahjahanpur)	Early shoot borer (% incidence) Top shoot borer (% incidence) Stalk borer (% incidence) (% Intensity) Pyrilla/leaf *Epiricania melanoleuca*	6.00 12.00 16.00 4.76 30 -	13.00 18.00 20.00 6.67 40 -	10.00 15.00 18.00 5.72 35 -	1-2 cocoon/ plot
6	Co 0238, Co 0118, CoSe 98231 CoS 767 CoS 08279	Sultanpur	Early shoot borer (% incidence) Top shoot borer (% incidence) Stalk borer (% incidence) (% Intensity) Pyrilla/leaf *Epiricania melanoleuca*	10.00 9.00 12.00 4.76 25 -	13.00 15.00 16.00 5.43 35 -	11.50 12.00 14.00 5.09 30 -	Negligible

Table-28.4: Survey and surveillance of insect pests of sugarcane at Pusa (2015-16)

Sr. No.	Variety	Location	Name of pest	% incidence		
				Min.	Max.	Average
1.	Co 238,BO 110,CoJ 85	Sawat	Pyrilla/leaves	15	60	37.5
			Shoot borer	5	17	11
			Top borer	8	20	14
2.	Co 238, Co 98014, Co 235	Narayan piper	Pyrilla	10	40	25
			Shoot borer	3	11	7
			Root borer	3	8	5.5
3.	Co 239,BO 91,CoVSi 3102	Sujanpur	Pyrilla	8	20	14
			Army warm	3	12	7.5
4.	CoJ 85 ,Co 239, CoPk 5191	Akemba	Pyrilla	35	85	60
			Top borer	5	12	6.5
5.	BO 91, Co 238,BO 110,	Ijraha	Pyrilla	15	35	25
			Army worm	15	25	20
			Shoot borer	8	17	12.5
6.	Co 238, Co 98014, Co 235	Bardha	Pyrilla	40	70	55
			Shoot borer	15	25	20
7.	Co 239, CoPk 5191, CoVSi 3102	Musepur	Pyrilla	20	45	32.5
			Army warm	12	25	17.5
8.	BO 91, Co 238 ,CoJ 85	Dharmpur	Pyrilla	15	25	20
			Top borer	7	15	11
			Shoot borer	5	12	7.5
	BO 110, Co 238, CoPk 5191	Sakarpura	Pyrilla	30	70	50

9.	BO 153	Pusa farm	Pyrilla	1.3	65	33.15
			Root borer	2.5	11.9	7.2
			Shoot borer	3.2	17.2	10.2
			Top borer	1.3	17	9.15
			Stalk borer	1.3	9.7	5.5

Table-28.5: Survey and surveillance of insect pests of sugarcane at Seorahi (2015-16)

Variety	Location	Name of Pest	% incidence/ population			Remark
			Min.	Max.	Average	
UP 05125, CoSe 01434, CoSe 92423, Co 0238, CoP 9301, Co 0118,CoS 8432 CoSe 98231	Seorahi	Early Shoot Borer at hot weather	8	10	9.00	--
		Top Borer at harvest	3	9	6.00	--
		Stalk Borer at harvest	3	11	7.00	--
		Root Borer at harvest	2	6	4.00	--
		Pyrilla / leaf	10	50	30	--
Co 0238, 0118, 0239,CoSe 01434, 98231 CoS 96275, BO110 ,UP 05125 CoLk 94184	Mankapur	Early Shoot Borer at hot weather	3	5	4.00	--
		Top Borer at harvest	2	6	4.00	--
		Stalk Borer at harvest	3	11	7.00	--
		Root Borer at harvest	3	6	4.50	--
		Pyrilla /leaf	8	20	14.00	--
Co 0238, CoLk 94184, CoS 97261,8432 CoSe 92423,01434 CoS 767, CoSe 98231, Bo 110& Co 0118	Balrampur	Early Shoot Borer at hot weather	2	5	3.50	--
		Top Borer at harvest	3	10	6.50	--
		Stalk Borer at harvest	2	11	6.50	--
		Root Borer at harvest	4	9	6.50	--
		Pyrilla /leaf	10	15	12.50	--
CoSe 92423, CoSe 01434, CoLk 94184, Co 0238,	Bhabhnan	Early Shoot Borer at hot weather	3	5	4.00	--
		Top Borer at harvest	8	12	10.00	--

CoSe 98231,		Stalk Borer at harvest	5	11	8.00	--
		Root Borer at harvest	2	8	5.00	--
		Pyrilla /leaf	15	20	17.50	--
CoSe 03234, CoSe 01434, CoLk 94184, Co 0238,CO 0118&CoSe 92423	Sathiaon	Early Shoot Borer at hot weather	2	4	3.00	--
		Top Borer at harvest	4	11	7.50	--
		Stalk Borer at harvest	2	7	4.50	--
		Root Borer at harvest	2	5	3.50	--
		Any other (new pest)	-	-	-	--
CoSe 01434, CoSe 98231, Co 0238, CoSa767, CoSe 92423, CoS 88230& CoS 8432	Dhada	Early Shoot Borer at hot weather	3	4	3.50	--
		Top Borer at harvest	6	10	8.00	--
		Stalk Borer at harvest	2	10	6.00	--
		Root Borer at harvest	3	11	7.00	--
		Pyrilla /leaf	25	40	32.50	--
Co 0238,0118 CoP 9301, UP 9530, CoSe 92423, CoSe 01434, CoS 8432&, Colk 94184 BO 110	Ramkola	Early Shoot Borer at hot weather	1	3	2.00	--
		Top Borer at harvest	2	6	4.00	--
		Stalk Borer at harvest	4	10	7.00	--
		Root Borer at harvest	2	9	5.50	--
		Pyrilla /leaf	15	20	17.50	--
CoLk 94184, Co 0238, CoSe 92423, CoS 767& Co 0118 CoS07250, CoSe 01434& CoSe98231	Goshi	Early Shoot Borer at hot weather	4	6	5.00	--
		Top Borer at harvest	4	13	8.50	--
		Stalk Borer at harvest	3	12	7.50	--
		Root Borer at harvest	3	8	5.50	--
		Any other (new pest)	-	-	-	--

Table-28.6: Survey and surveillance of insect pests of sugarcane at Padegaon (2015-16)

Sr. No.	Variety	Location	Name of pest	% incidence/Population			Remark
				Min.	Max.	Average	
1.	CoM 0265 Co 86032	Nimbut (Baramati), Padegaon (Phaltan), Padegaon (Khandala), Gardadwadi (Baramati), Pimpre	Early shoot borer (% incidence)	9.40	38.80	12.60	--
			Top shoot borer (% incidence)	0	1.20	0.20	--
			Internode borer [% incidence] (% intensity)	15.20 (2)	24.60 (8)	16.80 (4)	--
			Stalk borer (% incidence/% intensity)	--	--	--	--
			Root borer (% incidence)	2.20	5.40	3.20	--
			Any other borer (% incidence)	--	--	--	--
			Pyrilla/ leaf	0	01	--	very rare incidence
			Epiricania melanoleuca/plant	5	20	--	--
			Whitefly (per 2.5 sq.cm.)	0	01	--	very rare incidence
			Woolly aphid (Average grade)	0	03.40	01.60	On very few stools
			Scale insect (% incidence/% intensity)	0	08.20	02.00	--
			Mealy bug - % incidence / (% intensity)	20.40 (2)	25.80 (5)	22.20	--
			Black bug/leaf	--	--	--	--
			Spittle bug (% incidence)	--	--	--	--
			Thrips (% incidence)	--	--	--	In traces
			Mite (% incidence)	--	--	--	--
			White grub (No. of grub/ha)	--	--	--	In traces
			Termite (% incidence) At germination/harvest	--	--	--	In traces
			Derbid plant hopper, *Proutista moesta*	02.20	10.60	04.00	--
			Sugarcane grass hopper, *Hieroglyphus banian*	--	--	--	In traces
			Any other (New Pest)	--	--	--	--

Table-28.7: Survey and surveillance of insect pests of sugarcane at Pune (2015-16)

Sr. No.	Plot Number	Location (Village)	Variety	Date of planting/ ratoon	Name of the pest						
					Early shoot borer	Mealy bug		Root borer		Internode borer	
					% incidence	% incidence	% intensity	% incidence	% intensity	% incidence	% intensity
1	B11	Manjri Bk	Co 86032	05.2.15	1.58	--	--	--	--	--	--
2	A13	Manjri Bk	Co 86032	12.5.15	5.78	--	--	--	--	--	--
3	A14	Manjri Bk	Co 86032	15.2.15	7.72	--	--	--	--	--	--
4	A16	Manjri Bk	Co 86032	02.3.15	14.50	--	--	--	--	--	--
5	A17	Manjri Bk	Co 86032	03.3.15	18.01	--	--	--	--	--	--
6	A18	Manjri Bk	Co 86032	03.3.15	16.73	--	--	--	--	--	--
7	A20	Manjri Bk	Co 86032	06.3.15	15.78	--	--	--	--	--	--
8	AC1	Manjri Bk	Co 86032	09.3.15	25.60	--	--	--	--	--	--
9	A6	Manjri Bk	Co 86032	13.3.15	14.04	--	--	--	--	--	--
10	A7	Manjri Bk	Co 86032	13.3.15	16.12	--	--	--	--	--	--
11	A11	Manjri Bk	Co 86032	13.3.15	11.53	--	--	--	--	--	--
				Average	**13.39**	--	--	--	--	--	--
12	A21	Manjri Bk	CoM 0265	25.1.15	4.43	--	--	--	--	--	--
13	A22	Manjri Bk	CoM 0265	25.1.15	1.96	--	--	--	--	--	--
14	A23	Manjri Bk	CoM 0265	25.1.15	4.81	--	--	--	--	--	--
15	B10	Manjri Bk	CoM 0265	06.2.15	5.21	--	--	--	--	--	--
				Average	**4.10**	--	--	--	--	--	--
16	C22	Manjri Bk	CoC 671	28.2.15	18.48	--	--	--	--	--	--
17	B10	Manjri Bk	CoC 671	06.2.15	5.06	--	--	--	--	--	--
				Average	**11.77**	--	--	--	--	--	--
18	B21	Manjri Bk	152-5	11.3.15	8.04	--	--	--	--	--	--
19	B22	Manjri Bk	152-5	12.3.15	9.73	--	--	--	--	--	--
				Average	**8.88**	--	--	--	--	--	--
20	B 27	Manjri Bk	Co VSI 9805	04.3.15	49.62	--	--	--	--	--	--
21	B 10	Manjri Bk	Co VSI 9805	06.2.15	9.17	--	--	--	--	--	--
				Average	**29.4**	--	--	--	--	--	--

22	C 14	Manjri Bk	Co VSI 03102	18.08.14	--	35.8	12.45	0.00	0.00	24.8	5.45
23	C 10	Manjri Bk	Co 86032	31.10.14	--	16.8	5.17	0.00	0.00	17.0	4.23
24	C 15	Manjri Bk	Co VSI 03102	11.12.14	--	13.4	4.26	0.00	0.00	13.6	3.67

Table-28.8: Survey and surveillance of insect pests of sugarcane at Powarkheda (2015-16)

Sr. No.	Location	Name of pest (% incidence/Population)	Min.	Max.	Average
1.	Bankhedi	ESB (%)	10.7	23.65	17.18
		TSB (%)	2.10	4.70	3.40
		RB (%)	1.65	3.85	2.75
		Pyrilla /Leaf	13.19	19.89	16.54
		E. melanoleuca/Leaf	7.79	18.35	13.07
		Whitefly (per 2.5 sq.cm.)	0.19	1.18	0.68
2.	Hoshangabad	ESB (%)	10.72	26.64	18.68
		TSB (%)	0.20	0.56	0.38
		RB (%)	0.00	0.84	0.42
		Pyrilla /Leaf	8.47	16.85	12.66
		E. melanoleuca/Leaf	8.69	15.09	11.89
		Whitefly (per 2.5 sq.cm.)	0.08	0.97	0.53
3.	Kareli	ESB (%)	5.60	28.20	16.90
		TSB (%)	1.87	5.60	3.73
		RB (%)	3.13	4.20	3.67
		Pyrilla /Leaf	13.93	21.67	17.8
		E. melanoleuca/Leaf	8.01	14.46	11.24
		Whitefly (per 2.5 sq.cm.)	0.87	4.70	2.79
4.	Salichouka	ESB (%)	12.75	27.90	20.33
		TSB (%)	3.55	6.90	5.23
		RB (%)	2.35	4.70	3.53
		Pyrilla /Leaf	14.33	20.60	17.47
		E. melanoleuca/Leaf	8.30	16.18	12.24
		Whitefly (per 2.5 sq.cm.)	0.54	1.14	0.84

Table-28.9: Survey and surveillance of insect pests of sugarcane at Navsari (2015-16)

Name of pest	Varieties	Location	Per cent Incidence	Remarks
Whitefly	Co 86032 (ratoon)	Nava Rajuvadia Ta. Nandod Di: Narmada (Narmada sugar factory)	70 to 90 %	March -2015
	Co 86032 Planting		45to 60 %	
	Co 86032	Other villages surrounding sisodra Narmada sugar factory	30 to 35 %	March-2015
	Co 86032	Valvada, Vanskui of Mahuva Sugar	5 to 15 %	-
	Co 86032 Co86002 CoM 0265	Dungar, Chikhali, Ten,Movas and Kharvasa village, Bardoli sugar factory	25 to 35 %	-
	Co 86032 CoM 0265	Mohni,Niyol,Magob and surrounding villages of Chalthan Sugar factory	20 to 40 %	May-2015
Early shoot borer & Top borer	Co 97009 (MC- 707) CoC 671 Co 86032 Co 86002 CoM 0265 CoSi 95071	Sisodra, Khergam,Naugama and Surkhai Gandevi sugar factory	7 to 12 %	-
Root borer	Co 86002 Co 97009 (MC- 707) Co86032	Sayan, Velanja, Sandhiyer, Aerthan and Simarthu : Sayan sugar factory Chalthan sugar : Mohni,Niyol,Magob and surrounding villages Vihan, Rundh Vaktana, Vanz and vav, Kamrej: Choryasi, Navi Pardi, Antroli, Limodra and Ghala	30 to 40 % 9 to 12% 5 to 8 %	-

Table-28.10: Survey and surveillance of insect pests of sugarcane at Mandya (2015-16)

Sr. No.	Variety	Location	Name of pest	Per cent incidence/Population			Remark
				Min.	Max.	Av.	
1	Co86032 Co62175 Co8371 VCF 0517	Chamundi sugars K.M.Doddi,Maddur	Early shoot borer *Chilo infuscatellus*	3.25	17.75	10.25	ESB incidence was low in all the factory areas
			Top shoot borer *Scirpophaga cxcerptalis*	0.63	3.75	2.25	TSB activity was low in all the factory areas
			Internode borer *Chilo sacchariphagus indicus*	18.00	51.50	39.25	Activity was high in all the factory areas, Higher incidence on Variety VCF 0517
			Woolly aphid *Ceratovacuna lanigera*	10.00/ Cm^2	31.00/ Cm^2	18.00/ Cm^2	*Encarsia sp. and Dipha* were found active
			Oligonychus indicus	9.0/Cm^2	53/Cm^2	32.50/Cm^2	Occurred only in low lying areas from January to June when crop was young at Dodda arasinakere village.
			Eriophyid Leaf mite *Abacarus sacchari*	0.55/Cm^2	9.45/Cm^2	5.60/Cm^2	Higher incidence on Variety VCF 0517
			Root grub *Holotrichia serreta*	1/m^2	3/ m^2	2/m^2	Sporadic incidence, Ratoon crop suffered more. More severe in bore well irrigated plots
2	Co86032 Co62175 Co99463 Co86032 VCF 0517	My Sugar Co. Mandya	Early shoot borer	6.00	18.50	13.75	
			Top shoot borer	1.20	4.25	2.75	
			Internode borer	21.25	54.00	37.50	Higher incidence on Variety VCF 0517
			Woolly aphid	8.00/ Cm^2	18.00/ Cm^2	12.00/ Cm^2	*Encarsia* sp. kept the pest under check
			Oligonychus indicus	4.00/Cm^2	18/Cm^2	8.0/Cm^2	Occurred on young crop during summer at Ganadalu and Dudda

							villages.
			Abacarus sacchari	3.13/Cm²	10.90/Cm²	6.40/Cm²	Higher incidence on Variety VCF 0517
			Root grub	1.00/m²	6.00/m²	2.00/m²	Sporadic incidence, occurred in small patches, more severe in bore well irrigated plots
			Pyrilla *Pyrilla perpusilla*	0.0/Clump	0.25/Clump	0.16/Clump	
3.	Co86032 Co62175 Co99463 Co 8371 VCF 0517	N.S.L.Sugars Koppa,K.R.Pet	Early shoot borer	2.90	14.50	9.25	
			Top shoot borer	0.75	6.50	4.50	
			Internode borer	18.50	62.25	39.00	Higher incidence on Variety VCF 0517
			Pyrilla	0.50/Clump	1.5 Clump	0.60/ Clump	
			Abacarus sacchari	1.25/Cm^2	2.6/ Cm^2	1.80/ Cm^2	Higher incidence on Variety VCF 0517
			Root grub	2.0/ m²	5.00/ m²	3.00/ m²	Sporadic incidence
			Woolly aphid	7.0/Cm^2	42.0/Cm^2	9.0/Cm^2	Activity of *Encarsia* sp and *Dipha* was present

Table-28.11: Survey and surveillance of insect pests of sugarcane at Coimbatore (2015-16)

Sr. No	Variety	Location	Name of pest	% incidence/population			Remarks
				Min	Max	Average	
1	Co 86032	Pooluvapatti, Coimbatore	Internode borer	5.0	10.0	7.5	--
			Top borer	0.0	5.0	2.5	
			Root borer	-	-	-	
			Termite	0.0	-	-	
			Epiricania melanoleuca	0.0	5.0	-	
2	Co 86032	Thenamanallur	Mealybug	5.0	10.0	-	--
			Rat	0.0	1-2 burrows	-	
3	Co 86032	Puthur	Pyrilla	0.0	5.0	-	--
			Mealybug	5.0	40.0	27.0	
			Termite	0.0	5.0	2.5	
4	Co 86032	Telungupalayam	Top borer	0.0	5.0	2.5	--
			Woolly aphid	-	-	-	Stray incidence / patchy appearane
			Pyrilla	1egg mass/40 leaves	-	-	--
			Cotesia flavipes	0.0	17.0	8.5	On INB
				3.3	15.4	9.4	On SB
			Sturmiopsis inferens	0.0	3.85	1.9	On SB
	Co 62175		*Epiricania melanoleuca*	1cocoon/40leaves	-	-	--
5	Co 86032	M/s Amravathi Sugars, Udumalpet	INB	15.0	20.0	17.5	--
			RB	0.0	15.0	7.5	--
6	Co 86032	M/s Bannari Amman Sugars, Sathyamangalam	INB	0.0	10.0	5.0	--
			RB	0.0	15.0	7.5	--
7	Co 86032	M/s Rajshree Sugars, Mundiyampakkam	*Brahmina mysoreensis* (New record)	-	-	-	--
8	Co 86032	Annur, Sathyamangalam	INB	15.0	50.0	32.5	--
			Mealybug	10.0	20.0	15.0	--
			Rat, termite	Traces			--

Table-28.12: Survey and surveillance of insect pests of sugarcane at Anakapalle (2015-16)

S. No.	Variety	Location	Name of the pest	% incidence or population			Remarks
				Min.	Max.	Aver.	
1	87 A 298, 86 V96, 2003 V 46 Co 86032	Navabharat Ventures Pvt., Ltd., Samalkot, East Godavari district	Early shoot borer (*Chilo infuscatellus*)	6.00	26.00	16.00	Incidence of early shoot borer and internode borer were high on variety, Co 86032. Moderate to high incidence of scale insect was observed on variety, 87 A 298 (Viswa mitra) both on plant and ratoon crops.
			Root borer (*Emmalocera depresella*)	1.00	3.00	2.00	
			Top shoot borer (*Scirpophaga exrceptalis)*	2.00	5.00	3.50	
			Internode borer (*Chilo sacchariphagus indicus*)	20.00	85.00	52.50	
			Pyrilla perpusilla / leaf	8.00	17.00	12.50	
			Epiricania melanoleuca / plant	3.00	5.00	4.00	
			Whitefly (*Aleurolobus barodensis)* (N & P / 2.5sq.cm.)	10.33	18.33	14.33	
			Woolly aphid(*Ceratovacuna lanigera*) (Average grade)	1	2	1.5	
			Scale insect (*Melanaspis glomareta)* (%incidence)	10.00	70.00	40.00	
			Mealy bug (*Saccharicoccus sacchari*) (%incidence)	8.00	19.00	13.50	
			Red Mite (*Oligonychus indicus*) (% incidence)	4.00	26.00	15.00	
			Termite *(Odontotermes obesus)* (% incidence)	15.00	30.00	22.50	
			Derbid leafhopper (*Proutista moesta)* / leaf (number of adults/leaf)	3.00	9.00	6.00	
			Sugarcane grass hopper, *Hieroglyphus banian*	1/clump	4/clump	2/clump	
2	Co7219, 87 A 298 , Co 62175, 2001 A 63 & Co7805	Chodavaram sugar factory operational area, Visakhapatnam dt.	Early shoot borer	16.00	44.00	30.00	On variety, Co 62175 red rot incidence was observed along with severe incidence of internode borer. Moderate to severe incidence of Termite was more in red loamy soils in many pockets.
			Internode borer	20.00	80.00	50.00	
			Pyrilla/leaf	4.00	11.00	7.50	
			Epiricania melanoleuca/plant	1.00	3.00	2.00	
			Whitefly (N &P per 2.5sq.cm.)	5.00	21.00	13.00	
			Mealy bug	5.00	10.00	7.50	
			Woolly aphid	1.00	1.00	1.00	
			Scale insect	5.00	30.00	17.50	
			Red mite	5.00	45.00	25.00	
			Termite	23.00	37.00	30.00	

3	87 A 298, 2001 A 63, 93 A 145, Co7219, 81 V 48, Co 62175 & Co7805	Thummapala Cooperative Sugar factory area, Anakapalle, Munagapaka villages of Visakhapatnam district	Early shoot borer	13.00	47.00	30.00	Due to delayed onset of monsoon, moderate to severe incidence of early shoot borer was observed on all popular varieties.
			Internode borer	15.00	80.00	47.50	
			Pyrilla/leaf	5.00	13.00	9.00	
			Whitefly	13.33	16.67	15.00	
			Termite	8.00	15.00	11.50	
			Derbid planthoppers/leaf	7.00	17.00	12.00	
			Mealybug	4.00	10.00	7.00	
			scale insect	5.00	30.00	17.50	
			Red mite	5.00	36.00	20.50	
4	87 A 298, Co 62175, 2001 A 63 & 2003 V46,	Etikoppaka Cooperative sugar factory operational area, Visakhapatnam district	Early shoot borer	12.00	48.00	30.00	Early shoot borer and interndoe borer were the predominant species prevailed in the early stage of the crop period in Visakhapatnam district
			Internode borer	20.00	70.00	45.00	
			Pyrilla/leaf	3.00	13.00	8.00	
			Red Mite	12.00	30.00	21.00	
			Whitefly	14.33	21.33	17.83	
			White woolly aphid	2	2	2	
			scale insect	5.00	30.00	17.50	
			Termite	20.00	40.00	30.00	
			Leafhoppers(*Proutista moesta*)/ leaf	5.00	11.00	8.00	
			Pyrilla per leaf	2.00	12.00	7 .00	
5	87 A 298, 93 A 145, 2001 A 63	Sri Sarvaraya sugars Ltd., Chelluru, East Godavari dt.	Early shoot borer	11.00	34.00	22.50	High incidence of early shoot borer and internode borer were observed on variety, Co 86032, 2003 V 46. & 87 as 298. Moderate to high incidence of scale insect was observed on variety 87 A 298 both on plant and ratoon crops.
			Root borer	1.00	3.00	2.00	
			Top shoot borer	2.00	3.00	2.50	
			Internode borer	20.00	85.00	52.5	
			Pyrilla/leaf	8.00	18.00	13.00	
			*Epiricania melanoleuc*a/plant	1.00	3.00	2.00	
			Whitefly	3.00	18.00	10.50	
			Woolly aphid	1	1	1	
			Scale insect	20.00	60.00	40.00	
			Red mite (%incidence)	14.00	22	18.00	

Table-30.1: Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Kapurthala (2015-16)

Month	Percent incidence of early shoot borer	Percent parasitism (ESB)		Percent incidence of Top borer	Percent parasitism (Tb)			Percent incidence of Stalk borer	Percent parasitism (Stb)		Percent incidence of Pyrilla	Percent parasitism (Pyrilla)
		Trichogramma chilonis	*Stenobracon* sp.		*Rhaconotus sp.*	*Isotima javensis*	*Stenobracon* sp.		*Sturmiopsis inference*	*Cotesia flavipes*		*Epiricania melanoleuca*
11 April, 2015	3.9	-	-	-	-	-	-	-	-	-	-	-
11 May, 2015	10.8	2.2	3.1	1.3	-	-	-	-	-	-	-	-
11 June, 2015	8.5	4.6	1.3	4.5	-	1.0	2.0	-	-	-	-	-
11 July, 2015	3.0	1.0	-	9.8	4.3	3.1	3.8	-	-	-	-	-
11 August, 2015	-	-	-	3.5	2.1	1.2	2.6	-	-	-	5.6	3.8
11 September, 2015	-	-	-	2.8	-	-	1.0	3.5	1.8	-	2.9	2.0
11 October, 2015	-	-		-	-	-	-	8.1	2.8	3.0	1.7	1.4
11 November, 2015	-	-	-	-	-	-	-	9.3	3.6	1.0	-	-
11 Dec, 2015	-	-	-	-	-	-	-	3.6	-	-	-	-
11 January, 2016	-	-	-	-	-	-	-	2.0	-	-	-	-

Table-30.2: Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at SBI-Karnal (2015-16)

S. No	Insect-pests	Infestation / Population	Bio- agents	Parasitisation (%)
1	ESB	9.3 %	-	-
2	Top borer	5.9%	*Isotima javensis*	3.3 (Larvae)
3	Stalk borer	1.0 (Infestation index)	*Cotesia flavipes*	4.6 (Larvae)
4	Pyrilla	12.0 individual/ leaf	*Epiricania melanoleuca*	27.2 (Nymph and adults)
			Tetrasticus pyrillae.	3.6 (eggs)
5	Mites	2.3 %	--	--
6	Black bug	T to 38/ leaf	--	--
T = Traces				

Table-30.3 (a): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Shahjahanpur (2015-16)

Period of observation Dates + SMW	% incidence early shoot borer	% incidence stalk borer		% incidence stalk borer	% Parasitism (stalk borer)
		T. chilonis	*E. annulipes*		*Cotesia flavipes*
1	**2**	**3**	**4**	**5**	**6**
16-04-15 16th SMW	4.60	-	-	-	-
18-05-15 20th SMW	6.20	-	-	-	-
17-06-15 24th SMW	9.20	-	-	-	-
20-07-15 29th SMW	5.00	-	-	-	-
20-08-15 34th SMW	-	-	-	-	-
22-09-15 38th SMW	-	-	-	12.20	7.20
25-10-15 43rd SMW	-	-	-	18.50	11.50
19-11-15 47th SMW	-	-	-	-	-

Table-30.3 (b): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Shahjahanpur (2015-16)

Period of observation Dates & SMW	% incidence top shoot borer	% Parasitism (Top shoot borer)						
		T. beneficiens	*I. javensis*	*A. flavipes*	*Rhanconotus scripophagae*	*Elasmus zehntneri*	*S. deesae*	*B. bassiana*
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
16-04-15 16th SMW	-	-	-	-	-	-	-	-
30-05-15 22nd SMW	3.00	2.50	2.00	-	-	-	-	-
28-06-15 26th SMW	5.40	6.30	4.25	-	3.15	-	-	-
30-07-15 31st SMW	6.50	16.20	8.00	-	6.50	-	4.30	-
28-08-15 35th SMW	8.20	7.15	12.25	-	9.00	-	5.35	-
20-09-15 38th SMW	2.15	-	6.30	-	4.50	-	7.60	-
25-10-15 43rd SMW	-	-	-	-	-	-	-	-

Table-30.3 (c): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Shahjahanpur (2015-16)

Period of observations Dates + SMW	Pyrilla/leaf (Nymph + Adult)	*E. melanoleuca*		*Tetrastichus pyrillae*
		% Parasitism	*Egg mass and cocoon*	
16-04-15 (16th SMW)	15.00	Nil	Nil	Nil
01-05-15(18th SMW)	25.00	Nil	Nil	Nil
16-05-15(20th SMW)	30.50	Nil	1-2Cocoon/plot	Nil
10-08-15(32nd SMW)	55.00	15	5-8/ Clump	40-50
01.09.15 (35th SMW)	8.50	60-65	10-15/leaf	30

Table-30.4(a): Monitoring of top borer and its bioagents in sugarcane agro-ecosystem at Lucknow (2015-16)

Period of Observation	Incidence of top borer (%)	% parasitisation (Top borer)								
		T. japonicum	*T. chilonis*	*T. beneficiens*	*I. Javensis*	*Cotesia flavipes*	*Rhaconotus scirpophagae*	*Elasmus zehntneri*	*S. desae*	*B. bassiana*
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
II brood 08-05-15 (I Week)	5.50	-	-	44% on egg mass basis	0.0	-	11.0	-	0.0	-
III brood 17-06-15 (IV Week)	23.85	-	-	-	3.5	-	3.5	-	4.0	-
IV brood 24-09-2015 (IV Week)	44.44	-	-	-	4.0	-	0.0		1.5	-

Table-30.4(b): Monitoring of INB and RB and their bioagents in sugarcane agro-ecosystem at Lucknow (2015-16)

Period of Observation	Incidence of internode borer	% parasitisation				Period of Observation	Incidence of Root borer	% parasitisation		
		T. chilonis	*T. japonicum*	*Cotesia flavipes*	*B. bassiana*			*T. chilonis*	*Cotesia flavipes*	*B. bassiana*
1	2	3	4	5	6	1	2	3	4	5
26-08-15 (IV Week)	21.63	-	-	-	-	8-6-15 (II Week)	5.45	-	-	-
-	-	-	-	-	-	7-9-15 (I Week)	45.27	-	-	-

INB: - Internode borer RB: - Root borer

Table-30.4(c): Monitoring of Stalk borer and Mealy bug and their bioagents in sugarcane agro-ecosystem at Lucknow (2015-16)

Period of Observation	Incidence of stalk borer	% parasitisation				Period of Observation	Incidence of Mealy bug	% parasitisation		
		T. chilonis	*T. japonicum*	*Cotesia flavipes*	*B. bassiana*			*T. chilonis*	*Cotesia flavipes*	*B. bassiana*
1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**
24-08-15 (IV Week)	7.96	-	-	-	-	09-10-15 (II Week)	100.0 on cane basis	-	-	-

Table-30.4(d): Monitoring of pyrilla and their bioagents in sugarcane agro-ecosystem at Lucknow (2015-16)

Period of Observation	Incidence of *P. perpusilla*			% Parasitization				
				Epiricania melanoleuca			*Tetrastichus pyrillae*	*Lestrodryinus pyrillae*
	No. of adults/leaf	No. 0f nymphs/leaf	No. of egg mass/leaf	Cocoon	Egg mass	Adults	% parasitisation On egg mass basis	% parasitisation On egg mass basis
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
22-07-2015 (IV Week	1-3	10-20	1.3	traces	-	-	-	-
22-08-2015 (IV Week)	7-9	50-80	5.10	7-20	0-2	1	-	0-5
10-10-15 (II Week)	Traces	5-7	-	20-80	3-5	2	-	-

Table-30.5(a): Monitoring of borer pests and their bioagents in sugarcane agro-ecosystem at Pusa (2015-16)

Period of observation	% incidence top borer	% Parasitism (Top borer)			% incidence of shoot borer	% incidence of root borer	% Parasitism (Root and shoot borer)
		A. flavipes	*R. scripophagae*	*S. deesae*			
January	-	-	-	-	-	-	Not observed
February	-	-	-	-	-	-	
March	2.1	-	-	-	7.3	4.1	
April	8.9	-	-	-	12.7	7.3	
May	13.7	4.3	-	3.3	15.6	11.9	
June	17.2	8.7	-	6.9	7.4	6.3	
July	13.5	11.6	2.9	9.1	3.2	2.5	
August	9.6	13.1	4.1	11.3	-	-	
September	6.3	15.9	7.8	13.7	-	-	
October	2.9	7.5	4.4	6.8	-	-	
November	1.3	3.1	2.1	2.7	-	-	
December	Trace	-	--	-	-	-	

Table-30.5(b): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Pusa (2015-16)

Period of observation	Pyrilla/leaf	% Parasitism (Pyrilla)		% incidence of stalk borer	% parasitism *A. flavipes*
		T. pyrillae	*E. melanoleuca*		
January	-	-	-	-	-
February	-	-	-	-	-
March	2.7	-	-	-	-
April	7.3	-	-	-	-
May	18.1	-	5.3	-	-
June	32.3	-	11.2	-	-
July	25.7	13	29.5	4.3	-
August	11.2	37	42.7	7.1	12.5
September	6.5	77	34.0	9.7	18.1
October	2.3	100	17.03	6.4	15.3
November	0.3	100	6.1	2.1	6.6
December	-	-	-	1.3	4.7

Table-30.6: Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Seorahi (2015-16)

(1) Early shoot borer							
Period of observation Dates + SMW	**% incidence**	**% parasitism (ESB)**					
		T. chilonis		***E. annulipes***		***S. inferens***	
16-04-2016 16th SMW	5.26	-		-		-	
18-05-2016 20th SMW	9.21	-		-		-	
17-06-2016 24th SMW	9.75	-		-		-	
20-07-2016 29th SMW	8.75	-		-		-	
20-08-2016 34th SMW	-	-		-		-	
22-09-2016 38th SMW	-	-		-		-	
25-10-2016 43rd SMW	-	-		-		-	
19-11-2016 47th SMW	-	-		-		-	
(2) Stalk borer							
Period of observation Dates + SMW	**% incidence**	**% Parasitism (Stalk borer)**					
		Cotesia flavipes	***Apanteles flavipes***	***Apanteles pyralophagus***	***S. inference***	***Nosema sp.***	***B. bassiana***
16-04-2016 16th SMW	-	-	-	-	-	-	-
18-05-2016 20th SMW	-	-	-	-	-	-	-
17-06-2016 24th SMW	-	-	-	-	-	-	-
20-07-2016 29th SMW	-	-	-	-	-	-	-
20-08-2016	-	-	-	-	-	-	-

34th SMW							
22-09-2016 38th SMW	7.55	10.50	-	-	-	-	-
25-10-2016 43rd SMW	8.72	13.63	-	-	-	-	-
(3) Top Borer							
Period of observation Dates + SMW	**% incidence**	**% Parasitism (Top shoot borer)**					
		Stenobracon sp.	***I. javensis***	***Elasmus zehntneri***	***Rhaconotus scripophagae***	***T. Japonicum***	***T. chilonis***
16-04-2016 16th SMW	-	-	-	-	-	-	-
30-05-2016 22nd SMW	2.63	2.85	2.50	-	-	-	-
28-06-2016 26th SMW	3.75	4.54	4.00	4.16	3.33	-	-
30-07-2016 31th SMW	5.07	13.04	15.00	9.09	8.00	-	-
28-08-2016 35th SMW	4.53	16.00	16.00	13.63	12.50	-	-
20-09-2016 38th SMW	1.25	3.33	5.00	3.33	4.44	-	-
25-10-2016 43rd SMW	-	-	-	-	-	-	-

Table-30.7(a): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Padegaon (2015-16)

Period of observation (2015)	% incidence early shoot borer	% Parasitism (ESB)		
		T. chilonis	*E. annulipes*	*S. inferens*
1	**2**	**3**	**4**	**5**
15 (April 09-15)	--	--	--	--
16 (April 16-22)	5.33	--	--	--
17 (April 23-29)	8.13	--	--	--
18 (April 30- May06)	8.47	1.10	--	--
19 (May 07-13)	6.17	1.00	--	--
20 (May 14-20)	8.87	1.00	--	--
21(May 21-27)	7.54	2.00	--	--
22 (May 28-June 03)	7.99	2.10	--	--
23 (June 04-10)	7.06	2.40	--	--
24 (June 11-17)	7.91	2.00	--	--
25 (June 18-24)	4.69	2.40	--	--
26 (June 25- July01)	5.51	2.10	--	--
27 (July 02-08)	2.04	1.00	--	--
28 (July 09-15)	1.08	0.20	--	--
29 (July 16-22)	0.79	0.00	--	--
30 (July 23-29)	3.15	0.00	--	--
31 (July 30-Aug 05)	--	--	--	--

Table-30.7(b): Monitoring of insect pests in sugarcane agro-ecosystem at Padegaon (2015-16)

Period of observation (2015)	Pyrilla / leaf	Pyrilla/leaf				
		T. pyrillae	*Cheiloneurus pyrillae*	*Ooencyrtus papilionis*	*E. melanoleuca*	
					% Parasitism	*Egg mass & Cocoon*
1	**2**	**3**	**4**	**5**	**6**	**7**
29 (July 16-22)	-	-	-	-	-	1
30 (July 23-29)	0-1	-	-	-	-	0
31 (July 30-Aug 05)	0-1	-	-	-	-	1
32 (Aug 06-12)	1-2	10	-	-	50	1-2
33 (Aug 13-19)	2-3	30	-	-	67	2-3
34 (Aug 20-26)	3-5	20	-	-	80	0-2
35 (Aug 27-Sept 02)	4-7	05	-	-	80	1-2
36 (Sept 03-09)	2-3	-	-	-	60	0-1
37 (Sept 10-16)	1-2	-	-	-	50	0
38 (Sept 17-23)	0	-	-	-	0	0
39 (Sept 24-30)	0	-	-	-	0	0

Table-30.7(c): Monitoring of insect pests in sugarcane agro-ecosystem at Padegaon (2015-16)

Period of observation	woolly aphid (Av. Grade)	% Parasitism/Predator population per plant (Woolly aphid)				
		Encarsia flavoscutellum	*Micromus igorotus*	*D. aphidivora*	Syrphid fly	*Chrysoperla zastrowi sillemi*
1	**2**	**3**	**4**	**5**	**6**	**7**
28 (July 09-15) 2015	-	-	-	-	-	-
29 (July 16-22)	0.40	-	-	-	-	-
30 (July 23-29)	0.60	0.33/leaf	0.33/leaf	-	-	-
31 (July 30-Aug 05)	1.56	0.33/leaf	1/leaf	-	-	-
32 (Aug 06-12)	1.80	1/leaf	1/leaf	-	-	-
33 (Aug 13-19)	2.05	1.33/leaf	1.33/leaf	-	-	-
34 (Aug 20-26)	1.07	2.67/leaf	3/leaf	-	-	0.67/leaf
35 (Aug 27-Sept 02)	0.73	0.67/leaf	2.67/leaf	-	0.67/leaf	-
36 (Sept 03-09)	0.67	0.67/leaf	1/leaf	0.33/leaf	-	-
37 (Sept 10-16)	Since 37 to 50 SMW no woolly aphid incidence was seen in field.					
51 (Dec 17-23)	1.22	1/leaf	1.33/leaf	-	-	0.33/leaf
52 (Dec 24-31)	0.90	2.33/leaf	2/leaf	0.33/leaf	-	0.33/leaf
01 (Jan 01-07) 2016	0.76	2.67/leaf	2.33/leaf	1.33/leaf	-	-
02 (Jan 08-14) 2016	0.40	2/leaf	0.66/leaf	-	-	-
Note: The incidence of woolly aphid was only on few stools in the experimental field. The observations are based on the infested parts of the field.						

Table-30.7(d): Monitoring of insect pests in sugarcane agro-ecosystem at Padegaon (2015-16)

Period of observation (2015)	% incidence Mealy bug	% Parasitism/Predator population per plant (Mealy bug)			
		Coccinella septempunctata	*P. horni*	*Cheilomenes sexmaculata*	*C. zastrowi sillemi*
1	**2**	**3**	**4**	**5**	**6**
35 (Aug 27-Sept 02)	-	-	-	-	-
36 (Sept 03-09)	1	-	-	-	-
37 (Sept 10-16)	4	-	-	-	-
38 (Sept 17-23)	9	1	-	-	
39 (Sept 24-30)	7	2-3	-	1	11 eggs observed on one clump in 40 and 41 SMW
40 (Oct 01-07)	8	1	-	2-3	
41 (Oct 08-14)	5	1	-	0	
42 (Oct 15-21)	3	-	-	1	
43 (Oct 22-28)	1	-	-	-	
44 (Oct 29-Nov 04)	0	-	-	-	-

Table-30.8: Monitoring of insect pests in sugarcane agro-ecosystem at Pune (2015-16)

Sr. No	Month	Early shoot borer	Internode borer			Mealy bug	
		% incidence	% incidence	% intensity	Infestation index	% incidence	% intensity
1	February 2015	0.76	--	--	--	--	--
2	March 2015	2.39	--	--	--	--	--
3	April 2015	1.23	--	--	--	--	--
4	May 2015	1.04	--	--	--	--	--
5	June 2015	--	0.00	0.00	0.00	0.00	0.00
6	July 2015	--	0.00	0.00	0.00	5.00	0.90
7	August 2015	--	0.00	0.00	0.00	14.00	2.35
8	September 2015	--	4.00	0.32	0.01	11.00	1.67
9	October 2015	--	3.00	026	0.01	5.00	0.45
10	November 2015	--	10.00	0.56	0.06	1.00	0.06
11	December 2015	--	3.00	0.17	0.01	0.00	0.00

Table-30.9(a): Monitoring of insect pests in sugarcane agro-ecosystem at Powarkheda (2015-16)

SMW	Date	Max. Temp. (^{O}C)	Min. Temp (^{O}C)	RH%	Rainfall (mm)	ESB infestation (%)	
						Weekly	Cumulative
3	**15 to 21/1**	27.90	10.80	87.00	11.60	0.00	0.00
4	**22 to 28/1**	27.70	10.80	92.00	10.20	0.00	0.00
5	**29/1 to 4/2**	29.20	9.40	88.00	0.00	0.20	0.20
6	**5 to 11/2**	32.10	11.00	88.00	0.00	0.20	0.40
7	**12 to 18/2**	27.90	9.80	70.00	0.00	0.40	0.80
8	**19 to 25/2**	33.00	8.90	69.00	2.00	0.80	1.60
9	**26/2 to 4/3**	28.40	12.60	92.00	0.00	1.00	2.60
10	**5 to 11/3**	32.50	14.40	77.00	0.00	1.20	3.80
11	**12 to 18/3**	38.70	16.20	79.00	0.00	1.60	5.40
12	**19 to 25/3**	38.50	14.40	77.00	0.00	1.80	7.20
13	**26/3 to 1/4**	39.40	19.00	50.00	0.00	2.40	9.60
14	**2 to 8/4**	40.20	18.40	36.00	0.00	**2.20**	11.80
15	**9 to 15/4**	40.40	18.60	25.00	0.00	2.20	14.00
16	**16 to 22/4**	41.50	20.70	55.00	8.20	1.80	15.80
17	**23 to 29/4**	41.90	20.20	50.00	0.00	1.60	17.40
18	**30/4 to 6/5**	43.30	22.40	34.00	0.00	1.00	18.40
19	**7 to 13/5**	40.90	22.00	56.00	0.00	0.80	19.20
20	**14 to 20/5**	42.00	21.00	41.00	0.00	0.60	19.80
21	**21 to 27/5**	43.70	22.40	39.00	0.00	0.40	20.20
22	**28/5 to 3/6**	44.80	25.40	56.00	2.40	0.60	20.80
23	**4 to 10/6**	46.20	27.20	67.00	0.00	0.40	21.20
24	**11 to 17/6**	43.90	22.00	44.00	60.60	0.20	21.40
25	**18 to 24/6**	38.80	20.20	0.00	22.80	0.00	21.40

Table-30.9(b): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Powarkheda (2015-16)

SMW 2015	Max. Temp. (^{O}C)	Min. Temp (^{O}C)	RH%	Rainfall (mm)	Pyrilla (/leaf)	Pyrilla Egg Masses	*E. malanoleuca* (%)	*E. malanoleuca EM & C*	*T. pyrillae* (%)
10 (March)	32.50	14.40	77.00	0.00	0.00	0.05	0.00	0.05	0.00
11(March)	38.70	16.20	79.00	0.00	0.35	0.10	0.00	0.00	4.80
12 (March)	38.50	14.40	77.00	0.00	0.80	0.35	0.60	0.40	6.80
13 (March)	39.40	19.00	50.00	0.00	1.55	0.60	1.00	0.75	8.50
14 (April)	40.20	18.40	36.00	0.00	2.25	0.90	1.80	0.90	15.60
15 (April)	40.40	18.60	25.00	0.00	2.30	0.80	2.20	1.00	17.00
16 (April)	41.50	20.70	55.00	8.20	2.40	0.80	2.60	1.70	21.10
17 (April)	41.90	20.20	50.00	0.00	2.75	1.10	4.00	1.75	20.60
18 (May)	43.30	22.40	34.00	0.00	3.60	0.30	5.60	1.90	12.30
19 (May)	40.90	22.00	56.00	0.00	2.80	0.20	6.00	2.05	7.00
20 (May)	42.00	21.00	41.00	0.00	2.10	0.10	5.20	1.40	3.50
21 (May)	43.70	22.40	39.00	0.00	0.95	0.00	3.20	0.40	0.00
22 (May)	44.80	25.40	56.00	2.40	0.70	0.00	2.20	0.15	0.00
23 (June)	46.20	27.20	67.00	0.00	0.30	0.00	0.00	0.05	0.00
24 (June)	43.90	22.00	44.00	60.60	0.00	0.00	0.00	0.00	0.00
25 (June)	38.80	20.20	0.00	22.80	0.00	0.00	0.00	0.00	0.00
26 (June)	35.60	24.60	99.00	15.50	0.85	0.00	0.60	0.25	0.00
27 (July)	35.40	25.60	99.00	0.00	1.45	0.25	1.00	0.20	3.90
28 (July)	35.40	24.80	99.00	12.00	3.75	0.25	2.40	0.55	8.80
29 (July)	33.40	23.00	99.00	173.00	6.40	0.80	4.60	1.30	13.50
30 (July)	30.40	22.50	99.00	18.00	10.30	1.10	5.20	2.70	20.30
31 (Aug)	30.60	23.00	99.00	12.50	13.35	1.55	10.40	3.15	29.70
32 (Aug)	31.70	24.20	99.00	13.00	15.20	1.95	16.40	5.75	36.00
33 (Aug)	31.10	23.60	99.00	13.00	18.35	2.10	24.40	7.00	54.10
34 (Aug)	32.30	23.30	99.00	11.50	13.90	1.55	34.40	5.95	60.00

35 (Aug)	31.10	23.80	99.00	12.20	8.80	1.30	25.60	9.10	66.40
36 (Sept)	34.70	21.70	85.71	0.00	6.85	1.30	19.80	12.70	75.00
37 (Sept)	36.30	22.00	80.14	2.00	4.40	1.15	13.40	11.10	61.20
38 (Sept)	33.50	22.00	80.29	35.60	2.05	1.00	9.60	4.90	37.30
39 (Sept)	35.80	19.00	77.14	0.00	0.85	0.55	6.80	1.90	11.00
40 (Oct)	37.20	18.60	68.14	0.00	0.35	0.10	3.80	0.35	2.60
41 (Oct)	37.70	18.20	61.86	0.00	0.25	0.00	0.80	0.20	0.00
42 (Oct)	37.60	18.40	64.29	0.00	0.00	0.00	0.60	0.10	0.00
43 (Oct)	37.10	19.00	73.86	0.00	0.00	0.00	0.00	0.00	0.00

Table-30.10(a): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Navsari (2015-16)

Period of Observation (SMW)	% incidence of Early shoot borer	% Parasitism		
		T. chilonis	*E. annulipes*	*S. inferens*
7	3.79	13.19	-	-
11	3.49	8.59	-	-
16	1.71	8.77	-	-

Table-30.10(b): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Navsari (2015-16)

Period of Observation (SMW)	% incidence of Top shoot borer	% Parasitism			
		T. japonicum	*T. Chilonis*	*Apanteles flavipes*	*B. bassiana*
20	2.51	7.97	3.98	4.12	2.78
28	2.29	6.55	4.37	3.7	1.99
50	3.41	2.93	2.34	2.15	1.47

Table-30.10(c): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Navsari (2015-16)

Period of Observation (SMW)	% incidence of Shoot borer	% Parasitism	
		A. flavipes	*B. bassiana*
Average of All SMW	17.09	3.42	2.11

Table-30.10(d): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Navsari (2015-16)

Period of Observation (SMW)	% incidence of Root borer	% Parasitism	
		G. indicus	*B. bassiana*
50	19.55	12.78	1.02

Table-30.11: Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Mandya (2015-16)

Time of observation	Per cent Incidence			Woolly aphid	Mealy bug		Natural Enemies
	ESB	TSB	INB	leaf area covered	% Incidence	% Intensity	
30 DAP	1.90	--	--	--	-	-	--
60 DAP	2.84	--	--	--	-	-	--
90 DAP	1.31	--	--	--	-	-	--
120DAP	0.63	--	--	--	-	-	--
150 DAP	--	0.81	--	25%	-	-	*Encarsia flavoscutellum* 1adult/leaf
180 DAP	--	--	--	50%	-	-	*Encarsia flavoscutellum* 3adult/leaf
210 DAP	--	2.31	--	--	11.66	24.54	--
At harvest	--	--	24.50	--	--	--	Egg parasitoid (Unidentified)7.50%of egg masses

ESB- Early shoot borer; TSB- Top shoot borer; INB- Internode borer

Table-30.12: Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Coimbatore (2015-16)

S. No.	Location	Insect pest	Prevalence period	Max. incidence /population	Natural enemy	Prevalence period	Max. parasitization / population
1	Coimbatore	Shoot borer	May	5.82%	--	--	--
2			June	5.0%	--	--	--
3			July	1.32	--	--	--
4		Top borer	July	0.44	--	--	--
5		Termite	July	Traces	--	--	--
6		*Asamangulia*	July	Traces	--	--	--
7		SB	September	2.05	--	--	--
8		INB	September	0.51	--	--	--
9		TB	September	0.51	--	--	--
10		Whitefly	--	0.77	--	--	--
11		Mealybug	--	1.79	--	--	--
12		Woolly aphid	November	Av.rating 1.77 / leaf	*Encarsia flavoscutellum; Micromus*	November	--
13		Internode borer	March	35.0	--	--	--
14		Root borer	--	47.6	--	--	--

SB- Shoot borer, INB- Internode borer, TB- Top borer

Table-30.13(a): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Anakapalle (2015-16)

Period of observation	% incidence of early shoot borer	% parasitism (ESB), if any			% incidence of Internode borer	% Parasitism (INB)		
		T. chilonis	*E. annulipes*	*S. inferens*		*T. chilonis*	*S. inferens*	*Cotesia flavipes*
23-4-15/18MW	8.60	2.20	5-6/clump	-	-	-	-	-
25-5-15/22MW	38.60	3.10	4-3/clump	0.60	2.60	-	-	-
22-6-15/26MW	30.10	4.20	1-3/clump	1.30	12.60	-	-	-
24-7-15/31MW	11.50	1.00	--	3.80	25.40	--	0.40	-
22-8-15/35MW	-	-	--	0.60	52.00		1.00	-
23-9-15/39MW	-	-	-	-	38.00	1.00	2.60	0.60
23-10-15/43MW	-	-	2-3/cane	-	19.20	3.00	3.30	2.60
23-11-15/48MW	-	-	2-3/cane	-	18.60	3.60	1.80	2.20
23-12-15/52MW	-	-	-	-	14.10	2.80	-	4.60
5-1-16/1MW	-	-	-	-	4.33	1.00	-	5.40

Table-30.13(b): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Anakapalle (2015-16)

Period of observation	% incidence scale insect	% Parasitism/Predator population per plant (Scale insect)				% incidence Mealy bug	Predator population per plant (Mealy bug)		
		Encarsia flavoscutellum (%)	*A. mayurai (%)*	*C. nigritus*	*P. horni*		*Coccinella septempunctata*	*P. horni*	*Cheilomenes sexmaculata*
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
23-4-15/18MW	-	-	-		-	-	-	-	-
25-5-15/22MW	-	-	-		-	1.0	-	-	-
22-6-15/26MW	-	-	-		-	3.0	1	-	1-2
24-7-15/31MW	-	-	-		-	7.0	2-3	1-3	3-4
22-8-	-	-	-		-	1.0	-	1-2	1

15/35MW									
23-9-15/39MW	-	-	-		-	-	-	1	-
23-10-15/43MW	5.00	-	-		-	-	-	-	-
23-11-15/48MW	20.00	2.6	2.0	2-5	1-3	-	-	-	-
23-12-15/52MW	30.00	8.6	4.6	5-6	2-5	-	-	-	-
5-1-16/1MW	50.00	13.0	6.6	9-11	2-6	-	-	-	-

Table-30.13(c): Monitoring of insect pests and bioagents in sugarcane agro-ecosystem at Anakapalle (2015-16)

Period of observation Date/SMW	Red mite incidence (% incidence)	Whitefly (population/ 2.5sq.cm)	*Ascharsonia* sp. (%)	*Pyrilla perpusilla*			Derbid leafhopper (*Proutista moesta* Adults /leaf)	% Parasitization on *Pyrilla*			
								Epiricania melanoleuca			*Tetristichus pyrillae*
				No. of adults/ leaf	No. of Nymphs/ leaf	No .of egg mass/ leaf		Cocoon	Egg mass	Adults	
23-4-15/18MW	11.00	-	-	-	-	-	-	-	-	-	-
25-5-15/22MW	18.60	-	-	-	-	-	-	-	-	-	-
22-6-15/26MW	33.00	-	-	1-2	3-6	1	2	-	-	-	-
24-7-15/31MW	42.60	-	--	1-2	1- 8	1-2	3-5	-	-	-	-
22-8-15/35MW	6.50	-	-	2-4	7-10	2-3	3-8	-	-	-	2.0
23-9-15/39MW	--	-	-	4-7	6-16	3-4	5-11	1	-	1	3.0
23-10-15/43MW	-	19.25N&P	-	2-11	10-19	2-7	2-5	4-6	1	2	5.0
23-11-15/48MW	-	13.30 N &P	-	1-3	4-11	3-7	-	5-11	1-2	1	3.0
23-12-15/52MW	-	-	2.80	1-2	2-3	1-4	-	1-3	-	-	1.0
5-1-16/1MW	-	-	6.00	1	1	-	-	-	-	-	-

Table-34.1: Mass multiplication *B. bassiana* on different growth medium at Anakapalle (2015-16)

Media	Spore count (X 10^8) per ml	Biomass (g)/ 100 g	Cost of production of 1 X 10^8 spores (Rs)
Parboiled rice +1g Dextrose	13.10	0.13	0.32
Rice +1g Dextrose	12.00	0.15	0.36
Sorghum +1g Dextrose	10.60	0.67	0.39
Pearl millet +1g Dextrose	9.20	0.70	0.49
Ragi +1g Dextrose	11.36	0.61	0.36
Maize +1g Dextrose	12.10	0.63	0.33
Rice bran +1g Dextrose	--	--	--
Corcyra rearing waste (Maize) + 1g Dextrose	11.10	0.70	0.20
Press mud (Sugar mill) +1g Dextrose	11.41	0.20	0.26
Sugarcane bagasse+1g Dextrose	--	--	--
PDB	14.60	0.11	0.45
CD(p=0.05)	0.06	0.03	--
CV%	1.38	1.20	--

Table-34.2 (a): Production of *C. cephalonica* eggs and *T. chilonis* parasitoids cards at Pune (2015-16)

Sr. No.	Month	*Corcyra* eggs Produced (cc)		*T. chilonis* parasitoids cards	
		Per month	Per day	Per month	Per day
1	April 2015	7.00	0.23	7.00	0.23
2	May 2015	9.10	0.29	3.00	0.08
3	June 2015	26.30	0.88	9.00	0.30
4	July 2015	63.30	2.04	30.00	0.97
5	August 2015	36.50	1.18	28.00	0.90
6	September 2015	52.30	1.74	56.00	1.86
7	October 2015	72.30	2.33	58.00	1.87
8	November 2015	69.80	2.33	51.00	1.70
9	December 2015	72.50	2.34	45.00	1.45
10	January 2016	61.60	1.99	50.00	1.61
11	February 2016	54.60	1.88	60.00	2.06
12	March 2016	80.60	2.60	51.00	1.64
	Total	605.90	19.83	448	14.67
	Average	50.49	1.65	37.33	1.22

Table-34.2 (b): Supply of *T. chilonis* parasitoids cards/Corcyra eggs during at Pune (2015-16)

Sr. No.	Name of sugar mill/other	No. of Tricho cards supplied	Amount (Rs.)	Area covered (ha)	Corcyra eggs supplied (cc)	Amount (Rs.)
1.	Vitthalrao Shinde ssk,ltd Dist-Solapur	75	7125.00	5.00	--	--
2.	Kay Bee Exports, Phaltan	20	1900.00	1.33	--	--
3.	Vikrant Patil, T.K.Warna Kolhapur	12	1140.00	0.8	--	--
4.	Farmers	46	4370.00	3.06		
5.	Ms. Ladkat (Student)	--	--	--	2.00	190.00
6.	Venktesh Krupa Sugar mill Dist-Pune	20	1900.00	1.33	--	--
	Total (A)=	173	16435.00	11.53	--	--
7	VSI Farm (Gratis) Total (B)=	31.5	2992.50	2.10	--	--
	Total (C) = (A+B)	204.50	19427.50	13.63	--	--
				Total (D) =	2.00	190.00
	Grand Total F=(C+D)=	--	19617.50	--	--	--

Table-36.1(a): Moth catches of borer complex of sugarcane through lures at Kapurthala (2015-16)

Standard Week	Date	Early shoot borer (Moth/trap)	Top borer (Moth/trap)	Stalk borer (Moth/trap)	Average Temperature ◦C		Average Relative Humidity %		Total Rainfall (mm)
					Max	Min	Morning	Evening	
12	21.03.15	0.0	0.0	0.0	28.7	15.0	95.0	52.0	0.0
13	28.03.15	0.0	0.0	0.0	30.0	17.4	86.0	52.0	12.0
14	04.04.15	0.0	0.0	0.0	26.8	16.5	84.0	56.0	2.8
15	11.04.15	0.0	0.0	0.0	32.1	19.0	78.0	47.0	15.8
16	18.04.15	0.0	0.0	0.0	33.5	17.2	78.0	44.0	6.8
17	25.04.15	0.0	0.0	0.0	35.9	21.4	56.0	25.0	0.0
18	02.05.15	2.0	0.0	0.0	36.7	20.2	53.0	17.0	0.0
19	09.05.15	3.0	0.0	0.0	38.7	24.3	68.0	41.0	10.4
20	16.05.15	5.0	0.0	0.0	36.8	21.9	65.0	30.0	0.0
21	23.05.15	9.0	4.0	0.0	42.4	24.5	39.0	16.0	0.0
22	30.05.15	4.0	3.0	0.0	40.2	25.0	48.0	20.0	1.1
23	06.06.15	2.0	2.0	0.0	38.1	24.0	56.0	29.0	3.6
24	13.06.15	5.0	12.0	0.0	38.1	25.7	54.0	30.0	0.0
25	20.06.15	2.0	6.0	0.0	37.0	26.9	62.0	46.0	5.9
26	27.06.15	2.0	5.0	0.0	35.5	25.7	71.0	43.0	4.0
27	04.07.15	1.0	3.0	0.0	34.6	26.9	76.0	53.0	7.7
28	11.07.15	0.0	2.0	0.0	30.3	25.4	87.0	82.0	137.5
29	18.07.15	0.0	0.0	0.0	31.5	26.8	85.0	70.0	46.0
30	25.07.15	3.0	9.0	0.0	34.4	27.1	74.0	61.0	0.0
31	01.08.15	0.0	2.0	0.0	31.5	26.5	84.0	67.0	4.8
32	08.08.15	0.0	1.0	0.0	31.7	26.6	89.0	75.0	37.5
33	15.08.15	0.0	1.0	0.0	33.4	25.6	84.0	65.0	68.0
34	22.08.15	0.0	0.0	0.0	33.0	25.5	85.0	67.0	23.4
35	29.08.15	1.0	4.0	0.0	33.9	26.4	84.0	57.0	0.0
36	05.09.15	0.0	0.0	0.0	33.1	24.8	79.0	45.0	0.0
37	12.09.15	0.0	0.0	0.0	34.2	24.3	85.0	54.0	1.8
38	19.09.15	0.0	0.0	0.0	30.9	24.3	89.0	67.0	51.3

39	26.09.15	0.0	0.0	1.0	31.3	21.3	91.0	61.0	15.5
40	03.10.15	0.0	0.0	4.0	33.6	20.8	90.0	46.0	0.0
41	10.10.15	0.0	0.0	3.0	32.2	21.8	88.0	53.0	5.8
42	17.10.15	0.0	0.0	7.0	31.0	18.6	90.0	44.0	0.0
43	24.10.15	0.0	0.0	2.0	29.0	16.7	82.0	38.0	11.0
44	31.11.15	0.0	0.0	7.0	28.2	14.4	91.0	44.0	0.0
45	07.11.15	0.0	0.0	5.0	26.8	14.6	84.0	41.0	0.0
46	14.11.15	0.0	0.0	7.0	26.3	13.8	87.0	29.0	0.0
47	21.11.15	0.0	0.0	9.0	26.0	9.1	93.0	29.0	0.0
48	28.11.15	0.0	0.0	3.0	24.8	10.9	91.0	48.0	0.0
49	05.12.15	0.0	0.0	2.0	23.5	9.9	95.0	46.0	0.0
50	12.12.15	0.0	0.0	1.0	19.4	8.3	91.0	45.0	1.2
51	19.12.15	0.0	0.0	2.0	19.4	5.0	94.0	39.0	0.0
52	26.12.15	0.0	0.0	3.0	20.2	5.4	95.0	39.0	0.0
1	02.01.16	0.0	0.0	1.0	20.1	7.4	96.0	48.0	0.0
2	09.01.16	0.0	0.0	0.0	18.2	7.8	93.0	58.0	0.0
3	16.01.16	0.0	0.0	0.0	12.7	7.5	93.0	73.0	0.0
4	23.01.16	0.0	0.0	0.0	15.2	5.1	96.0	68.0	0.0
5	30.01.16	0.0	0.0	0.0	19.2	7.2	92.0	54.0	2.7
6	06.02.16	0.0	0.0	0.0	21.0	7.7	88.0	47.0	0.0
7	13.02.16	0.0	0.0	0.0	21.1	7.7	87.0	43.0	0.0
8	20.02.16	0.0	0.0	0.0	23.8	11.2	94.0	54.0	8.0

Table-36.1(b): Correlation analysis between moth catches and weather parameters at Kapurthala (2015-16)

Correlation coefficient	Early shoot borer	Top borer	Stalk borer
Maximum Temperature	0.58	0.44	0.21
Minimum Temperature	0.39	0.48	-0.35
Relative Humidity % (Morning)	-0.81	-0.52	0.34
Relative Humidity % (Evening)	-0.52	-0.11	-0.28
Rain fall	-0.16	-0.02	-0.21

Table-36.1(c): Impact of moth catches on incidence of borer complex at Kapurthala (2015-16)

Treatment	Early shoot borer (% incidence)	Top borer (% incidence)	Stalk borer (% incidence)
Pheromone (treatment)	6.57	7.95	6.05
Control	9.79	12.16	10.63
Percent reduction	32.98	34.62	43.08

Table-36.2(a): Moth catches of borer complex of sugarcane through lures at Shahjahanpur (2015-16)

Met. Week	Date	Shoot borer (Moth/trap)	Top borer (Moth/trap)	Stalk borer (Moth/trap)	Temperature^{0}C		R.H.%		Rainfall (mm)/Days
					Max.	Min.	F.N.	A.N.	
1	2	3	4	5	6	7	8	9	10
9	26-4 March, 2015	0.00	0.67	0.00	26.45	14.44	90.71	77.14	48.6/2
10	5-11	0.00	1.33	0.67	26.91	12.75	86.00	69.14	3/1
11	12-18	0.33	4.00	1.67	27.60	14.52	84.85	54.28	14.2/3
12	19-25	0.33	1.00	3.00	31.75	17.12	79.28	37.28	--
13	26-01 April	0.67	0.00	2.00	27.67	18.62	82.28	62.85	10.2/2
14	2-8	1.00	0.00	2.00	31.77	17.68	84.57	67.71	6.6/3
15	9-15	2.00	1.33	1.33	32.22	19.24	74.28	49.14	10/2
16	16-22	3.33	2.00	0.00	37.35	21.47	67.42	27.85	--
17	23-29	5.00	2.33	0.00	35.05	20.21	60.57	37.00	14.8/1
18	30-06 May	6.67	5.67	2.00	37.67	21.25	71.28	42.14	--
19	7-13	3.33	6.33	3.33	40.05	25.20	75.57	40.85	--
20	14-20	3.00	1.33	1.00	32.74	23.90	70.14	33.00	14.2/1
21	21-27	2.00	1.33	1.67	42.74	26.30	64.14	19.85	--
22	28-03 June	3.00	2.33	2.67	41.98	25.07	50.28	21.28	--
23	04-10	1.67	1.00	1.33	41.51	26.95	51.00	25.28	--
24	11-17	2.33	3.33	4.67	38.34	27.87	63.42	39.00	5.0/1
25	18-24	1.67	2.00	2.00	38.17	28.15	72.85	56.14	28.4/4
26	25-01 July	0.67	1.33	1.33	32.81	25.44	89.28	70.71	27.2/4
27	2-8	0.33	3.67	1.00	34.75	26.48	86.85	65.85	104.4/2
28	9-15	0.67	7.33	0.33	33.32	26.15	88.57	67.42	188.4/3
29	16-22	2.33	2.00	0.33	33.64	27.22	84.71	74.14	0.4/1
30	23-29	3.00	0.33	0.00	34.12	26.51	88.28	71.57	8.0/1

31	30-05 August	0.67	0.00	0.00	33.02	26.37	88.57	78.00	58.6/2
32	06-12	1.67	0.67	0.67	32.88	26.50	88.42	79.00	19.4/2
33	13-19	1.67	3.00	1.33	33.17	26.04	91.14	82.00	105.6/4
34	20-26	0.67	0.67	2.00	32.92	25.51	89.71	75.28	42.7/3
35	27-02 September	0.33	0.33	2.00	34.51	26.62	89.00	72.00	1.5/1
36	03-09	0.67	0.00	3.00	35.25	25.41	73.14	49.42	--
37	10-16	0.00	0.33	5.00	34.85	25.20	87.57	63.85	--
38	17-23	0.00	0.00	3.67	34.02	25.78	84.42	72.57	13.4/2
39	24-30	--	--	3.33	33.68	22.60	76.71	55.42	--
40	01-07 October	--	--	1.00	34.55	21.55	87.28	50.85	--
41	08-14	--	--	1.67	33.62	20.92	83.00	51.42	--
42	15-21	--	--	0.67	32.47	20.92	90.14	51.14	3.0/1
43	22-28	--	--	--	30.97	16.71	80.71	42.57	--

Table-36.2(b): Correlation analysis between moth catches and weather parameters at Shahjahanpur (2015-16)

Parameter	Shoot Borer	Top Borer	Stalk Borer
Max. Temp.	0.4977	0.2443	0.2264
Min. Tem.	0.1216	0.0668	0.1060
R.H.% FN	-0.4934	-0.0380	-0.1251
R.H.% AN	-0.5138	-0.2159	-0.1373

Table-36.2(c): Impact of moth catches on incidence of borer complex at Shahjahanpur (2015-16)

Insect pest	% Incidence of Insect Pest	
	Treated (Pheromone Trap)	Untreated (Without pheromone Trap)
Shoot Borer	10.50	14.00
Top Borer (2^{nd} brood)	3.50	5.00
Top Borer (3^{rd} brood)	5.15	7.00
Top Borer (At harvest)	13.00	16.60
Stalk borer (Infestation index)	1.20	2.00

Table-36.3(a): Moth catches of borer complex of sugarcane through lures at Lucknow (2015-16)

Top borer		Stalk borer
II Brood (05-05-2015 to 28-05-2015)	III Brood (10-06-2015to 07-07-2015)	Nil
337 (56.17 moths/trap),	166 (27.67 moths /trap)	Nil

Table-36.3(b): Impact of moth catches of borer complex of sugarcane through lures at Lucknow (2015-16)

Treatments	Brood-wise Incidence of top borer (%)	
	III	IV
With pheromone traps	5.20-16.30% (average 11.69 %)	28.62-48.57 % (average 38.13 %)
Without pheromone traps	7.78-23.33 % (average 14.80 %)	25.00-45.00% (average 32.89 %)

Table- 36.4(a): Moth Catch of borer complex of sugarcane through lures at Pusa (2015-16)

Months/year	Fortnightly Interval	Temperature (^{0}C)		Relative humidity (%)		Rainfall (mm)	No. of moth trapped/trap		
		Maximum	Minimum	Morning	Evening		ESB	TB	SB
Mar, 2015	I	27.5	13.3	83	48	10.8	0.66	0.00	0.00
	II	31.7	17.6	84	47	21.8	1.00	0.00	0.00
Apr, 2015	I	33.3	19.1	80	35	0.6	2.66	0.33	0.00
	II	32.9	20.7	84	50	32.6	3.00	1.66	0.00
May, 2015	I	34.6	23.0	82	43	15.2	4.33	2.33	0.00
	II	36.4	24.1	81	48	28.6	5.66	4.66	0.00
Jun, 2015	I	38.2	25.5	83	44	19.8	2.33	7.33	0.00
	II	35.1	25.5	85	55	35.6	1.33	4.00	0.00
Jul, 2015	I	33.7	25.2	87	77	97.6	0.66	2.66	0.00
	II	33.8	24.9	88	64	52.0	0.00	1.66	1.00
Aug, 2015	I	34.1	24.4	89	60	56.4	0.00	0.66	1.66
	II	33.1	24.3	92	75	400.4	0.00	0.33	2.33
Sep,2015	I	34.3	24.5	89	65	112.2	0.00	0.33	1.66
	II	33.0	23.4	89	63	43.6	0.00	0.00	1.00
Oct, 2015	I	34.1	21.6	89	51	4.2	0.00	0.00	0.66
	II	32.0	18.8	89	48	0	0.00	0.00	0.33
Nov,2015	I	30.4	15.4	90	51	0	0.00	0.00	0.00
	II	28.3	13.7	88	52	0	0.00	0.00	0.00
Dec,2015	I	24.4	12.2	85	62	0	0.00	0.00	0.00
	II	22.3	5.1	87	44	0	0.00	0.00	0.00
Jan,2016	I	23.6	7.4	88	54	0	0.00	0.00	0.00
	II	20.4	8.5	89	60	0	0.00	0.00	0.00
Feb, 2016	I	24.7	10.0	89	52	2.6	0.00	0.00	0.00
	II	28.4	14.1	86	51	0.2	0.00	0.00	0.00

ESB- Early shoot borer, INB- Internode borer, TB- Top borer

Table- 36.4(b): Correlation analysis between moth catches and weather parameters at Pusa (2015-16)

Borer complex	Temperature ^{0}C		Relative humidity %		Rainfall (mm)
	Max.	Min.	Morning	Evening	
ESB	0.4854**	0.3696	-0.7937	-0.4570*	-0.1098
TB	0.6070**	0.5581**	-0.4819	-0.1076	0.0146
SB	0.3249	0.4710**	0.5673	0.5900**	-0.7609
Significant at 5% level (r± =0.4227)			Significant at 1% level (r± = 0.5368)		

Table- 36.4(c): Impact of moth catches of borer complex of sugarcane through lures at Pusa (2015-16)

Treatment	% incidence of borer complex		
	Early shoot borer	Top borer	Stalk borer
With pheromone traps	11.63	15.71	5.56
Without pheromone traps	15.87	18.44	7.23

Table-36.5 (a): Moth catches of borer complex of sugarcane through lures at Seorahi (2015-16)

SMW	Date	Shoot borer (moth/trap)	Top borer (moth/trap)	Stalk borer (moth/trap)	Temperature 0C		R. H. %		Rain fall(mm) /Days
					Max.	Min.	F.N.	AN.	
9	26-4 March 2015	0.00	0.66	0.00	21.4	11.42	88.85	61.14	64.2/4
10	5-11	0.66	2.66	1.00	25.8	9.74	87.71	57.57	--
11	12-18	1.00	4.00	2.66	26.4	13.17	80.85	57.42	--
12	19-25	1.33	8.33	2.33	30.9	13.77	80.00	53.71	--
13	26-01 April2015	0.33	2.00	1.66	29.6	16.0	78.71	63.14	47.0/02
14	2-8	0.66	0.00	0.00	30.4	15.2	83.21	57.4	--
15	9-15	2.66	0.00	0.00	30.7	17.2	78.26	57.28	8.6/3
16	16-22	6.66	2.66	0.00	34.74	21.8	77.34	55.93	1.6/1
17	23-29	9.66	5.00	1.00	29.68	19.8	84.16	61.93	54.6/03
18	30-06May2015	2.66	6.00	3.33	33.02	21.48	76.85	53.57	--
19	7-13	3.00	7.33	7.33	33.92	21.6	79.4	53.0	30.0/1
20	14-20	0.33	0.33	2.00	34.72	24.2	76.28	54.57	23.0/0
21	21-27	2.66	0.00	0.00	35.94	24.72	69.26	46.68	--
22	28-03 June2015	3.66	0.00	0.00	37.25	25.94	67.0	43.28	--
23	4-10	6.66	0.00	1.33	39.85	25.97	64.0	39.0	--
24	11-17	1.66	0.00	7.00	35.42	25.02	71.0	53.14	28.4/2
25	18-24	1.00	5.33	10.00	35.85	26.25	71.14	54.42	--
26	25-01 July2015	1.00	3.00	2.00	31.71	26.22	73.85	59.0	39.8/5
27	2-8	1.33	6.00	1.33	31.96	25.83	83.18	59.6	87.0/3
28	9-15	1.00	3.33	0.00	32.37	25.24	87.96	60.85	49.6/4
29	16-22	0.33	0.00	0.00	32.12	26.05	79.4	67.63	70.0/02
30	23-29	1.66	0.00	3.33	32.62	26.02	84.69	51.57	43.4/03
31	30-05 August15	1.00	0.00	6.00	32.68	26.11	82.57	57.85	17.0/01
32	6-12	0.66	1.00	5.00	32.12	23.82	84.51	57.14	21.0/01
33	13-19	0.00	1.66	1.66	31.4	24.42	90.4	64.6	22.4/04
34	20-26	0.00	1.00	0.66	32.2	23.14	92.38	62.14	145.4/6
35	27-02-Sept.2015	0.33	0.00	4.00	33.0	25.17	90.57	59.28	9.0/2

36	3-9	0.00	1.00	1.66	33.64	25.64	84.0	53.71	--
37	10-16	0.00	0.66	2.00	34.08	25.97	78.71	49.42	--
38	17-23	0.00	0.33	1.66	33.4	24.97	80.43	50.85	5.6/1
39	24-30	0.00	0.00	3.00	34.8	23.57	78.85	48.42	--
40	1-7 October2015	0.00	0.33	2.00	33.77	22.37	81.14	53.72	--
41	8-14	0.00	0.00	1.00	31.85	20.34	85.42	59.14	30.0/02
42	15-21	0.00	0.00	0.66	31.45	19.14	85.42	56.28	--
43	22-28	0.00	0.00	0.00	32.14	16.34	82.57	52.14	--

Table- 36.5(b): Correlation analysis between moth catches and weather parameters at Seorahi (2015-16)

Parameter	Shoot borer	Top borer	Stalk borer
Max. Temp.	+0.257	-0.156	+0.253
Min. Temp.	+0.062	-0.196	+0.292
R.H.% FN	-0.400	-0.003	-0.185
R.H. %AN	-0.252	-0.157	-0.103
Rainfall	-0.054	+0.104	-0.192

Table- 36.5(c): Impact of moth catches of borer complex of sugarcane through lures at Seorahi (2015-16)

Insect-pest	% Incidence of Insect-Pest	
	Treated Pheromone trap	Untreated without pheromone trap
Shoot borer	5.65	8.95
Top borer (2^{nd} brood)	2.00	3.76
Top borer (3^{rd} brood)	3.75	5.07
Top borer (At harvest)	4.15	7.15
Stalk borer (on cane basis)	5.00	8.45

Table-36.6(a): Moth catches of borer complex of sugarcane through lures at Padegaon (2015-16)

SMW	Temp		RH %		Rainfall (mm)	ESB (Moths/trap)	IB (Moths/trap)	TSB (Moths/trap)
	Max	Min	RH1	RH2				
01	25.9	14.1	97	57	000.0	-	-	-
02	27.9	06.8	92	39	000.0	-	-	-
03	28.7	10.0	92	39	000.0	-	-	-
04	29.4	12.8	96	49	000.0	-	-	-
05	30.1	11.9	96	48	000.0	-	-	-
06	31.3	12.4	88	52	000.0	-	-	-
07	33.2	12.0	94	53	000.0	-	-	-
08	34.0	13.3	85	39	000.0	0	0	0
09	30.5	13.0	92	55	043.8	0	0	0
10	32.1	14.4	88	49	00.00	1	0	0
11	33.1	17.2	95	64	001.8	0	0	0
12	36.6	19.7	80	41	00.00	3	0	0
13	37.6	19.8	83	39	00.00	4	0	0
14	37.7	17.8	79	40	00.00	3	0	0
15	35.1	19.7	87	43	002.2	5	0	0
16	37.4	23.0	77	36	00.00	9	1	0
17	39.0	22.3	72	35	00.00	7	3	0
18	40.3	22.5	93	49	000.6	10	4	0
19	38.7	24.1	85	49	007.9	10	6	0
20	36.6	24.6	85	45	000.0	7	3	1
21	38.2	23.8	83	44	000.0	5	1	1
22	38.0	23.8	83	41	013.0	3	4	2
23	35.8	21.9	88	50	091.1	4	2	0
24	32.4	23.2	90	62	001.4	2	1	1
25	28.7	22.2	95	84	053.3	1	1	0
26	31.0	23.4	87	68	000.0	3	0	0
27	32.7	22.2	82	66	000.0	1	4	1
28	31.0	24.3	80	59	000.0	0	1	0

29	30.9	23.0	84	66	003.5	0	2	1
30	30.3	22.8	84	74	001.1	2	0	0
31	29.6	22.4	92	73	002.4	1	2	0
32	30.0	18.8	91	78	000.0	0	1	0
33	32.0	22.5	96	81	000.0	1	0	0
34	31.3	22.1	90	80	000.0	0	4	0
35	31.8	21.7	85	79	000.0	0	2	0
36	32.6	21.3	85	57	006.8	0	1	0
37	30.8	21.1	93	80	122.4	0	2	0
38	29.7	21.2	95	81	006.9	0	0	0
39	32.5	21.5	97	86	000.0	0	1	0
40	31.8	21.8	90	64	059.5	0	1	0
41	32.9	21.7	95	63	069.6	0	3	0
42	33.8	20.9	94	80	001.8	0	0	0
43	32.7	20.7	93	73	000.0	0	2	0
44	32.1	19.2	94	79	000.0	0	5	0
45	31.9	19.0	94	76	000.0	0	1	0
46	31.8	15.4	94	74	000.0	0	0	0
47	30.0	19.3	96	79	045.8	0	0	0
48	31.3	18.4	96	79	000.0	0	0	0
49	31.4	16.3	97	77	000.0	0	0	0
50	33.2	18.1	98	75	000.0	0	0	0
51	32.2	15.4	97	69	000.0	0	0	0
52	30.6	9.0	94	78	000.0	0	0	0

Table- 36.6(b): Impact of moth catches of early shoot borer complex of sugarcane through lures at Padegaon (2015-16)

Treatment/s	Per cent incidence of early shoot borer					% reduction over control
	45 DAP	60 DAP	90 DAP	120 DAP	Cumulative %	
Pheromone trap @ 15 / ha (i.e. 3 per ½ acre)	3.28	3.52	2.56	1.60	**9.05**	57.51
Plot without Pheromone trap	9.83	12.51	4.89	2.68	**21.30**	--

Table- 36.6(c): Impact of moth catches of internode borer complex of sugarcane through lures at Padegaon (2015-16)

Treatment/s	Internode Borer (%)		Cane yield (t/ha)	% Increase over control (Yield)	Remarks
	Incidence (Intensity)	% reduction over control			
Pheromone trap @ 15 / ha (i.e. 3 per ½ acre)	30.00 (2.30)	34.07 %	91.60	11.11	--
Plot without Pheromone trap	45.50 (7.10)		82.44		

Table-36.7(a): Moth catches of borer complex of sugarcane through lures at Pune (2015-16)

SMW	Mean Moths captured/week/trap		
	Early shoot borer	Internode borer	Top shoot borer
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0.50	0.17	0
18	0	0	0
19	0	0	0
20	0	0.17	0
21	0	0.17	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0.17	0	0
27	0.17	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0
33	0.17	0	0
34	0	0	0
35	0.50	0	0
36	0	0	0

37	0	0	0
38	0	0	0
39	0	0	0
40	0	0	0
41	0	0	0
42	0	0	0
43	0	0	0
44	0	0	0
45	0	0	0
46	0	0	0
47	0	0	0
48	0	0	0

Table-36.7(b): The per cent incidence /intensity of borers in treated/control plot at Pune (2015-16)

Sr. No.	Month	Early shoot borer (% incidence)		Top shoot borer (% Incidence)		Internode borer					
						% incidence		% intensity		Infestation index	
		T	C	T	C	T	C	T	C	T	C
1	February 2015	0.00	0.00	0.00	0.00	--	--	--	--	--	--
2	March 2015	0.73	0.32	0.00	0.00	--	--	--	--	--	--
3	April 2015	4.09	2.20	0.00	0.00	--	--	--	--	--	--
4	May 2015	2.79	4.46	0.00	0.00	--	--	--	--	--	--
5	June 2015	--	--	0.00	0.00	4.00	0.00	1.07	0.00	0.04	0.00
6	July 2015	--	--	0.00	0.00	0.00	16.00	0.00	2.66	0.00	0.43
7	August 2015	--	--	0.00	0.00	0.00	4.00	0.00	0.42	0.00	0.02
8	September 2015	--	--	0.00	0.00	0.00	4.00	0.00	0.33	0.00	0.01
9	October 2015	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	November 2015	--	--	0.00	0.00	0.00	4.00	0.00	0.32	0.00	0.01
11	December 2015	--	--	0.00	0.00	4.00	4.00	0.21	0.28	0.01	0.01
12	February 2015	0.00	0.00	0.00	0.00	--	--	--	--	--	--

T=Treated plot C=Control plot

Table-36.8: Moth catches of borer complex of sugarcane through lures at Powarkheda (2015-16)

2015	Meteorological Parameters					ESB (% infestation)			Moth Captures/ day/trap
Date From To	SMW	Max. Temp. (C)	Min. Temp (C)	RH%	Rainfall (mm)	Control Block	Lure Managed Block	Difference Over Control (+/-)	
1 to 7/1	2	27.60	4.30	92.00	0.00	0.00	0.00	0.00	0.00
8 to 14/1	3	31.40	10.00	87.00	0.00	0.00	0.00	0.00	0.00
15 to 21/1	4	24.60	7.20	85.00	5.00	0.20	0.00	-0.20	0.00
22 to 28/1	5	28.10	8.60	89.00	0.00	0.00	0.00	0.00	0.00
29/1 to 4/2	6	31.30	13.30	96.00	1.20	0.40	0.20	-0.20	0.00
5 to 11/2	7	32.50	13.80	91.00	57.60	0.40	0.20	-0.20	0.05
12 to 18/2	8	31.30	12.00	92.00	0.00	0.60	0.40	-0.20	0.10
19 to 25/2	9	32.70	12.50	84.00	0.00	1.80	1.00	-0.80	0.10
26/2 to 4/3	10	35.20	13.40	82.00	0.00	2.20	1.60	-0.60	0.14
5 to 11/3	11	35.50	15.60	77.00	5.40	2.40	2.00	-0.40	0.24
12 to 18/3	12	37.70	16.80	79.00	0.00	3.40	1.80	-1.60	0.38
19 to 25/3	13	38.00	16.00	74.00	0.00	3.00	2.40	-0.60	0.38
26/3 to 1/4	14	40.70	17.60	68.00	4.20	2.40	2.20	-0.20	0.48
2 to 8/4	15	40.50	20.20	60.00	0.00	2.20	1.80	-0.40	0.43
9 to 15/4	16	39.70	19.60	64.00	7.60	1.00	0.80	-0.20	0.52
16 to 22/4	17	42.50	20.80	62.00	0.00	1.00	0.60	-0.40	0.57
23 to 29/4	18	43.70	22.10	55.00	0.00	0.60	0.60	0.00	0.52
30/4 to 6/5	19	44.50	22.20	51.00	0.00	0.20	0.20	0.00	0.43

7 to 13/5	20	46.50	24.10	51.00	0.00	0.40	0.20	-0.20	0.38
14 to 20/5	21	45.90	24.90	60.00	0.00	0.20	0.00	-0.20	0.24
21 to 27/5	22	43.70	24.00	61.00	11.00	0.20	0.00	-0.20	0.14
28/5 to 3/6	23	42.10	22.40	68.00	21.80	0.00	0.00	0.00	0.14
4 to 10/6	24	36.60	22.00	76.00	104.80	0.00	0.00	0.00	0.05
11 to 17/6	25	34.40	23.70	92.00	27.40	0.00	0.00	0.00	0.05
-						22.60	16.00	-6.60	-

Table-36.9(a): Moth catches of borer complex of sugarcane through lures at Navsari (2015-16)

SMW	Date	Temperature ^{0}C		RH %		Sun shine (hrs/day)	Rain Fall (mm)	Rainy days	ESB (Moths/trap)	TB (Moths/trap)	INB (Moths/trap)
		Max ^{0}C	Min ^{0}C	Mor.	Eve.						
1	1-7	28.11	13.89	85.55	38.39	7.47	0.00	0.00	2	2	1
1	8-14	30.11	9.77	72.10	32.40	8.99	0.00	0.00	2	2	0
2	15-21	29.64	12.66	82.40	33.19	8.46	0.00	0.00	1	2	0
3	22-28	28.01	14.51	82.98	45.90	7.00	0.00	0.00	1	3	0
4	29-4	29.84	14.03	78.45	36.58	8.94	0.00	0.00	2	3	0
5	5-11	31.97	14.93	85.12	37.05	8.77	0.00	0.00	1	4	0
6	12-18	32.43	13.76	86.17	40.53	9.79	0.00	0.00	1	2	0
7	19-25	34.39	16.06	90.49	37.88	9.61	0.00	0.00	0	4	0
8	26-4	27.09	14.79	85.67	50.98	8.73	6.00	1.00	0	3	0
9	5-11	32.71	15.24	81.46	41.58	8.93	0.00	0.00	0	2	0
10	12-18	32.51	18.51	84.92	48.85	8.77	4.00	1.00	0	5	0
11	19-25	33.14	19.04	82.79	39.50	9.09	0.00	0.00	0	4	1
12	26-1	35.29	21.49	90.13	44.28	7.70	0.00	0.00	0	7	2
13	2-8	32.19	21.21	87.16	55.22	8.41	0.00	0.00	0	4	0
14	9-15	30.53	22.24	89.14	54.01	6.06	0.50	0.00	0	3	0
15	16-22	36.71	23.83	87.43	46.05	9.30	0.00	0.00	0	3	0
16	23-29	33.47	24.44	87.53	59.08	10.17	0.00	0.00	0	6	0
17	30-6	34.71	24.19	85.63	60.95	10.24	0.00	0.00	0	7	0
18	7-13	36.43	25.26	84.74	47.08	10.07	0.00	0.00	0	10	1
19	14-20	35.53	26.56	82.72	56.84	10.46	0.00	0.00	0	13	1
20	21-27	33.86	28.37	78.82	63.72	9.80	0.00	0.00	0	18	0
21	28-3	33.64	28.03	80.46	63.12	8.67	0.00	0.00	0	20	0
22	4-10	34.60	25.73	81.21	57.73	7.79	21.00	3.00	0	28	0
23	11-17	30.10	24.01	93.78	79.45	4.34	182.50	5.00	0	9	1

24	18-24	31.31	25.27	87.86	78.79	3.90	149.00	3.00	0	8	2
25	25-1	30.97	27.09	88.04	86.44	5.01	27.00	1.00	0	7	3
26	2-8	31.86	27.41	81.90	72.68	6.33	2.00	0.00	0	15	2
27	9-15	31.79	26.94	85.33	70.58	4.10	6.50	1.00	2	19	4
28	16-22	30.93	26.03	90.49	81.03	1.91	70.00	4.00	2	23	5
29	23-29	28.56	24.40	92.51	86.24	0.07	238.50	7.00	2	15	7
30	30-5	29.97	26.44	86.11	77.92	2.74	4.20	0.00	4	21	15
31	6-12	30.36	25.14	93.82	74.25	2.33	9.80	1.00	2	11	12
32	13-19	30.29	25.30	92.88	75.44	4.36	49.00	4.00	2	9	13
33	20-26	30.86	25.36	85.61	71.35	6.34	5.00	1.00	3	8	10
34	27-2	31.36	24.56	90.80	69.07	6.40	7.00	1.00	3	7	15
35	3-9	32.43	23.21	86.62	58.86	7.71	0.00	0.00	2	6	18
36	10-16	31.24	23.49	95.05	74.02	2.91	106.00	6.00	1	5	20
37	17-23	28.51	24.01	94.67	87.28	1.66	328.00	4.00	2	3	3
38	24-30	31.96	22.67	91.67	56.01	8.44	0.00	0.00	3	3	4
39	1-7	35.11	24.60	89.01	50.53	7.89	0.00	0.00	2	4	2
40	8-14	34.70	24.06	92.30	57.72	6.41	3.00	1.00	2	5	2
41	15-21	37.53	22.56	84.89	34.57	9.31	0.00	0.00	2	5	2
42	22-28	35.93	22.17	86.19	43.53	7.24	0.00	0.00	3	3	1
43	29-4	34.07	20.73	77.03	43.80	8.41	0.00	0.00	1	3	1
44	5-11	34.89	19.86	81.86	33.07	8.29	0.00	0.00	2	4	1
45	12-18	34.79	20.53	75.21	37.81	8.44	0.00	0.00	3	6	2
46	19-25	33.57	21.61	72.01	45.90	5.70	0.00	0.00	2	3	2
47	26-2	33.29	18.61	76.15	36.86	5.90	0.00	0.00	3	3	1
48	3-9	33.60	14.87	72.60	33.56	8.79	0.00	0.00	2	15	1
49	10-16	30.39	13.57	75.05	36.97	8.07	0.00	0.00	2	16	1
50	17-23	29.73	11.27	70.97	24.53	8.64	0.00	0.00	2	12	1

51	24-31	30.91	13.89	62.22	23.06	8.89	0.00	0.00	2	18	1
52	1-7	28.11	13.89	85.55	38.39	7.47	0.00	0.00	2	2	1

Table-36.9(b): Correlation analysis between moth catches and weather parameters at Navsari (2015-16)

Pests	Temperature (^{0}C)		Relative Humidity (%)		Rainfall (mm)	No. of rainy days	Sun shine hours
	Max.	Min.	Morning	Evening			
1	2	3	4	5	6	7	8
ESB	-0.5758**	-0.7177**	-0.4735**	-0.6057**	0.7088**	-0.0715	-0.1451
TB	0.4382**	0.7273**	-0.1895	0.5821**	0.0312	0.0308	0.1412
INB	0.2131	0.1983	0.3235**	0.0575	0.0414	-0.2079	0.2549*
*** Significant at 0.05 (r = ± 0.2262), ** Significant at 0.01 (r = ± 0.3158)**							

ESB- Early shoot borer, TB- Top borer, INB- Internode borer

Table-36.10(a): Moth catches of borer complex of sugarcane through lures at Mandya (2015-16)

SMW	Moth catch / Trap / Week			Temperature C		Relative humidity (%)		Rainfall (mm)
	ESW	TSB	INB	Max	Min	Morning	Evening	
1	0.67	0.00	0.33	29.86	15.43	92.00	46.29	0.00
2	0.33	0.00	0.00	28.86	13.5	94.29	44.57	0.00
3	1.00	0.67	0.00	28.57	14.14	88.43	46.43	0.00
4	2.00	0.00	0.00	29.43	14.00	87.00	49.71	0.00
5	2.00	4.33	1.00	29.5	15.64	83.07	45.13	0.00
6	1.33	6.00	1.00	30.21	12.93	86.39	41.31	0.00
7	0.67	3.33	0.67	31.21	14.07	76.53	47.29	0.00
8	2.33	2.33	0.33	31.86	12.71	75.54	46.74	0.00
9	2.00	3.00	0.67	32.57	17.21	80.41	45.43	0.00
10	1.67	2.67	1.67	32.36	17.71	81.10	45.13	0.00
11	1.67	1.67	0.67	33.07	15.57	72.03	49.26	0.00
12	2.00	2.00	0.33	34.79	17.71	83.21	36.37	0.00
13	1.33	1.00	0.33	34.53	18.64	81.02	38.69	8.80
14	2.00	0.33	0.00	35.00	17.86	80.33	39.93	0.00
15	1.33	0.67	0.67	32.57	21.07	80.77	29.17	6.80
16	1.33	2.33	1.00	33.36	19.71	78.90	34.3	6.00
17	1.33	2.00	0.67	34.00	20.07	78.66	30.94	1.60
18	1.67	0.00	0.00	34.64	19.86	81.03	32.9	7.00
19	2.33	0.33	0.33	33.14	19.86	79.77	43.1	0.00
20	1.00	0.00	0.00	31.71	19.14	92.67	35.16	88.80
21	2.00	0.33	0.00	32.93	20.29	83.96	35.3	8.60
22	2.67	0.00	0.00	31.50	19.14	93.36	45.99	29.30
23	0.67	0.67	0.33	31.21	20.00	88.73	49.23	21.20
24	0.33	0.67	0.00	31.21	19.29	89.04	62.89	3.80
25	2.00	0.00	0.00	29.64	20.21	83.76	57.14	7.40
26	0.67	1.33	0.00	30.57	19.36	85.46	65.89	3.00
27	2.33	3.67	0.33	31.50	18.86	83.69	59.26	0.00
28	2.00	5.33	1.00	31.58	20.08	80.10	54.3	0.00

29	0.33	4.33	0.33	29.64	19.07	80.43	53.43	1.20
30	1.67	6.67	0.33	30.07	19.29	85.14	55.29	0.00
31	1.33	5.00	1.00	30.86	19.29	83.43	56.43	11.50
32	1.33	2.67	0.33	30.14	19.29	76.14	58.57	1.40
33	2.00	3.67	0.67	30.36	19.21	86.43	64.86	39.80
34	2.00	1.33	0.00	30.29	19.64	86.29	58.29	15.10
35	0.33	3.00	0.00	29.79	18.21	88.71	56.86	0.00
36	1.67	1.67	1.00	29.21	18.5	91.29	54.29	19.40
37	1.00	2.33	0.00	29.86	18.14	90.43	55.14	2.60
38	2.33	2.67	0.33	29.36	18.07	91.71	54.14	00
39	1.67	2.67	0.00	30.00	19.29	90.43	56	60.60
40	1.33	3.00	1.00	29.29	20.93	91.14	60.14	21.00
41	0.33	1.67	0.00	29.21	18.79	91.00	57.14	0.00
42	0.67	0.67	0.00	29.64	18.57	90.43	58.71	0.00
43	1.33	0.00	0.67	29.79	19.43	89.86	62.57	22.00
44	0.00	1.00	0.67	29.29	18.64	88.14	57.86	108.20
45	1.00	1.33	0.00	29.57	14.93	90.43	57.29	37.40
46	0.00	0.67	0.00	29.71	14.86	91.00	59.57	7.00
47	0.00	1.00	0.00	28.86	14.71	90.57	59.43	16.80
48	0.00	1.33	0.00	29.50	15.71	88.57	60.86	6.60
49	0.00	2.00	0.00	29.57	15.93	85.43	63.57	3.80
50	1.00	2.00	0.33	28.79	15.57	89.86	65.14	0.00
51	0.67	1.00	0.33	28.57	15.07	89.29	68.29	0.00
52	0.67	1.67	0.00	28.63	12.81	90.13	66.13	0.00

Table-36.10(b): Correlation analysis between moth catches and weather parameters at Mandya (2015-16)

Pest	Temperature (˚c)			Relative humidity (%)			Rainfall (mm)
	Max.	Min.	Mean	Mor. RH	Evn. RH	Mean	
ESB	0.46*	0.27	0.42*	-0.36*	-0.36*	-0.42*	-0.17
TSB	-0.089	0.005	-0.043	-0.28*	0.137	-0.008	-0.078
INB	0.17	0.12	0.17	-0.37*	-0.190	-0.298*	-0.026
***Correlation is significant at the 0.05 level; ESB- Early shoot borer, TB- Top shoot borer, INB- Internode borer**							

Table-36.11(a): Moth catches of borer complex of sugarcane through lures at Anakapalle (2015-16)

SMW	Pheromone trap catches/ week/ 5 traps		Temperature (^{0}C)		Relative humidity (%)		Evaporation (mm)	Rainy days	Rainfall	Sunshine
	ESB	INB	Max	Min	Morn	Evening				
5	0	0	31.7	16.6	87	44	3.6	0	0	7
6	1	0	33.2	14.1	81	36	4.6	0	0	8.3
7	0	0	33.2	18.1	93	49	4.2	0	0	7.7
8	3	0	34.3	20	87	39	5.3	0	0	8.1
9	7	0	34	21.4	84	47	5	0	0	8.7
10	21	0	34.9	22.9	86	46	5.6	0	0	7.3
11	49	0	36.7	20.5	86	34	6.1	0	0	8.8
12	41	0	37	24.3	85	46	5.6	0	0	7.4
13	32	0	35.3	25.5	86	51	5.6	0	0	6.6
14	23	1	36.7	27.2	81	50	7.1	0	0	8
15	40	0	35.6	26.1	77	59	5.8	0	0	5.9
16	43	2	35.3	25.9	84	60	6.1	32.2	2	7.5
17	122	2	35.7	24.1	85	66	5.6	54.2	3	7.3
18	63	5	35.9	27.8	84	56	5.6	0	0	7.9
19	43	13	36.5	26.7	84	56	5.8	021.8	1	6.4
20	29	25	36.1	26.9	83	55	5.8	004.2	1	8.1
21	24	40	40.9	28.7	79	45	6.9	001.6	1	8.7
22	18	63	37.6	27.8	88	61	5.8	033.8	1	5.7
23	13	88	31.7	25.6	87	73	2.4	67.8	4	2
24	11	119	33.1	25.8	89	76	2.7	65.6	4	3.8
25	9	56	31.1	25.4	90	77	3.3	112.2	6	2.3
26	4	32	35.9	26.6	84	56	5.3	32.4	1	4.6

27	1	31	36.7	27.5	76	48	6.1	0	0	6.8
28	0	17	36.7	26.5	84	56	5.2	81.2	4	4.8
29	0	17	35.7	26.1	89	60	3.9	44.4	3	4.1
30	0	13	32.4	26.2	87	65	2.6	32.2	2	1.7
31	0	20	35.5	25.9	82	50	17.0	1	3.8	4.6
32	0	10	34.8	25.6	87	73	106.8	2	5	3.6
33	0	13	32.7	26.1	88	69	87.0	3	4.9	3.7
34	0	17	35	25.3	87	63	80.4	3	5.3	4.2
35	0	10	32.9	26.3	87	67	16.2	1	3.9	2.8
36	0	21	34.9	26	89	63	71.2	3	3.1	3.1
37	0	17	33.2	25.1	92	76	185.0	5	2.6	2.7
38	0	13	32.9	26.3	90	68	08.8	01	3.4	2.6
39	0	18	35.1	25.1	90	68	27.4	2	5.5	3.4
40	0	11	34.6	25.9	89	59	2.8	1	5.6	3.2
41	0	10	36.8	24.6	84	51	0	0	6.7	3.8
42	0	11	35.2	25.1	89	67	16.4	2	6.1	3.7
43	0	8	35.1	24.4	85	48	0	0	6.9	4.2
44	0	5	30.8	24	89	69	101.2	3	4.8	2.7
45	0	9	31.8	23.9	81	54	0	0	6.1	2.5
46	0	3	30.9	21.9	85	58	37	1	5.3	3.4
47	0	3	30.9	23.3	85	55	3.6	1	5.2	3.4
48	0	3	31.3	21.7	84	54	0	0	4.3	3.1
49	0	1	30.7	25.3	90	47	0	0	6.3	3.2
50	0	1	31.4	25.1	93	58	0	0	7.2	3.3
51	0	1	30.9	25.9	95	58	0	0	6.5	3.1
52	0	1	30.8	22.2	93	45	0	0	7.3	3.5
1	0	1	31.2	20.3	92	50	0	0	6.5	3.1

2	3	0	31	19.5	92	44	0	0	7.3	3.3
3	2	0	30.3	21.5	86	45	0	0	6.3	3.3
4	2	0	29	21.5	91	50	0	0	4.6	3.2
5	6	0	32.8	23.2	96	51	0	0	7.2	3.8
6	9	0	31.7	24.5	93	55	0	0	5.7	3.8
7	10	0	33.2	21.7	88	36	0	0	8.1	4.8
8	9	0	34.9	23.1	87	43	0	0	8.3	4.9
9	11	0	33.1	22.9	91	54	0	0	5.9	4.2

Table-36.11(b): Impact of moth catches of borer complex of sugarcane through lures at Anakapalle (2015-16)

Treatment	Incidence of early shoot borer up to 120 DAP					Incidence of INB (%)	Intensity of INB (%)	Sucrose (%)	Cane yield (t/ha)
	45 DAP	60 DAP	90 DAP	120 DAP	Cum				
Plot with Pheromone traps installed@ 10traps/acre	3.48	1.33	3.99	0	9.08	28.00	3.99	20.00	82.44
Plot without pheromone traps (Untreated control)	5.71	22.97	14.33	0	32.48	55.56	16.40	19.20	76.80
Per cent reduction over control					32.48	--	49.6	--	--

Table-36.11(c): Correlation analysis between moth catches and weather parameters at Anakapalle (2015-16)

Weather parameters	Correlation coefficient (r)	
	Early shoot borer moth catch	Internode borer moth catch
Rainfall	-0.17	0.07
No. of rainy days	-0.18	-0.19
Max. temp (^{o}) C	0.48	0.58
Min. temp (^{o}) C	0.25	0.13
Morning RH (%)	-0.14	0.46
Evening RH (%)	-0.48	0.60
Evaporation (mm)	0.70	-0.22

Table-37.1: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Kapurthala (Punjab) (2015-16)

Treat. No.	Treatment details	Cumulative percent incidence of early shoot borer (ESB)	Germination (%)	Number of millable cane (t/ha)	Cane yield (t/ha)	Growth Parameter				Quality parameter			
						Total cane height (cm)	Millable cane height (cm)	Number of internodes	Cane Girth (cm)	Brix (%)	Sucrose (%) in Juice	Purity (%)	CCS (%)
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	4.07d	58.04	71.67	81.23cd	272.40	240.67	19.57	2.17	19.47	17.62	90.54	12.32
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	1.94b	60.23	81.00	88.08ab	279.33	254.33	22.17	2.19	19.81	17.78	89.77	12.39
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	0.65a	59.64	82.33	89.28a	280.00	257.19	23.00	2.20	19.90	17.96	90.25	12.54
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	3.11c	57.67	75.33	82.88c	274.00	245.59	20.00	2.17	19.65	17.72	90.15	12.37
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	2.48bc	58.12	77.67	86.07b	273.67	247.00	21.13	2.18	19.72	17.76	90.06	12.39
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	4.28d	60.03	70.00	79.06d	269.40	236.00	18.00	2.16	19.44	17.61	90.98	12.32
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	4.10d	58.33	69.00	79.26d	270.00	235.00	19.00	2.16	19.37	17.62	90.58	12.36
T_8	Untreated control.	12.64e	57.33	61.00	67.24e	256.80	214.33	17.87	2.06	18.77	16.36	87.20	11.24
	CD @ 5%	0.74	NS	2.94	2.56	4.39	4.25	1.26	0.08	0.27	0.29	0.12	0.33

Table-37.2: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Shahjahanpur (2015-16)

Treat. No.	Treatment details	Early Shoot Borer Incidence (%)					Millable Canes (000/ha)	Average Cane Yield (t/ha)
		45 DAP	60 DAP	90 DAP	120 DAP	Cumulative incidence		
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	4.97	1.90	2.65	1.42	6.84	104a	103a
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	2.55	0.34	2.32	1.36	4.81	105a	94a
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	1.38	1.09	2.45	0.88	4.43	106a	105a
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	6.60	1.48	2.62	1.97	7.77	105a	83ab
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	3.54	1.56	3.23	1.87	7.66	96ab	102a
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	3.67	1.15	3.39	1.64	7.11	102a	100a
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	4.23	0.88	2.56	2.24	6.51	101a	87ab
T_8	Untreated control.	4.16	4.21	3.12	1.80	8.61	86b	68b
	S. E. ±	**2.70**	**0.59**	**0.64**	**0.37**	**-**	**5.78**	**10.50**
	C.D. at 5 %	**NS**	**1.26**	**NS**	**NS**	**-**	**12.41**	**22.52**

Table-37.3: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Pusa (2015-16)

Treat. No.	Treatment details	Cumulative incidence of ESB (%)	Cane Yield (t/ha)
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	7.54cd	82.2a
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	6.05ab	84.5a
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	5.28a	85.8a
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	9.36e	77.8ab
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	6.78bc	83.3a
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	8.40de	78.7a
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	7.93cd	80.4a
T_8	Untreated control.	18.66f	68.1b
	S. E. ±	0.40	3.24
	C.D. at 5 %	1.23	9.84
	C.V. (%)	11.76	7.63

Table-37.4: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Padegaon (2015-16)

Treat. No.	Treatment details	Early Shoot Borer Incidence (%)					Millable Canes (000/ha)	Average Cane Yield (t/ha)
		45 DAP	60 DAP	90 DAP	120 DAP	Cumulative incidence		
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	17.87	19.50	10.55	9.39	26.00bc	85.65ab	115.74abc
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	10.71	12.18	9.14	7.16	18.36a	92.32a	128.89a
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	13.70	13.98	13.12	9.16	23.23b	87.42ab	117.50ab
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	22.41	18.53	13.79	8.66	28.66cd	81.39bc	93.89d
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	17.93	21.46	10.82	8.25	27.35bc	83.61ab	108.33bcd
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	20.19	21.14	15.60	9.99	28.87cd	78.15bc	93.42d
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	18.25	20.67	12.69	9.39	27.41bc	82.96bc	100.18cd
T_8	Untreated control.	19.69	25.72	16.72	12.93	32.37d	73.98c	92.78d
	S. E. ±	1.02	1.27	0.94	0.61	1.56	3.07	5.60
	C.D. at 5 %	3.08	3.84	2.85	1.84	4.73	9.30	16.96
	C.V. (%)	10.02	11.47	12.72	11.25	10.20	6.40	9.12

Table-37.5: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Pune (2015-16)

Treat. No.	Treatment details	Early shoot borer (% incidence)						Cane Yield (t/ha)
		30 DAS	45 DAS	60 DAS	90 DAS	120 DAS	Cumulative	
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	0.00	0.00	0.00	7.84	7.03	13.74 (21.46)b	120.29ab
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	0.00	0.24	0.20	0.66	1.06	1.87 (7.53)a	137.66a
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	0.00	0.53	0.00	0.75	0.38	1.50 (6.40)a	123.52ab
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	0.35	0.49	0.19	9.31	14.18	23.05 (24.18)bc	115.92ab
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	0.31	0.73	1.66	4.85	10.17	15.66 (22.92)bc	104.05bc
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	1.08	0.25	0.42	23.73	19.84	37.19 (37.53)d	107.24bc
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	0.00	0.00	0.83	18.30	17.16	32.41 (34.42)cd	105.03bc
T_8	Untreated control.	0.00	0.27	0.21	21.30	21.05	37.04 (37.34)d	86.58c
						S.E ±	3.78	8.77
						C.D at 5%	11.52	26.61*
						C.V (%)	26.89	13.50
Figures inside parentheses are arcsine transformed values while those outside are original values								

Table-37.6: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Powarkheda (2015-16)

Sr. No.	Treatments	ESB (%)						Diameter (mm)	Height (cm)	NMC (000'/ha)	Cane Yield (t/ha)	% increase
		Germi. (%)	30 DAP	60 DAP	90 DAP	120 DAP	Cumu.					
T1	SA of fipronil 0.3 G @ 25 kg a.i./ha at the time of planting and 60 DAP	77.86	1.02	1.76	1.43	1.43	3.23a	28.36	208.17	82.25a	105.40ab	19.61
T2	SA of Chlorantraniliprole 0.4 G @ 22.5 kg /ha at the time of planting and 60 DAP	78.26	0.86	1.60	1.30	1.42	3.00a	28.03	208.23	82.72a	107.41a	21.89
T3	S of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP	77.08	8.75	2.18	2.10	1.66	5.49b	27.76	209.10	80.71ab	102.32bc	16.11
T4	S of spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP	80.73	7.95	3.78	4.48	4.52	9.94d	27.79	205.10	79.32b	95.22e	8.06
T5	S of flubendiamide 39.35 % SC @ 125 ml/ha at 30 and 60 DAP (50 g a.i./ha)	78.39	8.29	3.69	1.37	1.51	5.29b	27.79	205.87	80.25ab	100.16cd	13.66
T6	SA of phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500g a.i./ha)	79.17	1.87	3.43	2.69	4.45	7.68c	27.87	205.37	80.10ab	97.84de	11.03
T7	SA of carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g a.i./ha)	77.86	2.88	4.93	5.33	4.95	10.45e	27.64	205.50	79.17b	95.06e	7.88
T8	Untreated control	76.30	8.62	9.97	10.13	6.58	16.77f	27.18	204.80	75.92c	88.12f	0.00
S Em ±		**1.24**	**0.29**	**0.23**	**0.14**	**0.10**	**0.13**	**0.32**	**2.75**	**0.86**	**1.13**	
CD @ 5 %		**NS**	**0.88**	**0.71**	**0.43**	**0.30**	**0.39**	**NS**	**NS**	**2.62**	**3.43**	

Table-37.7(a): Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Navsari (2015-16)

Treat No	Treatment details	Early shoot borer (% incidence)				Cumulative % incidence	Cane Yield (t/ha)
		45 DAP	60 DAP	90 DAP	120 DAP		
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	15.05 (22.82)	16.07 (23.63)	18.24 (25.28)	20.13 (26.66)	20.01	117.74ab
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	12.29 (20.52)	15.47 (23.16)	17.19 (24.50)	17.62 (24.82)	13.82	125.79a
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	15.49 (23.18)	15.17 (22.92)	16.54 (24.00)	19.34 (26.09)	16.35	122.54a
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	17.08 (24.41)	16.25 (23.77)	18.92 (25.78)	21.59 (27.69)	22.08	114.79ab
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	16.46 (23.93)	15.99 (23.57)	17.61 (24.81)	21.03 (27.30)	21.20	115.90ab
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	17.93 (25.05)	17.45 (24.69)	20.76 (27.10)	22.73 (28.47)	24.22	99.73bc
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	18.50 (25.48)	18.68 (25.61)	18.59 (25.54)	22.09 (28.03)	24.99	90.07cd
T_8	Untreated control.	22.53 (28.34)	25.67 (30.44)	27.01 (31.31)	28.53 (32.29)	34.54	76.25d
	S. Em ±	1.12	1.08	0.56	0.75	--	6.32
	CD @ 5 %	3.41	3.22	1.71	2.30	--	19.01
	CV (%)	16.02	12.58	10.42	11.43	--	21.37
Figures inside parenthesis are original value and those outside are arcsine transformed values							

Table-37.7(b): Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Navsari (2015-16)

Treat. No.	Treatment details	Quality parameter			
		Brix (%)	Sucrose (%)	Purity (%)	C.C.S. (%)
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	20.43	17.92	87.86	12.35
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	20.60	18.16	88.24	12.56
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	21.10	18.36	87.14	12.61
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	21.67	18.70	86.30	12.79
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	19.77	17.46	88.48	12.08
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	21.57	18.44	85.48	12.55
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	21.80	19.85	89.68	13.83
T_8	Untreated control.	21.80	18.77	86.12	12.83
	S.Em ± (T)	1.36	1.40	3.21	2.05
	C. D @ 5%	NS	NS	NS	NS
	C. V. %	10.30	11.00	12.60	18.18

Table-37.8: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Mandya (2015-16)

Treat. No	Treatment details	Mean ESB Incidence (%)	Cane yield (t/ha)
T1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	3.62 (18.51)b	71.55ab
T2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	3.20 (17.74)ab	79.51a
T3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	3.15 (17.58)a	70.07ab
T4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	5.41 (22.68)d	60.77bc
T5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	3.60 (17.1)a	66.48bc
T6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	4.69 (21.16)c	56.16c
T7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	6.22 (24.74)e	58.17c
T8	Untreated control.	7.71 (27.41)f	54.97c
	C.D. @ 5%	0.80	11.84
	C.V. (%)	22.81	11.10
Figures inside parenthesis are arcsine transformed values and those outside are original values			

Table-37.9: Bioefficacy of new insecticides for the control of sugarcane early shoot borer at Anakapalle (2015-16)

Treat No	Treatment details	Early shoot borer (% incidence)					Cane weight (kg)	Cane height (mt)	Cane girth(cm)	Cane yield (t/ha)
		30 DAP	60 DAP	90 DAP	120 DAP	Cum				
T_1	Soil application of Fipronil 0.3 G @ 25 kg /ha at the time of planting and 60 DAP (75 g ai/ha)	2.24	1.64	0.26	0	5.40ab	1.53	3.06	2.49	85.63a
T_2	Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg/ha at the time of planting and 60 DAP (90 g ai/ha)	1.04	0.55	0.36	0	2.31a	1.47	2.91	2.48	86.66a
T_3	Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g ai/ha)	2.88	1.94	0.48	0	7.15bc	1.50	3.03	2.45	84.92a
T_4	Spraying of Spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g ai/ha)	3.08	4.02	0.59	0	10.61cd	1.50	3.03	2.38	78.40b
T_5	Spraying of Flubendiamide 39.35 SC @ 125 ml/ ha at 30 and 60 DAP (50 g ai/ha)	2.80	2.59	0.85	0	7.52bc	1.43	3.05	2.45	84.00a
T_6	Soil application of Phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g ai/ha)	2.26	3.38	2.67	0	11.73d	1.40	2.87	2.31	77.20b
T_7	Soil application of Carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g ai/ha)	4.83	4.51	1.34	0	11.50d	1.40	2.97	2.45	77.63b
T_8	Untreated control.	10.32	5.46	1.28	0	30.66e	1.43	3.01	2.45	75.65b
S.Em ± (T)		0.80	0.53	0.16	--	1.72	--	--	--	8.25
C.D. @ 5 %		1.72	1.17	0.36	NS	3.70	NS	NS	NS	3.83
C.V. (%)		26.72	23.05	27.94	--	23.5	--	--	--	17.69

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