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ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

(Indian Council of Agricultural Research)

CONSOLIDATED TECHNICAL PROGRAMME

(2015 – 2016)

INDIAN INSTITUTE OF SUGARCANE RESEARCH

LUCKNOW - 226 002

CONTENTS

CROP IMPROVEMENT

Technical programme for the year 2015-2016

North West Zone

B. II - Zonal Varietal Trial

Centres (10) : Faridkot, Karnal, Kota, Lucknow, Ludhiana, Muzaffarnagar, Pantnagar, Shahjahanpur, Sriganganagar and Uchani

1. Initial Varietal Trial (Early)

Entries (10)	:	Co 12026, Co 12027, CoH 12261, CoLk 12201, CoLk 12202, CoLk 12203, CoLk 12204, CoPant 12221, CoPant 12222 and CoS 12231
Standard (2)	:	CoJ 64 and Co 0238
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

Entries (4)	:	CoH 11262, CoLk 11201, CoLk 11202 and CoLk 11203
Standard (2)	:	CoJ 64 and Co 0238
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

3. Advanced Varietal Trial (Early) – II Plant

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

4. Advanced Varietal Trial (Early) - Ratoon

Entries (3)	:	Co 10035, CoH 10261 and CoS 10231.
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
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 (15)	:	Co 12028, Co 12029, CoH 12262, CoH 12263, CoLk 12205, CoLk 12206, CoPant 12223, CoPant 12224, CoPant 12225, CoPant 12226, CoPb 12181, CoPb 12182, CoPb 12211, CoPb 12212 and CoS 12232
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)	:	Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214 and CoS 11232
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 . Advanced Varietal Trial (Midlate) – II Plant

Entries (5)	:	Co 10036, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182
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. Advanced Varietal Trial (Midlate) – Ratoon

Entries (5)	:	Co 10036, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182
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 were accepted during the Group Meeting of AICRP(S) held at the Andhra University Campus, Visakhapatnam in 2013 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 (9) : Co 13033, Co 13034, CoLk 13201, CoLk 13202, CoLk 13203, CoPant 13221, CoPant 13222, CoPb 13181 and CoS 13231.

Midlate (13) : Co 13035, Co 13036, CoH 13261, CoH 13262, CoH 13263, CoLk 13204, CoLk 13205, CoPant 13223, CoPant 13224, CoPb 13182, CoPb 13183, CoS 13232 and CoS 13233.

10. New entries accepted

The following entries were accepted during the Workshop of AICRP(S) held at the Indian Institute of Sugarcane Research, Lucknow (U.P.) in 2014. The concerned breeders are requested to supply seed material of their entries for one year multiplication at SBIRC, Karnal multiplication centre.

Early (8) : Co 14034, CoLk 14201, CoLk 14202, CoPant 14221, CoPant 14222, CoPb 14181, CoPb 14182 and CoPb 14211.

Midlate (13) : Co 14035, CoH 14261, CoH 14262, CoLk 14203, CoLk 14204, CoLk 14205, CoPb 14183, CoPb 14184, CoPb 14185, CoPb 14212, CoS 14231, CoS 14232 and CoS 14233.

B.III - Evaluation and identification of climate resilient ISH and IGH genetic stocks

(i) Evaluation for drought tolerance (I Plant Crop)

Centres (4): Padegaon, Anakapalle, **Faridkot and Karnal**

Entries (15)	:	AS 04-245, MA 5/5, MA 5/37, GU 07-3774, CYM 07-986, GU 07-3849, GU 07-2276, AS 04-635, AS 04-1687, AS 04-2097, SA 04-472, AS 04-1689, BM 1022173, SA 04-496, SA 04-409 (Note: Padegaon, Anakapalle, Faridkot and Karnal will multiply the remaining 12 entries)
Standards (2)	:	Padegaon : CoM 88121and CoM 0265 Anakapalle :CoA 06231and 83 R 23 Faridkot : CoJ 88 and Co 98014 Karnal : CoJ 88 and Co 98014
Design	:	Split plot (please refer layout plan annexed) (Main plot treatments I. Drought II. Control (Recommended practices) (Sub plot treatments – test clones)
Replications	:	Two
Plot Size	:	6m X 2r X 0.90 m
Seed rate	:	12 buds per meter
Planting date	:	Padegaon and Anakapalle : 1st fortnight of January Faridkot and Karnal : 2nd fortnight of February
Crop Duration	:	12 months
Data to be recorded	:	As detailed below:

a) Germination at 30 days for tropical region and 45 days for subtropical region.
b) Tillers count at 90 and 120 days
c) Shoot count at 150, 180, 240 and 360 days
d) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 300 days
e) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 360 days
f) Cane yield at 360 days
g) Tiller mortality
(Max number of shoots-NMC at harvest) X 100/ Max number of shoots
h) Leaf area before imposition of drought and after withdrawing the drought
i) Estimation of Relative Water Content (Three times – Before, during and after water stress)
j) Leaf water potential (If facility available)
k) Leaf rolling at sunrise during water stress

Soil analysis:

i. Field Capacity and Permanent Wilting Point of the field (before commencing the experiment)
ii. Soil moisture content by gravimetric method once in a month at 0-15 and 15-30 cm soil depths. Three samples each in control and treatment plots should be taken.

Weather data:

Rainfall**,** Maximum and minimum temperature, RH, Wind velocity and Open Pan Evaporation

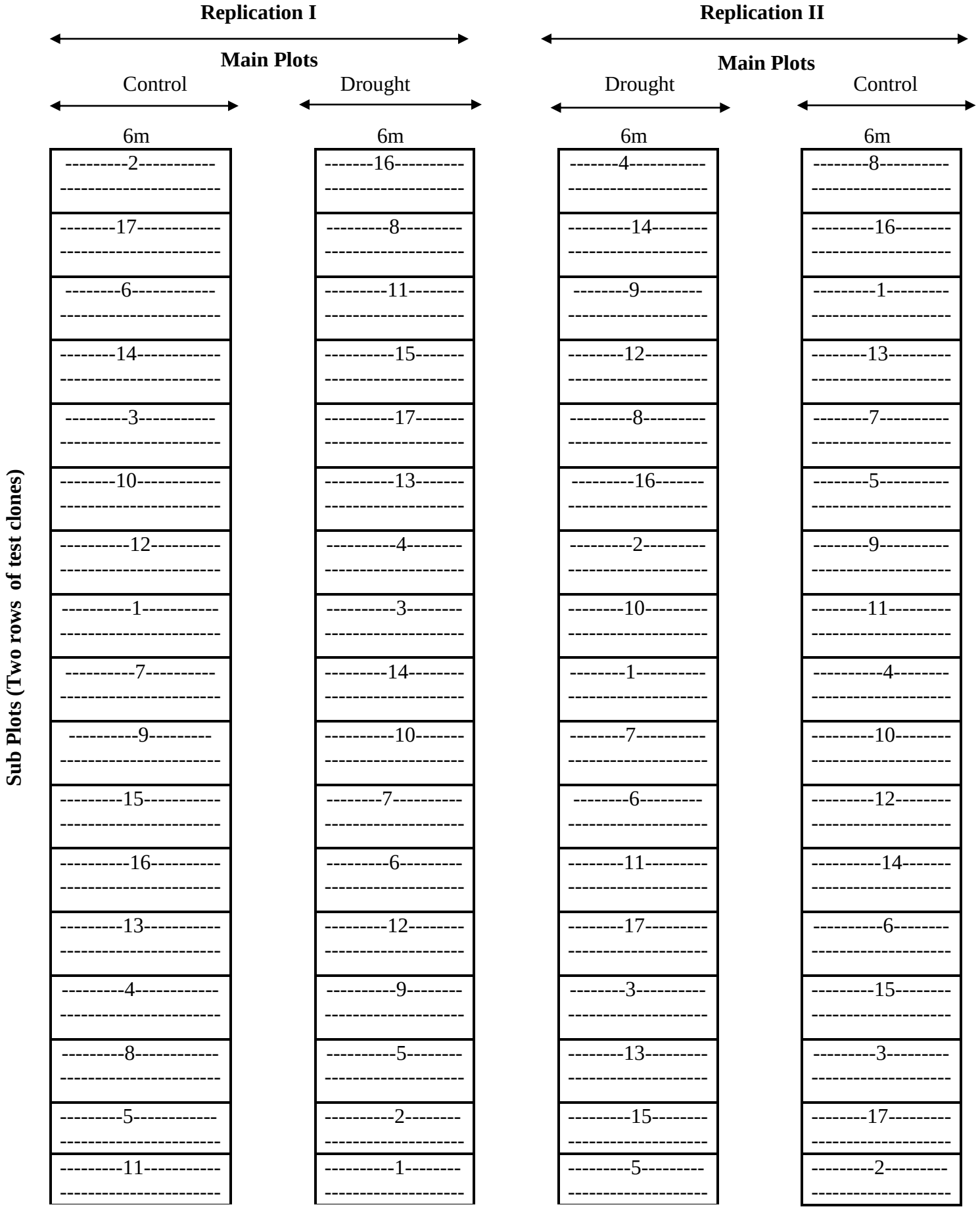
Imposition of drought:

Withdraw irrigation between 60 – 150 days after planting in **drought** treatment plot

(ii) Screening for water logging tolerance

Not applicable for North West Zone

Layout plan of Evaluation and identification of climate resilient ISH and IGH genetic stocks
Design – Split Plot Design



Number given in each plot are clone serial number in the following list.

ISH and IGH genetic stocks

1. AS 04-245
2. MA 5/5
3. MA 5/37
4. GU 07-3774
5. CYM 07-986
6. GU 07-3849
7. GU 07-2276
8. AS 04-635
9. AS 04-1687
10. AS 04-2097
11. SA 04-472
12. AS 04-1689
13. BM 1022173
14. SA 04-496
15. SA 04-409
16. Standards 1 } As per standard of the centre.
17. Standards 2 }

CROP IMPROVEMENT

Technical programme for the year 2015-2016

North Central and North Eastern Zones

B. II - Zonal Varietal Trial

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

1. Initial Varietal Trial (Early)

Entries (5)	:	CoLk 12207, CoLk 12208, CoP 12436, CoP 12437 and CoSe 12451
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

Entries (4)	:	CoP 11436, CoP 11437, CoP 11438 and CoSe 11451
Standard (2)	:	BO 130 and CoSe 95422
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

3. Initial Varietal Trial (Midlate)

Entries (6)	:	CoLk 09204, CoLk 12209, CoP 12438, CoP 12439, CoSe 12452 and CoSe 12453
Standard (3)	:	BO 91, CoP 9301 and CoSe 92423
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

4. Advanced Varietal Trial (Midlate) – I Plant

Entries (4)	:	BO 155, CoSe 11453, CoSe 11454 and CoSe 11455
Standard (3)	:	BO 91, CoP 9301 and CoSe 92423
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

5. Advanced Varietal Trial (Midlate) – II Plant

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

6. Advanced Varietal Trial (Midlate) – Ratoon

Entries (3)	:	CoSe 10451, CoSe 10452 and CoSe 10453
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
Date of ratooning	:	After harvest of plant crop
Crop duration	:	11 months
Data to be recorded	:	As per Annexure IV

7. Seed Multiplication for ZVT:

The following entries accepted during the Group Meeting of AICRP(S) held at the Andhra University Campus, Visakhapatnam in 2013 are to be multiplied at coordinating centres for one year (2015-2016). 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 (4) : CoP 13436, CoP 13437, CoSe 13451 and CoSe 13452.

Midlate (4) : CoP 13438, CoP 13439, CoSe 13453 and CoSe 13454.

8. New entries accepted:

The following entries were accepted during Workshop of AICRP(S) held at the Indian Institute of Sugarcane Research, Lucknow (U.P.) in 2014. The concerned breeders are requested to supply seed material of their entries for one-year multiplication at S.R.I., Pusa multiplication centre.

Early (8) : CoBln 14501, CoLk 14206, CoLk 14207, CoP 14436, CoP 14437, CoSe 14451, CoSe 14453 and CoSe 14454.

Midlate (9) : CoBln 14502, CoLk 14208, CoLk 14209, CoLk 14210, CoP 14438, CoP 14339, CoSe 14452, CoSe 14455 and CoSe 14456.

B.III - Evaluation and identification of climate resilient ISH and IGH genetic stocks

(i) Evaluation for drought tolerance (I Plant Crop)

Centres (4): Padegaon, Anakapalle, Faridkot and Karnal

Not applicable for North Central & North East Zones

(ii) Screening for water logging tolerance

Centres (4): Kolhapur, Vuyyuru, **Motipur and Pusa**

The four participating centres (Kolhapur, Vuyyuru, Motipur and Pusa) will multiply all the 27 clones as listed below during the year 2015-16 for conducting the evaluation trial during the year 2016-17.

Clones to be multiplied:

S. No	Clone	S.No	Clone	S. No	Clone
1	BM 1003143	10	SA 04-458	19	MA 5/51
2	BM 1005149	11	SA 04-390	20	MA 5/5
3	BM 1009163	12	SA 04-496	21	MA 5/37
4	BM 1010168	13	SA 04-409	22	MA 5/99
5	BM 1022173	14	AS 04-1689	23	MA 5/22
6	PG 9869137	15	AS 04-245	24	GU 07-3849
7	SA 98-13	16	AS 04-2097	25	GU 07-3774
8	SA 04-454	17	AS 04-635	26	GU 07-2276
9	SA 04-472	18	AS 04-1687	27	CYM 07-986

Note : Pusa centre will lift seed materials of the clones from Moitpur centre wherever sufficient seed materials are not available for conducting experiment in 2016-17.

CROP IMPROVEMENT

Technical Programme for the year 2015-2016

Peninsular Zone

B. II - Zonal Varietal Trial

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

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1. Initial Varietal Trial - Early

Entries (12)	**:**	Co 12001, Co 12003, Co 12006, Co 12007, Co 12008, CoM 12081, CoM 12082, CoM 12083, CoN 12071, CoN 12072, CoT 12366 and CoT 12367
Standards (3)	**:**	Co 85004, Co 94008 and CoC 671
Design	**:**	Randomized Block Design
Replications	**:**	Two
Plot size	**:**	Gross**:** 6m x 6r x 1.2 m Net **:** 5m x 4r x 1.2 m
Seed rate	**:**	12 buds per metre
Planting date	**:**	1st fortnight of January
Crop duration	**:**	10 months
Data to be recorded	**:**	As per Annexure - I

2. Advanced Varietal Trial (Early) – I Plant

Entries (8)	**:**	Co 10004, Co 10005, Co 10006, Co 10024, Co 10026, Co 10027, CoT 10366 and CoT 10367
Standards (3)	**:**	Co 85004, Co 94008 and CoC 671
Design	**:**	Randomized Block Design
Replications	**:**	Three
Plot size	**:**	Gross**:** 6m x 8r x 1.2 m Net **:** 5m x 6r x 1.2 m
Seed rate	**:**	12 buds per metre
Planting date	**:**	1st fortnight of January
Crop duration	**:**	10 months
Data to be recorded	**:**	As per Annexure – I

3. Advanced Varietal Trial (Early) – II Plant

Entries (3)	:	Co 09004, Co 09007 and CoN 09072
Standards (3)	:	Co 85004, Co 94008 and CoC 671
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross: 6m x 8r x 1.2 m Net : 5m x 6r x 1.2 m
Seed rate	:	12 buds per metre
Planting date	:	1st fortnight of January
Crop duration	:	10 months
Data to be recorded	:	As per Annexure – I

4. Advanced Varietal Trial (Early) – Ratoon

Entries (3)	:	Co 09004, Co 09007 and CoN 09072
Standards (3)	:	Co 85004, Co 94008 and CoC 671
Design	:	Randomized Block Design
Replications	:	Four
Plot size	:	Gross: 6m x 8r x 1.2 m Net : 5m x 6r x 1.2 m
Seed rate	:	12 buds per metre
Ratooning date	:	After harvest of AVT – I Plant
Crop duration	:	9 months
Data to be recorded	:	As per Annexure – II

5. Initial Varietal Trial – Midlate

Midlate (15)	:	Co 12009, Co 12012, Co 12014, Co 12016, Co 12017, Co 12019, Co 12021, Co 12024, CoM 12084, CoM 12085, CoM 12086, CoN 12073, CoN 12074, CoT 12368 and VSI 12121.
Standards (2)	:	Co 86032 and Co 99004
Design	:	Randomized Block Design
Replications	:	Two
Plot size	:	Gross : 6m x 6r x 1.2 m Net : 5m x 4r x 1.2 m
Seed rate	:	12 buds per metre
Planting date	:	2nd fortnight of November to end of December
Crop duration	:	12 months
Data to be recorded	:	As per Annexure- III

6. Advanced Varietal Trial (Midlate) – I Plant

Entries (11)	:	Co 09009*, Co 10015, Co 10017, Co 10031, Co 10033, CoM 10083, CoT 10368, CoT 10369, CoVC 10061, PI 10131 and PI 10132.
Standards (2)	:	Co 86032 and Co 99004
Design	:	Randomized Block Design
Replications	:	Two
Plot size	:	Gross : 6m x 8r x 1.2 m Net : 5m x 6r x 1.2 m
Seed rate	:	12 buds per metre
Planting date	:	2nd fortnight of November to end of December
Crop duration	:	12 months
Data to be recorded	:	As per Annexure- III

*Advanced from IVT (2012-13) as per decision of Breeders Meet at Navsari in 2013.

SEED MULTIPLICATION

I. Multiplication of IVT (2014-15) entries at the centres: The seed of the following entries will be multiplied at the centres during 2015-16:

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

II. Multiplication of pre-zonal entries for seed lifting.

The following entries accepted in the Group Meeting of AICRP(S) held at the Andhra University Campus, Visakhapatnam / RARS, Anakapalle (A.P.) in 2013 are under multiplication at Sugarcane Breeding Institute, Coimbatore and Central Sugarcane Research Station, Padegaon. On prior intimation, the following centers should depute their staff and lift the material for one year multiplication in 2015-16:

ICAR- 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 (8) : Co 13002, Co 13003, Co 13004, CoN 13071, CoN 13072, CoSnk 13101, CoSnk 13102 and MS 13081

Midlate (20) : Co 13005, Co 13006, Co 13008, Co 13009, Co 13011, Co 13013, Co 13014, Co 13016, Co 13018, Co 13020, CoM 13082 , CoN 13073 , CoN 13074 , CoSnk 13103, CoSnk 13104 , CoSnk 13105 , CoSnk 13106 , CoT 13366 , PI 13131 and PI 13132

III. Seed multiplication of new entries

The following entries were accepted in the Workshop of AICRP(S) held at the Indian Institute of Sugarcane Research, Lucknow in 2014. 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 in 2015-16.

Early (12) : Co 14002, Co 14003, Co 14004, Co 14006, CoN 14071, CoN 14072, CoSnk 14101, CoSnk 14102, CoT 14366, CoT 14367, MS 14081 and MS 14082

Midlate (25) : Co 13021, Co 13022, Co 14008, Co 14009, Co 14012, Co 14016, Co 14022, Co 14023, Co 14025, Co 14026, Co 14027, Co 14030, Co 14031, Co 14032, CoN 14073, CoN 14074, CoSnk 14103, CoTl 14111, CoTl 14112, CoVC 14061, CoVC 14062, PI 14131, PI 14132, VSI 14121 and VSI 14122

B.III - Evaluation and identification of climate resilient ISH and IGH genetic stocks

(iii) Evaluation for drought tolerance (I Plant Crop)

Centres (4): Padegaon, Anakapalle, Faridkot and Karnal

Entries (15)	:	AS 04-245, MA 5/5, MA 5/37, GU 07-3774, CYM 07-986, GU 07-3849, GU 07-2276, AS 04-635, AS 04-1687, AS 04-2097, SA 04-472, AS 04-1689, BM 1022173, SA 04-496, SA 04-409 (Note: Padegaon, Anakapalle, Faridkot and Karnal will multiply the remaining 12 entries)
Standards (2)	:	Padegaon : CoM 88121and CoM 0265 Anakapalle :CoA 06231and 83 R 23 Faridkot : CoJ 88 and Co 98014 Karnal : CoJ 88 and Co 98014
Design	:	Split plot (please refer layout plan annexed) (Main plot treatments I. Drought II. Control (Recommended practices) (Sub plot treatments – test clones)
Replications	:	Two
Plot Size	:	6m X 2r X 0.90 m
Seed rate	:	12 buds per meter
Planting date	:	Padegaon and Anakapalle : 1st fortnight of January Faridkot and Karnal : 2nd fortnight of February
Crop Duration	:	12 months
Data to be recorded	:	As detailed below:

a) Germination at 30 days for tropical region and 45 days for subtropical region.
b) Tillers count at 90 and 120 days
c) Shoot count at 150, 180, 240 and 360 days
d) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 300 days
e) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 360 days
f) Cane yield at 360 days
g) Tiller mortality
(Max number of shoots-NMC at harvest) X 100/ Max number of shoots
h) Leaf area before imposition of drought and after withdrawing the drought
i) Estimation of Relative Water Content (Three times – Before, during and after water stress)
j) Leaf water potential (If facility available)
k) Leaf rolling at sunrise during water stress

Soil analysis:

i. Field Capacity and Permanent Wilting Point of the field (before commencing the experiment)
ii. Soil moisture content by gravimetric method once in a month at 0-15 and 15-30 cm soil depths. Three samples each in control and treatment plots should be taken.

Weather data:

Rainfall**,** Maximum and minimum temperature, RH, Wind velocity and Open Pan Evaporation

Imposition of drought:

Withdraw irrigation between 60 – 150 days after planting in **drought** treatment plot

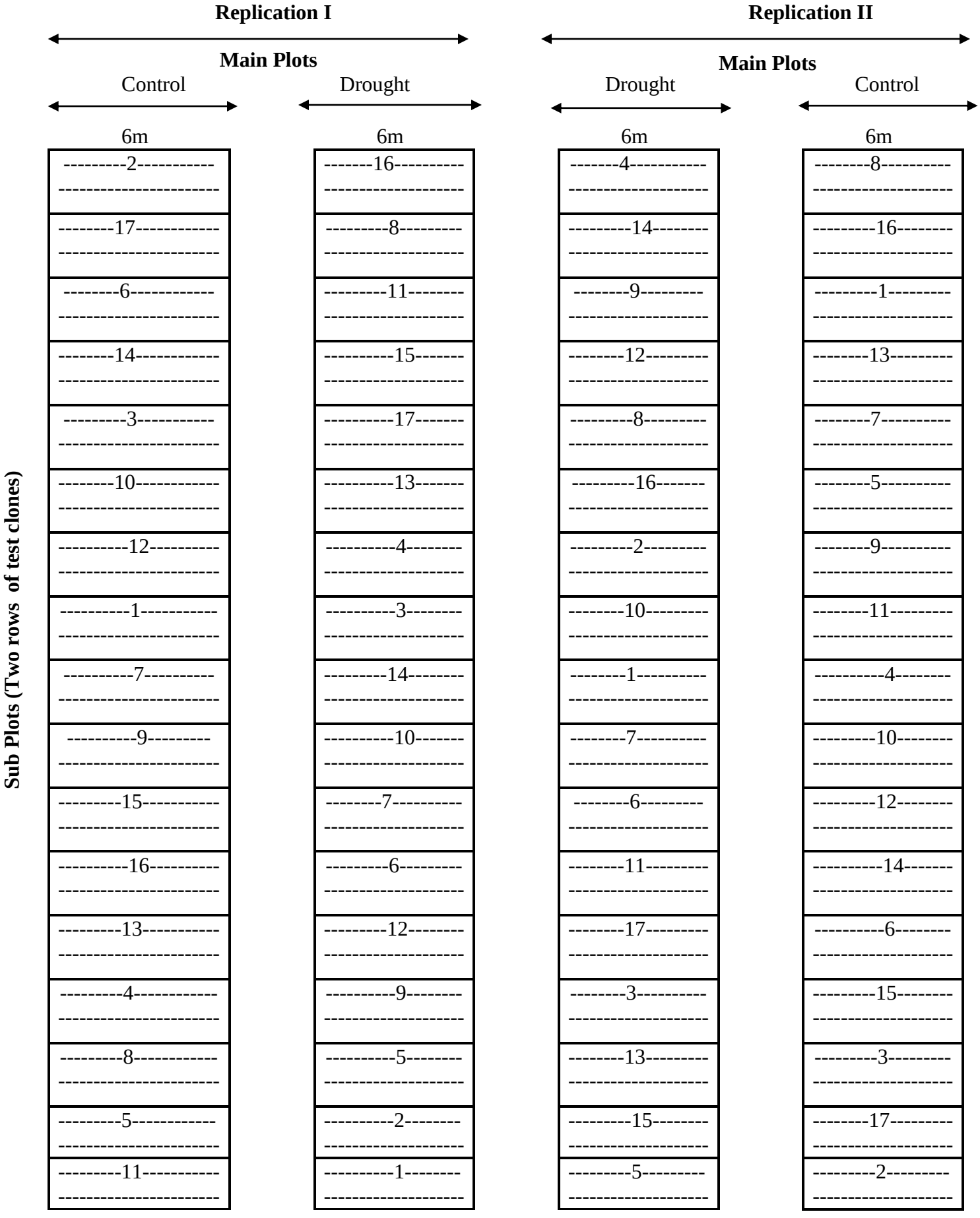
(iv) Screening for water logging tolerance

The four participating centres (Kolhapur, Vuyyuru, Motipur and Pusa) will multiply all the 27 clones as listed below during the year 2015-16 for conducting the evaluation trial during the year 2016-17.

Clones to be multiplied:

S. No	Clone	S.No	Clone	S. No	Clone
1	BM 1003143	10	SA 04-458	19	MA 5/51
2	BM 1005149	11	SA 04-390	20	MA 5/5
3	BM 1009163	12	SA 04-496	21	MA 5/37
4	BM 1010168	13	SA 04-409	22	MA 5/99
5	BM 1022173	14	AS 04-1689	23	MA 5/22
6	PG 9869137	15	AS 04-245	24	GU 07-3849
7	SA 98-13	16	AS 04-2097	25	GU 07-3774
8	SA 04-454	17	AS 04-635	26	GU 07-2276
9	SA 04-472	18	AS 04-1687	27	CYM 07-986

Layout plan of Evaluation and identification of climate resilient ISH and IGH genetic stocks
Design – Split Plot Design



Number given in each plot are clone serial number in the following list.

ISH and IGH genetic stocks

18. AS 04-245
19. MA 5/5
20. MA 5/37
21. GU 07-3774
22. CYM 07-986
23. GU 07-3849
24. GU 07-2276
25. AS 04-635
26. AS 04-1687
27. AS 04-2097
28. SA 04-472
29. AS 04-1689
30. BM 1022173
31. SA 04-496
32. SA 04-409
33. Standards 1 } As per standard of the centre.
34. Standards 2 }

CROP IMPROVEMENT

Technical Programme for the year 2015-2016

East Coast Zone

B.II - ZONAL VARIETAL TRIAL

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

1. Initial Varietal Trial - Early

Entries (8)	**:**	CoA 13321, CoA 13322, CoA 13323, CoA 13324, CoC 13336, CoC 13337, CoC 13338 and CoV 13356
Standards (3)	**:**	Co 6907, CoC 01061 and CoA 92081
Design	**:**	Randomized Block Design
Replications	**:**	Three
Plot size	**:**	Gross **:** 6.0 m x 6r x 0.90 m Net **:** 5.0 m x 4r x 0.90 m
Seed rate	**:**	12 buds per meter
Date of planting	**:**	1st fortnight of January
Crop duration	**:**	10 months
Data to be recorded	**:**	As per Annexure-I

2. Advanced Varietal Trial - Early (I Plant)

Entries (5)	**:**	CoA 12321, CoA 12322, CoA 12323, CoOr 12346 and CoV 12356
Standards (3)	**:**	Co 6907, CoC 01061 and CoA 92081
Design	**:**	Randomized Block Design
Replications	**:**	Three
Plot size	**:**	Gross **:** 6.0 m x 6r x 0.90 m Net **:** 5.0 m x 4r x 0.90 m
Seed rate	**:**	12 buds per meter
Date of planting	**:**	1st fortnight of January
Crop duration	**:**	10 months
Data to be recorded	**:**	As per Annexure-I

3. Advanced Varietal Trial - Early (II Plant)

Entries (4)	:	CoA 11321, CoA 11323, CoC 10336 and CoC 11336
Standards (3)	:	Co 6907, CoC 01061 and CoA 92081
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6.0 m x 8r x 1.2 m Net : 5.0 m x 6r x 1.2 m
Seed rate	:	12 buds per meter
Date of planting	:	1st fortnight of January
Crop duration	:	10 months
Data to be recorded	:	As per Annexure-I

4. Advanced Varietal Trial - Early (Ratoon)

Entries (4)	:	CoA 11321, CoA 11323, CoC 10336 and CoC 11336
Standards (3)	:	Co 6907, CoC 01061 and CoA 92081
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6.0 m x 8r x 1.2 m Net : 5.0 m x 6r x 1.2 m
Seed rate	:	12 buds per meter
Date of ratooning	:	After harvest of AVT – I Plant
Crop duration	:	9 months
Data to be recorded	:	As per Annexure-II

5. Initial Varietal Trial - Midlate

Entries (8)	:	CoA 12324, CoA 13325, CoA 13326, CoA 13327, CoA 13328, CoC 13339, CoOr 13346 and CoV 12357
Standards (3)	:	CoV 92102, Co 7219 and Co 86249
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross : 6.0 m x 6r x 0.90 m Net : 5.0 m x 4r x 0.90 m
Seed rate	:	12 buds per meter
Date of planting	:	2nd fortnight of November to end of December
Crop duration	:	12 months
Data to be recorded	:	As per Annexure-III

6. Advanced Varietal Trial (Midlate) - I Plant

Since IVT (Midlate) was not conducted during 2014-15, this trial (AVT-Midlate I Plant) has been deferred for 2016-17. The entry CoA 11326 will be multiplied during 2015-16 for inclusion in the trial to be conducted in 2016-17.

7. Seed multiplication of new entries

The following entries were accepted during the Workshop of AICRP(S) held at the Indian Institute of Sugarcane Research, Lucknow (U.P.) in 2014. 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 (7) : Co 07013, Co 13023, Co 13024, CoA 14321, CoA 14322, CoC 14336 and CoV 14356

Midlate (12) : Co 13025, Co 13027, Co 13028, Co 13029, Co 13030, Co 13031, Co 13032, CoA 14323 , CoA 14324, CoC 14337, PI 14376 and PI 14377

Note: Along with this set, CoA 11326 of IVT-Midlate (2012-13) will also be multiplied for inclusion in AVT (Midlate)-I Plant of 2016-17.

B.III - Evaluation and identification of climate resilient ISH and IGH genetic stocks

(v) Evaluation for drought tolerance (I Plant Crop)

Centres (4): Padegaon, Anakapalle, Faridkot and Karnal

Entries (15)	:	AS 04-245, MA 5/5, MA 5/37, GU 07-3774, CYM 07-986, GU 07-3849, GU 07-2276, AS 04-635, AS 04-1687, AS 04-2097, SA 04-472, AS 04-1689, BM 1022173, SA 04-496, SA 04-409 (Note: Padegaon, Anakapalle, Faridkot and Karnal will multiply the remaining 12 entries)
Standards (2)	:	Padegaon : CoM 88121and CoM 0265 Anakapalle :CoA 06231and 83 R 23 Faridkot : CoJ 88 and Co 98014 Karnal : CoJ 88 and Co 98014
Design	:	Split plot (please refer layout plan annexed) (Main plot treatments I. Drought II. Control (Recommended practices) (Sub plot treatments – test clones)
Replications	:	Two
Plot Size	:	6m X 2r X 0.90 m
Seed rate	:	12 buds per meter
Planting date	:	Padegaon and Anakapalle : 1st fortnight of January Faridkot and Karnal : 2nd fortnight of February
Crop Duration	:	12 months
Data to be recorded	:	As detailed below:

a) Germination at 30 days for tropical region and 45 days for subtropical region.
b) Tillers count at 90 and 120 days
c) Shoot count at 150, 180, 240 and 360 days
d) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 300 days
e) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 360 days
f) Cane yield at 360 days
g) Tiller mortality
(Max number of shoots-NMC at harvest) X 100/ Max number of shoots
h) Leaf area before imposition of drought and after withdrawing the drought
i) Estimation of Relative Water Content (Three times – Before, during and after water stress)
j) Leaf water potential (If facility available)
k) Leaf rolling at sunrise during water stress

Soil analysis:

i. Field Capacity and Permanent Wilting Point of the field (before commencing the experiment)
ii. Soil moisture content by gravimetric method once in a month at 0-15 and 15-30 cm soil depths. Three samples each in control and treatment plots should be taken.

Weather data:

Rainfall**,** Maximum and minimum temperature, RH, Wind velocity and Open Pan Evaporation

Imposition of drought:

Withdraw irrigation between 60 – 150 days after planting in **drought** treatment plot

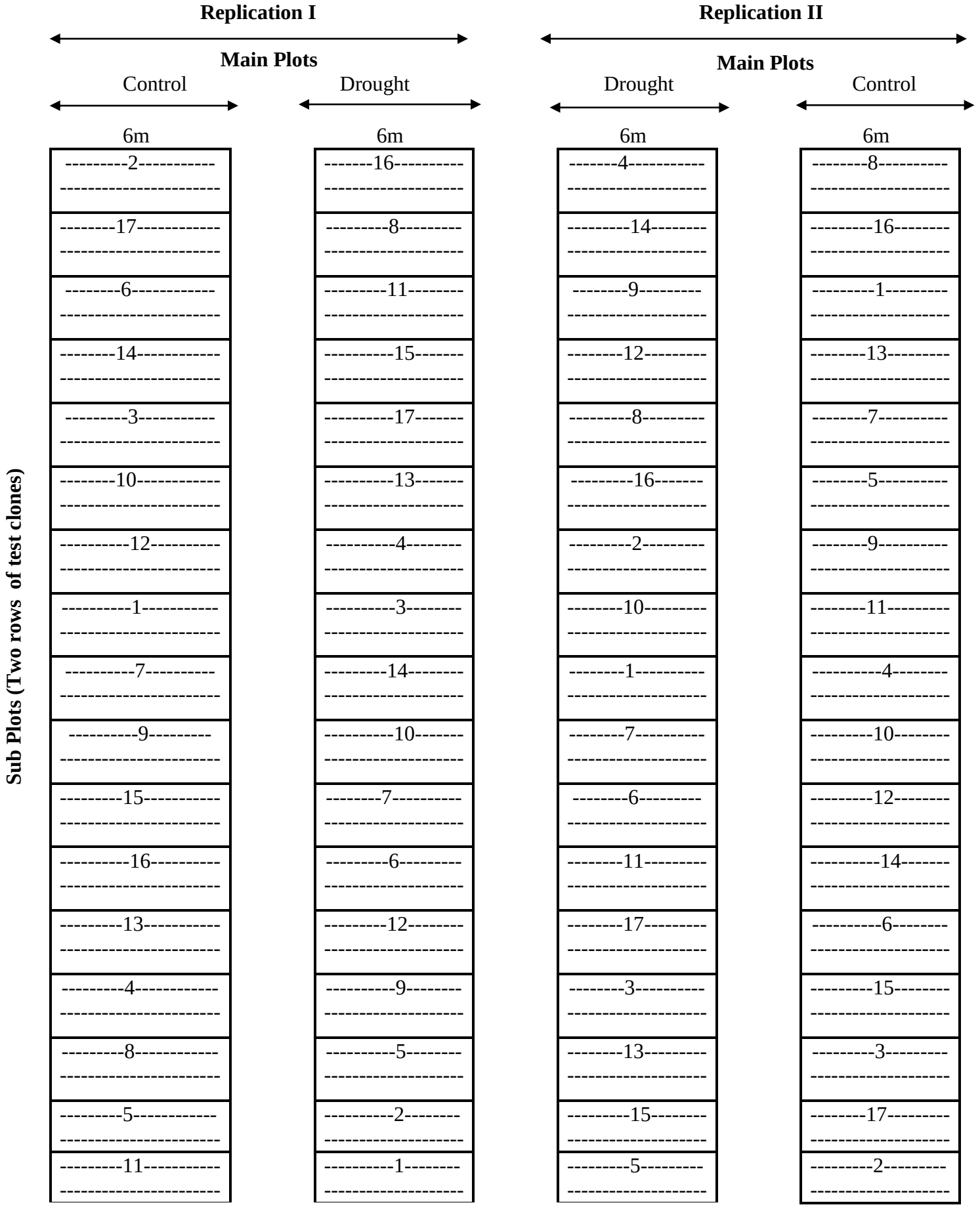
(vi) Screening for water logging tolerance

The four participating centres (Kolhapur, Vuyyuru, Motipur and Pusa) will multiply all the 27 clones as listed below during the year 2015-16 for conducting the evaluation trial during the year 2016-17.

Clones to be multiplied:

S. No	Clone	S.No	Clone	S. No	Clone
1	BM 1003143	10	SA 04-458	19	MA 5/51
2	BM 1005149	11	SA 04-390	20	MA 5/5
3	BM 1009163	12	SA 04-496	21	MA 5/37
4	BM 1010168	13	SA 04-409	22	MA 5/99
5	BM 1022173	14	AS 04-1689	23	MA 5/22
6	PG 9869137	15	AS 04-245	24	GU 07-3849
7	SA 98-13	16	AS 04-2097	25	GU 07-3774
8	SA 04-454	17	AS 04-635	26	GU 07-2276
9	SA 04-472	18	AS 04-1687	27	CYM 07-986

Layout plan of Evaluation and identification of climate resilient ISH and IGH genetic stocks
Design – Split Plot Design



Number given in each plot are clone serial number in the following list.

ISH and IGH genetic stocks

35. AS 04-245
36. MA 5/5
37. MA 5/37
38. GU 07-3774
39. CYM 07-986
40. GU 07-3849
41. GU 07-2276
42. AS 04-635
43. AS 04-1687
44. AS 04-2097
45. SA 04-472
46. AS 04-1689
47. BM 1022173
48. SA 04-496
49. SA 04-409
50. Standards 1 } As per standard of the centre.
51. Standards 2 }

CROP PRODUCTION

Technical Programme - 2015-2016

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.

Please note that the new experiment AS 70 **'Weed management in sugarcane with special reference to sedges'** proposed during AICRP Workshop-2014 has been deferred as the registration of the herbicide is pending.

AS-67	:	**Optimization of fertigation schedule for sugarcane through micro-irrigation technique under different agro-climatic conditions**

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:

I_1 : Sub-surface drip irrigation at 75% Pan Evalporation (PE)- irrigation once in two days.

I_2 : Sub-surface drip irrigation at 100% PE- irrigation once in two days.

I_3 : Sub-surface drip irrigation at 125% PE- irrigation once in two days.

I_4 : Farmer's practice – surface irrigation

B. Nitrogen levels :

N_1 : 100% recommended dose of nitrogen (RDN)

N_2 : 75% (RDN)

N_3 : 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. Root dry weight at 120 DAP and at harvest
4. Growth parameters i.e., cane length, diameter and weight
5. Juice quality (brix, pol and purity)
6. Cane and sugar yields

AS-68 : Impact of integrated application of organics and inorganics in improving soil health and sugarcane productivity

Objective : To develop nutrient management strategy for sustaining soil health and sugarcane production.
Year of start : 2014 - 2015
Locations : All the participating centres
Cropping system : Sugarcane – Ratoon-I – Ratoon-II
Treatment & Methodology:

Treatments	Sugarcane (plant crop)	Ratoon-I	Ratoon- II
T1	No organic + 50% RDF	Application of trash at 10 tonnes/ ha + 50% RDF	Application of trash at 10 tonnes/ ha + 50% RDF
T2	No organic + 100% RDF	Application of trash at 10 tonnes/ ha + 100% RDF	Application of trash at 10 tonnes/ ha + 100% RDF
T3	No organic + soil test based recommendation	Application of trash at 10 tonnes/ ha + soil test basis (NPK application)	Application of trash at 10 tonnes/ ha + soil test basis (NPK application)
T4	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)
T5	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)
T6	Application of FYM/Compost @ 20 tonnes / ha + inorganic nutrient application based on soil test (rating chart)	Application of FYM/Compost @ 20 tonnes / ha + inorganic nutrient application based on soil test (NPK application)	Application of FYM/Compost @ 20 tonnes / ha + inorganic nutrient application based on soil test (NPK application)
T7	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + 50% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + 50% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + 50% RDF
T8	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + 100% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + 100% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + 100% RDF
T9	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + soil test basis	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + soil test basis (NPK application)	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + PSB) + soil test basis (NPK application)

Note:

1. The application rate of biofertilizer (*Azotobacter/ Acetobacter* + PSB) will be 5 kg/acre (solid based fertilizer 10^{7-8}cfu).
2. $ZnSO_4$ @ 25 kg/ha will be applied at the start of the cycle.
3. Trash will be inoculated with cellulolytic organism such as *Trichoderma viride* @ 500 g/tonne.
4. The experiment will be conducted in permanent field lay out.

Design : RBD

Replications : Three

Plot size : 6 rows of 6 m length

Planting season: February – March / Main season

Observations to be recorded:

1. Germination count/ plant population at 30 and 45 DAP / DAR
2. Tiller population at 120 and 150 DAP/DAR
3. Millable canes, length, girth and cane weight at harvest
4. Cane and sugar yield
5. Juice quality parameters (Brix, pol, purity) at 10 and 12 months age
6. Soil analysis initial and after harvest of each crop (bulk density, infiltration rate, organic carbon, soil pH, EC, available N, P_2O_5, K_2O in kg/ha)
7. Economics
8. Nutrient uptake (N, P, K)) at harvest (optional)
9. Soil microbial parameters (optional)

AS-69	:	**Use of plant growth regulators (PGRs) for enhanced yield and quality of sugarcane**

Objectives

1. To accelerate rate and extent of sugarcane germination through the use of PGRs
2. To assess the effect of PGRs on sugarcane growth, yield and juice quality

Year of Start	**:**	2015-16
Year of Completion	**:**	2017-18
Participating centres	**:**	All centres
Treatments*(8)	**:**	1. Conventional planting/ Farmers' practice (3-bud setts) 2. Planting of setts after overnight soaking in water 3. Planting of setts after overnight soaking in 50 ppm ethrel solution 4. Planting of setts after overnight soaking in 100 ppm ethrel solution 5. T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP 6. T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP 7. T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP 8. T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP
Design	**:**	Randomized Block Design
Replication	**:**	3
Observations to be recorded	**:**	1. Germination count at 10 days interval starting from 10 DAP and up to 50 DAP 2. Monthly tiller/ shoot count beginning 90 DAP 3. Leaf area and biomass accumulation (above ground plant dry weight) at monthly interval starting from 90 DAP 4. Plant height at monthly interval 5. Root dry weight at 50, 120 and 180 DAP 6. Yield attributes and yield 7. Juice quality and CCS parameters

*The treatments suggested in AICRP Workshop-2014 have been modified.

Format for submission of Annual Report of Crop Production

1	Project No.	
2	Title	
3	Objectives	
4	Details of the treatment/ technical programme (in bullet form)	
5	Design	
6	Replications	
7	Plot size	
8	Climatic parameters (rainfall, Temperature-maximum & minimum, RH, etc.)	
9	Observations on soil health (initial and after harvest of crop: Bulk density, infiltration rate, organic carbon, available N, P_20_5 and K_2O in kg/ha)	
10	Summary of results in 200 words (1) Germination count/ plant population at 30 and 45 DAP / DAR 2)Tiller population at 120 and 150 DAP or DAR 3) No. of millable canes, length, girth and cane weight at harvest 4) Cane and sugar yield (t/ha) 5) Juice quality parameters (Brix, pol, purity) at 10 and 12 months age of crop 6) Soil analysis initial and after harvest of each crop (bulk density, infiltration rate, organic carbon, soil pH, EC, available NPK) 7) Nutrient composition of organic source used 8 Economics 9) Nutrient uptake (NPK) at harvest (optional) 10) Soil microbial parameters (optional)	

Note: The related analyzed data must be given in tabular form

PLANT PATHOLOGY

Technical Programme – 2015-2016

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, Kapurthala, Uchani and Karnal (SBI)
North Central Zone	**:**	Pusa and Seorahi
East Coast Zone	**:**	Anakapalle, Cuddalore and Nayagarh
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 (19 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, 15. Co 7805, 16. Co 86002, 17. Co 86032, 18. CoV 92102 and 19. CoSe 95422

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.

PP 17 A RED ROT

Locations :

North West Zone	**:**	Lucknow, Kapurthala, Uchani, Shahjahanpur, Pantnagar and Karnal (SBI)
North Central Zone	**:**	Pusa, Motipur, Seorahi and Bethuadahari
North East Zone	**:**	Buralikson
East Coast Zone	**:**	Anakapalle, Cuddalore and Nayagarh
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/nodal 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. Nodal 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. Nodal 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).

PP 17 B. SMUT

Locations :

North West Zone	**:**	Lucknow, Kapurthala, Uchani, Shahjahanpur and Pantnagar
North Central Zone	**:**	Pusa, Motipur and Seorahi
East Coast Zone	**:**	Anakapalle, Cuddalore and Nayagarh
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

PP 17 C. WILT

Location : Kapurthala, Lucknow, Pusa, Navsari, Sankeshwar, Anakapalle and Nayagarh

Year of Start : 2000-2001

Varieties : Entries of AVT of the respective zones.

Preparation of inoculum for application in soil: Mix 250 g sorghum seed (ground powder) and 750 g sand in 1:3 ratio and add 50-100 ml of distilled water (depending upon the soil moisture) in the container. Put 100 g of sorghum-sand mixture in 250 ml conical flasks and sterilize at 15 lb psi for 2 hr. After 2 days, inoculate each flask with 4-5 mycelia discs of *Fusarium sacchari* grown on oat meal agar medium in a Petri dish and incubate at 22±1^{o}C for 15 days. On 16th day, collect whole inoculum in one tray and mix thoroughly. Apply the inoculum mixture (@100 g/meter row) over the setts uniformly in the furrows at the time of planting.

Plot size & Planting : Two rows of 5 m length.

Standards (check) : 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.

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

PP 17 D : YELLOW LEAF DISEASE (YLD)

YLD symptoms of mid rib yellowing are expressed during 6-8 months crop stage. If disease severity increases, the yellowing spreads to laminar region and later there will be drying of affected mid rib and adjoining laminar tissue from leaf tip downwards along the mid rib. Another important symptom would be bunching of leaves in the crown. Highly susceptible variety will exhibit severe foliage drying during maturity stage. In place of yellow disclouration, purple or pinkish purple discolouration may also be seen on the mid rib and lamina. Canes of the affected plant do not dry.

To assess YLD severity, the following disease severity grades are to be given during maturity stages of the crop (3 observations by 8^{th}, 10^{th} and 12^{th}months). Each time, minimum of 25 canes (free from other biotic stresses) are to be scored.

YLD severity grades:

(The colour photographs of YLD symptoms displaying severity grades are available in the soft copy of the technical programme).

Disease grade	Description
0	No symptom of the disease
1	Mild yellowing of midrib in one or two leaves, no sign of typical bunching of leaves caused by YLD
2	Prominent yellowing of midrib on all the leaves in the crown. No bunching of leaves
3	Progress of midrib yellowing to laminar region in the whorl, yellowing on the upper leaf surface, and bunching of leaves
4	Drying of laminar region from leaf tip downwards along the midrib, typical bunching of leaves as a tuft
5	Stunted growth of the cane combined with drying of symptomatic leaves

Mean of the severity grades to be computed and the following YLD severity scale is to be used to assign disease reaction of the variety.

YLD severity scale :

Score	Disease reaction
0.0 - 1.0	Resistant
>1.0 – 2.0	Moderately resistant
>2.0 – 3.0	Moderately susceptible
>3.0 – 4.0	Susceptible
>4.0 – 5.0	Highly susceptible

Symptoms of Yellow Leaf Disease displaying different severity grades

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, Kapurthala, Uchani, Shahjahanpur, Pantnagar, Karnal (SBI), Pusa, Seorahi, Buralikson, Anakapalle, Cuddalore, Nayagarh, 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 : Kapurthala, 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 (b) : Methodology for screening sugarcane genotypes for resistance to brown rust (*Puccinia melanocephala*)

Objective : To standardize methodology for inoculation of urediniospores of brown rust and rating of resistance.

Year of start : 2013-14

Locations : Pune, Padegaon, Kolhapur, Sankeshwar and Anakapalle

I. Inoculation methodology :

(i) Clip inoculation in leaf whorl

As soon as brown rust appears in field, select rust affected leaves. Cut leaf bits (clips) measuring 8-10 cm. Select ten rust-free plants of the same susceptible variety in different location. In three shoots of each plant (clump), insert 2-3 clips in the leaf whorl of each shoot.

(ii) Leaf whorl inoculation

As soon as brown rust appears in field, collect rust affected leaves. Make a suspension of urediniopores in sterilized distilled water (10^4–10^5 spores/ml). Pour 1 ml freshly prepared urediniospore suspension in each leaf whorl. Inoculate in 10 clumps (three shoots per clump) of same susceptible variety.

In the aforementioned two methods, plants to be inoculated may be marked by cutting one-third of the tips of the uppermost leaves so that they can easily be identified during recording observations.

Observations : After 4 weeks, record symptoms on leaves by counting- (i) average number of rust pustules per square inch, and (ii) number of leaves bearing rust pustules.

II. Rating of resistance: To be taken up after standarization of inoculation method.

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 : Kapurthala**,** Uchani, Shahjahanpur, Seorahi, Pusa, Kolhapur, Pune, Akola, Sankeshwar, Anakapalle and Nayagarh

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

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 symptons of top rot or wilt or both and present, the data in tabular form

PP 32 : Management of brown spot disease of sugarcane

Objective : To find out effective method of brown spot management through chemicals.

Locations : Pune, Padegaon, Kolhapur and Sankeshwar

Year of Start : 2015-16

Treatment :

I. Variety : Brown spot susceptible variety CoM 0265 (or local susceptible variety)

II. Fungicides

T.1	- Propiconazole	-	0.1 %
T.2	- Hexaconazole	-	0.1 %
T.3	- Triadimefon	-	0.1 %
T.4	- Mancozeb	-	0.3 %
T.5	- Carbendazim	-	0.1 %
T.6	- Control (Untreated)	-	-

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

Plot size : 6 x 7 sq. m

Design : RBD

Replications : Three

Observations:

1. Germination %
2. Disease incidence% (No. of clumps showing disease / total no. of clumps x 100)
3. Disease severity (% leaf area covered with brown spot lesions based on observations of 10 leaves per clump; total no. of clumps to be observed at least 10)
4. Cane yield per plot and per hectare
5. Brix, Pol %, Purity and CCS %
6. Cost-benefit ratio

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 – 2015-2016

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, 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 entomologists are available

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

Project E. 30	**:**	**Monitoring of insect pests and bioagents 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, 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 **:** 2012-2013

Location and bio-agents to be multiplied :

Sr. No.	Locations	Target bio agents
1.	Anakapalle	*Beauveria bassiana*
2.	Uchani	*Encarsia* spp.
3.	Lucknow	*Metarhizium anisopliae, Beauveria bassiana, Chrysoperla carnae*
4.	Padegaon	*Chrysoperla carnae*
5.	Coimbatore	Centre will decide
6.	Pune	-do-

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

Note:

1. For mass multiplication of entomo-pathogenic 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.36 : Management of borer complex of sugarcane through lures

Objective : To manage sugarcane borers (early shoot borer, top borer, internode borer and stalk borer) through pheromone traps.

Year of Start : 2012-2013

Variety : Recommended variety of the location

Location :

Peninsular Zone	:	Mandya, Akola, Pune, Navsari, Powarkheda and Padegaon
East Coast Zone	:	Anakapalle
North West Zone	:	Kapurthala, 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 : The centre may purchase from local market or M/s Pest Control (India) Private Limited, Division : Bio-Control Research Laboratories, PO Box 6426, Yelahanka Post Office, Bangalore – 560 064, Karnataka.

Project E.37 : Bioefficacy of new insecticides for the control of sugarcane early shoot borer

Objective : To find out effective strategy for the management of sugarcane early shoot borer

Year of Start : 2013-14

Variety : Recommended variety of the location

Location : Kapurthala, Shahjahanpur, Pusa, Powarkheda, Mandya, Padegaon, VSI, Pune, Navsari and Anakapalle

Design : RBD

Number of treatments : 9 (Nine)

Number of replication : 3 (Three)

Plot size : Gross: 6 m x 5.4 m

Net: 6 m x 6.3 m

Spacing : Between two rows; 0.9 m (R-R)

Seed rate : As per the recommendation

Fertilizer application : As per the recommendation

Treatments details:

T_1 Soil application of fipronil 0.3 G @ 25 kg a.i./ha at the time of planting and 60 DAP (75 g a.i./ha)

T_2 Soil application of Chlorantraniliprole 0.4 G @ 22.5 kg /ha at the time of planting and 60 DAP (90 g a.i./ha)

T_3 Spraying of Chlorantraniliprole 18.5 SC 375 ml/ha at 30 and 60 DAP (70 g a.i./ha)

T_4 Spraying of spinosad 45 SC @ 90 ml/ha at 30 and 60 DAP (40 g a.i./ha)

T_5 Spraying of flubendiamide 39.35% SC @ 125 ml/ha at 30 and 60 DAP (50 g a.i./ha)

T_6 Soil application of phorate 10 G @ 15 kg/ha at the time of planting and 60 DAP (1500 g a.i./ha)

T_7 Soil application of carbofuran 3 G @ 33 kg/ha at the time of planting and 60 DAP (1000 g a.i./ha)

T_8 Untreated control

Observations to be recorded:

(A) <u>Early Shoot borer:</u>

- ESB infestation will be recorded by counting number of dead hearts easily pulled out and emitting offensive odour as well as the total number of shoots/plant in each net plot on 45, 60, 90 and 120 DAP.

- The per cent incidence of shoot borer will be worked out by following formula:

$$\text{Per cent incidence} = \frac{\text{Number of dead hearts}}{\text{Total number of shoots}} \times 100$$

- The cumulative per cent infestation will be worked out by taking progressive total of infested shoots in proportion to total shoot formed.

Yield, growth and quality parameters:

(a) Germination (%)
(b) Tillering per cent at 120 DAP
(c) Number of millable cane
(d) Cane yield (kg/ha)
(e) Growth parameters [total cane height (cm), millable cane height (cm), number of internodes (10 canes/treatment/replication) and girth of cane (10 canes/ treatment/replication].
(f) Quality parameters.

Note : Please give special remarks in Annual Report if any difficulty is observed during execution of treatments in Project E.37.

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

Annexure-IV

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)

Annexure –V

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	Ludhiana	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	Nellikuppam	376 –385	PI
North Central Zone			
25	Bethuadahari	426 - 435	CoB
26	Pusa	436 - 450	CoP
27	Seorahi	451 - 465	CoSe
North East Zone			
28	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 2015-2016

PENINSULAR ZONE

1. Initial Varietal Trial - Early

Entries (12) **:** Co 12001, Co 12003, Co 12006, Co 12007, Co 12008, CoM 12081, CoM 12082, CoM 12083, CoN 12071, CoN 12072, CoT 12366 and CoT 12367

2. Advanced Varietal Trial (Early) – I Plant

Entries (8) **:** Co 10004, Co 10005, Co 10006, Co 10024, Co 10026, Co 10027, CoT 10366 and CoT 10367

3. Advanced Varietal Trial (Early) – II Plant

Entries (3) **:** Co 09004, Co 09007 and CoN 09072

4. Initial Varietal Trial – Midlate

Entries (15) **:** Co 12009, Co 12012, Co 12014, Co 12016, Co 12017, Co 12019, Co 12021, Co 12024, CoM 12084, CoM 12085, CoM 12086, CoN 12073, CoN 12074, CoT 12368 and VSI 12121.

5. Advanced Varietal Trial (Midlate) – I Plant

Entries (11) **:** Co 09009, Co 10015, Co 10017, Co 10031, Co 10033, CoM 10083, CoT 10368, CoT 10369, CoVC 10061, PI 10131 and PI 10132.

EAST COAST ZONE

1. Initial Varietal Trial - Early

Entries (8) **:** CoA 13321, CoA 13322, CoA 13323, CoA 13324, CoC 13336, CoC 13337, CoC 13338 and CoV 13356

2. Advanced Varietal Trial - Early (I Plant)

Entries (5) **:** CoA 12321, CoA 12322, CoA 12323, CoOr 12346 and CoV 12356

3. Advanced Varietal Trial - Early (II Plant)

Entries (4) **:** CoA 11321, CoA 11323, CoC 10336 and CoC 11336

4. Initial Varietal Trial - Midlate

Entries (8) **:** CoA 12324, CoA 13325, CoA 13326, CoA 13327, CoA 13328, CoC 13339, CoOr 13346 and CoV 12357

NORTH WEST ZONE

1. Initial Varietal Trial - Early

Entries (10) **:** Co 12026, Co 12027, CoH 12261, CoLk 12201, CoLk 12202, CoLk 12203, CoLk 12204, CoPant 12221, CoPant 12222 and CoS 12231

2. Advanced Varietal Trial (Early) – I Plant

Entries (4) **:** CoH 11262, CoLk 11201, CoLk 11202 and CoLk 11203

3. Advanced Varietal Trial (Early) – II Plant

Entries (3) **:** Co 10035, CoH 10261 and CoS 10231

4. Initial Varietal Trial – Midlate

Entries (15) **:** Co 12028, Co 12029, CoH 12262, CoH 12263, CoLk 12205, CoLk 12206, CoPant 12223, CoPant 12224, CoPant 12225, CoPant 12226, CoPb 12181, CoPb 12182, CoPb 12211, CoPb 12212 and CoS 12232

5. Advanced Varietal Trial (Midlate) – I Plant

Entries (6) **:** Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214 and CoS 11232

6. Advanced Varietal Trial (Midlate) – II Plant

Entries (5) **:** Co 10036, CoH 10262, CoPant 10221, CoPb 10181 and CoPb 10182

NORTH CENTRAL & NORTH EAST ZONES

1. Initial Varietal Trial - Early

Entries (5) **:** CoLk 12207, CoLk 12208, CoP 12436, CoP 12437 and CoSe 12451

2. Advanced Varietal Trial (Early) – I Plant

Entries (4) **:** CoP 11436, CoP 11437, CoP 11438 and CoSe 11451

3. Initial Varietal Trial – Midlate

Entries (6) **:** CoLk 09204, CoLk 12209, CoP 12438, CoP 12439, CoSe 12452 and CoSe 12453

4. Advanced Varietal Trial (Midlate) – I Plant

Entries (4) **:** BO 155, CoSe 11453, CoSe 11454 and CoSe 11455

5. Advanced Varietal Trial (Midlate) – II Plant

Entries (3) **:** CoSe 10451, CoSe 10452 and CoSe 10453