

CROP PRODUCTION

Technical Programme - 2017-2018

AS-67	: Optimization of fertigation schedule for sugarcane through micro-irrigation technique under different agro-climatic conditions
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Objective : To economize water use in cultivation and improve sugarcane productivity.

Year of start : 2011-12

Centres : Cuddalore, Mandya, Lucknow and Faridkot

Treatments : **A. Irrigation water/ method applied:**
I₁ : Sub-surface drip irrigation at 75% Pan Evaporation (PE)-irrigation once in two days.
I₂ : Sub-surface drip irrigation at 100% PE- irrigation once in two days.
I₃ : Sub-surface drip irrigation at 125% PE- irrigation once in two days.
I₄ : Farmer's practice – surface irrigation
B. Nitrogen levels :
N₁ : 100% recommended dose of nitrogen (RDN)
N₂ : 75% (RDN)
N₃ : 50% (RDN)

Details of Methodology :

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

Treatments : 12

Design : Strip Plot

Replication : 3

Plot size : 10 rows of 10 meter length

Observations to be recorded : **A. Soil parameters**
1. Physical parameters (bulk density and infiltration rate)
2. Quantity of water applied
3. Water use efficiency

B. Sugarcane:

1. Germination
2. Periodic tiller population and millable cane count
3. 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
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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 (<i>Azotobacter/ Acetobacter</i> + PSB) + 50% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + 50% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + 50% RDF
T8	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + 100% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + 100% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + 100% RDF
T9	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + soil test basis	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + PSB) + soil test basis (NPK application)	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (<i>Azotobacter/ Acetobacter</i> + 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. ZnSO₄ @ 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, P₂O₅, K₂O 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
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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+GA₃ spray (35 ppm) at 90, 120 and 150 DAP
6. T2+ GA₃ spray (35 ppm) at 90, 120 and 150 DAP
7. T3 + GA₃ (35 ppm) spray at 90, 120 and 150 DAP
8. T4 + GA₃ (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

AS-70	: Scheduling irrigation with mulch under different sugarcane planting methods
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Objectives : To enhance crop and water productivity in sugarcane

Year of Start : 2016-17

Year of Completion : 2019-20

Participating centres : All centres

Treatment (A) : **North West, North Central and North East Zones**

Combination of planting methods and mulch practices

P₁ : Conventional flat planting (75 cm row spacing) with organic mulching @ 6 t/ha (sugarcane trash/paddy straw/any other available crop residue)

P₂ : Conventional flat planting (75 cm row spacing) without mulch

P₃ : Paired row trench planting (30:120 cm row spacing) with organic mulching @ 6 t/ha.

P₄ : Paired row trench planting (30:120 cm row spacing) without mulch.

Peninsular, East Coast Zones

Combination of planting methods, green manure and mulch practices

P₁ : Furrow planting (120 cm row spacing) without mulching

P₂ : Furrow planting (120 cm row spacing) with green manure (*dhaincha*/sunnhemp/cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP.

P₃ : Furrow planting (120 cm row spacing) with alternate skip furrow irrigation* after earthing-up without mulching.

P₄ : Furrow planting (120 cm row spacing) with alternate skip furrow irrigation* after earthing-up + green manure/brown mulching.

*First irrigation to be given in furrow nos. 1, 3, 5. Second irrigation to be given in furrow nos. 2 & 4. Similar schedule should be followed in successive irrigation.

Treatment (B)

Irrigation schedule (IW/CPE)

I₁ : 0.60

I₂ : 0.80

I₃ : 1.00

Irrigation water depth : 7.5 cm

Details of Methodology :

Recommended variety of sugarcane will be planted in spring season. Entire dose of N, P and K fertilizers as per recommendation of the region will be applied before onset of monsoon as per the recommendation.

Treatments (12) : Planting methods : 4
Irrigation regime : 3
Design : Strip plot design
Replication : 3
Plot size : 6m width x 8m length

Observations to be recorded : **A. Soil parameters**

1. Initial and final soil fertility status as well as physical parameters (bulk density and infiltration rate)
2. Moisture (%) before each irrigation up to onset of monsoon
3. Quantity of water applied
4. Water use efficiency

B. Sugarcane:

1. Germination (%)
2. Periodic tiller population 90, 120, 180 DAP/DAR
3. Plant height at 90, 120, 180 DAP/DAR
4. Growth parameters i.e., NMC, cane length, diameter and cane weight
5. Juice quality (brix, pol % and purity %)
6. Cane and sugar yields (t/ha).

AS-71	: Carbon sequestration assessment in sugarcane based cropping system
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Objective : To improve the total soil organic carbon build-up and sustain crop yields

Year of start : 2016 – 2017

Locations : All centers

Duration : One cycle of 3 years crop rotation

Treatments : **North West and North Central Zones**

(Cropping system)

T₁ : Rice - Wheat – Rice – Wheat (residue retention without *Trichoderma*)

T₂ : Rice - Wheat – Rice – Wheat (residue retention with *Trichoderma*)

T₃ : Sugarcane – Ratoon (trash mulching without *Trichoderma*) - Wheat

T₄ : Sugarcane – Ratoon (trash removal without *Trichoderma*) - Wheat

T₅ : Sugarcane – Ratoon (trash mulching with *Trichoderma*) - Wheat

T₆ : Sugarcane – Ratoon - Wheat (trash incorporation through rotavator and *Trichoderma* incorporation before sowing of wheat)

T₇ : Sugarcane – Ratoon- Wheat (Zero tilled) without *Trichoderma*

T₈ : Sugarcane – Ratoon-Wheat (Zero tilled) with *Trichoderma*

Peninsular and East Coast Zones

T₁ : Soybean-wheat/maize/*toria*

T₂ : Sugarcane-Ratoon-cowpea/urd bean/moong bean

T₃-T₈ : Will be same as in North West and North Central Zones except wheat to be substituted by maize/*toria*/cowpea

Treatments : 8

Design : RBD

Replication : 3

Plot size : 6 rows of 6 meter length

Observations to be recorded : **Soil parameters**

1. Initial and final soil fertility status (0-30, 30-60 and 60-90 cm soil depths) as well as physical parameters (bulk density, infiltration rate, WHC)

2. Total soil organic carbon before start of the experiment and after harvest of every crop

Rice – Wheat/ Maize/Toria:

1. Germination count

2. No. of tillers at 30, 60 & 90 DAS

3. Days to maturity

4. Straw and grain yield

Sugarcane:

1. Germination at 35 & 45 DAP
2. Periodic tiller population 90, 120, 180 DAP/DAR
3. Plant height at 90, 120, 180 DAP/DAR
4. Growth parameters i.e., NMC, cane length, diameter and cane wt.
5. Juice quality (Brix, pol % and purity %)
6. Cane and sugar yields (t/ha)

Note:

All other trash management treatments will be same for both the regions.

Trichoderma viride solid based culture (10^7 cfu/g)

The experiment will be conducted in permanent field layout.

Planting season: February – March

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	:	One year
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 : 1 st fortnight of January
Treatments	:	<ol style="list-style-type: none"> 1. Genotypes : Varieties and checks of the centre's zone are given at the end. 2. Agronomy : Spacing : Spacing for all the entries <ul style="list-style-type: none"> ▪ 90 cm and 120 cm (for North West, North Central, North East and East Coast Zones). ▪ 120 cm and 150 cm (for the Peninsular Zone). <p>Fertilizer levels: 125% of the recommended dose of NPK for the zone</p>
Design	:	RBD
Replication	:	2 or 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 2017-18

I. North West Zone (AVT II Plant)

Early maturing varieties (4) : Co 12026, Co 12027, CoLk 12203 and CoPant 12221

Zonal Check (2) : CoJ 64 and Co 0238

Midlate maturing varieties (6) : Co 12029, CoH 12263, CoLk 12205, CoPant 12226, CoPb 12211 and CoS 12232

Zonal Check (3) : CoS 767, CoS 8436 and CoPant 97222

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

Early maturing varieties (3) : CoLk 12207, CoP 12436 and CoSe 12451

Zonal Check (2) : BO 130 and CoSe 95422

Midlate maturing varieties (4) : CoLk 09204, CoLk 12209, CoP 12438 and CoSe 12453

Zonal Check (2) : BO 91, CoP 9301

III. Peninsular Zone (AVT II Plant)

Early maturing varieties (5) : Co 11001, Co 11004, CoM 11081, CoM 11082 and CoM 11084

Zonal Check (3) : Co 85004, Co 94008 and CoC 671

Midlate maturing varieties (6) : Co 11005, Co 11007, Co 11012, Co 11019, CoM 11085 and CoM 11086

Zonal Check (2) : Co 86032 and Co 99004

IV. East Coast Zone (AVT II Plant)

Early maturing varieties (5) : CoA 13322, CoA 13323, CoC 13336, CoC 13337 and CoV 13356

Zonal Check (2) : CoC 01061 and CoA 92081

Midlate maturing varieties (4) : CoA 11326, CoA 12324, CoC 13339 and CoOr 13346

Zonal Check (2) : CoV 92102 and Co 86249

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

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 ₂ O ₅ and K ₂ O in kg/ha)	
10	<p>Summary of results in 200 words (1)</p> <p>Germination count/ plant population at 30 and 45 DAP / DAR</p> <p>2)Tiller population at 120 and 150 DAP or DAR</p> <p>3) No. of millable canes, length, girth and cane weight at harvest</p> <p>4) Cane and sugar yield (t/ha)</p> <p>5) Juice quality parameters (Brix, pol, purity) at 10 and 12 months age of crop</p> <p>6) Soil analysis initial and after harvest of each crop (bulk density, infiltration rate, organic carbon, soil pH, EC, available NPK)</p> <p>7) Nutrient composition of organic source used</p> <p>8 Economics</p> <p>9) Nutrient uptake (NPK) at harvest (optional)</p> <p>10) Soil microbial parameters (optional)</p>	

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