

**Ag IALL INDIA COORDINATED RESEARCH PROJECT
ON SUGARCANE**



**TECHNICAL REPORT
(2016-17)**

**CROP PRODUCTION
(Agronomy and soil science)**

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Project No I

AS-72: Agronomic performance of elite sugarcane genotypes (Early Group)-plant crop

Objectives: To assess the performance of promising sugarcane genotypes of Advanced Varietal Trial (AVT)

Treatment:

Genotypes (4): CoP11436, CoP 11437, CoP 11438 and CoSe 11451

Zonal Check (2): Bo 130 and CoSe 95422

V₁: CoP11436,

V₂: CoP 11437

V₃: CoP 11438

V₄: CoSe 11451

V₅: Bo 130 (check)

V₆: CoSe 95422 (check)

Fertilizer Levels: 125% of the recommended dose of NPK (135:70:60)

The varieties were planted on 8th March, 2016 and harvested on 12th February, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.75 %) and low in available P (17.6 kg P₂O₅/ ha) and medium in available K (234 Kg K₂O/ ha) with pH 5.14

Result:

The data on “Agronomic performance of elite sugarcane genotypes (Early gp)” on yield and quality of sugarcane is presented in table (AS-72-1). The result revealed that all the genotypes were statistically at par in terms of cane yield and other growth parameters. None of genotypes was found superior than the check. However, significant difference was observed in case of quality of sugarcane.

NB: The low yield recorded by genotypes is might be due to high rainfall received throughout the growth period.

Table AS-72-1: Agronomic performance of elite sugarcane genotypes on yield and quality of sugarcane

Genotypes	Germination %	No of shoots (000/ha)	NMC (000/ha)	Cane length (cm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
V ₁ : CoP11436	22.7	62.4	59.8	194.0	2.4	17.7	36.1	12.8
V ₂ : CoP 11437	31.5	64.9	62.0	213.0	2.3	18.1	36.5	13.1
V ₃ : CoP 11438	31.0	60.5	57.4	197.5	2.6	18.1	34.8	13.1
V ₄ : CoSe 11451	32.1	66.9	63.7	214.5	2.3	18.0	36.5	13.0
V ₅ : Bo 130 (check)	28.6	72.6	69.4	216.3	2.4	17.9	35.6	12.9
V ₆ : CoSe 95422 (Check)	31.0	67.0	64.7	189.5	2.3	18.1	36.8	13.1
CD(0.05)	4.97	NS	NS	NS	NS	0.25	NS	0.19

Project No II

AS-72: Agronomic performance of elite sugarcane genotypes (Mid-late Group)-plant crop

Objectives: To assess the performance of promising sugarcane genotypes of Advanced Varietal Trial (AVT)

Treatment:

Genotypes (4): Bo155, CoSe 11453, CoSe 11454 and CoSe 11455

Zonal Check (2): Bo 91, CoP 9301 and CoSe 92423

V₁: Bo 155

V₂: CoSe 11453

V₃: CoSe 11454

V₄: CoSe 11455

V₅: Bo 91(check)

V₆: CoP 9301(check)

V₇: CoSe 92423(check)

Fertilizer Levels: 125% of the recommended dose of NPK (135:70:60)

The varieties were planted on 24th March, 2016 and harvested on 17th March, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.75 %) and low in available P (17.6 kg P₂O₅/ ha) and medium in available K (234 Kg K₂O/ ha) with pH 5.14

Result:

The data on “Agronomic performance of elite sugarcane genotypes (mid-late group)” on yield and quality of sugarcane is presented in table (AS-72-2). The result revealed that all the genotypes were statistically at par in terms of cane yield and other growth parameters. None of genotypes was found superior than the check. However, significant difference was observed in case of quality of sugarcane.

NB: The low yield recorded by genotypes is might be due to high rainfall received throughout the growth period.

Project No III

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 PGRs
2. To assess the effect of PGRs on sugarcane growth, yield and juice quality.

Treatments:

- T1: Conventional planting/farmers' practice (3 bud setts)
- T2: Planting of setts after overnight soaking in water.
- T3: Planting of setts after overnight soaking in 50 ppm ethrel solution
- T4: Planting of setts after overnight soaking in 100 ppm ethrel solution
- T5: T1+ GA₃ spray (35ppm) at 90,120 and 150 DAP
- T6: T2 + GA₃ spray (35ppm) at 90,120 and 150 DAP
- T7: T3 + GA₃ spray (35ppm) at 90,120 and 150 DAP
- T8: T4 + GA₃ spray (35ppm) at 90,120 and 150 DAP

The crop was planted on 17th March, 2016 and harvested on 24th March, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.78 %) and low in available P (19.6 kg P₂O₅/ ha) and medium in available K (233 Kg K₂O/ ha) with pH 5.14

Result:

The germination percentage counted at 10 days interval after planting revealed that there was significance difference in germination among all the treatments. Planting of setts after overnight soaking in water (T₂), Planting of setts after overnight soaking in 50 ppm ethrel solution (T₃), Planting of setts after overnight soaking in 100 ppm ethrel solution(T₄) significantly increased the germination% over conventional planting (T₁) (Table-AS-69-01). However, throughout germination period the highest germination (%) was recorded with treatment planting of setts after overnight soaking in 100 ppm ethrel solution i.e. T₄ and T₈ (10.64,13.4%) (28.31, 28.7%) (48.00, 48.32%) and (49.21, 51.77%) at 20, 30, 40 and 50 days after planting, respectively.

Likewise, in terms of cane yield all the treatments recorded significantly the higher cane yield than conventional planting. Out of all treatments, planting of setts after overnight soaking in 100 ppm ethrel solution followed by spraying of GA₃ (35ppm) at 90,120 and 150 DAP i.e. T₈ recorded significantly the highest cane yield (57.75t/ha) which is statistically at par with the

cane yield recorded by the treatments T₆ (54.80 t/ha), T₇ (53.21 t/ha), respectively (Table AS-69).

Table- AS-69-01: Effect of different on germination (%) of sugarcane

Treatments	Germination 20 DAP	Germination 30 DAP	Germination 40 DAP	Germination 50 DAP
T ₁ : Conventional planting	7.94	15.73	35.10	36.80
T ₂ : Planting of setts after Overnight soaking in water.	10.02	24.45	45.75	47.06
T ₃ : Planting of setts after overnight soaking in 50 ppm ethrel solution	9.80	26.54	43.13	44.67
T ₄ : Planting of setts after overnight soaking in 100 ppm ethrel solution'	10.64	28.31	48.00	49.21
T ₅ : T ₁ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	8.17	21.98	38.00	40.43
T ₆ : T ₂ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	12.00	27.00	48.68	49.70
T ₇ : T ₃ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	10.64	24.15	46.75	48.91
T ₈ : T ₄ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	13.42	28.70	48.32	51.77
CD(0.05)	3.96	4.95	5.35	5.44

AS-69-02: Effect of plant growth regulators (PGRs) on yield and quality of sugarcane

Treatments	NMC (000/ha)	Cane length (cm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
T ₁ : Conventional planting	60.41	192.3	2.36	17.2	39.58	12.4
T ₂ : Planting of setts after overnight soaking in water.	69.44	212.0	2.43	17.5	44.90	12.6
T ₃ : Planting of setts after overnight soaking in 50 ppm ethrel solution	75.11	213.3	2.42	17.3	46.60	12.5
T ₄ : Planting of setts after overnight soaking in 100 ppm ethrel solution'	77.67	217.3	2.43	17.8	48.77	12.8
T ₅ : T ₁ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	65.40	199.7	2.38	17.1	42.36	12.3
T ₆ : T ₂ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	77.72	220.7	2.45	17.9	54.80	12.9
T ₇ : T ₃ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	74.4	209.3	2.46	17.6	53.21	12.7
T ₈ :T ₄ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	81.00	224.7	2.46	17.8	57.75	12.9
CD(0.05)	4.74	9.66	0.06	0.22	7.82	0.19

Table AS-69-03: Effect of plant growth regulators (PGRs) on plant height (cm) recorded at monthly interval.

Treatments	90 DAP	120 DAP	150 DAP	180 DAP	210 DAP	240 DAP	270 DAP	300 DAP
T ₁ : Conventional planting	33.6	70.3	123.2	138.6	151.2	167.5	177.3	192.3
T ₂ : Planting of setts after overnight soaking in water.	38.1	74.1	136.5	149.2	160.6	177.6	191.3	212.0
T ₃ : Planting of setts after overnight soaking in 50 ppm ethrel solution	39.0	77.3	139.7	153.1	164.6	179.7	194.5	213.3
T ₄ : Planting of setts after overnight soaking in 100 ppm ethrel solution	41.5	78.1	143.1	157.8	165.7	180.3	194.4	217.3
T ₅ : T ₁ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	33.3	73.3	136.9	148.3	157.1	170.1	181.8	199.7
T ₆ : T ₂ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	40.2	82.7	151.2	162.1	172.4	182.0	194.3	209.3
T ₇ : T ₃ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	40.9	83.5	150.7	162.3	173.3	184.1	198.0	220.7
T ₈ : T ₄ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	42.9	83.4	152.1	165.7	175.7	185.6	203.7	224.7
CD(0.05)	3.54	7.22	6.06	4.90	3.68	4.89	7.49	9.66

Table AS-69-04: Effect of PGRS on Biomass accumulation (gm/plant) & Root dry weight (gm/plant) in Sugarcane

Treatments	Biomass accumulation (t/ha) (120 DAP)	Biomass accumulation (t/ha) (150 DAP)	Biomass accumulation (t/ha) (210 DAP)	Root dry Weight (g/plant) (120DAP)
T ₁ : Conventional planting	5.76	6.92	13.80	9.33
T ₂ : Planting of setts after overnight soaking in water.	6.65	8.24	17.40	12.56
T ₃ : Planting of setts after overnight soaking in 50 ppm ethrel solution	6.87	8.77	20.11	13.87
T ₄ : Planting of setts after overnight soaking in 100 ppm ethrel solution	7.84	9.23	21.53	14.33
T ₅ : T ₁ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	5.87	6.83	14.30	10.53
T ₆ : T ₂ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	8.62	10.98	19.51	14.03
T ₇ : T ₃ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	8.19	10.13	20.73	14.63
T ₈ : T ₄ + GA ₃ spray (35ppm) at 90,120 and 150 DAP	9.50	11.06	23.30	15.93
CD(0.05)	1.80	1.72	2.54	3.52

Table AS-69-05: Effect of PGRs on leaf area index (at monthly interval)

Treatments	90DAP	120 DAP	150 DAP	180DAP	210DAP
T1: Conventional planting	1.40	1.65	1.97	2.35	1.80
T2: Planting of setts after overnight soaking in water.	1.64	1.96	2.36	2.76	2.06
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution	1.62	2.02	2.36	2.76	2.12
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution?	1.78	2.25	2.54	2.78	2.18
T5: T1+ GA ₃ spray (35ppm) at 90,120 and 150 DAP	1.38	1.78	2.17	2.50	1.82
T6: T2 + GA ₃ spray (35ppm) at 90,120 and 150 DAP	1.82	2.00	2.52	2.84	2.11
T7: T3 + GA ₃ spray (35ppm) at 90,120 and 150 DAP	1.76	2.00	2.64	2.93	2.10
T8: T4 + GA ₃ spray (35ppm) at 90,120 and 150 DAP	1.80	2.13	2.63	2.98	2.46
CD(0.05)	0.11	0.17	0.24	0.21	0.21

Project IV

AS-68: Impact of integrated application of organic and inorganic in improving soil health and sugarcane productivity.

Objectives: To develop nutrient management strategy for sustaining soil health and sugarcane productivity

The ratoon crop was initiated on 13th April, 2016 and harvested on 18th January, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P₂O₅/ ha) and medium in available K (215 Kg K₂O/ ha) with pH 5.13

Treatments:

T₁: Trash + 50% RDF

T₂ Trash + 100% RDF

T₃: Trash + soil test based recommendation

T₄: Application of FYM/Compost@20 tonnes/ha + 50% RDF (inorganic source)

T₅: Application of FYM/Compost@20 tonnes/ha + 100% RDF (inorganic source)

T₆: Application of FYM/Compost@20 tonnes/ha + soil test based fertilizer.

T₇: Application of FYM/Compost@10 tonnes/ha + bio-fertilizer (Azotobacter/Acetobacter + PSB) + 50% RDF

T₈: Application of FYM/Compost@10 tonnes/ha + bio-fertilizer (Azotobacter/Acetobacter + PSB) + 100% RDF

T₉: Application of FYM/Compost@10 tonnes/ha + bio-fertilizer (Azotobacter/Acetobacter + PSB) + soil test based fertilizer.

Result:

In the second year ratoon crop, application of FYM @10 tonnes /ha along with bio-fertilizer and inorganic fertilizer based on soil test recorded significantly the higher cane yield (44.79 t/ha) which is statistically at par with application of FYM @10 tonnes/ha along with bio-fertilizer (Azotobacter + PSB) and 100% RDF (44.09t/ha) and the yield recorded by application of FYM @20 tonnes/ha along with soil test based fertilizer (40.39t/ha) respectively (Table- AS-68-01).

Table AS-68-01: Effect of integrated application of organic and inorganic nutrients on yield and quality of sugarcane

Treatments	Plant Population 45DARI	No. of shoots (000/ha) 120DARI	No. of shoots (000/ha) 150DAP	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Cane yield (t/ha)	Sucrose (%)	CCS (%)
T ₁	58.01	62.30	64.69	39.35	2.00	2.30	27.08	17.14	12.33
T ₂	63.42	67.24	68.98	48.84	2.14	2.34	34.14	17.40	12.56
T ₃	66.20	71.64	74.99	49.31	2.14	2.40	35.07	17.52	12.65
T ₄	70.02	74.30	76.54	46.18	2.25	2.43	34.83	17.33	12.50
T ₅	63.54	70.13	73.37	50.22	1.83	2.36	36.62	17.45	12.40
T ₆	72.80	78.12	82.52	60.41	2.34	2.48	40.39	17.52	12.52
T ₇	65.28	71.29	75.56	51.04	2.08	2.41	37.27	17.31	12.47
T ₈	79.51	85.64	88.54	60.24	2.32	2.48	44.09	17.63	12.40
T ₉	81.13	89.58	91.89	62.95	2.34	2.52	44.79	17.65	12.40
CD 5 %	7.14	7.22	5.61	9.43	0.17	0.06	8.10	0.18	0.18

Table AS-68-02: Economics of cultivation

Treatments	Cost of cultivation/ha (Rs)	Gross return/ha (Rs)	B:C
Trash + 50% RDF	65,475.00	94780	1.45
Trash + 100% RDF	79,725.00	119490	1.50
Trash + soil test based RD	81,625.00	122745	1.50
FYM @20 tonnes/ha + 50% RDF	106,475.00	121905	1.14
FYMt@20 tonnes/ha + 100% RDF	120,725.00	128170	1.17
FYM/Compost@20 tonnes/ha + soil test basis	122,625.00	141365	1.06
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/Acetobacter + PSB) + 50% RDF	88,025.00	130445	1.50
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/Acetobacter + PSB) + 100% RDF	101,025.00	154315	1.55
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/Acetobacter + PSB) + soil test basis.	102875.00	156765	1.52

Project No V

AS-70: Scheduling irrigation with mulch under different sugarcane planting method

Objectives: To enhance crop and water productivity in sugarcane

Treatments:

Treatment (A): 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

Treatment (B): Irrigation schedule (IW/CPE)

I1: 0.60

I2: 0.80

I3: 1.00

The crop was planted on 18th April, 2016 and harvested on 7th March, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.75 %) and low in available P (17.6 kg P₂O₅/ ha) and medium in available K (234 Kg K₂O/ ha) with pH 5.14.

Result: The data on Effect on irrigation on combination of planting methods and mulch practice” is presented on table AS-70-1. Data revealed that no significant difference was observed among the irrigation schedule on yield and quality of sugarcane. However, the highest cane yield was recorded by paired row trench planting (30:120 cm row spacing) with organic mulching @ 6 t/ha (53.72 t/ha) which is statistically at par with paired row trench planting (30:120 cm row spacing without mulch (50.22 t/ha) but superior over other two planting methods. Moreover, no significant differences were recorded in case of quality of sugarcane.

Meteorological data-16

Month/year	Temperature °C	Total Rain Fall (mm)	No of rainy days	RH% (Avg)
	Maximum Range			
January, 16	16.5-26	Nil	Nil	83.3
February, 16	16.8-30	Nil	-	83.2
March, 16	22.2-33	76.3	6	83.4
April, 16	20.6-32	317.8	14	80.4
May,16	23-35	289.4	18	85.6
June,16	25-36	444.6	19	84.9
July,16	27-35	567.4	22	86
August,16	31-38.8	104.8	9	75.4
September, 16	31-34.8	230.2	12	76
October, 16	25-36	44.4	4	79
November, 16	22.4-33	16.8	4	84.8
December, 16	22-28.4	-	-	76.9
January, 2017	23.4-28.4	4	1	74
February, 2017	20-30.6	61	5	76.4
March, 2017	21-31.8	116.6	8	78