

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON SUGARCANE CROP IMPROVEMENT

Technical Programme for the year 2021-22 North West Zone

B. II - Zonal Varietal Trial

Centres (10) : Faridkot, Karnal, Kota, Lucknow, Kapurthala, Muzaffarnagar, Pantnagar, Shahjahanpur, Sriganagar and Uchani

1. Initial Varietal Trial (Early)

Entries (7) : CoS17232,CoPb18181,CoPb18182,CoLk18201,
CoLk18202,CoPb18211,CoPb18212,CoPant18221

Standard (3) : CoJ64,Co0238andCo05009

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

Time of Harvest : 2nd fortnight of January

Data to be recorded : As per Annexure I

2. Advanced Varietal Trial (Early) – II Plant

Entries(6) : CoLk14201,Co15025,Co16029,CoLk16201,CoLk16202,CoPb16181

Standard(3) : CoJ64,Co0238,Co05009

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

Time of Harvest : 2nd fortnight of January

Data to be recorded : As per Annexure I

3. Advanced Varietal Trial (Early) - Ratoon

Entries(6) : CoLk14201,Co15025,Co16029,CoLk16201,CoLk16202,CoPb16181
Standard(3) : CoJ64,Co0238andCo05009
Design : Randomized Block Design
Replications : Three
Plot size : Gross : 6m x 8r x 0.90m
Net : 5m x 6r x 0.90m
Date of : After harvest of plant crop
ratooning
Time of Harvest : 2nd fortnight of December
Data to be : As per Annexure II
recorded

4. Initial Varietal Trial (Midlate)

Entries(11) : Co18021,Co18022,CoLk18203,CoLk18204,CoPb18213,CoPb18214,CoPant18221,CoS18231,
CoS18233,CoS18234
Standard(3) : CoS767,CoPant97222,Co05011
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 : February- March
planting
Time of : 2nd fortnight of March
Harvest
Data to be : As per Annexure III
recorded

5. Advanced Varietal Trial (Midlate) – I Plant

Entries(9)	:	Co17018,CoLk17204,CoPb17215,CoPant17233, CoS17234,CoS17235,CoS17236,CoH17261,CoH17262
Standard(3)	:	CoS767,CoPant97222,Co05011
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
Time of Harvest	:	2 nd fortnight of March
Data to be recorded	:	As per Annexure III

6. Advanced Varietal Trial (Midlate) – II Plant

Entries(5)	:	Co16030,CoLk16203,CoLk16204,CoS16232,CoS16233
Standard(3)	:	CoS767,CoPant97222,Co05011
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
Time of Harvest	:	2 nd fortnight of March
Data to be recorded	:	As per Annexure III

7. Advanced Varietal Trial (Midlate) – Ratoon

Entries(5)	:	Co16030,CoLk16203,CoLk16204,CoS16232,CoS16233
Standard(3)	:	CoS767,CoPant97222,Co05011
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
Time of Harvest	:	2 nd fortnight of February
Data to be recorded	:	As per Annexure IV

9. SEED MULTIPLICATION

(i) Multiplication of zonal entries accepted during 2018 for seed lifting

The following entries accepted during the group meeting of AICRP(S) held at UAS, Dharwad during 2019 are under multiplication at UPCSR, Shahjahanpur. On prior intimation, the participating centres should depute their staff to the Shahjahanpur centre and lift the seed material for one year multiplication at their centres.

Early (10) : CoS 17231*, Co 19016, CoPb 19181, CoLk 19201, CoLk 19202, CoLk 19203, CoPb 19211, CoPb 19212, CoPant 19221, CoS 19231, CoH 19261

*CoS 17231 will be multiplied for inclusion in AVT I Pant (Early) during the year 2022-23

Midlate (12) : Co 19017, Co 19018, CoPb 19182, CoLk 19204, CoPb 19213, CoPb 19214, CoPant 19222, CoS 19232, CoS 19233, CoS 19234, CoS 19235, CoH 19262

(ii). Seed multiplication of new entries

The following entries were accepted during the biennial workshop of AICRP(S) held at ICAR-IISR, Lucknow during 2020. The concerned breeders are requested to supply seed material of their entries for one year multiplication at UPCSR, Shahjahanpur seed multiplication centre.

Early (6) : Co 20016, CoLk 20201, CoLk 20202, CoLk 20203, CoPb 20211, CoH 20261

Midlate (9) : Co 20017, Co 20018, CoPb 20181, CoLk 20204, CoLk 20205, CoPb 20212, CoSe 20231, CoSe 20232, CoSe 20234

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

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

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

Centres (4): Sankeshwar, Pune, Lucknow and Karnal

Entries(18) : ISH501,ISH502,ISH512,ISH519,ISH524,ISH534,ISH536,ISH548,ISH567,ISH584,ISH585,
ISH587,ISH590,ISH594,IGH823,IGH829,IGH833,IGH834

Standards : Sankeshwar:: CoM 88121, CoM 0265 and one more local check.

(3) Pune : CoM 88121, CoM 0265 and one more local check.

Lucknow : CoJ 88, Co 98014 and one more local check.

Karnal : CoJ 88, Co 98014 and one more local check.

Design : Alpha design (please refer layout plan annexed)

Replications : Two

Plot Size : 6m X 2r X 1.2 m

Seed rate : 12 buds per meter

Planting : Sankeshwar, Pune : 2nd fortnight of Dec to 1st fortnight of Jan
date Lucknow and Karnal : 2nd fortnight of February

Crop : 12 months

Duration

Data to be recorded

- i) Germination at 30 days for tropical region and 45 days for subtropical region.
- ii) Tillers count at 90 and 120 days
- iii) Shoot count at 150, 180, 240 and 360 days
- iv) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 300 days
- v) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 360 days
- vi) Cane yield at 360 days
- vii) Tiller mortality (Max number of shoots-NMC at harvest) X 100/ Max number of shoots
- viii) Leaf area before imposition of drought and after withdrawing the drought
- ix) Estimation of Relative Water Content (Three times – Before, during and after water stress)
- x) Leaf water potential (If facility available)
- xi) 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 plots

Randomized Layout plan for Evaluation and identification of climate resilient ISH and IGH genetic stocks for drought tolerance

Normal condition:

	Replication 1						
Block 1	11	9	17	6	1	20	15
Block 2	3	5	8	16	10	14	19
Block 3	18	7	13	12	4	2	21

	Replication 2						
Block 1	20	11	14	8	17	2	5
Block 2	21	12	18	3	15	6	9
Block 3	1	10	13	4	7	19	16

Drought condition:

	Replication 1						
Block 1	13	7	10	1	4	16	19
Block 2	8	17	2	20	14	5	11
Block 3	18	15	12	21	3	9	6

	Replication 2						
Block 1	12	2	7	21	13	4	18

Block 2	5	8	19	3	10	16	14
Block 3	11	20	9	17	6	1	15

Name of the clones and serial numbers:

S. No	Clone	S. No	Clone	S. No	Clone
1	ISH 501	8	ISH 548	15	IGH 823
2	ISH 502	9	ISH 567	16	IGH 829
3	ISH 512	10	ISH 584	17	IGH 833
4	ISH 519	11	ISH 585	18	IGH 834
5	ISH 524	12	ISH 587	19	Check 1
6	ISH 534	13	ISH 590	20	Check 2
7	ISH 536	14	ISH 594	21	Check 3

Note: In case one or two entries are missing due to unavailability of seed material, additional checks (other than Check 1, 2, 3) may be taken.

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

ii) Evaluation for waterlogging tolerance (I Plant Crop)

Centres (3): Pantnagar, Motipur and Pusa

Entries(18) : ISH501,ISH502,ISH512,ISH519,ISH524,ISH534,ISH536,ISH548,ISH567,ISH584,ISH585,IS

Standards : Three standards (At least one sensitive and one tolerant checks) may be decided by the centres.
(3)

Design : Alpha design (please refer layout plan annexed)

Replications : Two

Plot Size : 6m X 2r X 0.90 m

Seed rate : 12 buds per meter

Planting : Kolhapur and Vuyyuru : 1st fortnight of February

date : Motipur and Pusa : 2nd fortnight of February

Crop : 12 months

Duration

Data to be recorded : As detailed below:

- i) Germination at 30 days for tropical region and 45 days for sub-tropical region and tillering at 90 days.

- ii) Shoot count, Single cane weight, Cane length, Cane diameter, Internode length (average of three middle internodes), number of fully emerged leaves and leaf area/plant just before of water logging, 30 and 60 days after water logging
- iii) Juice Brix %, Juice sucrose %, Juice purity %, Extraction %, Cane fibre %, NMC, cane diameter, cane length, single cane weight at 300 and 360 days
- iv) Cane and CCS yields at 360 days
- v) Aerial rooting: Number of nodes with aerial roots and intensity of aerial roots (Rated as absent, low, medium and high)
- vi) Foliage colour (green, light green, pale yellow) at 30 and 60 days after water logging

Weather data:

Rainfall (weekly rainfall), Maximum and Minimum temperature, RH

Imposition of water logging treatment:

1. In case natural water logging fails due to insufficient rains, water stagnation may be ensured (minimum 15 cm) during the grand growth phase (150 – 210 days after planting) / monsoon season.
2. Control plots must be well drained to avoid stagnation of water though out the cropping period.
3. Water level (in cm) above ground level in water logged blocks at 15 days interval after initiation of monsoon.
4. Duration of water logging.

Randomized Layout plan for Evaluation and identification of climate resilient ISH and IGH genetic stocks for drought tolerance

Normal condition:

	Replication 1						
Block 1	11	9	17	6	1	20	15
Block 2	3	5	8	16	10	14	19
Block 3	18	7	13	12	4	2	21

	Replication 2						
Block 1	20	11	14	8	17	2	5
Block 2	21	12	18	3	15	6	9
Block 3	1	10	13	4	7	19	16

Drought condition:

	Replication 1						
Block 1	13	7	10	1	4	16	19
Block 2	8	17	2	20	14	5	11
Block 3	18	15	12	21	3	9	6

	Replication 2						
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Block 1	12	2	7	21	13	4	18
Block 2	5	8	19	3	10	16	14
Block 3	11	20	9	17	6	1	15

Name of the clones and serial numbers:

S. No	Clone	S. No	Clone	S. No	Clone
1	ISH 501	8	ISH 548	15	IGH 823
2	ISH 502	9	ISH 567	16	IGH 829
3	ISH 512	10	ISH 584	17	IGH 833
4	ISH 519	11	ISH 585	18	IGH 834
5	ISH 524	12	ISH 587	19	Check 1
6	ISH 534	13	ISH 590	20	Check 2
7	ISH 536	14	ISH 594	21	Check 3

Note: In case one or two entries are missing due to unavailability of seed material, additional checks (other than Check 1, 2, 3) may be taken.

Seed Multiplication: The following ISH/IGH clones should be multiplied in the participating centres during 2021-22 for conducting trial in the year 2022-23.

Drought : Sankeshwar, Pune, Lucknow, Karnal,

Water logging: Motipur, Pantnagar and Pusa

Entries (12): ISH 513, ISH 516, ISH 526, ISH 528, ISH 535, ISH 542, ISH 545, ISH 554, ISH 558, ISH 564, IGH 806, IGH 816

B.III (b) Evaluation and identification of climate resilient near commercial clones
i) Evaluation for drought tolerance (I Plant Crop)

Centres (3): Sankeshwar, Anakapalle, Lucknow

Entries(13)	: Co09022,Co12029,Co13034,Co14034,Co15023, Co15024,Co15026,Co15027,CoLk14203,CoLk15204,CoLk15206,CoLk15207,CoS08279
Standards (3)	: Sankeshwar :CoM 88121, CoM 0265 and one more local check. Anakapalle :CoA 06231, 83 R 23 and one more local check. Lucknow :CoJ 88, Co 98014 and one more local check.
Design	: Alpha design (please refer layout plan annexed)
Replications	: Two
Plot Size	: 6m X 2r X 1.2 m
Seed rate	: 12 buds per meter
Planting date	: Sankeshwar, Anakapalle : 2 nd fortnight of Dec to 1 st fortnight of Jan Lucknow : 2 nd fortnight of February
Crop Duration	: 12 months

Data to be recorded

- i. Germination at 30 days for tropical region and 45 days for subtropical region.
- ii. Tillers count at 90 and 120 days
- iii. Shoot count at 150, 180, 240 and 360 days
- iv. Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 300 days
- v. Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 360 days
- vi. Cane yield at 360 days
- vii. Tiller mortality (Max number of shoots-NMC at harvest) X 100/ Max number of shoots
- viii. Leaf area before imposition of drought and after withdrawing the drought
- ix. Estimation of Relative Water Content (Three times – Before, during and after water stress)
- x. Leaf water potential (If facility available)
- xi. 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

Layout plan for Evaluation and identification of climate resilient commercial clones for drought tolerance

Randomized Layout

Normal condition:

	Replication 1							
Block 1	3	7	15	11	13	5	9	1
Block 2	6	14	4	2	12	16	10	8

	Replication 2							
Block 1	9	5	2	12	8	13	3	16
Block 2	11	1	10	6	4	7	15	14

Drought condition:

	Replication 1							
Block 1	10	6	15	4	14	1	11	7
Block 2	5	8	12	2	3	13	9	16

	Replication 2							
Block 1	15	9	13	1	7	11	3	5
Block 2	8	14	4	6	2	12	10	16

Name of the near commercial clones and serial numbers:

S. No	Clone	S.No	Clone
1	Co 09022	9	CoLk 14203
2	Co 12029	10	CoLk 15204
3	Co 13034	11	CoLk 15206
4	Co 14034	12	CoLk 15207
5	Co 15023	13	CoS 08279
6	Co 15024	14	Check 1
7	Co 15026	15	Check 2
8	Co 15027	16	Check 3

Note : In case one or two entries are missing due to unavailability of seed material, additional checks (other than Check 1,2,3) may be taken.

Seed Multiplication: The following near commercial clones should be multiplied in the participating centres during 2021-22 for conducting trial in the year 2022-23.

Water logging: Pantnagar

Water logging tolerant clones (18): Co 99006, 96 WL 1206, WL 10-20, 99 WL 1028, WL 09-965, WL 09-678, WL-10-24, WL-10-62, WL-10-85, WL-10-3, WL-10-18, WL-10-83, WL-10-105, WL 11-2263, WL 11-2534, WL 12-509, WL 12-182, WL 12-300

ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

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

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 %, Sucrose %, Purity % and CCS % - 2nd fortnight of November and January
10. CCS t/ha after 10 months at harvest
11. Extraction % after 10 months at harvest
12. Fibre % after 10 months at harvest
13. Pol % cane after 10 months at harvest
14. Jaggery quality after 10 months at harvest (if facility available)
15. 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 AVT – Early (Ratoon crop)

- Note :**
1. No gap filling should be done.
 2. Ratooning operation should be completed within 15 days after harvesting plant crop.
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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 %, Sucrose %, Purity % and CCS % - 2nd fortnight of December
 9. CCS t/ha after 270 days at harvest
 10. Extraction % after 270 days at harvest
 11. Fibre % after 270 days at harvest
 12. Pol % cane after 270 days at harvest
 13. Jaggery quality after 270 days at harvest (if facility available)
 14. 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) in Midlate (Plant crop)**

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 %, Sucrose %, Purity % and CCS % - 2nd fortnight January and March
10. CCS t/ha after 12 months at harvest
11. Extraction % after 12 months at harvest
12. Fibre % after 12 months at harvest
13. Pol % cane after 12 months at harvest
14. Jaggery quality after 12 months at harvest (if facility available)
15. 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 AVT – Midlate (Ratoon crop)

- 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 %, Sucrose %, Purity % and CCS % - 2nd fortnight of February
 9. CCS (t/ha) after 330 days at harvest
 10. Extraction % after 330 days at harvest
 11. Fibre % after 330 days at harvest
 12. Pol % cane after 330 days at harvest
 13. Jaggery quality after 330 days at harvest (if facility available)
 14. Jaggery yield (t/ha) after 330 days at harvest (if facility available)