

## CROP IMPROVEMENT

### Technical programme for the year 2022-2023 Peninsular Zone

#### B. II- Zonal Varietal Trial

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

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#### 1. Initial Varietal Trial

Entries (23) : Co 19002, Co 19003, Co 19004, Co 19005, Co 19008, Co 19009, Co 19014, Co 18023, CoN 19071, MS 19081, CoVSI 19121, CoT 19366, CoT 19367, CoR 19141, CoR 19142, CoR 19143, CoR 19144, CoR 19145, CoR 19146, CoT 18366, CoT 18367, CoT 18368, CoT 18369

Standards (3) : Co 86032, CoC 671 and Co 09004

Design : Randomised Block Design

Replications : Three

Plot size : Gross: 6m x 6r x 1.2m  
Net : 5m x 4r x 1.2m

Seed rate : 12 buds per metre

Planting date : II fortnight of December to I fortnight of January

Crop duration : 12 months

Data to be recorded : As per Annexure - I

#### 2. Advanced Varietal Trial – I Plant

Entries (12) : Co 17001, Co 17002, Co 17003, Co 17004, Co 17005, Co 17010, Co 17012, Co 17013, CoVc 17061, CoN 17072, MS 17082, and CoT 17366

Standards (3) : Co 86032, CoC 671 and Co 09004

Design : Randomised Block Design

Replications : Three

Plot size : Gross: 6m x 8r x 1.2m  
Net : 5m x 6r x 1.2m

Seed rate : 12 buds per metre

Planting date : II fortnight of December to I fortnight of January

Crop duration : 12 months

Data to be recorded : As per Annexure - I

### **3. Advanced Varietal Trial - II Plant**

Entries (5)	:	Co 16006, Co 16010, Co 16018, CoVSI 16121 and PI 16131
Standards (3)	:	Co 86032, CoC 671 and Co 09004
Design	:	Randomized Block Design
Replications	:	Three
Plot size	:	Gross: 6m x 8r x 1.2m Net : 5m x 6r x 1.2m
Seed rate	:	12 buds per metre
Planting date	:	II fortnight of December to I fortnight of January
Crop duration	:	12 months
Data to be recorded	:	As per Annexure - I

### **4. Advanced Varietal Trial – (Ratoon)**

Entries (5)	:	Co 16006, Co 16010, Co 16018, CoVSI 16121 and PI 16131
Standards (3)	:	Co 86032, CoC 671 and Co 09004
Design	:	Randomised Block Design
Replications	:	Three
Plot size	:	Gross: 6m x 8r x 1.2m Net : 5m x 6r x 1.2m
Ratooning date	:	After harvest of AVT Plant – I
Crop duration	:	11 months
Data to be recorded	:	As Annexure-II

## **SEED MULTIPLICATION**

**1. Multiplication of IVT (2020-21) entries at the centers :** Following 13 entries will be multiplied at the centers during 2021-22 for inclusion in AVT – I plant in 2023-24

Co 18001, Co 18002, Co 18003, Co 18009, Co 18012, Co 18013, Co 18024, CoVC 18061, CoN 18071, CoN 18072, CoVSI 18121, Co 17009, CoT 16366

**2. Multiplication of zonal entries accepted during 2020**

The following entries accepted in the Group Meeting of AICRP (S) held at ICAR –IISR Lucknow through online during 19-20<sup>th</sup> October 2020 are under multiplication at ICAR-Sugarcane Breeding Institute, Coimbatore and Central Sugarcane Research Station, Padegaon. On prior intimation the centers should depute their staff and lift the material for one year multiplication.

**ICAR-SBI, Coimbatore (Multiplication centre):**

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

**CSRS, Padegaon (Multiplication centre):**

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

**Entries (17):** Co 20001, Co 20002, Co 20003, Co 20005, Co 20006, Co 20007, Co 20009, Co 20010, Co 20011, Co 20012, CoN 20071, CoN 20072, CoM 20082, CoSnk 20101, CoSnk 20102, CoSnk 20103, CoT 20366.

**3. Seed multiplication of new entries**

The following entries were accepted in the AICRP(S) workshop held at ICAR-IISR, Lucknow in 2021. The concerned breeders are requested to supply two sets of seed materials of the accepted entries; one set to ICAR-SBI, Coimbatore and the other set to CSRS, Padegaon for one year multiplication.

**Entries (16):** Co 21002, Co 21003, Co 21004, Co 21005, Co 21006, Co 21007, Co 21009, Co 21010, CoN 21071, CoN 21072, CoM 21081, CoM 21082, CoM 21083, VSI 21121, CoR 21141, CoT 21366

### **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 (II Plant Crop)**

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

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Entries (18)	:	ISH 501, ISH 502, ISH 512, ISH 519, ISH 524, ISH 534, ISH 536, ISH 548, ISH 567, ISH 584, ISH 585, ISH 587, ISH 590, ISH 594, IGH 823, IGH 829, IGH 833, IGH 834
Standards (3)	:	Sankeshwar:: CoM 88121, CoM 0265 and one more local check. 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 date	:	Sankeshwar, Pune : 2 <sup>nd</sup> fortnight of Dec to 1 <sup>st</sup> fortnight of Jan Lucknow and Karnal : 2 <sup>nd</sup> 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 plots

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

**Randomized Layout****Normal condition:**

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

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

**Drought condition:**

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

	<b>Replication 2</b>						
<b>Block 1</b>	12	2	7	21	13	4	18
<b>Block 2</b>	5	8	19	3	10	16	14
<b>Block 3</b>	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	<b>Check 1</b>
6	ISH 534	13	ISH 590	20	<b>Check 2</b>
7	ISH 536	14	ISH 594	21	<b>Check 3</b>

**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.**

**(iii) Evaluation for drought tolerance (Ratoon Crop)**

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

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Entries (18)	:	ISH 501, ISH 502, ISH 512, ISH 519, ISH 524, ISH 534, ISH 536, ISH 548, ISH 567, ISH 584, ISH 585, ISH 587, ISH 590, ISH 594, IGH 823, IGH 829, IGH 833, IGH 834
Standards (3)	:	Sankeshwar : CoM 88121, CoM 0265 and one more local check. 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
Replications	:	Two
Plot Size	:	6m X 2r X 1.2 m
Ratooning date	:	Immediately after harvest of the plant crop
Crop Duration	:	11 months

**Data to be recorded**

- i) Tillers count at 90 and 120 days
- ii) Shoot count at 150, 180, 240 and 330 days
- iii) Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 330 days
- iv) Cane yield at harvest
- v) Tiller mortality (Max number of shoots-NMC at harvest) X 100/ Max number of shoots
- vi) Leaf area before imposition of drought and after withdrawing the drought

- vii) Estimation of Relative Water Content (Three times – Before, during and after water stress)
- viii) Leaf water potential (If facility available)
- ix) Leaf rolling at sunrise during water stress

**Soil analysis:**

- iii. Field Capacity and Permanent Wilting Point of the field (before commencing the experiment)
- iv. 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 ratooning in drought treatment plots

**Seed Multiplication:** The following ISH/IGH clones should be multiplied in the participating centres during 2022-23

**Drought** : Sankeshwar, Pune, Lucknow, Karnal,

**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**

#### **(ii) Evaluation for drought tolerance (II Plant Crop)**

**Centres (3):** Sankeshwar, Anakapalle, Lucknow

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Entries (13)	:	Co 09022, Co 12029, Co 13034, Co 14034, Co 15023, Co 15024, Co 15026, Co 15027, CoLk 14203, CoLk 15204, CoLk 15206, CoLk 15207, CoS 08279
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 <sup>nd</sup> fortnight of Dec to 1 <sup>st</sup> fortnight of Jan Lucknow : 2 <sup>nd</sup> 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:**

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

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

**Drought condition:**

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

	<b>Replication 2</b>							
<b>Block 1</b>	15	9	13	1	7	11	3	5
<b>Block 2</b>	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	<b>Check 1</b>
7	Co 15026	15	<b>Check 2</b>
8	Co 15027	16	<b>Check 3</b>

**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.**

**(iii)Evaluation for drought tolerance (Ratoon Crop)**

**Centres (3):** Sankeshwar, Anakapalle, Lucknow

Entries (13) : Co 09022, Co 12029, Co 13034, Co 14034, Co 15023, Co 15024, Co 15026, Co 15027, CoLk 14203, CoLk 15204, CoLk 15206, CoLk 15207, CoS 08279

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  
 Replications : Two  
 Plot Size : 6m X 2r X 1.2 m  
 Ratooning date : Immediately after harvest of the plant crop  
 Crop Duration : 11 months

**Data to be recorded**

- i. Tillers count at 90 and 120 days
- ii. Shoot count at 150, 180, 240 and 330 days
- iii. Single cane weight, Cane length, Cane diameter, Number of internodes, Juice Brix %, Juice sucrose %, Extraction %, cane fibre % at 330 days
- iv. Cane yield at harvest
- v. Tiller mortality (Max number of shoots-NMC at harvest) X 100/ Max number of shoots
- vi. Leaf area before imposition of drought and after withdrawing the drought
- vii. Estimation of Relative Water Content (Three times – Before, during and after water stress)
- viii. Leaf water potential (If facility available)

- ix. Leaf rolling at sunrise during water stress

**Soil analysis:**

- iii. Field Capacity and Permanent Wilting Point of the field (before commencing the experiment)
- iv. 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 ratooning in drought treatment plot

**Seed Multiplication:** The following near commercial clones should be multiplied in the participating centres during 2022-23

**Water logging:** Motipur, Pantnagar and Pusa

**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

*Annexure-I*

**ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE**

**Characters on which data to be recorded in Initial Varietal Trial (IVT)  
and Advanced Varietal Trial (AVT) – Plant crops**

**Crop: Sugarcane**

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. Number of millable canes (thousand/ha) after 10 months and 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 % in juice at 8, 10 and 12 months
10. Sucrose % in juice at 8, 10 and 12 months
11. Purity % at 8, 10 and 12 months
12. CCS % at 8, 10 and 12 months
13. Extraction % after 10 and 12 months at harvest
15. Fibre % in cane after 10 and 12 months at harvest
16. Pol % cane after 10 and 12 months at harvest
17. Cane yield (t/ha) after 12 months at harvest
18. CCS t/ha after 12 months at harvest
19. Jaggery quality after 10 and 12 months at harvest (if facility available)
20. Jaggery yield (t/ha) after 12 months at harvest (if facility available)

*Morphological characters*

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

**ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE**

**Characters on which data to be recorded in ratoon crop**

**Advanced Varietal Trial (Ratoon)**

- 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 and 330 days at harvest
  4. Stalk length (cm) after 330 days at harvest
  5. Stalk diameter (cm) after 330 days at harvest
  6. Single cane weight (kg) after 330 days at harvest
  7. Brix % in juice after 270 days and 330 days at harvest
  8. Sucrose % in juice after 270 days and 330 days at harvest
  9. Purity % after 270 days and 330 days at harvest
  10. CCS % after 270 days and 330 days at harvest
  11. Fibre % in cane after 270 days and 330 days at harvest
  12. Pol % cane after 270 days and 330 days at harvest
  13. Cane yield (t/ha) after 330 days at harvest
  14. CCS t/ha after 330 days at harvest
  15. Extraction % after 270 days and 330 days at harvest
  16. Jaggery quality after 270 days and 330 days at harvest (if facility available)
  17. Jaggery yield (t/ha) after 270 days and 330 days at harvest (if facility available)