

CROP IMPROVEMENT

Technical programme for the year 2012-2013

North West Zone

Zonal Varietal Trial

Centres (11) : Faridkot, Karnal, Kota, Lucknow, Ludhiana, Modipuram, Muzaffarnagar, Pantnagar, Shahjahanpur, Sriganaganagar and Uchani

1. Initial Varietal Trial (Early)

Entries (12)	:	Co 09020, CoH 09261, CoH 09262, CoH 09263, CoLk 09201, CoLk 09202, CoLk 09203, CoPb 09181, CoPb 09211, CoPb 09212, CoPb 09213 and CoS 09246
Standard (2)	:	CoJ 64 and CoPant 84211
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 6r x 0.75m Net : 5m x 4r x 0.75m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	10 months
Data to be recorded	:	As per Annexure I

2. Advance Varietal Trial (Early) – I Plant

Entries (3)	:	CoPb 08211, CoPb 08212 and CoS 08233
Standard (2)	:	CoJ 64 and CoPant 84211
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross : 6m x 8r x 0.75m Net : 5m x 6r x 0.75m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	10 months
Data to be recorded	:	As per Annexure I

3. Advance Varietal Trial (Early) - II Plant

Entries (5)	:	Co 06032, Co 07023, Co 07025, CoH 07261 and CoLk 07201
Standard (2)	:	CoJ 64 and CoPant 84211
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.75m Net : 5m x 6r x 0.75m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	10 months
Data to be recorded	:	As per Annexure I

4. Advance Varietal Trial (Early) - Ratoon

Entries (5)	:	Co 06032, Co 07023, Co 07025, CoH 07261 and CoLk 07201
Standard (2)	:	CoJ 64 and CoPant 84211
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.75m Net : 5m x 6r x 0.75m
Date of ratooning	:	After harvest of plant crop
Crop duration	:	9 months
Data to be recorded	:	As per Annexure II

5. Initial Varietal Trial (Midlate)

Entries (8)	:	Co 09021, Co 09022, CoH 09264, CoLk 09204, CoPb 09214, CoS 09231, CoS 09232 and CoS 09240
Standard (3)	:	CoS 767, CoS 8436 and CoPant 97222
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 6r x 0.90m Net : 5m x 4r x 0.90m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

6. Advanced Varietal Trial (Midlate) – I Plant

Entries (6)	:	CoH 08262, CoH 08263 CoH 08264, CoPb 08217, CoS 08234 and CoS 08235
Standard (3)	:	CoS 767, CoS 8436 and CoPant 97222
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.90m Net : 5m x 6r x 0.90m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

7. Advance Varietal Trial (Midlate) – II Plant

Entries (9)	:	Co 07028, CoH 07263, CoH 07264, CoLk 07202, CoLk 07203, CoPb 07212, CoPb 07213, CoS 07232 and CoS 07234
Standard (3)	:	CoS 767, CoS 8436 and CoPant 97222
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.90m Net : 5m x 6r x 0.90m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

8. Advance Varietal Trial (Midlate) – Ratoon

Entries (9)	:	Co 07028, CoH 07263, CoH 07264, CoLk 07202, CoLk 07203, CoPb 07212, CoPb 07213, CoS 07232 and CoS 07234
Standard (3)	:	CoS 767, CoS 8436 and CoPant 97222
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.90m Net : 5m x 6r x 0.90m
Date of ratooning	:	After harvest of plant crop
Crop duration	:	11 months
Data to be recorded	:	As per Annexure IV

9. Seed Multiplication for ZVT

The following entries accepted during the Workshop of AICRP(S) held at NAU, Navsari in 2010 are under multiplication at SBI Regional Centre, Karnal. On prior intimation, the coordinating centres should depute their staff to SBI Regional Centre, Karnal and lift the seed material for one year multiplication at their centres :

Early (3) : Co 10035, CoH 10261 and CoS 10231.

Midlate (11) : Co 10036, Co 10037, Co 10039, CoH 10262, CoH 10263, CoPant 10221, CoPb 10181, CoPb 10182, CoPb 10183 and CoPb 10211.

Note: The entry CoS 10232, under multiplication at Karnal, was heavily infested with smut. Hence, the entry is deleted for further multiplication and ZVT.

10. New entries accepted

The following entries were accepted during Group Meeting of AICRP(S) held at OUAT, Bhubaneswar in 2011. The concerned breeders are requested to supply seed material of their entries for one year multiplication at Karnal multiplication centre.

Early (7) : CoH 11261, CoH 11262, CoLk 11201, CoLk 11202, CoLk 11203, CoPb 11211 and CoPb 11212

Midlate (13) : Co 11026, Co 11027, CoH 11263, CoH 11264, CoLk 11204, CoLk 11205, CoLk 11206, CoPb 11181, CoPb 11182, CoPb 11213, CoPb 11214, CoS 11231 and CoS 11232

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Technical programme for the year 2012-2013

North Central and North Eastern Zone

Zonal Varietal Trial

Centres (6): Bethuadahari, Buralikson, Gorakhpur, Motipur, Pusa and Seorahi

1. Initial Varietal Trial (Early)

Entries (5)	:	CoP 09436, CoSe 09451, CoSe 09452, BO 153 and UP 09453
Standard (2)	:	BO 130 and CoSe 95422
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 6r x 0.75m Net : 5m x 4r x 0.75m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	10 months
Data to be recorded	:	As per Annexure I

2. Advanced Varietal Trial (Early) – I Plant

Note : There will be no trial during 2012-13 as all the entries except CoP 08436 of IVT (2011-12) did not qualify for AVT. Hence, CoP 08436 will be multiplied at centres and included in AVT (E) – I Plant during 2013-14.

3. Initial Varietal Trial (Midlate)

Entries (3)	:	CoP 09437, CoSe 09454 and BO 154
Standard (3)	:	BO 91, CoP 9301 and CoSe 92423
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross : 6m x 6r x 0.90m Net : 5m x 4r x 0.90m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

4. Advanced Varietal Trial (Midlate) – I Plant

Entries (3)	:	CoP 08437, CoSe 08451 and CoSe 08452
Standard (3)	:	BO 91, CoP 9301 and CoSe 92423
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross : 6m x 8r x 0.90m Net : 5m x 6r x 0.90m
Seed rate	:	12 buds per meter
Date of planting	:	February- March
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

5. Seed Multiplication for ZVT:

The following entries accepted at AICRP(S) Workshop held at NAU, Navsari in 2010 are to be multiplied at coordinating centres for one year (2012-2013). On prior intimation, the centres of the zone are requested to depute their staff at S.R.I., Pusa centre and lift the material for one year multiplication at their centre as detailed below:

Early (0) : Nil

Midlate (3) : CoSe 10451, CoSe 10452 and CoSe 10453

6. New entries accepted:

The following entries were accepted during Group Meeting of AICRP(S) held at OUAT, Bhubaneswar in 2011. The concerned breeders are requested to supply seed material of their entries for one year multiplication at S.R.I., Pusa multiplication centre.

Early (5) : CoP 11436, CoP 11437, CoP 11438, CoSe 11451 and CoSe 11452

Midlate (7) : BO 155, CoP 11439, CoP 11440, CoSe 11453, CoSe 11454, CoSe 11455 and CoSe 11456

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Peninsular Zone

Zonal Varietal Trial

Centres (18) : Akola, Basmathnagar, Coimbatore, Kolhapur, Mandya, Navsari, Padegaon, Perumalapalle, Powarkheda, Pravaranagar, Pune, Pugalur, Raipur, Rudrur, Sameerwadi, Sankeshwar, Sirugamani and Thiruvalla.

1. Initial Varietal Trial - Early

Early (8) : Co 09002, Co 09003, Co 09004, Co 09005, Co 09006, Co 09007, CoN 09071 and CoN 09072

Standards (3) : Co 85004, Co 94008 and CoC 671

Design : Randomised Block Design

Replications : Three

Plot size : Gross: 6m x 6r x 0.9m
Net : 5m x 4r x 0.9m

Seed rate : 12 buds per metre

Planting date : 1st fortnight of February

Crop duration : 10 months

Data to be recorded : As per Annexure - I

2. Advanced Varietal Trial (Early) – I Plant

Early (2) : Co 08001 and VSI 08121

Standards (3) : Co 85004, Co 94008 and CoC 671

Design : Randomised Block Design

Replications : Four

Plot size : Gross: 6m x 8r x 0.9m
Net : 5m x 6r x 0.9m

Seed rate : 12 buds per metre

Planting date : 1st fortnight of February

Crop duration : 10 months

Data to be recorded : As per Annexure - I

3. Advanced Varietal Trial (Early) - II Plant

Entries (4)	:	Co 07012, Co 07015, CoN 07071 and PI 07131
Standards (3)	:	Co 85004, Co 94008 and CoC 671
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross: 6m x 8r x 0.9m Net : 5m x 6r x 0.9m
Seed rate	:	12 buds per metre
Planting date	:	1 st fortnight of February
Crop duration	:	10 months
Data to be recorded	:	As per Annexure - I

4. Advanced Varietal Trial – Early (Ratoon)

Entries (4)	:	Co 07012, Co 07015, CoN 07071 and PI 07131
Standards (3)	:	Co 85004, Co 94008 and CoC 671
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross: 6m x 8r x 0.9m Net : 5m x 6r x 0.9m
Ratooning date	:	After harvest of AVT Plant – I
Crop duration	:	9 months
Data to be recorded	:	As Annexure-II

5. Initial Varietal Trial – Midlate

Midlate (10)	:	Co 09009, Co 09010, Co 09012, Co 09013, Co 09014, Co 02040, CoN 09073, CoN 09074, CoSnk 05102 and CoVSI 09121
Standards (2)	:	Co 86032 and Co 99004
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 6r x 0.9m Net : 5m x 4r x 0.9m
Seed rate	:	12 buds per metre
Planting date	:	December to January
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

6. Advanced Varietal Trial (Midlate) – I Plant

Midlate (5)	:	Co 08008, Co 08009, Co 08016, Co 08020 and CoSnk 08101
Standards (2)	:	Co 86032 and Co 99004
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.9m Net : 5m x 6r x 0.9m
Seed rate	:	12 buds per metre
Planting date	:	December to January
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

7. Advanced Varietal Trial (Midlate) - II Plant

Entries (6)	:	Co 07006, Co 07007, Co 07008, Co 07009, Co 07010 and CoSnk 07103
Standards (2)	:	Co 86032 and Co 99004
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross : 6m x 8r x 0.9m Net : 5m x 6r x 0.9m
Seed rate	:	12 buds per metre
Planting date	:	December - January
Crop duration	:	12 months
Data to be recorded	:	As per Annexure III

8. Advanced Varietal Trial – Midlate (Ratoon)

Entries (6)	:	Co 07006, Co 07007, Co 07008, Co 07009, Co 07010 and CoSnk 07103
Standards (2)	:	Co 86032 and Co 99004
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross: 6m x 8r x 0.9m Net : 5m x 6r x 0.9m
Ratooning date	:	After harvest of AVT Plant I
Crop duration	:	11 months
Data to be recorded	:	As per Annexure IV

SEED MULTIPLICATION

The following entries accepted in the Workshop of AICRP(S) held at NAU, Navsari in 2010 are under multiplication at Sugarcane Breeding Institute, Coimbatore and Central Sugarcane Research Station, Padegaon. On prior intimation the centers should depute their staff and lift the material for one year multiplication.

S.B.I, Coimbatore (Multiplication centre):

Mandya, Perumalapalle, Powarkheda, Pugalur, Rudrur, Sameerwadi, Sirugamani and Thiruvalla.

C S R S, Padegaon (Multiplication centre):

Akola, Basmathnagar, Kolhapur, Navsari, Pravaranagar, Pune, Raipur and Sankeshwar.

Early (12) : Co 10004, Co 10005, Co 10006, Co 10024, Co 10026, Co 10027, CoM 10081, CoM 10082, CoN 10071, CoN 10072, CoT 10366 and CoT 10367

Midlate (14) : Co 10015, Co 10017, Co 10031, Co 10033, CoM 10083, CoM 10084, CoN 10073, CoT 10368, CoT 10369, CoVC 10061CoVSI 10121, CoVSI 10122, PI 10131 and PI 10132

New Entries accepted

The following entries were accepted in the Group Meeting of AICRP(S) held at the OUAT, Bhubaneswar in 2011. The concerned breeders are requested to supply two sets of seed material of the accepted entries; one set is to be sent to SBI, Coimbatore and the other set to CSRS, Padegaon for one year multiplication.

Early (13) : Co 11001, Co 11004, Co 11016, Co 11017, Co 11018, CoM 11081, CoM 11082, CoM 11083, CoM 11084, CoN 11071, CoN 11072, CoT 11366 and PI 11131

Midlate (14) : Co 11005, Co 11007, Co 11012, Co 11019, Co 11020, Co 11021, Co 11022, Co 11023, Co 11024, CoM 11085, CoM 11086, CoM 11087, CoN 11073 and CoN 11074

CROP IMPROVEMENT

Technical programme for the year 2012-2013

East Coast Zone

ZONAL VARIETAL TRIAL

Centres (5): Anakapalle, Cuddalore, Nayagarh, Nellikuppam and Vuyyuru

1. Advanced Varietal Trial (Early) - II Plant

Entries (6)	:	CoA 08323, CoA 09321, CoC 08336, CoC 09336, CoV 09356 and PI 09376
Standards (3)	:	Co 6907, CoC 01061 and CoA 92081
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6.0 m x 8r x 0.8 m Net : 5.0 m x 6r x 0.8 m
Seed rate	:	12 buds per meter
Date of planting	:	1 st fortnight of February
Crop duration	:	10 months
Data to be recorded	:	As per Annexure-I

2. Advanced Varietal Trial (Early) – Ratoon

Entries (6)	:	CoA 08323, CoA 09321, CoC 08336, CoC 09336, CoV 09356 and PI 09376
Standards (3)	:	Co 6907, CoC 01061 and CoA 92081
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6.0 m x 8r x 0.8 m Net : 5.0 m x 6r x 0.8m
Date of Ratooning	:	After harvest of AVT-I Plant
Crop duration	:	9 months
Data to be recorded	:	As per Annexure-II

3. Initial Varietal Trial - Midlate

Entries (3)	:	CoA 10321, CoC 10337 and CoOr 10346
Standards (3)	:	CoV 92102, Co 7219 and Co 86249
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross : 6.0 m x 6r x 0.8 m Net : 5.0 m x 4r x 0.8m
Seed rate	:	12 buds per meter
Date of planting	:	December 20 to January, 20
Crop duration	:	12 months
Data to be recorded	:	As per Annexure-III

4. Advanced Varietal Trial (Midlate) - II Plant

Entries (3)	:	Co 06031, CoC 08339 and CoC 09337
Standards (3)	:	CoV 92102, Co 7219 and Co 86249
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross : 6.0 m x 8r x 0.8 m Net : 5.0 m x 6r x 0.8m
Seed rate	:	12 buds per meter
Date of planting	:	December to January
Crop duration	:	12 months
Data to be recorded	:	As per Annexure-III

5. Advanced Varietal Trial – Midlate (Ratoon)

Entries (3)	:	Co 06031, CoC 08339 and CoC 09337
Standards (3)	:	CoV 92102, Co 7219 and Co 86249
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross : 6.0 m x 8r x 0.8 m Net : 5.0 m x 6r x 0.8m
Date of Ratooning	:	After harvest of AVT-I Plant
Crop duration	:	11 months
Data to be recorded	:	As per Annexure-IV

6. New entries accepted and seed multiplication :

The following entries were accepted during the Group Meeting of AICRP(S) held at the OUAT, Bhubaneswar in 2011. The concerned breeders are requested to supply seed material to all the centres of the zone for one-year multiplication. Breeders of all the centres of the zone may please ensure that seed material of new entries is received well in time for planting.

Early (5) : CoC 10336 (accepted in Workshop 2010), CoA 11321, CoA 11322, CoA 11323
and CoC 11336

Midlate (4) : CoA 11324, CoA 11325, CoA 11326 and CoOr 11346

CROP PRODUCTION

Technical Programme - 2012-2013

AS-42	:	Agronomic evaluation of promising sugarcane genotypes
Objective	:	To work out agronomy of sugarcane genotypes of advanced varietal trial (AVT)
Year of start	:	2007-2008 (with new set of genotypes of AVT)
Year of completion	:	Continuing
Locations	:	All centres
Planting season	:	Autumn or Spring (Experiment will be conducted only in one crop season either in autumn or spring followed by ratoon, i.e. 2 plant + 1 ratoon)
Treatments	:	
1. Varieties	:	Minimum of three promising genotypes (from AVT).
2. Fertilizer levels:		i) 75% of the recommended dose of N ii) 100% of the recommended dose of N iii) 125% of the recommended dose of N
Design	:	RBD
Replication	:	3-4
Plot size	:	In the first year, the plot size will depend on the availability of seed, but in the second year, it will be 6 rows of at least 6 m length
Row spacing	:	Recommended row spacing for a particular season in the concerned zone
Note: 1. Seed material of the test varieties may be obtained from concerned breeder of the center. 2. Separate trials may be laid out for early and mid-late groups.		
Observations to be recorded	:	i) Initial soil fertility status for available NPK, soil texture, physico-chemical properties of the soil. ii) Data on germination, tillers, millable canes, cane yield, juice quality, CCS%, CCS yield of plant/ratoon crop. iii) Other specific characteristics of the genotypes. iv) Planting and harvesting dates, name of variety, fertilizers applied, irrigations, plant protection measures, etc.

AS-63	: Plant geometry in relation to mechanization in sugarcane
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- Objective** : 1. To work out optimum plant geometry for use of farm machinery.
2. To study varietal response to different planting geometry.
- Year of Start** : 2011-2012
- Year of completion** : 2013-2014
- Locations** : Lucknow, Pantnagar, Pune, Navsari, Thiruvalla, Faridkot, Pusa, Padegaon, Ludhiana, Modipuram and Kolhapur
- Treatments** : **A. Plant geometry**
(i) 120 cm row distance
(ii) 150 cm row distance
(iii) 30 : 120 cm for subtropical region (Paired)
30 : 150 cm for tropical region (Paired)
- B. Genotype: Four genotypes with distinct plant morphological traits**
- Design** : Split plot
- Replications** : Four
- Plot size** : 6.0 m x 8.0 m
- Date of planting** : Subtropical : February - March
Tropical : December - January
- Observations** : 1. Germination count at 35 DAP
2. Tiller population at 90,120 and 180 DAP
3. Plant height at 120 & 180DAP.
4. Juice sucrose at one month prior to harvest and at harvest.
5. Number of millable canes, length and girth of the cane at harvest.
6. Cane and sugar yield.

AS-64	: Response of sugarcane crop to different plant nutrients in varied agro-ecological situations
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Objective : To study differential response of sugarcane crop to different nutrients.

Year of Start : 2011-2012

Year of completion : 2013-2014

Locations : All participating centres

Treatments :

1. Control (No Fertilizer)
2. N
3. NP
4. NPK
5. NPK+S
6. NPK+Zn
7. NPK+Fe
8. NPK+Mn
9. NPK+S+Zn
10. NPK+S+Zn+Fe
11. NPK+S+Zn+Fe+Mn
12. Soil test based fertilizer application
13. FYM @ 20 t/ha

Note :

S : 40/60 kg/ha-elemental sulphur (Subtropical / Tropical)

Zn : 25/50 kg ZnSO₄/ha (Subtropical / Tropical)

Fe : Foliar spray of 1% FeSO₄ thrice in weekly interval at vegetative stage

Mn : 5/10 kg MnSO₄/ha (Subtropical / Tropical)

N P K as per recommendations

Design : RBD

Replications : Three

Plot size : 6 rows ; 8 m length

Date of planting : Sub-tropical : February – March
Tropical : December - January

Observations to be recorded :

1. Germination count at 35 DAP
2. Tiller population at 90,120 and 180 DAP
3. Plant height at 120 & 180DAP.
4. Juice sucrose at one month prior to harvest and at harvest.
5. Number of millable canes, length and girth of the cane at harvest
6. Cane and sugar yield.
7. Soil analysis : Initial and final Soil O.C, Soil pH, EC, N,P,K, Fe, Mn, Zn, S
8. Analysis of FYM for chemical properties.

AS-65	: Enhancing sugarcane productivity and profitability under wheat – sugarcane cropping system
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- Objective : To enhance the productivity of sugarcane under wheat-sugarcane cropping system.
- Year of Start : 2012-2013
- Year of completion : Three crop cycles
- Locations : Subtropical centres (Faridkot, Ludhiana, Sriganaganagar, Uchani, Lucknow, Pantnagar, Modipuram, Pusa and Bethuadahari)
- Treatments :
- T₁ : Autumn planted sugarcane
 - T₂ : T₁ + Wheat (1:2)
 - T₃ : T₁ + Wheat (1:3)
 - T₄ : Wheat sown on 15th Nov. – late sugarcane
 - T₅ : Wheat sown on 15th Dec- late sugarcane
 - T₆ : FIRB sowing of wheat 15th Nov. (75 cm with 3 rows of wheat) + sugarcane in furrow in 3rd week of February.
 - T₇ : FIRB sowing of wheat 15th Nov. (75 cm with 3 rows of wheat) + sugarcane in furrow in 3rd week of March.
 - T₈ : T₆ with 15th December sowing of wheat
 - T₉ : T₇ with 15th December sowing of wheat
- Design : RBD
- Replication : Three
- Plot size : 6 rows ; 8 m length
- Date of sowing : As per treatments
- Observations to be recorded :
- Wheat :**
1. Germination count
 2. Number of tillers at 30,60 and 90 DAS
 3. Days to maturity
 4. Straw and grain yield
- Sugarcane :**
1. Germination count at 45 DAP
 2. Tiller population at 90,120 and 180 DAP
 3. Plant height at 120 & 180 DAP.
 4. Juice sucrose at harvest.
 5. Number of millable canes, length, diameter and weight of cane at harvest
 6. Cane and sugar yield.
 7. B:C ratio

AS-66	: Priming of cane node for accelerating germination
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- Objectives : (i) To find out suitable cane node priming technique.
(ii) To assess the effect of cane node on acceleration of germination.
- Year of Start : 2012-2013
- Centres : All participating centres
- Treatments : : T₁ : Un-primed cane node
T₂ : Treating cane node in hot water at 50°C for 2 hours.
T₃ : Treating cane node in hot water (50°C) urea solution (3%) for 2 hours
T₄ : Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio.
T₅ : Conventional 3-bud sett planting.
*T₆ : Primed and sprouted cane node (Incubated for four days after priming)
(*Put the single cane node in the slurry of cattle dung, cattle urine and water for 15 minutes. Take out the buds and put in decomposed FYM and cover it with sugarcane trash for 4-5 days for sprouting.)
- Design : RBD
- Replication : Four
- Observations to be recorded : 1. Germination at 10, 20, 30 and 40 DAP
2. Shoot counting at 60, 90, 120 and 150 DAP
3. Per clump shoot counting at 60, 90, 120 and 150 DAP
4. Number of millable canes, cane length, diameter and weight of cane
5. Juice quality (brix, pol % juice and purity)
6. Cane and sugar yields

Note :

1. Cane nodes having bud and root bands with 4-5 cm length and 10-15 in weight will be taken up for planting.
2. Normal package of practices will be followed.
3. After planting cane nodes in furrows, these will be covered with 2-3 cm soil layer.
4. At the time of planting, there should be 60% available moisture in the soil.
5. Depth of planting at 10 cm with soil coverage of 2.5 cm. Plant to plant spacing at 30 cm.

AS-67	: Optimization of fertigation schedule for sugarcane through micro irrigation technique under different agro-climatic conditions
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- Objective : To economize water use in cultivation and improve sugarcane productivity.
- Year of start : 2011-12
- Centres : Cuddalore, Mandya, Lucknow and Faridkot
- Treatments : **A. Irrigation water/ method applied:**
 I₁ : Sub-surface drip irrigation at 75% Pan Evaporation (PE)-irrigation once in two days.
 I₂ : Sub-surface drip irrigation at 100% PE- irrigation once in two days.
 I₃ : Sub-surface drip irrigation at 125% PE- irrigation once in two days.
 I₄ : Farmer's practice – surface irrigation
- B. Nitrogen levels :**
 N₁ : 100% recommended dose of nitrogen (RDN)
 N₂ : 75% (RDN)
 N₃ : 50% (RDN)

Details of Methodology :

Recommended variety of sugarcane will be planted in paired rows at recommended spacing for the region. Drip treatments will be placed between sugarcane rows at a depth of 20-25 cm. Entire dose of P and K fertilizers as per recommendation of the region will be applied. Entire dose of nitrogen after deducting the amount of N supplied through DAP will be applied through urea in different installments at 10-12 days interval before onset of monsoon as per the recommendation.

- Treatments : 12
- Design : Strip Plot
- Replication : 3
- Plot size : 10 rows of 10 meter length
- Observations to be recorded : **A. Soil parameters**
 1. Physical parameters (bulk density and infiltration rate)
 2. Quantity of water applied
 3. Water use efficiency
- B. Sugarcane:**
 1. Germination
 2. Periodic tiller population and millable cane count
 3. Growth parameters i.e., cane length, diameter and weight
 4. Juice quality (brix, pol and purity)
 5. Cane and sugar yields

PLANT PATHOLOGY

Technical Programme – 2012-2013

PP 14 & : Identification of pathotypes of red rot pathogen

PP 14 (a) : Maintenance of isolates of red rot pathogen

Objective : To gather information on the major pathotypes of red rot from the different areas/zones.

Year of start : 1983-84 (Continuing project)

Location :

North West Zone	:	Lucknow, Shahjahanpur, Ludhiana, Uchani and Karnal (SBI)
North Central Zone	:	Pusa and Seorahi
East Coast Zone	:	Anakapalle and Cuddalore
Peninsular Zone	:	Navsari, Coimbatore and Thiruvalla

Working isolates showing pathogenic variability from the previously reported pathotypes at different centers will be confirmed at the following centers : Lucknow and Uchani (North-West zone) and S.B.I., Coimbatore (Peninsular and East Coast zones). The participating centers will deposit such working isolates at the above mentioned centers latest by June 15 of each year. The zonal centers will also maintain the type cultures.

Sugarcane Differentials (14 Nos.) : 1. *Baragua* (*S. officinarum*); 2. *Khakai* (*S. sinense*); 3. SES 594 (*S. spontaneum*); 4. CoS 767; 5. BO 91; 6. CoC 671; 7. Co 7717; 8. Co 997; 9. CoJ 64; 10. Co 1148; 11. Co 419; 12. Co 62399; 13. Co 975; 14. CoS 8436

No. of isolates : Virulent isolates collected from red rot affected canes of commercially cultivated varieties in the zone.

Method of inoculation : Plug method of inoculation is to be used (Details vide PP.17). Inoculations with each isolate to be done on all the differentials with freshly prepared spore suspension. All inoculations to be completed in 2 days by last week of August.

Observation : One observation at 60th day of inoculation.

Evaluation : The canes are to be split open longitudinally. Inoculated canes free from borer infestation and other damages are taken for evaluation. Based on parameters viz., nodal transgression, lesion width, white spots, top yellowing/drying, rind infection and sporulation over the rind, the host reaction is categorized into three groups viz., Resistant (R), Susceptible (S) and Intermediate (X) as follows –

- R : Lesion width laterally restricted; nodal transgression up to 2 nodes; white spots, rind infection, sporulation over the rind and yellowing/drying of tops absent.
- S : Lesion width laterally spreading, nodal transgression more than 2 nodes; white spots progressive or restricted; in case of progressive white spots, rind infection, sporulation over the rind and yellowing/drying of tops absent or present.
- X : Lesion width laterally restricted or spreading; nodal transgression more than 2 nodes; white spots absent or present (restricted type), rind infection, sporulation over the rind and yellowing/drying of tops absent.

PP 17 : Evaluation of zonal varieties for resistance to red rot, smut and wilt

Objective : To gather information on the relative resistance to red rot, smut and wilt of the entries in zonal varietal trial of the respective zones.

A. RED ROT

Locations :

- North West Zone : Lucknow, Ludhiana, Uchani, Shahjahanpur, Pantnagar and Karnal (SBI)
- North Central Zone : Pusa, Motipur, Seorahi and Bethuadahari
- North East Zone : Buralikson
- East Coast Zone : Anakapalle and Cuddalore
- Peninsular Zone : Thiruvalla, Navsari and Coimbatore

Year of Start : 1986-87 (Continuing project)

Varieties : All the centres will test all the entries of early and midlate groups under IVT and AVT of the respective zones. The seed material for this programme is to be obtained from the respective breeders of the centres. One six-metre row of at least 20 clumps may be kept for inoculation with each pathotype by plug/cotton swab method. Any red rot susceptible variety of the same maturity group may be used as standard (check).

Inoculum (Pathotypes to be used) :

- North West Zone : CF 08 & CF 09 (To be inoculated separately)
- North Central Zone : CF 07 & CF 08 (To be inoculated separately)
- East Coast Zone : CF 04 & CF 06 (To be inoculated separately)
- Other zones : Two widely occurring isolates on commercial varieties in the area

(Note: If pathotypes are not available, CF 07, CF 08 and CF 09 may be obtained from IISR, Lucknow and CF 04 & CF 06 from RARS, Anakapalle.)

Freshly sporulating, 7-day-old, culture, in Petri-dishes will be taken. The spore mass will be washed with 100 ml of sterile water and collected in a flask. Conidial suspension at a spore concentration of one million spores per ml will be prepared for inoculation. Fresh inoculum should

always be used for inoculation. To maintain the virulence of pathotype, it should be inoculated in susceptible variety and re-isolated and purified.

Method of inoculation

1. Plug Method : Two canes in each of the 20 clumps to be inoculated. Inoculation is to be done in the middle of the 3rd exposed internode from bottom and two drops of the spore suspension is to be injected with a large syringe in each cane and sealed with plastic clay (plasticine) or modeling clay.

2. Cotton Swab Method : Two canes in each of 20 clumps will be inoculated by removing leaf sheath (lower most green leaf sheath) and immediately placing cotton swab (dipped in freshly prepared inoculum suspension) around the cane covering nodal region. The cotton swab should be held in place by wrapping parafilm over the swab.

Evaluation

1. Plug Method : The canes to be split open longitudinally sixty days after inoculation along the point of inoculation. Inoculated canes free from borer infestation and other damages are taken for evaluation. This is graded on the international scale of 0-9 as follows :

Variety (genotype): ----- **Method of inoculation:** -----

No. of canes evaluated	Condition of tops*	Lesion width ** (LW)	White spot < (WS)	Nodal transgression ※ (NT)	Total Score	Remarks
1.						
2. to						
15.						

* 1.Condition of top : Green (G)-0; Yellow (Y)/Dry (D)-1.

**2. Lesion width above to inoculated internode is assigned the score 1, 2 or 3

< 3. White spot is assigned score of 1 or 2 according to whether it is restricted or progressive.

※4. N.T. No. of nodes crossed above the inoculated internode and given the score as :

1- if one node crossed; 2-if two nodes crossed; 3. if three nodes are crossed (maximum)

Average Score = Total Score/No. of canes evaluated

Disease reaction : 0-9 scale

0.0 to 2 - R

2.1 to 4 – MR

4.1 to 6 – MS

6.1 to 8 – S

Above 8 – HS

Note : Average score is taken into account for assigning the disease reaction.

2. Cotton Swab Method : Remove cotton swab and scrap the node with a knife. Record presence/absence of lesions. In case lesions are progressing into stalk, the reaction is to be recorded as S (susceptible) and if no lesion development, then R (resistant).

B. SMUT

- Locations :**
- North West Zone : Lucknow, Ludhiana, Uchani, Shahjahanpur and Pantnagar
 - North Central Zone : Pusa, Motipur and Seorahi
 - East Coast Zone : Anakapalle and Cuddalore
 - Peninsular Zone : Coimbatore, Powarkheda, Thiruvalla, Padegaon, Navsari, Kolhapur, Sankeshwar and Pune
- Year of Start :** 1994-1995
- Varieties :** All the entries of early and midlate group under IVT and AVT of the respective zones. The seed material is to be obtained from the respective breeders of the centre.
- Inoculum :** *Sporisorium scitamineum* (Syn. *Ustilago scitaminea*) teliospores freshly collected from smut susceptible sugarcane varieties will serve as source of inoculum.
- Storage :** Freshly collected whips are air dried by keeping under shade and teliospores are collected in butter paper bags and are stored in desiccator under anhydrous calcium chloride. Spore viability is to be ensured before inoculation.
- Inoculation :** The method of inoculation consists of steeping of setts (three bud) for 30 minutes in a spore suspension of over 90% viability and with a spore load of one million spores per milliliter.
- Plot size & Planting :** The plot size is one, 3-metre row planted with 10, three-bud setts with a minimum of two replications.
- Standards :** Any smut susceptible and resistant variety of same maturity group may be used as standard (check).
- Observations :** Number of smut affected clumps per row are to be recorded. Smut incidence at fortnightly intervals has to be recorded up to harvest of the crop.
- Evaluation :** Evaluation is based on percentage of total clumps infected (No. of affected clumps/total clumps x100). It is required to maintain at least 15 to 20 clumps in each genotype before arriving at the percentage of infection. The following grading is to be followed for disease reaction:
- 0 % : Resistant
 - >0 to 10 % : Moderately resistant
 - >10 to 20 % : Moderately susceptible
 - >20 to 30 % : Susceptible
 - Above 30 % : Highly susceptible

C. WILT

Location : Ludhiana, Lucknow, Pusa, Navsari, Sankeshwar and Anakapalle

Year of Start : 2000-2001

Varieties : Entries of AVT of the respective zones.

Plot size & Planting : Two rows of 5 m length, planted under wilt sick soils.

Standards : Any wilt susceptible and resistant variety of the zone.

Observations :

1. Germination count at 45 days after planting
2. Appearance of wilt symptoms on the standing canes (on clumps)
3. At the end of 10 months, 10 clumps are to be uprooted with roots. All the canes from the clumps will be split open longitudinally and the wilt severity index scored on a 0-4 scale.

Evaluation : 0-4 Scale of wilt severity index

Grade Symptoms

- 0 Healthy canes and roots with no external or internal symptoms of wilt.
- 1 No wilting or drying of leaves, no stunting or shrinking of the stalk or rind, slight pith formation with yellow discolouration of the internal tissues in one or two lower internodes only. No cavity formation or fungal growth seen. Apparently normal and healthy roots.
- 2 Mild yellowing of top leaves and drying of lower leaves, mild stunting and shrinking of the stalk and rind. Yellowish discolouration of the internal tissues extending to three or four bottom internodes. Slight cavity formation of the pith, no fungal growth seen, slightly discoloured roots.
- 3 Mild yellowing of top leaves and drying of lower leaves, mild stunting and shrinking of the stalk and rind. Light brown discolouration of the internal tissues throughout the entire length of the cane except the top. Severe pith and cavity formation. Sparse fungal growth observed in the pith cavities.
- 4 Complete yellowing and death of the leaves, marked stunting, shrinking and drying of the stalk and rind, dark brown discolouration of the internal tissues extending throughout the entire length of the cane. Large pith cavities with profuse overgrowth of the associated fungi. Most of the roots necrotic with dark discolouration dislodge easily from the stalks. Roots mildly discoloured and slightly necrotic.

The mean wilt severity index is worked out based on the number of canes samples.

Mean wilt severity index :
$$\frac{\text{Sum of wilt indices of individual stalks}}{\text{Number of stalks samples}}$$

PP 22 : Survey of sugarcane diseases naturally occurring in the area on important sugarcane varieties

- Objective** : To gather information on the diseases naturally occurring in the area on varieties for compiling an all India disease status report yearly
- Locations** : Lucknow, Ludhiana, Uchani, Shahjahanpur, Pantnagar, Karnal (SBI), Modipuram, Pusa, Seorahi, Buralikson, Anakapalle, Cuddalore, Coimbatore, Mandya, Sankeshwar, Powarkheda, Thiruvalla, Padegaon, Kolhapur, Navsari and Pune.
- Year of Start** : 1989-1990
- Observations** : Periodic observations in June, September and December in all locations to gather information on the **per cent incidence of diseases** on all varieties of the area (General survey)

PP 23 : Assessment of elite and ISH genotypes for resistance to red rot

- Objective** : To gather information on *Saccharum* sp. and elite genotypes for resistance to red rot, so that the resistant genotypes could be used in breeding programme as possible donor for resistance
- Locations** : Ludhiana, Uchani, Karnal, Shahjahanpur, Lucknow, Pusa, Seorahi, Anakapalle, Cuddalore and Navsari.
- No. of genotypes** : Director, SBI, Coimbatore may be requested in advance for supply of seed material of the genotypes.
- Plot size** : One, six metre row of at least 10 clumps
- No. of isolates** : As indicated in PP 17 experiment.
- Method of inoculation** : Plug method only.
- Inoculum** : As per details given under PP 17 (Pathotypes to be inoculated individually only)
- Method of evaluation** : As per details in PP 17

PP 28 (a) : Management of rust of sugarcane
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Objective : To find out effective method of rust management through chemicals.

Locations : Pune, Padegaon, Kolhapur and Anakapalle

Year of Start : 2012-13

Treatment :

I. Variety : Rust susceptible variety of the area (Date of planting : July/August)

II. Fungicides

T.1	- Chlorothalonil	-	0.25 %
T.2	- Propineb	-	0.20 %
T.3	- Triadimefon	-	0.10 %
T.4	- Mancozeb	-	0.30 %
T.5	- Control (Untreated)	-	-

III. Time of application of fungicides : To be applied just after appearance of rust pustules followed by two sprays at 15 days interval.

Plot size : 6 x 7 sq. m

Design : RBD

Replications : Three

Observations :

1. Germination %
2. Disease severity (% leaf area covered with rust pustules based on observations of 10 leaves per clump; total no. of clumps to be observed at least 10)
3. Cane yield per plot and per hectare
4. Brix, Pol %, Purity and CCS %
5. Cost-benefit ratio

PP 30: Assessment of field resistance in sugarcane to red rot

Objective : Identification sugarcane varieties exhibiting field resistance to red rot.

Year of Start : 2010-11

Duration : 3 years

Location : North West Zone : Pantnagar
North Central Zone : Pusa
East Coast Zone : Cuddalore, Anakapalle
Peninsular Zone : Navsari and Coimbatore

Methodology :

Isolates/pathotypes: North West Zone - CF 08 & CF 09
North Central Zone - CF 07 & CF 08
East Coast Zone - CF 04 & CF 06
Peninsular Zone - prevailing isolates/pathotype

Varieties : Two known moderately resistant (by plug method) checks, two known susceptible checks of the zone and 10-15 entries in IVT/AVT which are susceptible under cotton swab method of inoculation

Inoculum preparation: One kg of sorghum grain (partially broken grains without powdering) and sand mixture (1:3 ratio) mixed with 100 ml of distilled water. The thoroughly mixed medium is to be distributed in container either in glass bottle or 500 ml conical flask and sterilized at 15 lb pressure for 2 hr. After 2 days, each container is inoculated with mycelia/spore suspension. After 15 days, the inoculum will be ready for application.

Method of application: 150 g of grain inoculum/ 20 ft row is applied at the time of planting. The inoculum is to be applied on the setts in the furrows and covered with soil before irrigation and it has to be mixed with equal quantity of sand to have uniform distribution.

Observations: Disease development is to be recorded at pre-emergence as well as post-emergence stages at monthly intervals till maturity of crop. Disease development is indicated by death of seedlings, yellowing and drying of leaves, mid rib lesions in the whorl and production of dead hearts, which can not be pulled out easily as in early shoot borer. From affected seedling/plant part, the pathogen should be re-isolated for confirming the presence of *C. falcatum*. The information generated should be presented in tabular form giving details of symptoms observed after planting date as exemplified below:

Table : Assessment of field resistance of sugarcane varieties to red rot

S.No.	Variety	Resistance Level (MR / S)	Symptoms observed followed by no. of days after planting	<i>C. falcatum</i> recovered (Yes / No)	Any other information
1.	CoJ 64 (For example)	Field S	SY (65), SM (90), CR (150), LY (160), CD (180)	Yes	In all five clumps were affected
2.					
3					
4.					
5.					
6.					

Symptom code: Yellowing of leaves in settling (SY); Drying of leaves in settling (SD); Settling mortality (SM); Rotting in intermodal tissue of cane (CR); Yellowing of spindle leaves (LY); Drying of spindle leaves (LD); Whole clump drying (CD).

PP 31: Screening, epidemiology and management of pokkah boeng in sugarcane

Objectives : To study the development of pokkah boeng disease in relation to weather parameters and its management in sugarcane crop.

Location : Uchani, Shahjahanpur, Seorahi, Kolhapur, Pune, Akola and Anakapalle

Year of start : 2011-2012

Observations to be recorded : Screening the desirable varieties for the incidence of pokkah boeng, correlation of climatic factors in relation to disease development and management of pokkah boeng under field conditions if the disease reaches acute phase.

(i) Screening:

Symptoms to be observed

Mild - Green plants with pokkah boeng (curling/ twisting of spindle leaves, tearing of leaves, whitish/chlorotic streaks on the leaves) at varying intensities.

Moderate - Yellowing of 3rd/ 4th leaf followed by complete yellowing of foliage and expression of top rot symptom

Severe - Yellowing of leaves + Discolouration (Light coloured) of stalks + Wilting symptom in opened stalks

Observe for the presence of above symptoms and grade it as given below:

Varieties*	Per cent infected plants				Disease reaction
	Mild	Moderate	Severe	Total incidence	
V1					
V2					
V3					

*: No restriction on number of varieties to be studied

Disease Reaction:

0-5% - Resistant; >5-10% - Mod. Susceptible; >10-20% - Susceptible; > 20% - Highly Susceptible

(ii) Epidemiology

Record temperature, relative humidity and rainfall from May to September and establish correlation with disease incidence

(iii) Management- (To be taken up after decision is taken in Workshop / Group Meeting of AICRP)

Varieties : Two susceptible varieties

Treatments:

T-1. Sett treatment - Overnight soaking with Carbendazim – 0.1% a.i.

T-2. Foliar spray - Carbendazim – 0.05% a.i. (3 sprays at 15 days interval from May15th)

T-3. Sett treatment (T1) + Foliar spray with carbendazim (T2)

T-4. Control

Replications: 4

Observations: Record disease incidence of pokkah boeng displaying symptoms of top rot or wilt or both and present, the data in tabular form

For North West Zone

PP 14: Pathogenic behaviour of isolates of *C. falcatum* on a set of differentials

Sl. No	Pathotype /Isolate	Source	Reaction of host differentials													
			Co 419	Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	BO 91	Bara-gua	Kakhai	SES 594
1.	CF 01	Co 1148														
2.	CF 02	Co 7717														
3.	CF 03	CoJ 64														
4.	CF 07	CoJ 64														
5.	CF 08	CoJ 64														
6.	CF 09	CoS 767														
7.	CF 11	CoJ 64														
8.	New isolate/s															

The order of the differentials to be maintained and if additional differentials are added they may be given at the end.

For North Central Zone

PP 14: Pathogenic behaviour of isolates of *C. falcatum* on a set of differentials

Sl. No	Pathotype /Isolate	Source	Reaction of host differentials													
			Co 419	Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	BO 91	Bara-gua	Kakhai	SES 594
1.	CF 07	Co J 64														
2.	CF 08	CoJ 64														
3.	New isolate/s															

The order of the differentials to be maintained and if additional differentials are added they may be given at the end.

For East Coast Zone

PP 14: Pathogenic behaviour of isolates of *C. falcatum* on a set of differentials

Sl. No	Pathotype /Isolate	Source	Reaction of host differentials													
			Co 419	Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	BO 91	Baragua	Kakhai	SES 594
1.	CF 04	Co 419														
2.	CF 05	Co 997														
3.	CF 06	CoC 671														
4.	CF 10															
5.	New isolate/s															

The order of the differentials to be maintained and if additional differentials are added they may be given at the end.

For Peninsular Zone

PP 14: Pathogenic behaviour of isolates of *C. falcatum* on a set of differentials

Sl. No	Pathotype /Isolate	Source	Reaction of host differentials													
			Co 419	Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	BO 91	Baragua	Kakhai	SES 594
1.	CF 06	CoC 671														
2.	New isolate/s															

The order of the differentials to be maintained and if additional differentials are added they may be given at the end.

PP 22: Survey of naturally occurring sugarcane diseases

Sl.No.	Disease	Name of area* surveyed	% Disease incidence (clump basis)	Varieties affected	Crop stage when observed	Any other information
1	Red rot					
2	Smut					
3	Wilt					
4	RSD					
5	YLD					
6	GSD					
7	Foliar Diseases (Specify)					
8	Other disease problems specific to the location					

* Mention name of district also; RSD= Ratoon stunting disease; YLD= Yellow leaf disease; GSD= Grassy shoot disease

ENTOMOLOGY

Technical Programme – 2012-2013

Project E.4.1	:	Evaluation of zonal varieties/genotypes for their reaction against major insect pests
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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 : Ludhiana, Uchani, Karnal (SBI), Lucknow, Shahjahanpur, Pusa, Seorahi, Bethuadahari, Buralikson, Anakapalle, Navsari, Padegaon, Pune, Powarkheda, Kolhapur, 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. The susceptible check variety for each major insect pest is to be included.

Observations to be recorded:

For shoot borer : i) Per cent incidence (based on dead-hearts)
ii) No. of bored plants/ha

Observations to be recorded in post-germination phase at 30 days interval up to 120 days

For top borer : Per cent incidence during the 3rd and 4th broods (July, August and September) in North West, North Central and North East Zones and during 5th & 7th months and at harvest in Peninsular and East Coast Zones

For stalk and internode borers : (i) At harvest both per cent incidence and per cent intensity (25 canes per replication) may be recorded. The infestation index may also be computed as follows:

$$\text{Infestation index} = \frac{\text{Per cent incidence} \times \text{per cent intensity}}{100}$$

(ii) The yield and quality parameters are also to be recorded in both healthy and bored canes and CCS/plot calculated separately.

- For pyrilla : Population of nymph, adult and egg masses be recorded from a unit of 10 canes (20 leaves) and average per leaf sheath be reported.
- For white fly : Population of nymph and puparia be recorded from a unit of 10 canes (20 leaves), from proximal, middle and distal region. Average population cm² be reported.
- For white grub : Grub as well as adult population be recorded by digging 1 square meter area at 5 sites in the field. Population per ha be calculated and reported.
- Observations also to be recorded on termites, thrips and mite infestation and broad categorisation be made as less susceptible, susceptible and highly susceptible.

Note :

1. In the first year, the entomologists will record observations in the breeder's trial (IVT) and from second year onwards they should take separate experiment with entries of AVT (plant and ratoon). A susceptible check be included in the trial.
2. A minimum of three years data are needed to grade the variety. (The maximum pest incidence should be considered instead of mean data of three years for grading the variety).
3. Grading of infestation level should be done as per following table:

Grades of insect pests infestation

Pest	LS	MS	HS
Early shoot borer (%)	Below 15.0	15.1-30.0	Above 30.0
Internode borer (%)	Below 20.0	20.1-40.0	Above 40.0
Scale insect	Below 10.0	10.1-35.0	Above 35.0
Mealy bug/spittle bug	Below 5.0	5.1-30.0	Above 30.0
Root borer	Below 15.0	15.1-30.0	Above 30.0
Top borer (%)	Below 10.0	10.1-20.0	Above 20.0
Stalk borer (infestation index)	Below 2.0	2.1-5.0	Above 5.0
Pyrilla (Nymph + Adult per leaf)	Below 5.0	5.1-20.0	Above 20.0
White fly (per square inch)	Below 2.0	2.1-5.0	Above 5.0
Woolly aphid	0 (Resistant) –Free 1 (Moderately resistant)– Less than 25% leaf area covered 2 (Moderately susceptible)– 25% leaf area covered 3 (Susceptible)– 25-50% leaf area covered 4 (Highly susceptible)– More than 50% leaf area covered		

Project E. 28	:	Survey and surveillance of sugarcane insect pests
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Objective : To identify key insect pests of sugarcane in the area
Duration : Long term
Year of start : 2003-2004
Locations : All Centres where entomologists are available

Methodology & observations to be recorded :

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

Project E. 30	:	Monitoring of insect pests and bioagents in sugarcane agro-ecosystem
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Objective : To monitor the key insect pests and natural enemies in the area
Locations : Ludhiana, Uchani, Karnal (SBI), Lucknow, Shahjahanpur, Modipuram, Pusa, Seorahi, Bethuadahari, Buralikson, Anakapalle, Navsari, Padegaon, Pune, Powarkheda, Kolhapur, Mandya and Akola.

Year of start : 2006-2007

Duration : Long term

Methodology :
1. Planting of sugarcane variety recommended for the region in 0.2 ha area.
2. All recommended practices to be followed except application of insecticide.

Observations to be recorded
1. Observations on incidence of borers be recorded by examining 100 canes at five places (four corners and in the middle), sucking pests by examining 20 canes and others as mentioned in technical programme of E 4.1.
2. Meteorological data (weekly average) to be recorded on: temperature (max & min), relative humidity, no. of rainy days and total rainfall.

Project E.33 : Bioefficacy of insecticides against mealy bugs in sugarcane

Objective : To evaluate efficacy of insecticides against mealy bugs in sugarcane.

Year of Start : 2011-12

Locations : Padegaon, Akola, Pune, Navsari, Anakapalle

Design : RBD (Randomized Block Design)

Replications : Three

No. of treatments : 9

List of treatments:

Treatment No.	Name of the treatment
1	Sett treatment of Imidacloprid 70 WG /SP 25 g a.i./ha + spraying of Imidacloprid 17.8 SL 0.005%
2	Sett treatment of Imidacloprid 70 % WG /SP 25 g a.i./ha + spraying of Thiamethoxam 25 WG 0.004%
3	Sett treatment of Imidacloprid 70 % WG /SP 25 g a.i./ha + spraying of Clothianidin 50 WSG 0.004%
4	Sett treatment of Imidacloprid 70 % WG /SP 25 g a.i./ha + spraying of Acetamaprid 20 SP 0.004%
5	Sett treatment of Thiamethoxam 70 WG /SP 10 g a.i./ha + spraying of Imidacloprid 17.8 SL 0.005%
6	Sett treatment of Thiamethoxam 70 WG /SP 10 g a.i./ha + spraying of Thiamethoxam 25 WG 0.004%
7	Sett treatment of Thiamethoxam 70 WG /SP 10 g a.i./ha + spraying of Clothianidin 50 WSG 0.004%
8	Sett treatment of Thiamethoxam 70 WG /SP 10 g a.i./ha + spraying of Acetamaprid 20 SP 0.004%
9	Untreated Control

Plot size: 6.0 m x 5.4 m

Method of application:

Dose of a.i. is based on 35000 three eye bud setts. Spraying will be done at the time of cane formation (Approximately 4 - 5 months after planting).

Method of observation:

Germination percentage at 30 and 45 DAP

Randomly select 10 canes from 3 meter row length and count number of infested internodes out of total number of internodes

1. Before spraying and 7, 15 and 30 DAS and at harvest.
2. Yield and quality parameters.

Variety: Most susceptible variety of respective centre.

Project E.34	:	Standardization of simple and cost effective techniques for mass multiplication of sugarcane bio-agents
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Objective : To develop simple and cost effective mass-multiplication techniques of promising bio-agents of the area.

Duration : Three years

Year of start : 2012-2013

Location and bio-agents to be multiplied :

Sr. No.	Locations	Target bio agents
1.	Anakapalle	<i>Beauveria bassiana</i>
2.	Uchani	<i>Encarsia</i> spp.
3.	Lucknow	<i>Metarhizium anisopliae</i> , <i>Beauveria bassiana</i> , <i>Chrysoperla carnae</i>
4.	Padegaon	<i>Chrysoperla carnae</i>

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.
 2. Uchani centre will provide *Beauveria bassiana* culture and Mandya centre may provide *Encarsia* culture.

Project E.35 : Bioefficacy of insecticides against white grub in sugarcane

Objective : To evaluate bioefficacy of different insecticides against white grub in sugarcane.

Year of Start : 2012-2013

Design : RBD (Randomized block design)

Replications : Three

No. of treatments: 10

List of treatments:

Soil application 15 days before onset of monsoon

Treatment No.	Name of the treatment
1.	Chlorpyrifos 20 EC 1 kg a.i./ha
2.	Fipronil 0.3% G 60 g a.i./ha
3.	Deltamethrin 2.8 EC 25 g a.i./ha
4.	Imidacloprid 17.8 SL 100 g a.i./ha
5.	Thiamethoxam 20% SG 50 g a.i./ha
6.	Carbofuran 3% G 1.5 kg a.i./ha
7.	Clothianidin 50% WDG 100 g a.i./ha
8.	Control

Plot size: 6 x 6 m Gross; 6 x 5 m net

Method of application:

Soil application before onset of monsoon

Method of observation:

1. Larval population count per metre row length starting from 15 days after application of insecticide and succeeding 3 observations at monthly interval and final observation at harvest (per cent incidence).
2. Yield and quality parameters.

Project E.36	:	Management of borer complex of sugarcane through lures
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- Objective** : To manage sugarcane borers (early shoot borer, top borer, internode borer and stalk borer) through pheromone traps.
- Year of Start** : 2012-2013
- Variety** : Recommended variety of the location
- Location** :
- Peninsular Zone** : Mandya, Akola, Pune, Navsari, Powarkheda and Padegaon
 - East Coast Zone** : Anakapalle
 - North West Zone** : Ludhiana, Uchani, Shahjahanpur and Lucknow
 - North Central Zone** : Seorahi and Pusa
- Treatments** : Pheromone lures of sugarcane early shoot borer, top borer and stalk borer
- Plot size** : Two blocks, each of minimum half acre. In first block, trap should be installed and the second be kept as such (control). In between both blocks, at least one acre sugarcane crop should be taken to avoid the pheromone trap effect.
- Methodology** : In Peninsular and East Coast Zone, the test insect-pests will be early shoot borer, top borer and internode borer, while in north west and north central zones, early shoot borer, top borer and stalk borer. Three pheromone traps for each pest will be installed in the second fortnight of February till harvest of crop in one acre of sugarcane crop. The pheromone lure will be changed after 2 months.
- Observations to be recorded** :
1. Observations on number of moths trapped will be recorded at weekly interval. The mean number of moth capture will be worked out. The correlation and regression of moth captures will be worked out with weekly meteorological parameters.
 2. Infestation of each borer will be recorded in both blocks.
- Source of lure** : Pest Control (India) Private Limited, Division : Bio-Control Research Laboratories, PO Box 6426, Yelahanka Post Office, Bangalore – 560 064, Karnataka.

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) after 10 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

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)

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	CoTI
8	VSI, Pune	121 - 130	CoVSI
9	EID Parry, Pugalur	131 - 140	PI
North West Zone			
10	Faridkot	181 - 190	CoPb
11	Kota	191 - 200	CoPK
12	Lucknow	201 - 210	CoLk
13	Ludhiana	211 - 220	CoPb
14	Pantnagar	221 - 230	CoPant
15	Shahjahanpur	231 - 250	CoS
16	Sriganganagar	251 - 260	CoSg
17	Uchani	261 - 270	CoH
East Coast Zone			
18	Anakapalle	321 - 335	CoA
19	Cuddalore	336 –345	CoC
20	Nayagarh	346 - 355	CoOr
21	Vuyyuru	356 –365	CoV
22	Perumallapalle	366- 375	CoT
23	Nellikuppam	376 –385	PI
North Central Zone			
24	Bethuadahari	426 - 435	CoB
25	Pusa	436 - 450	CoP
26	Seorahi	451 - 465	CoSe
North East Zone			
27	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.

List of entries for screening against major insect pests and diseases of sugarcane during 2012-2013

North West Zone

1. Initial Varietal Trial (Early)

Early (12) : Co 09020, CoH 09261, CoH 09262, CoH 09263, CoLk 09201, CoLk 09202, CoLk 09203, CoPb 09181, CoPb 09211, CoPb 09212, CoPb 09213 and CoS 09246

2. Advanced Varietal Trial (Early) - I Plant

Entries (3) : CoPb 08211, CoPb 08212 and CoS 08233

3. Advanced Varietal Trial (Early) – II Plant

Entries (5) : Co 06032, Co 07023, Co 07025, CoH 07261 and CoLk 07201

4. Initial Varietal Trial (Midlate)

Entries (8) : Co 09021, Co 09022, CoH 09264, CoLk 09204, CoPb 09214, CoS 09231, CoS 09232 and CoS 09240

5. Advanced Varietal Trial (Midlate) - I Plant

Entries (6) : CoH 08262, CoH 08263, CoH 08264, CoPb 08217, CoS 08234 and CoS 08235

6. Advanced Varietal Trial (Midlate) - II Plant

Entries (9) : Co 07028, CoH 07263, CoH 07264, CoLk 07202, CoLk 07203, CoPb 07212, CoPb 07213, CoS 07232 and CoS 07234

NORTH CENTRAL AND EASTERN ZONE

1. Initial Varietal Trial (Early)

Early (5) : CoP 09436, CoSe 09451, CoSe 09452, BO 153 and
UP 09453

2. Initial Varietal Trial (Midlate)

Entries (3) : CoP 09437, CoSe 09454 and BO 154

2. Advance Varietal Trial (Midlate) – I Plant

Entries (3) : CoP 08437, CoSe 08451 and CoSe 08452

PENINSULAR ZONE

1. Initial Varietal Trial (Early)

Early (8) : Co 09002, Co 09003, Co 09004, Co 09005, Co 09006,
Co 09007, CoN 09071 and CoN 09072

2. Advanced Varietal Trial (Early) - I Plant

Entries (2) : Co 08001 and VSI 08121

3. Advanced Varietal Trial (Early) - II Plant

Entries (4) : Co 07012, Co 07015, CoN 07071 and PI 07131

4. Initial Varietal Trial (Midlate)

Midlate (10) : Co 09009, Co 09010, Co 09012, Co 09013, Co 09014,
Co 02040, CoN 09073, CoN 09074, CoSnk 05102 and
CoVSI 09121

5. Advanced Varietal Trial (Midlate) - I Plant

Entries (5) : Co 08008, Co 08009, Co 08016, Co 08020 and
CoSnk 08101

6. Advanced Varietal Trial (Midlate) - II Plant

Entries (6) : Co 07006, Co 07007, Co 07008, Co 07009, Co 07010 and
CoSnk 07103

EAST COAST ZONE

1. Advanced Varietal Trial (Early) - II Plant

Entries (6) : CoA 08323, CoA 09321, CoC 08336, CoC 09336, CoV 09356 and
PI 09376

2. Initial Varietal Trial (Midlate)

Entries (3) : CoA 10321, CoC 10337 and CoOr 10346

3. Advanced Varietal Trial (Midlate) - II Plant

Entries (3) : Co 06031, CoC 08339 and CoC 09337