CROP PRODUCTION

Technical Programme - 2022-2023

AS-72	**:**	**Agronomic performance of elite sugarcane genotypes**
Objective	**:**	To assess the performance of promising sugarcane genotypes of Advanced Varietal Trial (AVT)
Year of start	**:**	2016-2017
Duration	**:**	Long term (Genotypes to be selected annually)
Locations	**:**	All centres where post of Agronomist has been provided as well as any voluntary centre.
Planting time	**:**	North West, North Central & North East Zones: February-March Peninsular & East Coast Zones: Ist fortnight of January
Treatments	**:**	
1. Genotypes	**:**	Varieties and only one of the checks of the Centre's zone
2. Agronomy	**:**	**Spacing : S**pacing for all the entries ▪ 120 cm (for North West, North Central, North East and East Coast Zones). ▪ 150 cm (for the Peninsular Zone). **Fertilizer levels**: (2) 100 % and125% of the recommended dose of NPK for the zone
Design	**:**	RBD
Replication	**:**	3
Plot size	**:**	North West, North Central, North East and East Coast Zones: 5 rows of 6 m length. Peninsular Zone: 4 rows of 6 m length.

Note: 1. Seed material of the test varieties may please be obtained from concerned breeder of the center.

2. Separate trials to be laid out for early and mid-late maturity groups along with zonal checks.

Observations to be recorded	**:**	i) Initial soil fertility status for available NPK, soil texture, physico-chemical properties of the soil. ii) Data on germination, no. of millable canes, cane yield, Pol (%), CCS (t/ha).

List of varieties (zone-wise) for the Experiment AS 72 during 2022-23

I. North West Zone (AVT II Plant)

Early maturing varieties (7): CoS 17232, CoPb 18181, CoPb 18182, CoLk 18201, CoLk 18202, CoPb 18211, CoPb 18212, CoPant 18221

Zonal Check (3): CoJ 64, Co 0238, Co 05009

Mid-late maturing varieties (9): Co 17018, CoLk 17204, CoPb 17215, CoPant 17233, CoS 17234, CoS 17235, CoS 17236, CoH 17261, CoH 17262

Zonal Check (3): CoS 767, CoPant 97222, Co 05011

II. North Central & North East Zones (AVT II Plant)

Early maturing varieties (7): CoSe 16454, CoP 17436, CoP 17437, CoP 17438, CoP 17440, CoP 17441, CoSe 17451

Zonal Check (3): CoLk 94184, CoSe 95422, CoSe 01421

Mid-late maturing varieties (3): CoSe 16455, CoP 17446, CoSe 17452
Zonal Check (3): BO 91, CoP 06436, CoP 9301

III. Peninsular Zone (AVT II Plant)

Varieties (5): Co 16006, Co 16010, Co 16018, CoVSI 16121 and PI 16131

Zonal Check (3): Co 86032, CoC 671 and Co 09004

IV. East Coast Zone (AVT II Plant)

Early maturing varieties (3): CoV 18356, CoV 18357, CoOr 18346

Zonal Check (3): CoA 92081,CoC 01061and CoOr 03151

Note : Varieties other than listed above should not be included or substituted.

AS-74	**:**	**Evaluation of sugarcane varieties for drought tolerance**

Objective **:** Identification of drought tolerant varieties suitable for specific agro-climatic condition.

Year of start **:** 2018-2019

Duration **:** Long term (Based on 2-years crop performance)

Locations **:** All centres where post of Agronomist has been provided as well as any voluntary centre.

Planting time **:** North West, North Central & North East Zones: February-March
Peninsular & East Coast Zones: Ist fortnight of January

Treatments **:** **(a) Newly released varieties:**

- Early maturing (3)
- Mid-late maturing (3)

(b) Irrigation regimes: 2

- IW/CPE ratio 1.0
- IW/CPE ratio 0.3

Total no. of treatments: 12

Design **:** Strip plot design

Replication **:** 3

Plot size **:** North West, North Central, North East and East Coast Zones : 8 rows of 8 m length.
Peninsular Zone : 8 rows of 8 m length.

Methodology **:** All the irrigation regimes would be applied 50 days after planting in the main season crop of the region.

Observations to **:**

i) Root dry weight at 50, 100, 150 and 200 DAP.

ii) Relative leaf water content 24 hrs before and after each irrigation 50 DAP onwards.

iii) Soil moisture content before and after each irrigation.

iv) Leaf area index and specific leaf weight at 50, 100, 150 and 200 DAP.

v) Dry matter accumulation at 50, 100, 150, 200 and at harvest.

vi) Monthly tiller count and other plant biometric data.

vii) Yield attribute and cane yield

viii) Juice quality at 10 and 12 months stages including juice extraction percentage.

Protocol for determination of:

1. Relative leaf water content
2. Leaf area index (LAI) and specific leaf weight

Relative leaf water content (RWC):

1. Take LTM leaf & cut out 20 leaf disc using sharp cork borer.
2. Take the fresh weight of these leaf discs (20 discs). Take middle part of the leaf and avoid taking midrib.
3. Incubate the discs of leaf in distilled water for 6 hrs under proper illumination (use fluorescent tubes). Incubation can be done in petri dishes.
4. After 6 hrs, take out the discs, wipe out with tissue paper & weight the same, which is recorded as turgid weight.
5. Dry the discs (drying can be done at 60^0C) and record the dry weight.
6. Calculate the RWC (Relative Water Content %) using following formula :

$$\text{RWC \%} = \frac{\text{Fresh weight} - \text{Dry weight}}{\text{Turgid weight} - \text{dry weight}} \times 100$$

Leaf area index can be calculated by following formula:

$$\text{Leaf area index} = \frac{\text{Leaf area}}{\text{Ground area}}$$

Specific leaf weight (SLW)

1. Take LTM leaf and measure the length (L) and width (W) (centre of the leaf). Multiply (LxW) with factor 0.627 to get leaf area of the leaf.
2. Dry the same leaf in oven at 60^0C and take the weight of the dry leaf. SLW is calculated using following formula :

$$\text{SLW (g/cm}^2\text{)} = \frac{\text{Dry weight of leaf taken for the area}}{\text{Leaf area}}$$

AS 75 :Precision nutrient management through rescheduling time of application for widely spaced sugarcane plant - ratoon system

Objectives

1. To assess the effect of split application of N & K till advanced crop growth stages on nutrient use efficiency, crop growth, yield and quality.
2. To find the most efficient method and application schedule of nutrients for widely planted sugarcane plant-ratoon system.

Year of Start: 2020 (to be carried out for one plant – ratoon cycle)
Locations: All the centres where Agronomist is in place

Treatment Details

Main Plot : Method of application (2)

1. Broadcasting
2. Band placement

Note: Basal dose should be applied in furrows. Broadcasting and band application will be initiated with first application after basal application. Band application: 3 inches away from cane clump and 3 inches below the soil surface.

Sub Plots

1. RDN + RDK in five splits
   (Basal 10% remaining at 45, 75, 90 and 120 DAP in equal splits)
2. RDN + RDK in six splits
   (Basal 10% remaining at 45, 75, 90,120 and 150 DAP in equal splits)
3. RDN + RDK in seven splits
   (Basal 10% remaining at 45, 75, 90,120,150 and 180 DAP in equal splits)
4. Recommended dose and schedule of nutrient applications*

North West and North Central Zone	Half of total N and full dose of P & K at planting rest of N at 45 and 90 DAP in equal quantity.
North Eastern Zone	25 % of total N and full dose of P & K at planting rest of N at 45 and 90 DAP in equal doze
Peninsular zone	25 % of total N and full dose of P & K at planting rest of N at 35, 65 and 95 DAP in equal doze
East Coast	25 % of total N and full dose of P & K at planting and rest of N at 35, 65 and 95 DAP in equal doze

*May be fine-tuned as per local recommendation under information to PI

Total number of treatments (2 x 4) = 8

Design: Split plot
Replication : 03

Season : Main season of planting
Variety: Ruling common variety of the region
Spacing : 120 cm between rows with 3 bud setts
Planting method : Conventional
Note: Use of organic manures, overnight sett soaking in 100 ppm ethrel solution, *RDF and* Micronutrient application as recommended for a location is to be common for all the treatments.

Observations to be recorded:

1. Germination count/ plant population at 30 and 45 DAP / DAR
2. Tiller population at monthly interval
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
9. Soil microbial parameters (optional)

AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality * (Sponsored trial)

Objectives:

1. To work out the optimum dose and schedule of PSAP application in sugarcane crop
2. To assess the effect of PSAP on sugarcane growth, yield and juice quality
3. To analyse the impact of the product on soil fertility and cultivation economics

Year of Start: 2021 (to be carried out for two consecutive years)

Locations: Faridkot, Lucknow, Uchani, Coimbatore, Kolhapur, Pune, Sankeshwar, Nayagarh, Pusa, Bethuadhari (10)

Treatment Details

T_1- Recommended dose of NPK (RDF)

T_2- RDF + sett soaking with 0.8 % PSAP solution

T_3- Recommended N, 50% P and 50% K

T_4- T_3 + sett soaking with 0.8 % PSAP solution

T_5- T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP

T_6- T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP

T_7- T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP

T_8- T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP

T_9- T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP

T_{10}- T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP

Replications: 03
Design: Randomized block design

Note: Sett soaking is to be done at least for 04 hours before planting

Season: Main season of planting
Variety: Ruling common variety of the region
Spacing : 120 cm between rows with 3 bud setts
Planting method : Conventional

Observations to be recorded:

1. Germination count/ plant population at 30 and 45 DAP
2. Tiller population at monthly interval
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
9. Soil microbial parameters (optional)
10. Phyto-toxicity to sugarcane crop, if any. Visual observations to be recorded and reported.

*The trial will be carried out at 10 centres subject to fulfilment of administrative and financial requirements by the sponsors of the product. PSAP will be supplied by the sponsors to all the centres listed by PC for carrying out the trial.

AS 77: Evaluation of liquid nano urea for its efficacy in enhancing N use efficiency and sugarcane growth and yield

Objectives:

1. To assess the effect of liquid nano urea spray on sugarcane growth, yield and quality
2. To work out the prilled urea substitution through liquid nano urea
3. To design the nano urea spray schedule for sugarcane and assess the economics

Year of Start: 2022 (to be carried out for two consecutive plant –ratoon cycles)

Centres: All the centres

Treatment Details

1. Half of RDN applied as 50% basal through fertilizers and rest in two equal split sprays of liquid nano urea at 45 and 90 DAP
2. Half of RDN applied as 50% basal through fertilizers and rest in three equal split sprays of liquid nano urea at 30, 60 and 90 DAP
3. Half of RDN applied as 50% basal through fertilizers and rest in three equal split sprays of liquid nano urea at 45, 90 and 135 DAP
4. 75 % of RDN applied as 50% basal through fertilizers and rest in two equal split sprays of liquid nano urea at 45 and 90 DAP
5. 75 % of RDN applied as 50% basal through fertilizers and rest in three equal split sprays of liquid nano urea at 30, 60 and 90 DAP
6. 75 % of RDN applied as 50% basal through fertilizers and rest in three equal split sprays of liquid nano urea at 45, 90 and 135 DAP
7. RDN applied as 50% basal through fertilizers and rest in two equal split sprays of liquid nano urea at 45 and 90 DAP
8. RDN applied as 50% basal through fertilizers and rest in three equal split sprays of liquid nano urea at 30, 60 and 90 DAP
9. RDN applied as 50% basal through fertilizers and rest in three equal split sprays of liquid nano urea at 45, 90 and 135 DAP
10. RDN applied as per conventional recommendation for the zone through conventional fertilizers

Replications: 03
Design: Randomized block design

Note: Sett soaking is to be done at least for 04 hours before planting. Full dose of P, K, Zn and S to be applied as per recommendation for the zone.

Season: Main season of planting
Variety: Ruling common variety of the region
Spacing : 120 cm between rows with 3 bud setts
Planting method : Conventional

Observations to be recorded:

1. Germination count/ plant population at 30 and 45 DAP
2. Tiller population at monthly interval
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
9. Soil microbial parameters (optional)
10. Phyto-toxicity to sugarcane crop, if any. Visual observations to be recorded and reported.

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