# Annual Report of Sugarcane Entomology

**2016-17**

**Scheme**

**AICRP on Sugarcane**

**(Voluntary Centre)**

**Sugarcane Research Centre,**

**Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola**


**Submitted by**

**Senior Research Scientist (Sugarcane)**

**Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS)**

**Technical Programme implemented at Akola during 2016-17**

| Sr.No. | Projects / Experiments | Title of Projects/ Experiments |
|---|---|---|
| 1) | E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Initial Varietal Trial – Early |
| 2) | E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial ( Early) – I Plant |
| 3) | E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial ( Early) – II Plant |
| 4) | E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Initial Varietal Trial – Midlate |
| 5) | E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial (Midlate) – I Plant |
| 6) | E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial (Midlate) – II Plant |
| 7) | E-28 | Survey and surveillance of sugarcane insect pests |
| 8) | E.30 | Monitoring of insect pests and bioagents in sugarcane agro-ecosystem. |

**Table A: Weekly Weather data for the year 2016 recorded at Meteorological Observatory Department of Agronomy Dr. PDKV., Akola**

| | | Actual | | | | 2016 | | | | | | | | | | Normal | | 1971-2010 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW | Dates | T MAX ($^{o}$C) | | T MIN ($^{o}$C) | | BSH (hrs) | | WS (km/hr) | | RH I (%) | | RH II (%) | | Evap (mm) | | RF (mm) | | CRF (mm) | Rainy Days | |
| | | N | A | N | A | N | A | N | A | N | A | N | A | N | A | N | A | | N | A |
| 1 | 1-7 Jan | 29.0 | 32.3 | 10.3 | 10.7 | 8.7 | 9.2 | 4.9 | 0.7 | 78 | 66 | 30 | 21 | 4.2 | 4.9 | 1.7 | 0.0 | 0.0 | 0.2 | 0.0 |
| 2 | 8-14 | 29.2 | 31.4 | 11.3 | 10.9 | 8.6 | 8.1 | 6.3 | 1.0 | 71 | 60 | 30 | 23 | 4.5 | 4.6 | 3.4 | 0.0 | 0.0 | 0.2 | 0.0 |
| 3 | 15-21 | 29.9 | 29.9 | 11.6 | 13.7 | 8.9 | 7.6 | 5.4 | 2.6 | 69 | 70 | 28 | 29 | 4.8 | 5.4 | 0.9 | 0.0 | 0.0 | 0.1 | 0.0 |
| 4 | 22-28 | 30.8 | 29.5 | 11.8 | 8.5 | 9.1 | 9.4 | 5.5 | 1.2 | 67 | 52 | 27 | 16 | 5.2 | 5.1 | 1.1 | 0.0 | 0.0 | 0.2 | 0.0 |
| 5 | 29-4 Feb | 31.1 | 33.7 | 12.1 | 12.6 | 9.3 | 9.7 | 5.8 | 1.9 | 61 | 58 | 25 | 21 | 5.6 | 6.2 | 2.8 | 0.0 | 0.0 | 0.2 | 0.0 |
| 6 | 5-11 | 31.3 | 32.8 | 11.9 | 14.5 | 9.1 | 9.3 | 5.6 | 2.3 | 59 | 51 | 23 | 25 | 5.9 | 6.1 | 4.9 | 0.0 | 0.0 | 0.4 | 0.0 |
| 7 | 12-18 | 32.5 | 33.9 | 13.4 | 15.9 | 9.4 | 9.2 | 6.1 | 2.9 | 56 | 51 | 22 | 21 | 6.6 | 7.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 19-25 | 33.0 | 36.1 | 13.8 | 17.6 | 9.5 | 8.3 | 6.5 | 2.1 | 57 | 53 | 22 | 26 | 7.3 | 6.7 | 3.3 | 0.0 | 0.0 | 0.5 | 0.0 |
| 9 | 26-4 Mar | 34.7 | 35.8 | 14.8 | 19.2 | 9.6 | 8.9 | 7.0 | 2.3 | 50 | 70 | 17 | 32 | 8.1 | 6.9 | 3.4 | 0.0 | 0.0 | 0.3 | 0.0 |
| 10 | 5-11 | 36.1 | 36.5 | 16.7 | 19.0 | 9.6 | 9.0 | 6.8 | 3.3 | 44 | 48 | 18 | 20 | 9.0 | 7.9 | 2.1 | 0.0 | 0.0 | 0.3 | 0.0 |
| 11 | 12-18 | 37.3 | 36.8 | 17.5 | 20.2 | 9.6 | 9.3 | 6.9 | 3.3 | 42 | 44 | 17 | 20 | 9.5 | 8.5 | 2.5 | 0.4 | 0.4 | 0.3 | 0.0 |
| 12 | 19-25 | 38.5 | 39.0 | 18.3 | 20.2 | 9.6 | 9.5 | 6.9 | 4.4 | 37 | 29 | 13 | 11 | 10.5 | 9.6 | 0.3 | 0.0 | 0.4 | 0.1 | 0.0 |
| 13 | 26-1 Apr | 39.0 | 40.4 | 19.7 | 22.2 | 9.6 | 8.4 | 7.6 | 2.8 | 36 | 32 | 15 | 15 | 11.3 | 9.8 | 2.9 | 0.0 | 0.4 | 0.3 | 0.0 |
| 14 | 2-8 Apr | 40.1 | 41.2 | 21.1 | 25.4 | 9.8 | 8.4 | 7.9 | 2.0 | 36 | 37 | 15 | 18 | 11.7 | 9.8 | 0.6 | 0.0 | 0.4 | 0.1 | 0.0 |
| 15 | 9-15 | 40.8 | 41.8 | 22.5 | 24.9 | 9.9 | 9.7 | 9.3 | 3.6 | 34 | 33 | 12 | 17 | 13.4 | 13.0 | 0.3 | 0.0 | 0.4 | 0.1 | 0.0 |
| 16 | 16-22 | 41.7 | 44.0 | 23.5 | 27.5 | 10.2 | 9.8 | 9.1 | 4.8 | 34 | 34 | 14 | 14 | 13.7 | 13.9 | 0.3 | 0.0 | 0.4 | 0.0 | 0.0 |
| 17 | 23-29 | 42.1 | 41.7 | 24.8 | 25.6 | 10.1 | 10.0 | 10.2 | 8.1 | 37 | 38 | 14 | 18 | 14.4 | 14.8 | 0.0 | 0.0 | 0.4 | 0.1 | 0.0 |
| 18 | 30- 6 May | 42.7 | 42.9 | 26.0 | 27.6 | 9.9 | 9.3 | 11.4 | 6.1 | 38 | 37 | 14 | 14 | 15.4 | 14.1 | 0.3 | 0.0 | 0.4 | 0.2 | 0.0 |
| 19 | 7-13 | 42.6 | 40.7 | 26.5 | 26.1 | 10.1 | 8.4 | 12.7 | 3.7 | 43 | 50 | 17 | 17 | 16.4 | 10.7 | 0.3 | 19.9 | 20.3 | 0.1 | 1.0 |
| 20 | 14-20 | 42.6 | 45.2 | 27.3 | 30.7 | 9.7 | 8.9 | 14.6 | 4.1 | 48 | 33 | 18 | 12 | 17.3 | 13.9 | 1.8 | 0.6 | 20.9 | 0.2 | 0.0 |
| 21 | 21-27 | 42.4 | 42.0 | 27.4 | 29.4 | 9.8 | 10.0 | 15.7 | 18.8 | 50 | 52 | 20 | 21 | 17.0 | 19.5 | 4.1 | 0.0 | 20.9 | 0.5 | 0.0 |
| 22 | 28-3 Jun | 41.9 | 41.4 | 27.6 | 29.9 | 9.7 | 10.0 | 16.2 | 14.2 | 56 | 51 | 23 | 21 | 16.3 | 15.2 | 5.7 | 0.0 | 20.9 | 0.5 | 0.0 |
| 23 | 4-10 | 39.0 | 41.2 | 25.8 | 28.0 | 8.0 | 6.5 | 14.9 | 8.5 | 62 | 56 | 30 | 27 | 13.4 | 11.5 | 18.3 | 8.6 | 29.5 | 1.2 | 2.0 |
| 24 | 11-17 | 38.2 | 38.9 | 25.5 | 29.0 | 7.5 | 7.7 | 15.4 | 16.0 | 71 | 55 | 42 | 28 | 11.1 | 16.5 | 43.3 | 0.0 | 29.5 | 2.0 | 0.0 |
| 25 | 18-24 | 35.3 | 34.5 | 24.9 | 24.7 | 7.1 | 5.8 | 15.1 | 5.3 | 76 | 83 | 50 | 47 | 9.1 | 6.1 | 52.3 | 88.0 | 117.5 | 2.2 | 4.0 |
| 26 | 25-1Jul | 34.1 | 32.8 | 24.2 | 24.6 | 5.3 | 3.5 | 13.4 | 8.3 | 80 | 80 | 55 | 58 | 7.3 | 5.5 | 38.2 | 49.9 | 167.4 | 2.3 | 2.0 |

**Table A: Weekly Weather data for the year 2016 recorded at Meteorological Observatory Department of Agronomy Dr. PDKV., Akola**

| Weeks | Dates | Actual | | | | 2015 | | | | Normal | | | | | | 1971-2010 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T MAX ($^{o}$C) | | T MIN ($^{o}$C) | | BSH (hrs) | | WS (km/hr) | | RH I (%) | | RH II (%) | | Evap (mm) | | RF (mm) | | CRF (mm) | Rainy Days | |
| | | N | A | N | A | N | A | N | A | N | A | N | A | N | A | N | A | | N | A |
| 27 | 2-8 | 33.5 | 30.7 | 24.4 | 24.8 | 5.2 | 1.1 | 12.9 | 10.0 | 81 | 86 | 58 | 70 | 6.8 | 4.7 | 34.7 | 53.1 | 220.5 | 2.4 | 3.0 |
| 28 | 9-15 | 32.3 | 28.1 | 23.7 | 23.6 | 3.8 | 2.3 | 12.0 | 11.6 | 84 | 90 | 62 | 73 | 5.5 | 3.9 | 52.2 | 212.8 | 433.3 | 2.8 | 6.0 |
| 29 | 16-22 | 32.0 | 31.5 | 23.9 | 24.9 | 3.3 | 4.7 | 11.2 | 7.3 | 84 | 83 | 65 | 62 | 5.6 | 4.3 | 58.6 | 5.7 | 439.0 | 2.6 | 1.0 |
| 30 | 23-29 | 31.7 | 29.8 | 23.3 | 23.6 | 4.3 | 2.5 | 11.9 | 4.7 | 85 | 91 | 64 | 72 | 5.3 | 3.8 | 44.2 | 104.5 | 543.5 | 2.6 | 6.0 |
| 31 | 30-5 Aug | 31.1 | 29.4 | 23.1 | 23.9 | 3.6 | 2.3 | 11.7 | 7.5 | 88 | 86 | 66 | 71 | 4.6 | 4.0 | 49.3 | 65.3 | 608.8 | 2.5 | 4.0 |
| 32 | 6-12 | 30.2 | 30.4 | 22.9 | 24.0 | 3.5 | 3.6 | 11.6 | 6.6 | 87 | 84 | 69 | 66 | 4.2 | 4.0 | 59.9 | 10.5 | 619.3 | 2.9 | 2.0 |
| 33 | 13-19 | 30.5 | 31.0 | 22.8 | 23.4 | 4.4 | 5.3 | 11.7 | 11.5 | 86 | 85 | 66 | 58 | 4.5 | 5.6 | 40.6 | 0.0 | 619.3 | 2.2 | 0.0 |
| 34 | 20-26 | 30.5 | 30.0 | 22.6 | 23.4 | 4.3 | 5.8 | 11.0 | 4.1 | 88 | 83 | 66 | 64 | 4.3 | 4.0 | 46.7 | 13.7 | 633.0 | 2.0 | 2.0 |
| 35 | 27-2 Sep | 30.4 | 31.9 | 22.7 | 24.5 | 4.4 | 4.5 | 10.6 | 4.5 | 86 | 85 | 64 | 62 | 4.2 | 3.9 | 47.1 | 6.5 | 639.5 | 2.4 | 1.0 |
| 36 | 3-9 | 31.1 | 31.3 | 22.5 | 22.6 | 5.7 | 8.5 | 9.1 | 8.4 | 85 | 85 | 61 | 47 | 4.7 | 6.2 | 28.5 | 1.5 | 641.0 | 1.5 | 0.0 |
| 37 | 10-16 | 32.2 | 31.8 | 22.4 | 23.6 | 7.1 | 3.4 | 9.0 | 5.5 | 85 | 86 | 56 | 59 | 5.1 | 4.2 | 18.9 | 28.5 | 669.5 | 1.1 | 3.0 |
| 38 | 17-23 | 33.4 | 30.9 | 22.3 | 23.3 | 7.2 | 4.3 | 8.5 | 2.8 | 83 | 94 | 53 | 70 | 5.3 | 3.4 | 24.6 | 62.9 | 732.4 | 1.4 | 3.0 |
| 39 | 24-30 | 33.7 | 30.8 | 21.9 | 23.0 | 7.6 | 6.0 | 5.4 | 4.9 | 83 | 92 | 50 | 71 | 4.9 | 4.4 | 24.4 | 30.3 | 762.7 | 1.5 | 1.0 |
| 40 | 1-7 Oct | 33.9 | 29.1 | 20.2 | 22.8 | 8.1 | 4.6 | 7.5 | 1.8 | 81 | 92 | 45 | 73 | 5.5 | 3.2 | 21.8 | 61.5 | 824.2 | 1.1 | 4.0 |
| 41 | 8-14 | 34.1 | 31.2 | 18.7 | 21.3 | 4.2 | 7.6 | 4.1 | 3.0 | 76 | 90 | 40 | 59 | 5.3 | 4.1 | 16.0 | 29.0 | 853.2 | 0.9 | 1.0 |
| 42 | 15-21 | 33.9 | 32.9 | 18.1 | 16.5 | 8.4 | 8.9 | 4.4 | 0.4 | 74 | 80 | 36 | 29 | 5.5 | 4.4 | 3.1 | 0.0 | 853.2 | 0.4 | 0.0 |
| 43 | 22-28 | 33.1 | 32.4 | 18.5 | 15.8 | 8.4 | 8.4 | 4.1 | 0.9 | 73 | 80 | 36 | 34 | 5.3 | 4.7 | 10.0 | 0.0 | 853.2 | 0.6 | 0.0 |
| 44 | 29-4 Nov | 33.0 | 31.4 | 15.8 | 14.3 | 8.7 | 8.7 | 4.7 | 0.4 | 72 | 81 | 31 | 34 | 5.3 | 4.4 | 2.3 | 0.0 | 853.2 | 0.3 | 0.0 |
| 45 | 5-11 | 32.4 | 31.4 | 14.8 | 11.2 | 8.6 | 8.6 | 4.5 | 0.3 | 70 | 77 | 30 | 27 | 5.2 | 3.8 | 3.7 | 0.0 | 853.2 | 0.3 | 0.0 |
| 46 | 12-18 | 31.7 | 30.3 | 13.7 | 11.9 | 8.6 | 8.3 | 4.6 | 0.4 | 70 | 84 | 30 | 33 | 4.9 | 3.7 | 1.1 | 0.0 | 853.2 | 0.2 | 0.0 |
| 47 | 19-25 | 31.0 | 30.7 | 13.1 | 9.7 | 8.6 | 8.4 | 4.4 | 0.3 | 71 | 85 | 30 | 32 | 4.6 | 3.6 | 10.1 | 0.0 | 853.2 | 0.3 | 0.0 |
| 48 | 26-2 Dec | 30.3 | 31.9 | 12.4 | 10.9 | 8.8 | 8.9 | 4.6 | 0.2 | 71 | 85 | 31 | 31 | 4.3 | 3.8 | 6.8 | 0.0 | 853.2 | 0.3 | 0.0 |
| 49 | 3-9 | 29.8 | 30.1 | 11.2 | 10.7 | 8.7 | 8.0 | 4.7 | 0.8 | 70 | 88 | 29 | 35 | 4.3 | 3.5 | 1.3 | 0.0 | 853.2 | 0.2 | 0.0 |
| 50 | 10-16 | 29.4 | 30.2 | 10.3 | 10.7 | 8.8 | 8.0 | 4.5 | 1.2 | 70 | 79 | 27 | 32 | 4.2 | 4.2 | 1.3 | 0.0 | 853.2 | 0.2 | 0.0 |
| 51 | 17-23 | 29.5 | 29.2 | 10.6 | 8.6 | 8.7 | 8.5 | 4.7 | 0.5 | 69 | 85 | 29 | 35 | 4.3 | 3.5 | 0.9 | 0.0 | 853.2 | 0.1 | 0.0 |
| 52 | 24-31 | 29.2 | 29.5 | 10.7 | 8.4 | 8.6 | 8.5 | 4.8 | 0.5 | 70 | 83 | 31 | 29 | 4.3 | 3.4 | 2.6 | 0.0 | 853.2 | 0.2 | 0.0 |
| | | | | | | | | | | TOTAL RF January to Dec | | | | | | 805.6 | 853.2 | | | 46 |
| | | | | | | | | | | Total RF June to Dec | | | | | | | | | | 45.0 |

**Part II-B**

**Details of the Research Work Carried Out During the Year 2016-17**

## Methodology used:

1) **Early Shoot borer:** Four middle rows were selected from the plot and total germinated shoots were counted. The shoots affected by early shoot borer showing "dead hearts" were counted. Calculated the % incidence as per the following formula

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

2) **Scale Insects:** Twenty five canes were selected randomly from the plot and affected internodes due to the scale insects and total internodes in each cane were counted. Calculated the % incidence and % intensity as per the following formula.

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

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

3) **Pyrilla :** Ten canes were selected and two leaves per cane were selected in all Twenty leaves were selected randomly from the plot and pyrilla per leaf were counted.

4) **White fly:** Population of nymph and puparia were recorded from a unit of 10 canes (20 leaves) and average population on per 3 leaves was reported.

5**) Aphids :** Population of Aphid were recorded from a unit of 10 canes (20 leaves) and average population per 3 leaves was reported.

**Experiment No.1**

| Part-I General Information | | | |
|---|---|---|---|
| **600** | Project Code | -- | E-4.1 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Initial Varietal Trial – Early** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Host Plant Resistance |
| 605 | Duration of Project | -- | One year |
| 605.1 | Date of Start | -- | 2015-16 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Dr.N.K.Patke |
| 611.2 | Designation | -- | Senior Research Scientist |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To screen the sugarcane varieties in AICRP Trials for their reactions to major insect pests. |
| 620.2 | Specific objectives | -- | To identify resistant varieties to major insect pests of sugarcane |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | First (2016-17) |
| | 2. Design | -- | Randomized Block Design |
| | 3. Replication | -- | Three |
| | 4. Plot Size | -- | 6.00 x 4.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Fertilizer | -- | 175 kg N + 100 kg $P_2O_5$ + 100 kg $K_2O$ $ha^{-1}$ |
| | 7. Date of Planting | -- | 19/01/2016 |
| | 8. Date of Harvesting | -- | 05/11/2016 |
| | 9. Treatments | -- | Eleven varieties |
| | | | 1) Co13002 2) Co13003 3) Co85004<br>4) CoN 13071 5) CoN13072 6) CoC 671<br>7) CoSnk130102 8) MS 13081 9) Co13004<br>10) Co94008 11) CoSnk 13101 |
| | 10. Observations recorded | -- | |

**For Early Shoot Borer:**

Observation were recorded in post-germination phase at 30 days interval up to 120 days (at 30, 60, 90 and 120 DAP).

The observations on the total number of shoots and number of dead hearts due to the early shoot borer were recorded. Calculated the per cent incidence as per the following formula:

$$\text{Per cent Incidence} = \frac{\text{Number of Dead Hearts}}{\text{Total number of shoots}} \times 100$$

**The grade of infestation was given as under,**

| Grade | % Incidence |
|---|---|
| Less Susceptible (LS) | Below 15 |
| Moderately Susceptible (MS) | 15.1 – 30 |
| Highly Susceptible (HS) | Above 30 |

**For Scale insect:** Twenty five canes were selected randomly from each plot and affected Internodes due to scale insect in each cane were counted.

Calculated the per cent incidence as per following formula

$$\text{Per cent Incidence} = \frac{\text{Number of affected canes}}{\text{25 canes}} \times 100$$

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

**The grade of infestation was given as under,**

| Grade | % Incidence |
|---|---|
| Less Susceptible (LS) | Below 10 |
| Moderately Susceptible (MS) | 10.1-35 |
| Highly Susceptible (HS) | Above 35 |

**Pyrilla :** Ten canes were selected and two leaves per cane were selected in all Twenty leaves were selected randomly from the plot and pyrilla per leaf were counted.

**The grade of infestation was given as under,**

| Grade | % Incidence |
|---|---|
| Less Susceptible (LS) | Below 5.0 |
| Moderately Susceptible (MS) | 5.1- 20.0 |
| Highly Susceptible (HS) | Above 20.0 |

**Table 1: Reaction of Sugarcane varieties/genotypes to major insect pests in IVT Early Plant at 30, 60, 90 and 120 DAP.**

| Sr. No. | Genotypes | ESB at 30 DAP | | ESB at 60 DAP | | ESB at 90 DAP | | ESB at 120 DAP | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction |
| 1 | Co13002 | 24.90 | MS | 16.78 | MS | 6.05 | LS | 6.34 | LS |
| 2 | Co13003 | 40.27 | **HS** | 25.86 | MS | 7.34 | LS | 8.86 | LS |
| 3 | Co85004 | 17.30 | MS | 11.59 | **LS** | 5.93 | LS | 5.74 | LS |
| 4 | CoN13071 | 27.47 | MS | 17.81 | MS | 4.81 | LS | 4.90 | LS |
| 5 | CoN13072 | 15.17 | MS | 11.54 | **LS** | 5.75 | LS | 5.41 | LS |
| 6 | CoC671 | 22.65 | MS | 16.55 | MS | 7.25 | LS | 5.41 | LS |
| 7 | CoSnk13102 | 44.80 | **HS** | 26.19 | MS | 10.90 | LS | 13.68 | LS |
| 8 | MS13081 | 89.11 | **HS** | 25.59 | MS | 9.83 | LS | 8.78 | LS |
| 9 | Co13004 | 34.85 | **HS** | 21.67 | MS | 8.08 | LS | 7.43 | LS |
| 10 | Co94008 | 20.34 | MS | 15.20 | MS | 6.83 | LS | 6.29 | LS |
| 11 | CoSnk13101 | 19.69 | MS | 14.74 | **LS** | 7.99 | LS | 12.13 | LS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.

Grades LS = Below 15.0 MS= 15.1 to 30.0 HS = above 30.0

**Table 2: Reaction of Sugarcane varieties/genotypes to scales in IVT Early Plant at Harvest**

| Sr. No. | Genotypes | Scales | | |
|---|---|---|---|---|
| | | % incidence | % intensity | Reaction |
| 1 | Co13002 | 34.00 | 5.79 | MS |
| 2 | Co13003 | 26.00 | 4.28 | MS |
| 3 | Co85004 | 36.00 | 6.24 | **HS** |
| 4 | CoN13071 | 26.00 | 4.72 | MS |
| 5 | CoN13072 | 30.00 | 4.06 | MS |
| 6 | CoC671 | 26.00 | 3.08 | MS |
| 7 | CoSnk13102 | 40.00 | 7.54 | **HS** |
| 8 | MS13081 | 42.00 | 5.41 | **HS** |
| 9 | Co13004 | 36.00 | 4.37 | **HS** |
| 10 | Co94008 | 26.00 | 4.57 | MS |
| 11 | CoSnk13101 | 34.00 | 5.34 | MS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.

Grades: LS= below 10, MS= 10.1 – 35, HS= Above 35

**Table 3: Reaction of Sugarcane varieties/genotypes to Pyrilla (Nymph & Adults) per leaf in IVT Early Plant**

| Sr. No. | Genotypes | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Co13002 | **0.95** | LS | **1.02** | LS | **0.80** | LS | **0.80** | LS |
| 2 | Co13003 | **0.87** | LS | **0.98** | LS | **0.70** | LS | **0.70** | LS |
| 3 | Co85004 | **0.83** | LS | **1.25** | LS | **0.70** | LS | **0.70** | LS |
| 4 | CoN13071 | **0.67** | LS | **1.20** | LS | **0.43** | LS | **0.43** | LS |
| 5 | CoN13072 | **0.62** | LS | **1.13** | LS | **0.43** | LS | **0.43** | LS |
| 6 | CoC671 | **0.68** | LS | **0.93** | LS | **0.48** | LS | **0.48** | LS |
| 7 | CoSnk13102 | **0.72** | LS | **0.93** | LS | **0.52** | LS | **0.52** | LS |
| 8 | MS13081 | **0.98** | LS | **0.87** | LS | **0.78** | LS | **0.75** | LS |
| 9 | Co13004 | **0.87** | LS | **0.93** | LS | **0.68** | LS | **0.68** | LS |
| 10 | Co94008 | **0.73** | LS | **1.02** | LS | **0.58** | LS | **0.58** | LS |
| 11 | CoSnk13101 | **0.55** | LS | **0.70** | LS | **0.40** | LS | **0.38** | LS |

LS = Less susceptible Below 5, MS= Moderately susceptible 5.1-20.0 and HS = Highly Susceptible Above 20.

**Results :**

**Early Shoot Borer:** The data (Table 1) revealed that the entries Co13003 CoSnk130102, MS 13081 and Co13004 were found highly susceptible whereas, Co94008, CoSnk 13101, Co13002, Co85004 CoN 13071, CoN13072 and CoC 671 were moderately susceptible at 30 DAP. At 60 DAP Co85004, CoN13072 and CoSnk 13101 were found less susceptible while all other entries were found moderately susceptible. At 90 and 120 DAP all the entries were found less susceptible.

**Scales:** The data (Table 2) revealed that varieties CoSnk130102, Co13004, Co85004 and MS 13081 were found to be Highly susceptible and remaining varieties were found moderately susceptible.

**Pyrilla:** The data (Table 3) of pyrilla at 15 days interval revealed that all the eleven entries showed less susceptible reaction to pyrilla at fortnightly intervals.

**Conclusions:** The early shoot borer infestation at 30 DAP was ranging from 15.17 to 89.11 % infestation indicating the genotypes are Highly susceptible to moderately susceptible, at 60 DAP was ranging from 11.54 to 26.19 % infestation indicating the genotypes are moderately susceptible to less susceptible, at 90 DAP it was ranging from 4.81 to 10.90 % infestation indicating the genotypes are less susceptible and at 120 DAP it was ranging from 4.90 to 13.68% infestation indicating the genotypes are less susceptible.

The infestation of the scales was ranging from 26 to 42 % incidence indicating the genotypes to be moderately susceptible to highly susceptible and the infestation of pyrilla in all varieties was ranging from 0.38 to 1.25 per leaf indicating less susceptible.

**622.4 Utility of results obtained so far:** The genotypes showing tolerant/resistant reaction to different insect pests will be utilized in resistant breeding programme in future.

**Experiment No.2**

| | | | |
|---|---|---|---|
| **Part-I General Information** | | | |
| **600** | Project Code | -- | E-4.1 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial ( Early) – I Plant** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Host Plant Resistance |
| 605 | Duration of Project | -- | One year |
| 605.1 | Date of Start | -- | 2015-16 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Dr.N.K.Patke |
| 611.2 | Designation | -- | Senior Research Scientist |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To screen the sugarcane varieties in AICRP Trials for their reactions to major insect pests. |
| 620.2 | Specific objectives | -- | To identify resistant varieties to major insect pests of sugarcane |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | First (2016-17) |
| | 2. Design | -- | Randomized Block Design |
| | 3. Replication | -- | Three |
| | 4. Plot Size | -- | 6.00 x 4.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Fertilizer | -- | 175 kg N + 100 kg $P_2O_5$ + 100 kg $K_2O$ $ha^{-1}$ |
| | 7. Date of Planting | -- | 13/01/2016 |
| | 8. Date of Harvesting | -- | 11/11/2016 |
| | 9. Treatments | -- | Eight varieties |
| | | | 1) Co11001 2) Co85004 3) CoM 11081<br>4) Co94008 5) CoM 11084 6) Co11004<br>7) CoM11082 8) CoC671 |
| | 10. Observations recorded | -- | As per the technical details given in Experiment E-4.1 |

**Table 4: Reaction of Sugarcane varieties/genotypes to major insect pests in AVT Early I Plant at 30, 60, 90 and 120 DAP.**

| Sr. No. | Genotypes | ESB at 30 DAP | | ESB at 60 DAP | | ESB at 90 DAP | | ESB at 120 DAP | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction |
| 1 | Co11001 | **16.68** | MS | **8.31** | LS | **6.40** | LS | **6.03** | LS |
| 2 | Co85004 | **18.16** | MS | **11.82** | LS | **7.86** | LS | **7.82** | LS |
| 3 | CoM11081 | **25.21** | MS | **15.77** | MS | **8.59** | LS | **11.61** | LS |
| 4 | Co94008 | **15.76** | MS | **9.23** | LS | **8.17** | LS | **7.90** | LS |
| 5 | CoM11084 | **10.56** | LS | **4.54** | LS | **4.22** | LS | **3.75** | LS |
| 6 | Co11004 | **16.41** | MS | **7.64** | LS | **5.59** | LS | **5.67** | LS |
| 7 | CoM11082 | **27.58** | MS | **9.33** | LS | **6.01** | LS | **5.55** | LS |
| 8 | CoC671 | **3.38** | LS | **2.40** | LS | **3.07** | LS | **2.00** | LS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.
Grades LS = Below 15.0 MS= 15.1 to 30.0 HS = above 30.0

**Table 5: Reaction of Sugarcane varieties/genotypes to scales in AVT Early I Plant at Harvest**

| Sr. No. | Genotypes | Scales | | |
|---|---|---|---|---|
| | | % incidence | % intensity | Reaction |
| 1 | Co11001 | 36.00 | 5.05 | HS |
| 2 | Co85004 | 26.67 | 4.34 | MS |
| 3 | CoM11081 | 32.00 | 5.57 | MS |
| 4 | Co94008 | 32.00 | 6.23 | MS |
| 5 | CoM11084 | 37.33 | 6.38 | HS |
| 6 | Co11004 | 34.67 | 7.21 | MS |
| 7 | CoM11082 | 34.67 | 6.59 | HS |
| 8 | CoC671 | 25.33 | 4.47 | MS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.
Grades: LS= below 10, MS= 10.1 – 35, HS= Above 35

**Table 6: Reaction of Sugarcane varieties/genotypes to Pyrilla (Nymph & Adults) per leaf in AVT Early I Plant**

| SN | Genotypes | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Co11001 | **0.80** | LS | **1.28** | LS | **0.85** | LS | **1.15** | LS |
| 2 | Co85004 | **0.83** | LS | **1.25** | LS | **0.85** | LS | **1.07** | LS |
| 3 | CoM11081 | **1.02** | LS | **1.25** | LS | **0.97** | LS | **1.08** | LS |
| 4 | Co94008 | **0.73** | LS | **1.02** | LS | **0.88** | LS | **0.97** | LS |
| 5 | CoM11084 | **1.12** | LS | **1.12** | LS | **1.07** | LS | **0.93** | LS |
| 6 | Co11004 | **1.13** | LS | **1.00** | LS | **1.00** | LS | **0.87** | LS |
| 7 | CoM11082 | **0.83** | LS | **0.93** | LS | **0.87** | LS | **0.88** | LS |
| 8 | CoC671 | **0.68** | LS | **0.93** | LS | **0.70** | LS | **0.85** | LS |

LS = Less susceptible Below 5, MS= Moderately susceptible 5.1-20.0 and HS = Highly Susceptible Above 20.

**Results :**

**Early Shoot Borer:** The data (Table 4) revealed that the entries CoM 11084 and CoC671 were found less susceptible whereas, the remaining entries i.e. Co11001, Co85004, CoM 11081, Co94008, Co11004 and CoM11082 were found moderately susceptible at 30 DAP. At 60 DAP CoM 11081 was found moderately susceptible while all other entries were found less susceptible. At 90 and 120 DAP all the entries were found less susceptible.

**Scale insect:** The data (Table 5) revealed that varieties CoM 11084, Co11001 and CoM11082 were found to be Highly susceptible and remaining varieties were found moderately susceptible.

**Pyrilla:** The data (Table 6) of pyrilla at 15 days interval revealed that all the eight entries showed less susceptible reaction to pyrilla at fortnightly intervals.

**Conclusions:** The early shoot borer infestation at 30 DAP was ranging from 3.38 to 27.58 % infestation indicating the genotypes are Highly susceptible to moderately susceptible, at 60 DAP was ranging from 2.40 to 15.77% infestation indicating the genotypes are moderately susceptible to less susceptible, at 90 DAP it was ranging from 3.07 to 8.59% infestation indicating the genotypes are less susceptible and at 120 DAP it was ranging from 2.00 to 11.61% infestation indicating the genotypes are less susceptible.

The infestation of the scales was ranging from 25.33 to 37.33% incidence indicating the genotypes to be moderately susceptible to highly susceptible and the infestation of pyrilla in all varieties was ranging from 0.68 to 1.28 per leaf indicating less susceptible.

**622.4 Utility of results obtained so far:** The genotypes showing tolerant/resistant reaction to different insect pests will be utilized in resistant breeding programme in future.

**Experiment No.3**

| | | | |
|---|---|---|---|
| **Part-I General Information** | | | |
| **600** | Project Code | -- | E-4.1 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial ( Early) – II Plant** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Host Plant Resistance |
| 605 | Duration of Project | -- | One year |
| 605.1 | Date of Start | -- | 2015-16 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Dr. N. K. Patke |
| 611.2 | Designation | -- | Senior Research Scientist |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To screen the sugarcane varieties in AICRP Trials for their reactions to major insect pests. |
| 620.2 | Specific objectives | -- | To identify resistant varieties to major insect pests of sugarcane |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | First (2016-17) |
| | 2. Design | -- | Randomized Block Design |
| | 3. Replication | -- | Three |
| | 4. Plot Size | -- | 6.00 x 4.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Fertilizer | -- | 175 kg N + 100 kg $P_2O_5$ + 100 kg $K_2O$ $ha^{-1}$ |
| | 7. Date of Planting | -- | 09/01/2016 |
| | 8. Date of Harvesting | -- | 10/11/2016 |
| | 9. Treatments | -- | Eleven varieties |
| | | | 2) Co10004 2) Co10005 3) Co10006<br>4) Co10024 5) Co10026 6) Co10027<br>7) CoT10366 8) CoT10367 9) Co85004<br>10) Co94008 11) CoC 671 |
| | 10. Observations recorded | -- | As per the technical details given in Experiment E-4.1 |

**Table 7: Reaction of Sugarcane varieties/genotypes to major insect pests in AVT Early II Plant at 30, 60, 90 and 120 DAP.**

| Sr. No. | Genotypes | ESB at 30 DAP | | ESB at 60 DAP | | ESB at 90 DAP | | ESB at 120 DAP | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction |
| 1 | Co10004 | **15.33** | MS | **8.79** | LS | **4.76** | LS | **3.54** | LS |
| 2 | Co10005 | **5.66** | LS | **2.41** | LS | **3.32** | LS | **1.52** | LS |
| 3 | Co10006 | **29.10** | MS | **15.33** | MS | **10.97** | LS | **7.18** | LS |
| 4 | Co10024 | **14.29** | LS | **8.99** | LS | **8.69** | LS | **5.84** | LS |
| 5 | Co10026 | **14.73** | LS | **8.37** | LS | **6.08** | LS | **4.69** | LS |
| 6 | Co10027 | **10.10** | LS | **5.14** | LS | **3.58** | LS | **2.29** | LS |
| 7 | CoT10366 | **22.08** | MS | **11.76** | LS | **8.97** | LS | **5.76** | LS |
| 8 | CoT10367 | **6.82** | LS | **4.61** | LS | **3.80** | LS | **3.15** | LS |
| 9 | **Co 85004 (C)** | **4.91** | LS | **2.36** | LS | **2.66** | LS | **1.61** | LS |
| 10 | **Co 94008 (C)** | **7.72** | LS | **3.68** | LS | **3.46** | LS | **2.52** | LS |
| 11 | **CoC 671 (C)** | **7.58** | LS | **4.22** | LS | **3.57** | LS | **2.58** | LS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.

Grades LS = Below 15.0 MS= 15.1 to 30.0 HS = above 30.0

**Table 8: Reaction of Sugarcane varieties/genotypes to scales in AVT Early II Plant at Harvest**

| Sr. No. | Genotypes | Scales | | |
|---|---|---|---|---|
| | | % incidence | % intensity | Reaction |
| 1 | Co10004 | 40.00 | 6.56 | **HS** |
| 2 | Co10005 | 26.00 | 3.69 | MS |
| 3 | Co10006 | 34.00 | 5.00 | MS |
| 4 | Co10024 | 44.00 | 6.65 | **HS** |
| 5 | Co10026 | 38.00 | 5.39 | **HS** |
| 6 | Co10027 | 32.00 | 5.23 | MS |
| 7 | CoT10366 | 28.00 | 6.85 | MS |
| 8 | CoT10367 | 32.00 | 6.16 | MS |
| 9 | **Co 85004 (C)** | 30.00 | 4.38 | MS |
| 10 | **Co 94008 (C)** | 32.00 | 6.28 | MS |
| 11 | **CoC 671 (C)** | 36.00 | 7.73 | **HS** |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.
Grades: LS= below 10, MS= 10.1 – 35, HS= Above 35

**Table 9: Reaction of Sugarcane varieties/genotypes to Pyrilla (Nymph & Adults) per leaf in AVT Early II Plant**

| Sr. No. | Genotypes | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Co10004 | **0.90** | LS | **1.03** | LS | **0.75** | LS | **0.80** | LS |
| 2 | Co10005 | **1.10** | LS | **1.15** | LS | **0.95** | LS | **0.92** | LS |
| 3 | Co10006 | **0.75** | LS | **1.35** | LS | **0.60** | LS | **0.70** | LS |
| 4 | Co10024 | **0.90** | LS | **1.00** | LS | **0.75** | LS | **0.85** | LS |
| 5 | Co10026 | **0.80** | LS | **1.00** | LS | **0.65** | LS | **0.75** | LS |
| 6 | Co10027 | **1.10** | LS | **1.15** | LS | **0.95** | LS | **1.00** | LS |
| 7 | CoT10366 | **0.52** | LS | **0.68** | LS | **0.37** | LS | **0.45** | LS |
| 8 | CoT10367 | **1.20** | LS | **1.35** | LS | **1.05** | LS | **1.10** | LS |
| 9 | **Co 85004 (C)** | **0.75** | LS | **0.80** | LS | **0.60** | LS | **0.65** | LS |
| 10 | **Co 94008 (C)** | **1.00** | LS | **1.15** | LS | **0.85** | LS | **0.90** | LS |
| 11 | **CoC 671 (C)** | **0.60** | LS | **0.77** | LS | **0.45** | LS | **0.45** | LS |

LS = Less susceptible Below 5, MS= Moderately susceptible 5.1-20.0 and HS = Highly Susceptible Above 20.

**Results :**

**Early Shoot Borer:** The data (Table 7) revealed that the entries Co10004, Co10006 and CoT10366 were found to be moderately susceptible whereas, the remaining entries i.e. Co10005 , Co10024, Co10026 , Co10027, CoT10367, Co85004, Co94008 and CoC 671 were found less susceptible at 30 DAP. At 60 DAP Co10006 was found moderately susceptible while all other entries were found less susceptible. At 90 and 120 DAP all the entries were found less susceptible.

**Scales:** The data (Table 8) revealed that varieties Co10004, Co10024 and Co10026 were found to be highly susceptible and remaining varieties were found moderately susceptible.

**Pyrilla:** The data (Table 9) of pyrilla at 15 days interval revealed that all the eleven entries showed less susceptible reaction to pyrilla at fortnightly intervals.

**Conclusions:** The early shoot borer infestation at 30 DAP was ranging from 4.91 to 29.10 % infestation indicating the genotypes are less susceptible to moderately susceptible, at 60 DAP was ranging from 2.36 to 15.33 % infestation indicating the genotypes are less susceptible to moderately susceptible, at 90 DAP it was ranging from 2.66 to 10.97 % infestation indicating the genotypes are less susceptible and at 120 DAP it was ranging from 1.52 to 7.18% infestation indicating the genotypes are less susceptible.

The infestation of the scales was ranging from 26.00 to 44.00 % incidence indicating the genotypes to be moderately susceptible to highly susceptible and the infestation of pyrilla in all varieties was ranging from 0.45 to 1.35 per leaf indicating less susceptible.

**622.4 Utility of results obtained so far:** The genotypes showing tolerant/resistant reaction to different insect pests will be utilized in resistant breeding programme in future.

**Experiment No.4**

| | | | |
|---|---|---|---|
| **Part-I General Information** | | | |
| **600** | Project Code | -- | E-4.1 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Initial Varietal Trial – Midlate** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Host Plant Resistance |
| 605 | Duration of Project | -- | One year |
| 605.1 | Date of Start | -- | 2015-16 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Shri.A.B.Kandalkar |
| 611.2 | Designation | -- | Assistant Prof. Agronomy |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To screen the sugarcane varieties in AICRP Trials for their reactions to major insect pests. |
| 620.2 | Specific objectives | -- | To identify resistant varieties to major insect pests of sugarcane |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | First (2016-17) |
| | 2. Design | -- | Randomized Block Design |
| | 3. Replication | -- | Two |
| | 4. Plot Size | -- | 6.00 x 4.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Fertilizer | -- | 175 kg N + 100 kg $P_2O_5$ + 100 kg $K_2O$ $ha^{-1}$ |
| | 7. Date of Planting | -- | 12/01/2016 |
| | 8. Date of Harvesting | -- | 10/01/2017 |
| | 9. Treatments | -- | Twenty two varieties |
| | | | 1) Co13005 2) Co13006 3) Co13008<br>4) Co13009 5) Co13011 6) Co13013<br>7) Co13014 8) Co13016 9) Co13018<br>10) Co13020 11) CoM13082 12) Co86032<br>13) CoN13073 14) CoN13074<br>15) Co99004 16) CoSnk 13103<br>17) CoSnk 13104 18) CoSnk 13105<br>19) CoSnk 13106 20) CoT13366<br>21) PI 13131 22) PI13132 |
| | 10. Observations recorded | -- | As per the technical details given in Experiment E-4.1 |

**Table 10: Reaction of Sugarcane varieties/genotypes to major insect pests in IVT midlate Plant at 30, 60, 90 and 120 DAP.**

| Sr. No. | Genotypes | ESB at 30 DAP | | ESB at 60 DAP | | ESB at 90 DAP | | ESB at 120 DAP | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction |
| 1 | Co13005 | **16.90** | **MS** | **9.64** | LS | **3.60** | LS | **3.33** | LS |
| 2 | Co13006 | **11.78** | LS | **6.69** | LS | **4.31** | LS | **3.03** | LS |
| 3 | Co13008 | **13.13** | LS | **5.50** | LS | **3.59** | LS | **2.58** | LS |
| 4 | Co13009 | **9.40** | LS | **8.09** | LS | **5.84** | LS | **3.88** | LS |
| 5 | Co13011 | **8.61** | LS | **8.38** | LS | **3.61** | LS | **2.80** | LS |
| 6 | Co13013 | **10.00** | LS | **4.69** | LS | **2.12** | LS | **1.85** | LS |
| 7 | Co13014 | **10.23** | LS | **7.04** | LS | **4.31** | LS | **3.23** | LS |
| 8 | Co13016 | **12.71** | LS | **6.93** | LS | **5.96** | LS | **3.09** | LS |
| 9 | Co13018 | **11.17** | LS | **7.53** | LS | **4.62** | LS | **3.69** | LS |
| 10 | Co13020 | **8.90** | LS | **4.13** | LS | **3.51** | LS | **2.48** | LS |
| 11 | CoM13082 | **10.63** | LS | **8.04** | LS | **3.07** | LS | **2.92** | LS |
| 12 | Co86032 | **11.94** | LS | **6.18** | LS | **3.36** | LS | **3.25** | LS |
| 13 | CoN13073 | **12.32** | LS | **4.06** | LS | **2.34** | LS | **1.94** | LS |
| 14 | CoN13074 | **6.08** | LS | **6.40** | LS | **4.27** | LS | **3.61** | LS |
| 15 | Co99004 | **24.80** | **MS** | **22.36** | **MS** | **13.17** | LS | **8.82** | LS |
| 16 | CoSnk13103 | **17.42** | **MS** | **9.31** | LS | **6.85** | LS | **5.73** | LS |
| 17 | CoSnk13104 | **12.40** | LS | **6.34** | LS | **3.82** | LS | **2.99** | LS |
| 18 | CoSnk13105 | **7.86** | LS | **11.71** | LS | **7.42** | LS | **6.60** | LS |
| 19 | CoSnk13106 | **14.57** | LS | **6.90** | LS | **4.23** | LS | **3.65** | LS |
| 20 | CoT13366 | **14.19** | LS | **10.76** | LS | **9.00** | LS | **6.20** | LS |
| 21 | PI13131 | **21.49** | **MS** | **14.81** | LS | **7.96** | LS | **6.56** | LS |
| 22 | PI13132 | **18.14** | **MS** | **9.52** | LS | **6.05** | LS | **5.11** | LS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.

Grades LS = Below 15.0 MS= 15.1 to 30.0 HS = above 30.0

**Results :**

**Early Shoot Borer:** The data (Table10) revealed that the entries Co13005, Co99004, CoSnk 13103, PI 13131and PI13132 were found to be moderately susceptible whereas, the remaining entries i.e.Co13006 , Co13008, Co13009 , Co13011 , Co13013,Co13014, Co13016, Co13018, Co13020, CoM13082 Co86032, CoN13073, CoN13074, ,CoSnk 13104 , CoSnk 13105, CoSnk 13106 and CoT13366, were found less susceptible at 30 DAP. At 60 DAP Co99004 was found moderately susceptible while all other entries were found less susceptible. At 90 and 120 DAP all the entries were found less susceptible.

**Scales:** The data (Table 11) revealed that varieties Co13006 , Co13008, Co13009, Co13020, CoM13082, CoN13074, CoSnk 13103, CoSnk 13104 and CoSnk 13105were found to be highly susceptible and remaining varieties were found moderately susceptible.

**Table 11: Reaction of Sugarcane varieties/genotypes to scales in IVT midlate Plant at Harvest**

| Sr. No. | Genotypes | Scales | | |
|---|---|---|---|---|
| | | % incidence | % intensity | Reaction |
| 1 | Co13005 | 26.00 | 3.71 | MS |
| 2 | Co13006 | 36.00 | 5.81 | **HS** |
| 3 | Co13008 | 38.00 | 5.95 | **HS** |
| 4 | Co13009 | 36.00 | 7.42 | **HS** |
| 5 | Co13011 | 28.00 | 3.70 | MS |
| 6 | Co13013 | 32.00 | 6.38 | MS |
| 7 | Co13014 | 30.00 | 4.83 | MS |
| 8 | Co13016 | 34.00 | 6.22 | MS |
| 9 | Co13018 | 28.00 | 4.43 | MS |
| 10 | Co13020 | 36.00 | 10.70 | **HS** |
| 11 | CoM13082 | 40.00 | 8.20 | **HS** |
| 12 | Co86032 | 28.00 | 5.18 | MS |
| 13 | CoN13073 | 32.00 | 6.16 | MS |
| 14 | CoN13074 | 36.00 | 7.85 | **HS** |
| 15 | Co99004 | 26.00 | 5.89 | MS |
| 16 | CoSnk13103 | 36.00 | 6.58 | **HS** |
| 17 | CoSnk13104 | 38.00 | 7.66 | **HS** |
| 18 | CoSnk13105 | 38.00 | 6.69 | **HS** |
| 19 | CoSnk13106 | 30.00 | 6.06 | MS |
| 20 | CoT13366 | 32.00 | 7.08 | MS |
| 21 | PI13131 | 32.00 | 5.55 | MS |
| 22 | PI13132 | 28.00 | 4.80 | MS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.
Grades: LS= below 10, MS= 10.1 – 35, HS= Above 35

**Pyrilla:** The data (Table 12) of pyrilla at 15 days interval revealed that all the twenty two entries showed less susceptible reaction to pyrilla at fortnightly intervals.

**Conclusions:** The early shoot borer infestation at 30 DAP was ranging from 6.08 to 24.80 % infestation indicating the genotypes are moderately susceptible to highly susceptible, at 60 DAP was ranging from 4.06 to 22.36 % infestation indicating the genotypes are less susceptible to moderately susceptible, at 90 DAP it was ranging from 2.12 to 13.17 % infestation indicating the genotypes were less susceptible and at 120 DAP it was ranging from 1.85 to 8.82% infestation indicating the genotypes are less susceptible.

The infestation of the scales was ranging from 26.00 to 40.00 % incidence indicating the genotypes to be moderately susceptible to highly susceptible and the infestation of pyrilla in all varieties was ranging from 0.40 to 1.45 per leaf indicating less susceptible.

**622.4 Utility of results obtained so far:** The genotypes showing tolerant/resistant reaction to different insect pests will be utilized in resistant breeding programme in future.

**Table 12: Reaction of Sugarcane varieties/genotypes to Pyrilla (Nymph & Adults) per leaf in IVT midlate Plant**

| Sr. No. | Genotypes | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Co13005 | **0.68** | LS | **0.80** | LS | **0.75** | LS | **0.88** | LS |
| 2 | Co13006 | **0.98** | LS | **1.08** | LS | **0.85** | LS | **1.10** | LS |
| 3 | Co13008 | **1.05** | LS | **1.20** | LS | **1.13** | LS | **1.20** | LS |
| 4 | Co13009 | **0.98** | LS | **1.20** | LS | **0.88** | LS | **1.15** | LS |
| 5 | Co13011 | **0.85** | LS | **0.98** | LS | **0.90** | LS | **1.08** | LS |
| 6 | Co13013 | **1.15** | LS | **1.25** | LS | **1.25** | LS | **1.35** | LS |
| 7 | Co13014 | **1.30** | LS | **1.45** | LS | **0.90** | LS | **1.13** | LS |
| 8 | Co13016 | **0.85** | LS | **0.95** | LS | **0.90** | LS | **0.98** | LS |
| 9 | Co13018 | **0.75** | LS | **0.90** | LS | **0.83** | LS | **0.95** | LS |
| 10 | Co13020 | **0.98** | LS | **1.15** | LS | **0.98** | LS | **1.03** | LS |
| 11 | CoM13082 | **0.85** | LS | **1.10** | LS | **1.15** | LS | **1.15** | LS |
| 12 | Co86032 | **0.40** | LS | **0.55** | LS | **0.48** | LS | **0.63** | LS |
| 13 | CoN13073 | **0.75** | LS | **0.90** | LS | **0.83** | LS | **0.95** | LS |
| 14 | CoN13074 | **0.98** | LS | **1.13** | LS | **1.05** | LS | **1.18** | LS |
| 15 | Co99004 | **1.10** | LS | **1.25** | LS | **1.18** | LS | **1.35** | LS |
| 16 | CoSnk13103 | **1.05** | LS | **1.20** | LS | **1.20** | LS | **1.35** | LS |
| 17 | CoSnK13104 | **0.75** | LS | **0.90** | LS | **1.13** | LS | **1.13** | LS |
| 18 | CoSnK13105 | **0.70** | LS | **1.13** | LS | **0.75** | LS | **1.25** | LS |
| 19 | CoSnK13106 | **0.85** | LS | **1.10** | LS | **0.93** | LS | **1.08** | LS |
| 20 | CoT13366 | **1.10** | LS | **1.35** | LS | **1.18** | LS | **1.38** | LS |
| 21 | PI13131 | **1.15** | LS | **1.30** | LS | **1.25** | LS | **1.35** | LS |
| 22 | PI13132 | **1.25** | LS | **1.40** | LS | **1.23** | LS | **1.35** | LS |

LS = Less susceptible Below 5, MS= Moderately susceptible 5.1-20.0 and HS = Highly Susceptible Above 20.

**Experiment No.5**

| Part-I General Information | | | |
|---|---|---|---|
| **600** | Project Code | -- | E-4.1 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial (Midlate) – I Plant** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Host Plant Resistance |
| 605 | Duration of Project | -- | One year |
| 605.1 | Date of Start | -- | 2015-16 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Shri. A.B.Kandalkar |
| 611.2 | Designation | -- | Assistant Prof. of Agronomy |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To screen the sugarcane varieties in AICRP Trials for their reactions to major insect pests. |
| 620.2 | Specific objectives | -- | To identify resistant varieties to major insect pests of sugarcane |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | First (2016-17) |
| | 2. Design | -- | Randomized Block Design |
| | 3. Replication | -- | Three |
| | 4. Plot Size | -- | 6.00 x 4.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Fertilizer | -- | 175 kg N + 100 kg $P_2O_5$ + 100 kg $K_2O$ $ha^{-1}$ |
| | 7. Date of Planting | -- | 15/01/2016 |
| | 8. Date of Harvesting | -- | 16/01/2017 |
| | 9. Treatments | -- | Eight varieties |
| | | | 1) Co11005, 2) Co11007 3) Co86032 4) Co11019 5) CoM11085 6) CoM11086 7) Co11012 and 8) Co99004 |
| | 10. Observations recorded | -- | As per the technical details given in Experiment E-4.1 |

**Table 13: Reaction of Sugarcane varieties/genotypes to major insect pests in AVT midlate I Plant at 30, 60, 90 and 120 DAP.**

| Sr. No. | Genotypes | ESB at 30 DAP | | ESB at 60 DAP | | ESB at 90 DAP | | ESB at 120 DAP | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction |
| 1 | Co11005 | **13.53** | LS | **9.20** | LS | **7.37** | LS | **6.77** | LS |
| 2 | Co11007 | **14.81** | LS | **11.30** | LS | **7.44** | LS | **7.31** | LS |
| 3 | Co86032 | **9.96** | LS | **6.45** | LS | **6.47** | LS | **4.31** | LS |
| 4 | Co11019 | **14.32** | LS | **9.47** | LS | **5.57** | LS | **4.26** | LS |
| 5 | CoM11085 | **9.12** | LS | **7.22** | LS | **6.63** | LS | **5.07** | LS |
| 6 | CoM11086 | **8.95** | LS | **5.90** | LS | **5.10** | LS | **5.02** | LS |
| 7 | Co11012 | **26.73** | MS | **16.55** | MS | **8.66** | LS | **8.94** | LS |
| 8 | Co99004 | **16.37** | MS | **11.32** | LS | **9.34** | LS | **8.22** | LS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.
Grades LS = Below 15.0 MS= 15.1 to 30.0 HS = above 30.0

**Table 14: Reaction of Sugarcane varieties/genotypes to scales in AVT midlate I Plant at Harvest**

| Sr. No. | Genotypes | Scales | | |
|---|---|---|---|---|
| | | % incidence | % intensity | Reaction |
| 1 | Co11005 | 29.33 | 4.85 | MS |
| 2 | Co11007 | 36.00 | 6.96 | **HS** |
| 3 | Co86032 | 22.67 | 2.93 | MS |
| 4 | Co11019 | 30.67 | 5.32 | MS |
| 5 | CoM11085 | 33.33 | 5.84 | MS |
| 6 | CoM11086 | 38.67 | 7.39 | **HS** |
| 7 | Co11012 | 36.00 | 5.45 | **HS** |
| 8 | Co99004 | 28.00 | 3.70 | MS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.
Grades: LS= below 10, MS= 10.1 – 35, HS= Above 35

**Table 15: Reaction of Sugarcane varieties/genotypes to Pyrilla (Nymph & Adults) per leaf in AVT midlate I Plant**

| Sr. No. | Genotypes | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Co11005 | **0.93** | LS | **0.83** | LS | **1.03** | LS | **0.92** | LS |
| 2 | Co11007 | **0.73** | LS | **0.97** | LS | **0.83** | LS | **0.73** | LS |
| 3 | Co86032 | **0.53** | LS | **0.78** | LS | **0.63** | LS | **0.58** | LS |
| 4 | Co11019 | **0.72** | LS | **0.67** | LS | **0.82** | LS | **0.78** | LS |
| 5 | CoM11085 | **0.93** | LS | **0.83** | LS | **1.03** | LS | **0.92** | LS |
| 6 | CoM11086 | **1.03** | LS | **0.93** | LS | **1.12** | LS | **0.97** | LS |
| 7 | Co11012 | **0.85** | LS | **0.98** | LS | **0.95** | LS | **0.83** | LS |
| 8 | Co99004 | **0.95** | LS | **0.92** | LS | **1.05** | LS | **0.92** | LS |

LS = Less susceptible Below 5, MS= Moderately susceptible 5.1-20.0 and HS = Highly Susceptible Above 20.

**Results :**

**Early Shoot Borer:** The data (Table13) revealed that the entries Co11012 and Co99004 were found to be moderately susceptible whereas, the remaining entries i.e. Co11005, Co11007, Co86032 ,Co11019, CoM11085 and CoM11086 were found less susceptible at 30 DAP. At 60 DAP Co11012 was found moderately susceptible while all other entries were found less susceptible. At 90 and 120 DAP all the entries were found less susceptible.

**Scales:** The data (Table 14) revealed that varieties Co11007, Co11012 and CoM11086 were found to be highly susceptible and remaining varieties were found moderately susceptible.

**Pyrilla:** The data (Table 15) of pyrilla at 15 days interval revealed that all the eight entries showed less susceptible reaction to pyrilla at fortnightly intervals.

**Conclusions:** The early shoot borer infestation at 30 DAP was ranging from 9.12 to 26.73 % infestation indicating the genotypes are less susceptible to moderately susceptible, at 60 DAP was ranging from 5.90 to 16.55 % infestation indicating the genotypes are less susceptible to moderately susceptible, at 90 DAP it was ranging from 5.10 to 9.34 % infestation indicating the genotypes were less susceptible and at 120 DAP it was ranging from 4.26 to 8.94% infestation indicating the genotypes were less susceptible.

The infestation of the scales was ranging from 22.67 to 38.67% incidence indicating the genotypes to be moderately susceptible to highly susceptible and the infestation of pyrilla in all varieties was ranging from 0.58 to 1.12 per leaf indicating less susceptible.

**622.4 Utility of results obtained so far:** The genotypes showing tolerant/resistant reaction to different insect pests will be utilized in resistant breeding programme in future.

**Experiment No.6**

| Part-I General Information | | | |
|---|---|---|---|
| **600** | Project Code | -- | E-4.1 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial (Midlate) – II Plant** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Host Plant Resistance |
| 605 | Duration of Project | -- | One year |
| 605.1 | Date of Start | -- | 2015-16 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Dr.N.K.Patke |
| 611.2 | Designation | -- | Senior Research Scientist |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To screen the sugarcane varieties in AICRP Trials for their reactions to major insect pests. |
| 620.2 | Specific objectives | -- | To identify resistant varieties to major insect pests of sugarcane |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | First (2016-17) |
| | 2. Design | -- | Randomized Block Design |
| | 3. Replication | -- | Three |
| | 4. Plot Size | -- | 6.00 x 4.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Fertilizer | -- | 175 kg N + 100 kg $P_2O_5$ + 100 kg $K_2O$ $ha^{-1}$ |
| | 7. Date of Planting | -- | 08/01/2016 |
| | 8. Date of Harvesting | -- | 15/12/2016 |
| | 9. Treatments | -- | Thirteen varieties |
| | | | 1) Co09009 2) Co10015 3) Co10017 4) Co10031 5) Co10033 6) CoM10083 7) CoT10368 8) CoT10369 9) CoVC10061 10) PI10131 11) PI10132 12) Co86032 13) Co99004 |
| | 10. Observations recorded | -- | As per the technical details given in Experiment E-4.1 |

**Table 16: Reaction of Sugarcane varieties/genotypes to major insect pests in AVT midlate II Plant at 30, 60, 90 and 120 DAP.**

| Sr. No. | Genotypes | ESB at 30 DAP | | ESB at 60 DAP | | ESB at 90 DAP | | ESB at 120 DAP | |
|---|---|---|---|---|---|---|---|---|---|
| | | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction | Average % Infestation | Reaction |
| 1 | Co09009 | **4.98** | LS | **3.30** | LS | **3.06** | LS | **2.45** | LS |
| 2 | Co10015 | **10.84** | LS | **5.98** | LS | **3.54** | LS | **2.87** | LS |
| 3 | Co10017 | **16.26** | **MS** | **12.13** | LS | **8.66** | LS | **6.04** | LS |
| 4 | Co10031 | **8.98** | LS | **6.11** | LS | **5.75** | LS | **3.63** | LS |
| 5 | Co10033 | **11.53** | LS | **9.16** | LS | **7.45** | LS | **4.75** | LS |
| 6 | CoM10083 | **6.87** | LS | **4.63** | LS | **4.84** | LS | **3.36** | LS |
| 7 | CoT10368 | **8.14** | LS | **5.57** | LS | **4.21** | LS | **2.90** | LS |
| 8 | CoT10369 | **13.70** | LS | **10.26** | LS | **10.63** | LS | **6.37** | LS |
| 9 | CoVC10061 | **12.12** | LS | **8.61** | LS | **7.94** | LS | **4.77** | LS |
| 10 | PI 10131 | **7.53** | LS | **6.13** | LS | **3.74** | LS | **2.65** | LS |
| 11 | PI 10132 | **12.26** | LS | **9.29** | LS | **6.49** | LS | **4.37** | LS |
| 12 | Co86032 | **7.38** | LS | **5.14** | LS | **4.49** | LS | **3.09** | LS |
| 13 | Co99004 | **11.64** | LS | **7.73** | LS | **5.40** | LS | **4.01** | LS |

LS = Less susceptible, MS= Moderately susceptible and HS = Highly susceptible.

Grades LS = Below 15.0 MS= 15.1 to 30.0 HS = above 30.0

**Table 17: Reaction of Sugarcane varieties/genotypes to scales in AVT midlate II Plant at Harvest**

| Sr. No. | Genotypes | Scales | | |
|---|---|---|---|---|
| | | % incidence | % intensity | Reaction |
| 1 | Co09009 | 46.00 | 7.74 | **HS** |
| 2 | Co10015 | 38.00 | 8.20 | **HS** |
| 3 | Co10017 | 42.00 | 17.32 | **HS** |
| 4 | Co10031 | 34.00 | 6.26 | MS |
| 5 | Co86032 | 34.00 | 5.79 | MS |
| 6 | Co10033 | 30.00 | 3.94 | MS |
| 7 | CoM10083 | 40.00 | 5.78 | **HS** |
| 8 | CoT10368 | 30.00 | 4.36 | MS |
| 9 | CoT10369 | 32.00 | 5.23 | MS |
| 10 | CoVc10061 | 30.00 | 3.46 | MS |
| 11 | Co99004 | 28.00 | 4.66 | MS |
| 12 | PI10131 | 22.00 | 3.34 | MS |
| 13 | PI10132 | 26.00 | 2.80 | MS |

LS = Less susceptible, MS= moderately susceptible and HS = Highly susceptible.
Grades: LS= below 10, MS= 10.1 – 35, HS= Above 35

**Table 18: Reaction of Sugarcane varieties/genotypes to Pyrilla (Nymph & Adults) per leaf in AVT midlate II Plant**

| Sr. No. | Genotypes | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction | Pyrilla (Nymph & Adults) per leaf | Reaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Co09009 | **0.90** | LS | **1.20** | LS | **0.78** | LS | **0.75** | LS |
| 2 | Co10015 | **1.95** | LS | **1.65** | LS | **1.83** | LS | **1.25** | LS |
| 3 | Co10017 | **0.98** | LS | **1.05** | LS | **0.85** | LS | **0.83** | LS |
| 4 | Co10031 | **1.43** | LS | **1.65** | LS | **1.30** | LS | **1.30** | LS |
| 5 | Co10033 | **1.13** | LS | **0.90** | LS | **1.00** | LS | **0.98** | LS |
| 6 | CoM10083 | **1.95** | LS | **1.50** | LS | **1.83** | LS | **1.38** | LS |
| 7 | CoT10368 | **1.43** | LS | **2.10** | LS | **1.30** | LS | **1.50** | LS |
| 8 | CoT10369 | **1.78** | LS | **1.95** | LS | **1.65** | LS | **1.55** | LS |
| 9 | CoVC10061 | **1.95** | LS | **1.80** | LS | **1.83** | LS | **1.78** | LS |
| 10 | PI 10131 | **1.95** | LS | **1.65** | LS | **1.83** | LS | **1.33** | LS |
| 11 | PI 10132 | **2.18** | LS | **1.73** | LS | **1.78** | LS | **1.50** | LS |
| 12 | Co86032 © | **1.05** | LS | **1.38** | LS | **0.93** | LS | **0.90** | LS |
| 13 | Co99004 © | **0.83** | LS | **0.83** | LS | **0.58** | LS | **0.68** | LS |

LS = Less susceptible Below 5, MS= Moderately susceptible 5.1-20.0 and HS = Highly Susceptible Above 20.

**Results :**

**Early Shoot Borer:** The data (Table 16) revealed that the entry Co10017was found to be moderately susceptible whereas, the remaining entries i.e. Co09009, Co10015, Co10031, Co10033 , CoM10083, CoT10368, CoT10369, CoVC10061, PI10131, PI10132, Co86032 and Co99004were found less susceptible at 30 DAP. At 60, 90 and 120 DAP all the entries were found less susceptible.

**Scales:** The data (Table 17) revealed that varieties Co09009, Co10015, Co10017 and CoM10083 were found to be highly susceptible and remaining varieties were found moderately susceptible.

**Pyrilla:** The data (Table 18) of pyrilla at 15 days interval revealed that all the thirteen entries showed less susceptible reaction to pyrilla at fortnightly intervals.

**Conclusions:** The early shoot borer infestation at 30 DAP was ranging from 4.98 to 16.26% infestation indicating the genotypes are less susceptible to moderately susceptible, at 60 DAP was ranging from 3.30 to 12.13 % infestation indicating the genotypes were less susceptible, at 90 DAP it was ranging from 3.06 to 10.63% infestation indicating the genotypes were less susceptible and at 120 DAP it was ranging from 2.45 to 6.37% infestation indicating the genotypes were less susceptible.

The infestation of the scales was ranging from 22.00 to 46.00% incidence indicating the genotypes to be moderately susceptible to highly susceptible and the infestation of pyrilla in all varieties was ranging from 0.58 to 2.18 per leaf indicating less susceptible.

**622.4 Utility of results obtained so far:** The genotypes showing tolerant/resistant reaction to different insect pests will be utilized in resistant breeding programme in future.

**Experiment No.7**

| | | | |
|---|---|---|---|
| **Part-I General Information** | | | |
| **600** | Project Code | -- | E-28 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 602 | Project Title | -- | **Survey and surveillance of sugarcane insect pests** |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Population Dynamics |
| 605 | Duration of Project | -- | Long term |
| 605.1 | Date of Start | -- | 2003-2004 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Dr.N.K.Patke |
| 611.2 | Designation | -- | Senior Research Scientist |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To identify key insect pests of sugarcane in the area |
| 620.2 | Specific objectives | -- | To identify key insect pests of sugarcane in the area |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | 2016-17 |
| | 2. Design | -- | Non-replicated |
| | 3. Replication | -- | Non-replicated |
| | 4. Method of observation | -- | Roving survey of sugarcane fields of Vidarbha districts be recorded.<br>Report containing information on location, variety, date of planting, spacing, fertilizer doses and inter crops, if any.<br>Observations on incidence of borers be recorded by examining 25 canes at five places (four corners and one in middle), sucking pests were recorded by examining 20 canes and others as mentioned in technical programme of E. 4.1 |

**Table-19: Survey and surveillance of insect pests of sugarcane at Wardha, Yavatmal and Telhara (2016-17)**

| Sr. No. | Varieties | Location | Name of the farmers | Name of Pest | Internode borer | | | | Pyrilla per leaf |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Per cent incidence | Per cent Intensity | Infestation Index | Reaction | |
| 1. | Co-265 (Ratoon) | Jalgaon Tal. Arvi | Sau. Sarita Manohar Sawarkar<br>Sau.Sunita Prabhakar Nehare<br>Viay Panjabrao Deshmukh<br>Manohar Mahadeo Sawarkar | Internode borer<br>Pyrilla (*Pyrilla perpusilla*) | 16.00<br>12.00<br>8.00<br>20.00 | 4.24<br>4.50<br>3.58<br>4.71 | 0.68<br>0.54<br>0.29<br>0.94 | LS<br>LS<br>LS<br>LS | 7.00<br>7.50<br>7.48<br>7.65 |
| 2. | Co-265 (Ratoon) for seed purpose | Dhanoli Tal. Karanja | Shri. Pradip Wamanrao Dive | Internode borer<br>Pyrilla (*Pyrilla perpusilla*) | 12.00 | 3.98 | 0.48 | LS | 4.00 |
| 3. | Co-265 (Ratoon) for seed purpose | Talegaon Farm Tal. Talegaon | Agril. Asstt. Jetendra Patil | Internode borer<br>Pyrilla (*Pyrilla perpusilla*)<br>Whitefly (*Aleurolobus barodensis*) | 16.00 | 3.71 | 0.59 | LS | 4.10 3-5/ $cm^2$ |
| 4. | Co86032 | Chikali Tal. Darvha Dist. Yavatmal | Shri. Ghive | Whitefly | 4.00 | 2.45 | 0.10 | LS | 20-24/ $cm^2$ |
| 5. | Local variety Paturda | Tal. Telhara Dist . Akola | Shri. Ramkrishna More | Pyrilla<br>Whitefly | -- | -- | -- | -- | 7.00 26-28/ $cm^2$ |
| 6. | Local Chewing variety Paturda | Mahispur Tal. Akola Dist Akola | Balkrishna Patekhede | Early Shoot borer | 20.34 % ESB infestation | -- | -- | -- | -- |

**Table-20: Survey and surveillance of insect pests of sugarcane at Nagpur and Bhandara (2016-17)**

| Sr. No. | Varieties | Location | Name of the farmers | Name of Pest | Internode borer | | | | Pyrilla per leaf |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Per cent incidence | Per cent Intensity | Infestation Index | Reaction | |
| 1. | Co86032 | Sawali Tal. Kamthi Dist. Nagpur | Chandrabhan Shriram Ingole | Internode borer Pyrilla (*Pyrilla perpusilla*) | 12.00 | 3.81 | 0.46 | LS | 13.35 |
| 2. | Co-265 (Ratoon) for seed purpose Co86032 | Wadoda Tal. Kamthi Dist. Nagpur | Shri. Ramu Bhagwan Bhure<br>Shri. Sunil Bhagwan Bhure<br>Shri. Raju Bhagwan Bhure | Internode borer Pyrilla (*Pyrilla perpusilla*) | 16.00<br>8.00<br>12.00<br>12.00 | 3.57<br>3.35<br>3.15<br>3.00 | 0.57<br>0.27<br>0.38<br>0.36 | LS<br>LS<br>LS<br>LS | 15.30<br>13.35<br>13.65<br>13.88 |
| 3. | Co-03102<br>Co-92005<br>NR-9805<br>Co-86032 | Devhada Tal. Tumsar Dist. Bhandara | Shri. Rameshwar Topale Nursery Incharge Manas Agro Industries Unit No.4 Sugar factory farm | Internode borer Pyrilla (*Pyrilla perpusilla*) | 12.00<br>8.00<br>12.00<br>12.00 | 3.77<br>3.07<br>2.55<br>2.82 | 0.33<br>0.25<br>0.31<br>0.34 | LS<br>LS<br>LS<br>LS | 3.38<br>2.98<br>2.45<br>4.40 |
| 4. | Co-92005 | Madgi Tal. Tumsar | Shri. Deoramji T. Bodge | Internode borer Pyrilla | 12.00 | 3.43 | 0.41 | LS | 27.90 |
| 5. | Co-92005 | Sukdi Tal. Tumsar | Shri. Dharmapal T. Chaudhary | Internode borer Pyrilla | 12.00 | 2.75 | 0.33 | LS | 29.43 |
| 6. | Co-92005 | Madgi Tal. Tumsar | Shri. Jagan S. Wahile | Internode borer Pyrilla Aphids | 16.00 | 2.99 | 0.48 | LS | 28.98<br>28-32/ $cm^2$ |
| 7. | Co-03102<br>NR-9805 | Madgi Tal. Tumsar | Shri. Manohar Chindu Wahile | Internode borer Pyrilla | 12.00<br>8.00 | 3.20<br>2.58 | 0.38<br>0.21 | LS<br>LS | 29.23<br>29.18 |
| 8. | Co-86032 | Tal. Sakoli Dist. Bhandara | Shri. Sharad Gobhade | Internode borer Pyrilla | 12.00 | 3.16 | 0.38 | LS | 2.98 |
| 9. | Co-86032 | Tal. Sakoli Dist. Bhandara | Shri. Gulab Chaganji Kapgate | Internode borer Pyrilla | 8.00 | 2.80 | 0.22 | LS | 3.38 |

**Table-21: Survey and surveillance of insect pests of sugarcane at Wardha (2016-17)**

| Sr. No. | Varieties | Location | Name of the farmers | Name of Pest | Internode borer | | | | Pyrilla per leaf |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Per cent incidence | Per cent Intensity | Infestation Index | Reaction | |
| 1. | Co-86032 | Mahakal Tal Wardha | Shri. Pavane | Internode borer Pyrilla | 12.00 | 2.70 | 0.32 | LS | 4.40 |
| 2. | Co-86032 | Mahakal Tal. Wardha | Shri. Mahdeo Patil | Internode borer Pyrilla | 12.00 | 3.06 | 0.37 | LS | 4.35 |
| 3. | Co-86032 | Mahakal Tal. Wardha | Shri. Purshottam Tonape | Internode borer Pyrilla Aphids | 12.00 | 2.95 | 0.35 | LS | 5.35 |
| 4. | Co-265 | Mahakal Tal. Wardha | Shri. Babanrao Karmore | Internode borer Pyrilla Aphids Whitefly | 12.00 | 3.46 | 0.42 | LS | 4.93 32-34/ $cm^2$ 28-30/ $cm^2$ |
| 5. | CoVSI-8005 Co-265 | Jamni Tal.. Deoli | Sugar Factory Nursery | Internode borer Pyrilla | 8.00 8.00 | 3.16 2.78 | 0.25 0.22 | LS LS | 2.45 2.28 |
| 6. | Co-265 | Jamni Shindi Tal. Deoli | Shri. Ashokrao C. Karotkar | Internode borer Pyrilla | 12.00 | 3.81 | 0.46 | LS | 2.98 |
| 7. | Co-86032 | Bhidi Tal. Deoli | Shri. Ajay Dashrathji Zade | Internode borer Pyrilla | 16.00 | 3.57 | 0.57 | LS | 3.38 |

**Experiment:8**

| Part-I General Information | | | |
|---|---|---|---|
| **600** | Project Code | -- | E-30 |
| 601.1 | Name of the Research Station | -- | Sugarcane Research Centre, Dr. PDKV, Akola |
| 601.2 | Location of the Project | -- | Sugarcane Research Centre, Dr. PDKV, Akola |
| 602 | Project Title | -- | **Monitoring of insect pests and bio-agents in sugarcane agro-ecosystem**. |
| 603 | Priority Area- Main Group<br>Sub Group | -- | Plant Protection<br>Entomology |
| 603.1 | Research Approach | -- | Applied Research |
| 604 | Specific Area | -- | Population Dynamics |
| 605 | Duration of Project | -- | Long term |
| 605.1 | Date of Start | -- | 2000-2001 |
| 605.2 | Period for which report submitted | -- | 2016-17 |
| **Part II Investigation Profile** | | | |
| **610** | Principal Investigator | | |
| 610.1 | Name | -- | Dr. Gajanan K. Lande |
| 610.2 | Designation | -- | Assistant Professor of Entomology |
| 610.3 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **611** | **Co-Investigator** | | |
| 611.1 | Name | -- | Dr.N.K.Patke |
| 611.2 | Designation | -- | Senior Research Scientist |
| 611.3 | Department | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| 611.4 | Location | -- | Akola |
| 611.5 | Address | -- | Sugarcane Research Centre, Dr.PDKV, Akola |
| **Part III Technical Details** | | | |
| 620 | Introduction and Objectives | -- | |
| 620.1 | Immediate Objectives | -- | To Study the seasonal occurrence and Peak periods of pest infestation |
| 620.2 | Specific objectives | -- | To prepare forewarning models |
| 621 | Project Technical Profile | -- | |
| 621.1 | Technical details | -- | |
| | 1. Progressive year | -- | 2016-17 |
| | 2. Design | -- | Non-replicated |
| | 3. Replication | -- | Non-replicated |
| | 4. Plot Size | -- | 6.00 x 13.50 $m^2$ |
| | 5. Spacing | -- | 90 cm row to row |
| | 6. Variety | -- | Co-86032 |
| | 7. Date of Planting | -- | 08/01/2016 |
| | 8. Date of Harvesting | -- | 15/12/2016 |
| | 9. Method of observation | -- | |

1) **Early Shoot borer:** Four middle rows were selected from the plot and total germinated shoots were counted. The shoots affected by early shoot borer showing “dead hearts” were counted. Calculated the % incidence as per the following formula

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

2) **Scale Insects:** Twenty five canes were selected randomly from the plot and affected internodes due to the scale insects and total internodes in each cane were counted. Calculated the % incidence and % intensity as per the following formula.

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

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

3) **Pyrilla :** Ten canes were selected and two leaves per cane were selected in all Twenty leaves were selected randomly from the plot and pyrilla per leaf were counted.

4) **White fly:** Population of nymph and puparia were recorded from a unit of 10 canes (20 leaves) and average population on per 3 leaves was reported.

5**) Aphids :** Population of Aphid were recorded from a unit of 10 canes (20 leaves) and average population per 3 leaves was reported.

**Results:** The insect pests recorded on sugarcane var. Co-86032 during 2016-17 were early shoot borer, scales, pyrilla, White fly and aphids.

However, the incidence of aphids, white fly and pyrilla was patchy and very meager.

**Early shoot borer:** The seasonal incidence data (Table 22) revealed that the damage due to early shoot borer was initiated during the 7th meteorological week i.e. 12th Feb 2016 (12.96% dh) and it was continued up to 30th MW. The maximum damage due to early shoot borer was observed during 7th MW i.e. 12th Feb 2016 (12.96% dh) during which met parameters were in the range of 15.9 to 33.9$^0$C temperature, 21 to 51% RH and 0.0 mm rainfall.

**Scales:** The incidence of scales was initiated during 37th MW (40% incidence and 4.96% intensity) and it was continued up to 52nd MW. The % incidence and % intensity increased at 37th MW and then % intensity decreased but the % incidence of scales increased during last met week and was maximum on 52nd MW (44%).

**Pyrilla:** The incidence of pyrilla was initiated during 30th MW (0.90 per leaf) and it was continued up to 42nd MW. The maximum pyrilla per leaf was observed on 33rd MW (1.60 per leaf).

**Aphids :** The meager population of aphids was noticed. The incidence started from 27th MW and it was continued up to 47th MW the maximum incidence was noticed on 33rd MW i.e. 28 aphids per 3 leaves.

**White fly:** The meager population of White fly was noticed. The incidence started from 27th MW and it was continued up to 45th MW the maximum incidence was noticed on 41st MW i.e. 10 white flies per 3 leaves.

**Natural Enemies/Bio-agents:** The Bio-agents such as Lady bird beetles, spiders and *Apanteles* Spp. in traces were observed as bioagents against early shoot borer and *Epiricania*

against pyrilla were also observed. Mostly the unidentified spiders as a predator were also observed feeding on nymphs of pyrilla during 7th MW and continued up to 52nd MW.

**Table 22: Monitoring of insect pests and bio-agents in sugarcane agro-ecosystem on Co-86032 during 2016-2017**

| Sr. No | MW | Per cent infestation of early shoot borer | Per cent incidence of scales | Per cent intensity of Scale insects | Bio agents per 3 plants | | Aphids per 3 leaves | White fly per 3 leaves | Pyrilla Nymph adult per leaf | Rainfall (mm) | Temperature (0C) | | RH I (%) | RH II (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | LBB | Spiders | | | | | Max | Min | | |
| 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 32.3 | 10.7 | 66 | 21 |
| 2 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 31.4 | 10.9 | 60 | 23 |
| 3 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 29.9 | 13.7 | 70 | 29 |
| 4 | 4 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 29.5 | 8.5 | 52 | 16 |
| 5 | 5 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 33.7 | 12.6 | 58 | 21 |
| 6 | 6 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 32.8 | 14.5 | 51 | 25 |
| 7 | 7 | 12.96 | -- | -- | 6 | 7 | -- | -- | -- | 0.0 | 33.9 | 15.9 | 51 | 21 |
| 8 | 8 | 6.43 | -- | -- | 13 | 11 | -- | -- | -- | 0.0 | 36.1 | 17.6 | 53 | 26 |
| 9 | 9 | 6.12 | -- | -- | 7 | 9 | -- | -- | -- | 0.0 | 35.8 | 19.2 | 70 | 32 |
| 10 | 10 | 7.44 | -- | -- | 15 | 4 | -- | -- | -- | 0.0 | 36.5 | 19.0 | 48 | 20 |
| 11 | 11 | 7.27 | -- | -- | 16 | 5 | -- | -- | -- | 0.4 | 36.8 | 20.2 | 44 | 20 |
| 12 | 12 | 6.25 | -- | -- | 12 | 6 | -- | -- | -- | 0.0 | 39.0 | 20.2 | 29 | 11 |
| 13 | 13 | 6.61 | -- | -- | 12 | 3 | -- | -- | -- | 0.0 | 40.4 | 22.2 | 32 | 15 |
| 14 | 14 | 7.00 | -- | -- | 10 | 4 | -- | -- | -- | 0.0 | 41.2 | 25.4 | 37 | 18 |
| 15 | 15 | 7.02 | -- | -- | 12 | 5 | -- | -- | -- | 0.0 | 41.8 | 24.9 | 33 | 17 |
| 16 | 16 | 4.19 | -- | -- | 10 | 9 | -- | -- | -- | 0.0 | 44.0 | 27.5 | 34 | 14 |
| 17 | 17 | 4.53 | -- | -- | 8 | 10 | -- | -- | -- | 0.0 | 41.7 | 25.6 | 38 | 18 |
| 18 | 18 | 4.17 | -- | -- | 10 | 12 | -- | -- | -- | 0.0 | 42.9 | 27.6 | 37 | 14 |
| 19 | 19 | 3.73 | -- | -- | 8 | 7 | -- | -- | -- | 19.9 | 40.7 | 26.1 | 50 | 17 |
| 20 | 20 | 4.23 | -- | -- | 7 | 4 | -- | -- | -- | 0.6 | 45.2 | 30.7 | 33 | 12 |
| 21 | 21 | 3.42 | -- | -- | 6 | 2 | -- | -- | -- | 0.0 | 42.0 | 29.4 | 52 | 21 |
| 22 | 22 | 3.44 | -- | -- | 6 | 4 | -- | -- | -- | 0.0 | 41.4 | 29.9 | 51 | 21 |
| 23 | 23 | 3.08 | -- | -- | 3 | 6 | -- | -- | -- | 8.6 | 41.2 | 28.0 | 56 | 27 |
| 24 | 24 | 2.68 | -- | -- | 7 | 5 | -- | -- | -- | 0.0 | 38.9 | 29.0 | 55 | 28 |
| 25 | 25 | 3.08 | -- | -- | 6 | 6 | -- | -- | -- | 88.0 | 34.5 | 24.7 | 83 | 47 |
| 26 | 26 | 2.69 | -- | -- | 5 | 4 | -- | -- | -- | 49.9 | 32.8 | 24.6 | 80 | 58 |
| 27 | 27 | 2.67 | -- | -- | 2 | 3 | 4 | 3 | 0.00 | 53.1 | 30.7 | 24.8 | 86 | 70 |
| 28 | 28 | 2.27 | -- | -- | 4 | 4 | 9 | 5 | 0.00 | 212.8 | 28.1 | 23.6 | 90 | 73 |
| 29 | 29 | 1.52 | -- | -- | 7 | 5 | 6 | 4 | 0.00 | 5.7 | 31.5 | 24.9 | 83 | 62 |
| 30 | 30 | 1.52 | -- | -- | 6 | 5 | 6 | 4 | 0.90 | 104.5 | 29.8 | 23.6 | 91 | 72 |
| 31 | 31 | 0.00 | -- | -- | 4 | 4 | 14 | 8 | 1.50 | 65.3 | 29.4 | 23.9 | 86 | 71 |
| 32 | 32 | 0.00 | -- | -- | 3 | 4 | 19 | 5 | 1.50 | 10.5 | 30.4 | 24.0 | 84 | 66 |
| 33 | 33 | 0.00 | -- | -- | 6 | 4 | 28 | 8 | 1.60 | 0.0 | 31.0 | 23.4 | 85 | 58 |
| 34 | 34 | -- | -- | -- | 5 | 4 | 10 | 4 | 0.65 | 13.7 | 30.0 | 23.4 | 83 | 64 |
| 35 | 35 | -- | -- | -- | 6 | 5 | 11 | 5 | 0.70 | 6.5 | 31.9 | 24.5 | 85 | 62 |
| 36 | 36 | -- | -- | -- | 8 | 6 | 10 | 6 | 0.75 | 1.5 | 31.3 | 22.6 | 85 | 47 |
| 37 | 37 | -- | 40 | 4.96 | 9 | 5 | 11 | 6 | 0.70 | 28.5 | 31.8 | 23.6 | 86 | 59 |
| 38 | 38 | -- | 40 | 4.35 | 8 | 4 | 10 | 7 | 0.70 | 62.9 | 30.9 | 23.3 | 94 | 70 |
| 39 | 39 | -- | 20 | 2.04 | 10 | 5 | 11 | 6 | 0.65 | 30.3 | 30.8 | 23.0 | 92 | 71 |
| 40 | 40 | -- | 40 | 3.31 | 6 | 6 | 8 | 8 | 0.65 | 61.5 | 29.1 | 22.8 | 92 | 73 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 41 | -- | 40 | 3.45 | 8 | 6 | 10 | 10 | 0.65 | 29.0 | 31.2 | 21.3 | 90 | 59 |
| 42 | 42 | -- | 28 | 2.21 | 9 | 7 | 11 | 6 | 0.65 | 0.0 | 32.9 | 16.5 | 80 | 29 |
| 43 | 43 | -- | 40 | 3.35 | 10 | 8 | 10 | 6 | 0.00 | 0.0 | 32.4 | 15.8 | 80 | 34 |
| 44 | 44 | -- | 40 | 1.85 | 10 | 9 | 10 | 7 | 0.00 | 0.0 | 31.4 | 14.3 | 81 | 34 |
| 45 | 45 | -- | 32 | 1.69 | 11 | 8 | 11 | 8 | 0.00 | 0.0 | 31.4 | 11.2 | 77 | 27 |
| 46 | 46 | -- | 40 | 1.88 | 10 | 7 | 10 | 0 | 0.00 | 0.0 | 30.3 | 11.9 | 84 | 33 |
| 47 | 47 | -- | 28 | 1.88 | 9 | 8 | 9 | 0 | 0.00 | 0.0 | 30.7 | 9.7 | 85 | 32 |
| 48 | 48 | -- | 32 | 1.59 | 8 | 7 | 0 | 0 | 0.00 | 0.0 | 31.9 | 10.9 | 85 | 31 |
| 49 | 49 | -- | 32 | 1.45 | 11 | 6 | 0 | 0 | 0.00 | 0.0 | 30.1 | 10.7 | 88 | 35 |
| 50 | 50 | -- | 28 | 1.53 | 10 | 7 | 0 | 0 | 0.00 | 0.0 | 30.2 | 10.7 | 79 | 32 |
| 51 | 51 | -- | 36 | 1.62 | 10 | 8 | 0 | 0 | 0.00 | 0.0 | 29.2 | 8.6 | 85 | 35 |
| 52 | 52 | -- | 44 | 1.76 | 10 | 9 | 0 | 0 | 0.00 | 0.0 | 29.5 | 8.4 | 83 | 29 |
| | | | | | | | Total Rainfall Jan to Dec | | | **853.2** | | | | |

**MW :** Meteorological Week

**Table 23:** Correlation of incidence of insect pests on sugarcane at Akola with the weather parameters during the year 2016-17.

| **Variety** | | **Rainfall (mm)** | **Max. Temp** | **Min. Temp** | **RH I (%)** | **RH II (%)** |
|---|---|---|---|---|---|---|
| **Early shoot borer** | | | | | | |
| **Co 86032** | **r** | 0.388*<br>0.496** | | | | |
| | **t (cal)** | -0.80 | 7.72 | 2.98 | -10.60 | -4.8 |
| | **n=24** | **NS** | **NS** | **-NS** | **NS** | **NS** |
| **Scales** | | | | | | |
| **Co 86032** | **r** | 0.468*<br>0.590** | | | | |
| | **t (cal)** | -0.65 | -4.03 | -6.61 | 3.98 | 0.79 |
| | **n=16** | **NS** | **-S** | **-S** | **S** | **NS** |
| **Pyrilla** | | | | | | |
| **Co 86032** | **r** | 0.497*<br>0.623** | | | | |
| | **t (cal)** | 1.18 | -3.15 | 1.09 | 3.34 | 5.50 |
| | **n=14** | **NS** | **-S** | **-NS** | **S** | **S** |

Here r= coefficient of correlation, t = calculated t NS = Non significant
S = significant at 0.05%* and 0.01%**

**Results:**

The data presented in Table 23 revealed that the early shoot borer incidence on Co-86032 has shown non-significant correlation with morning relative humidity, evening relative humidity, rainfall and Maximum temp. It showed negative non-significant in Min.Temp.at 5% level. Similarly, in case of scales the incidence of scales has also shown non-significant correlation with rainfall and Relative humidity at evening. But it showed Significant correlation with relative humidity at morning hours and negative significant with Max temp and min temp. In case of pyrilla it showed significant correlation with Relative humidity at morning and evening hours and non-significant with rainfall. It showed negative significant and negative non-significant with max. temp. and min. temp., respectively.

**Table 24: Monitoring of major insect pests of sugarcane recorded during 2016-17**

| Sr.No. | Insect Pests | Infestation period (MW) | Highest infestation | Meteorological parameters | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | RF (mm) | T max °C | T min °C | RH I (%) | RH II (%) |
| 1 | Early Shoot Borer % infestation | 7th to 30th MW | (12.96) 7th MW | **0.0** | **33.9** | **15.9** | **51** | **21** |
| 2 | Pyrilla per leaf | 30th to 42nd MW | (1.60 per leaf) 33rd MW | **0.0** | **31.0** | **23.4** | **85** | **58** |
| 3 | Scale insect % incidence | 37th to 52nd MW | (44%) 52nd MW | **0.0** | **29.5** | **8.4** | **83** | **29** |
| 4 | Scale insect % intensity | 37th to 52nd MW | (4.96%) 37th MW | **28.5** | **31.8** | **23.6** | **86** | **59** |

**PART III**

**List of ongoing projects to be undertaken during 2017-18.**

| Project Code | Title of the Projects / Experiments |
|---|---|
| E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Initial Varietal Trial – Early |
| E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial – Early I Plant |
| E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial – Early II Plant |
| E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Initial Varietal Trial – Midlate |
| E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial – Midlate I Plant |
| E-4.1 | Evaluation of zonal varieties for their reaction against major insect pests of sugarcane in Advanced Varietal Trial – Midlate II Plant |
| E-28 | Survey and surveillance of sugarcane insect pests |
| E-30 | Monitoring of insect pests and bio-agents in sugarcane agro-ecosystem |