ENTOMOLOGY

Technical Programme – 2020-21

Project E.4.1	**:**	**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)

Locations : Kapurthala, Uchani, Karnal (SBI), Lucknow, Shahjahanpur, Pusa, Seorahi, Anakapalle, Coimbatore, Navsari, Padegaon, Pune, Kolhapur, Powarkheda, Mandya and Akola.

No. of replications : Three

Plot size : A minimum of 3, six metre, rows/variety per replication

Methodology : The experiment should be conducted separately without insecticidal application. The seed material is to be obtained from the breeders of the respective centres and evaluation of only zonal entries be done. The susceptible check variety for each major insect-pest is to be included.

Observations to be recorded: Please follow 'Research Methodology' (The soft copy has already been sent to the Entomologist of the centre).

Project E. 28	**:**	**Survey and surveillance of sugarcane insect-pests**

Objective : To identify key insect-pests of sugarcane in the area

Duration : Long term

Year of start : 2003-2004

Locations : All Centres (Where post of entomologist is given) including Coimbatore centre.

Methodology & Observations : Observations on insect pest incidence should be recorded three time preferably at an interval of three months after germination (shoot stage, cane formation stage, maturity stage) at least form command areas of 5 sugar mills.

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

Objective : To monitor the key insect pests and natural enemies in the area

Locations : Kapurthala, Uchani, Karnal (SBI), Lucknow, Shahjahanpur, Pusa, Seorahi, Anakapalle, Navsari, Padegaon, Pune, Powarkheda, Coimbatore, Kolhapur Mandya and Akola.

Year of start : 2006-2007

Duration : Long term

Methodology & Observations : Please follow 'Research Methodology' (The soft copy has already been sent to the Entomologist of the centre).

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

Objective : To develop simple and cost effective mass-multiplication techniques of promising bio-agents of the area.

Duration : Three years

Year of start : 2017-18

Location and bio-agents to be multiplied :

Sr. No.	Locations	Target bio agents
1.	Anakapalle	*Epiricanea melanoleuca*
2.	Uchani	*Epiricanea melanoleuca*
3.	Lucknow	*Eumicrosoma sp.* and *Chrysoperla carnea.*
4.	Padegaon	*Trichogramma chilonis*
5.	Coimbatore	*Beauveria brongniartii* *Metarhizium anisopliae*
6.	Pune	*Beauveria bassiana*
7.	Mandya	*Chrysoperla carnae* and *Epiricanea melanoleuca*

Methodology : Simple and cost effective host insect/media for multiplication of parasitoid/predator and insect pathogen/parasite.

Note: 1. For mass multiplication of entomopathogenic fungi, plant pathologist at the centre may be requested to jointly work.

Project E.40 : Integrated approach to manage white grubs in sugarcane

Problem of white grub is coming up as one of the serious problems in Maharashtra state. By keeping it in consideration this programme was proposed by AICRP (S) Entomology team to overcome the problem.

Treatments

T_1. Spraying of trees nearby sugarcane fields with contact insecticides (Quinolehos 25% EC. or Chlorpyriphos 20% EC. @ 0.05% solution at first shower of the season.

T_2 Installation of IISR Combo light trap on trees or stands at the distance of 500 meter.

T_3. Soil application of Lecenta @ 450gm formulation /ha. at planting

T_4. Soil application of chlorpyriphos 20% EC @2.0Kg a i /ha at planting

T_5. BVM (Consortia of Beauveria bassiana + Verticillium lecanii +Metarhizium anisopliae @ $1x10^{10}$ c.f.u./gm. dranching @ of 5 liters/ha in the months of July.

T_6. Farmers standard practice in the area

Experiment lay out

T_1 and T_2 should be taken Four traps covering 2000 meter periphery of sugarcane field (five hectare) and rest of the treatments may be taken in one hectare sugarcane field with the help of progressive farmers of the area.

Observations to be recorded

- Outbreak of the pest
- Shower time
- Observations on pests population and infestation by destructive sampling (digging of 5 clumps/sample) and number of samples as maximum as possible
- Cane damage by measuring plant height, cane girth, cane weight and leaf color and size.
- Recording and removal of trap catch on daily basis
- Cane yield at harvest

Note: Suggestion if any is welcome.

Project E.41 : Assessment of yield losses caused by borer pests of sugarcane under changing climate scenario

The quantitative damage caused by insect pests of sugarcane is a function of the pest population-its characteristics of oviposition or feeding behavior and the biological characteristics of the host plants. Loss estimation can be assessed by two methods for more precision

A. Chemical Protection of the Crop

Parameters	Treated with recommended effective chemical insecticide	Untreated open for natural normal infestation of borers
Area	0.1 ha	0.1 ha
Infestation Borer wise	All most Nil	Value recorded
Yield	t/ha	t/ha

The correlation between the crop yield and degree of infestation is to be worked out to estimate the loss in yield.

B. Comparison of Average Yield of Individual Plants Free from Pest Incidence with that of Infested Ones

- In this, individual plants form the same field is examined or the pest incidence and their yield are determined individually.
- The loss in yield is estimated by comparing the average yield of healthy plants with that of plats showing different degrees of infestation.
- The same data can also be used for working out a correlation equation between yield and infestation on the basis of individual plants. This technique may be used with some modifications in this study. Correlation between damage by borer and Yield of sugarcane in the following way:

  $Y=6.6204\ X_1—0.9257\ X_2—27.17$

  In this case, Y is the yield of sugarcane, X_2 is the percentage of stalk length infested (intensity of damage) and X_1 is the number of cane/ plot.

Observations to be recorded

- Recording of incidence and pest population of borer pests generation wise
- Intensity of insect damage by splinting the cane (counting of damage internodes)
- Weight of infested and healthy cane for comparison (sample size as per availability of infested and healthy cane).
- Analysis of cane juice quality of infested cane with different intensity separately and healthy canes

Note: Suggestion if any is welcome.

Annexure-I

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

Characters on which data to be recorded in Initial Varietal Trial (IVT) and Advance Varietal Trial (AVT)

Crop : Sugarcane (Early – Plant)

1. Germination % at 30 days for tropics and 45 days for sub-tropics
2. No. of tillers (thousand/ha) at 120 days
3. No. of shoots (thousand/ha) at 240 days
4. Cane yield (t/ha) after 10 months at harvest
5. Number of millable canes (thousand/ha) after10 months at harvest
6. Stalk length (cm) after 10 months at harvest
7. Stalk diameter (cm) after 10 months at harvest
8. Single cane weight (kg) after 10 months at harvest
9. Brix % at 8 and 10 months
10. Sucrose % in juice at 8 and 10 months
11. Purity % at 8 and 10 months
12. CCS % at 8 and 10 months
13. CCS t/ha after 10 months at harvest
14. Extraction % after 10 months at harvest
15. Fibre % after 10 months at harvest
16. Pol % cane after 10 months at harvest
17. Jaggery quality after 10 months at harvest (if facility available)
18. Jaggery yield (t/ha) after 10 months at harvest (if facility available)

Morphological characters

1. Lodging : Erect, lodging, snapping, heavy lodging
2. Leaf sheath spines : Absent (A), present (P), medium (M), heavy (H)
3. Flowering : Absent (A), present (P)
4. Canopy structure and colour : Green, light green, yellowish green, dark green
5. Bud size : Big (B), small (S), medium (M)
6. Pithiness : Absent (A), present (P), less (L), heavy (H)
7. Internode splits : Absent (A), present (P), low (L), moderate (M), heavy (H)
8. Natural incidence of diseases and pests

Annexure-II

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

Characters on which data to be recorded in ratoon crop

Crop : Sugarcane (Early – Ratoon)

Note : 1. No gap filling should be done.

2. Ratooning operation should be completed within 15 days after harvesting plant crop.

1. Number of tillers (thousand/ha) before giving full earthing up (90 days)
2. Number of cane formed tillers (thousand/ha) after 180 days
3. Number of millable canes (thousand/ha) after 270 days at harvest
4. Cane yield (t/ha) after 270 days at harvest
5. Stalk length (cm) after 270 days at harvest
6. Stalk diameter (cm) after 270 days at harvest
7. Single cane weight (kg) after 270 days at harvest
8. Brix % after 270 days at harvest
9. Sucrose % in juice after 270 days at harvest
10. Purity % after 270 days at harvest
11. CCS % after 270 days at harvest
12. CCS t/ha after 270 days at harvest
13. Extraction % after 270 days at harvest
14. Fibre % after 270 days at harvest
15. Pol % cane after 270 days at harvest
16. Jaggery quality after 270 days at harvest (if facility available)
17. Jaggery yield (t/ha) after 270 days at harvest (if facility available)

Annexure-III

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

Characters on which data to be recorded in Initial Varietal Trial (IVT) and Advance Varietal Trial (AVT)

Crop : Sugarcane (Midlate – Plant)

1. Germination % at 30 days for tropics and 45 days for sub-tropics
2. No. of tillers (thousand/ha) at 120 days
3. No. of shoots (thousand/ha) at 240 days
4. Cane yield (t/ha) after 12 months at harvest
5. Number of millable canes (thousand/ha) after 12 months at harvest
6. Stalk length (cm) after 12 months at harvest
7. Stalk diameter (cm) after 12 months at harvest
8. Single cane weight (kg) after 12 months at harvest
9. Brix % at 10 and 12 months
10. Sucrose % in juice at 10 and 12 months
11. Purity % at 10 and 12 months
12. CCS % at 10 and 12 months
13. CCS t/ha after 12 months at harvest
14. Extraction % after 12 months at harvest
15. Fibre % after 12 months at harvest
16. Pol % cane after 12 months at harvest
17. Jaggery quality after 12 months at harvest (if facility available)
18. Jaggery yield (t/ha) after 12 months at harvest (if facility available)

Morphological characters

1. Lodging : Erect, lodging, snapping, heavy lodging
2. Leaf sheath spines : Absent (A), present (P), medium (M), heavy (H)
3. Flowering : Absent (A), present (P)
4. Canopy structure and colour : Green, light green, yellowish green, dark green
5. Bud size : Big (B), small (S), medium (M)
6. Pithiness : Absent (A), present (P), less (L), heavy (H)
7. Internode splits : Absent (A), present (P), low (L), moderate (M), heavy (H)
8. Natural incidence of diseases and pests

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

Characters on which data to be recorded in ratoon crop

Crop : Sugarcane (Midlate – Ratoon)

Note : 1. No gap filling should be done.
2. Ratooning operation should be completed within 15 days after harvesting plant crop.

1. Number of tillers (thousand/ha) before giving full earthing up (90 days)
2. Number of cane formed tillers (thousand/ha) after 180 days
3. Number of millable canes (thousand/ha) after 330 days at harvest
4. Cane yield (t/ha) after 330 days at harvest
5. Stalk length (cm) after 330 days at harvest
6. Stalk diameter (cm) after 330 days at harvest
7. Single cane weight (kg) after 330 days at harvest
8. Brix % after 330 days at harvest
9. Sucrose % in juice after 330 days at harvest
10. Purity % after 330 days at harvest
11. CCS % after 330 days at harvest
12. CCS (t/ha) after 330 days at harvest
13. Extraction % after 330 days at harvest
14. Fibre % after 330 days at harvest
15. Pol % cane after 330 days at harvest
16. Jaggery quality after 330 days at harvest (if facility available)
17. Jaggery yield (t/ha) after 330 days at harvest (if facility available)

Centre-wise slot numbers allotted to sugarcane entries proposed for evaluation in AICRP(S)

S.No	Centre	Slot number	Centre Code
Peninsular Zone			
1	Coimbatore (including Karnal)	001 - 060	Co
2	Mandya	061 – 070	CoVC
3	Navsari	071 - 080	CoN
4	Padegaon	081 - 090	CoM
5	Powarkheda	091- 100	CoJN
6	Sankeshwar	101 - 110	CoSnk
7	Thiruvalla	111 - 120	CoTl
8	VSI, Pune	121 - 130	CoVSI
9	EID Parry, Pugalur	131 - 140	PI
10	Sirugamani	141 - 145	CoSi
North West Zone			
11	Faridkot	181 - 190	CoPb
12	Kota	191 - 200	CoPK
13	Lucknow	201 - 210	CoLk
14	Kapurthala	211 - 220	CoPb
15	Pantnagar	221 - 230	CoPant
16	Shahjahanpur	231 - 250	CoS
17	Sriganganagar	251 - 260	CoSg
18	Uchani	261 - 270	CoH
East Coast Zone			
19	Anakapalle	321 - 335	CoA
20	Cuddalore	336 –345	CoC
21	Nayagarh	346 - 355	CoOr
22	Vuyyuru	356 –365	CoV
23	Perumallapalle	366- 375	CoT
24	EID Parry, Nellikuppam	376 –385	PI
North Central Zone			
25	Bethuadahari	426 - 435	CoB
26	Pusa	436 - 450	CoP
27	Seorahi	451 - 465	CoSe
28	Motipur (IISR)	466 - 475	CoLk
North East Zone			
29	Buralikson	501 - 510	CoBln

Note: In each agro-climatic zone sufficient slot numbers are kept reserved for accommodating entries of centers identified in future under AICRP (S). The 3-digit slot numbers are to be prefixed by 2-digit number of the year in which entries are accepted for evaluation at AICRP (S) workshop/group meeting. Finally, a 5-digit number of a variety is to be preceded by the centre's code.