

**ALL INDIA COORDINATED RESEARCH
PROJECT ON SUGARCANE**



**TECHNICAL REPORT
(2013-14)**

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

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AGRONOMY

Project No AS-42

Title: Agronomic Evaluation of Promising Sugarcane Genotypes (Early group).

The experiment was conducted to work out agronomy of Sugarcane genotypes of advanced varietal trial (AVT) with the following genotypes:

- V1:** CoBln 04172 (17/99)
- V2:** CoBln 05501 (185/00)
- V3:** CoBln03172
- V4:** CoBln07501

In the experiment, there were three levels fertilizers viz.-

- F1:** 75% of the recommended dose of N
- F2:** 100% of the recommended dose of N
- F3:** 125% of the recommended dose of N

Plant Crop:

The genotypes were planted on 22nd March, 2013 and harvested on 12th February 2014. The experimental field was clay loam in texture, poor in organic carbon (0.35%), low in available P (16.4 kg P₂O₅/ha) and medium in available K (172 kg K₂O/ha) with ph 4.4

Result: The data on second year trial of effect of four early genotypes and three nitrogen levels is presented in Table AS-42-01. All the four genotypes showed significant differences in terms of growth and cane yield. Among the four genotypes CoBln07501 recorded significantly higher number of shoots (114.85 thousand/ha), higher cane yield (88.43 t/ha) which is statistically at par with CoBln 03172 which recorded 111.27 thousand/ ha and 87.29 t/ha respectively.

In case of different levels of nitrogen, application of 125% of RD of N recorded significantly higher number of shoots (113.79 thousand/ha) and millable canes (104.01 thousand/ha) than the other nitrogen levels. The same treatment also recorded significantly the highest cane yield (90.74t/ha) which is statistically at par with 100% RD of N (87.77 t/ha). However there were no significant differences recorded in case of juice quality parameters due to genotypes and nitrogen levels.

Table AS-42-01: Effect of genotypes (early group) and fertilizer levels on performance of Sugarcane. (Plant crop)

Treatments	Germ-ination (%)	No. of shoots (000/ha)	NMC (000/ha)	Cane length (m)	Cane dia-meter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes								
CoBln 04172 (17/99)	44.36	110.13	100.42	2.59	2.40	16.69	73.84	10.98
CoBln 05501 (185/00)	44.36	109.64	102.45	2.59	2.37	16.43	79.58	9.88
CoBln03172	43.14	111.27	102.12	2.62	2.42	16.12	87.29	10.66
CoBln07501	45.22	114.85	100.49	2.60	2.52	15.73	88.43	9.34
CD at 5%	NS	2.91	NS	NS	0.07	NS	8.10	NS
Fertility Levels								
F ₁ (75% of Recommended N)	41.17	109.0	92.51	2.54	2.41	16.29	77.38	9.93
F ₂ (100% of Recommended N)	46.55	111.47	100.09	2.61	2.38	16.11	87.77	10.57
F ₃ (125% of Recommended N)	47.46	113.79	104.01	2.59	2.46	16.33	90.74	10.14
CD at 5%	2.64	2.52	5.41	NS	NS	NS	7.01	NS

Ratoon Crop:

The first year ratoon crop was harvested on 25.02.2014.

Result: The data on growth, cane yield and quality parameters are presented in Table AS-42-02. All the four genotypes showed significant differences on growth and cane yield. Among the four genotypes, CoBln 03172 recorded significantly higher number of shoots (71.45 thousand/ha), number of millable canes (77.77 thousand/ha) and cane yield (66.25t/ha) followed by CoBln 07501 which recorded 71.18 thousand/ha, 73.84 thousand 63.87 t/ha respectively.

However no significant differences were recorded in terms other growth and juice quality parameters. In case of different nitrogen levels, application of 125% RD of N recorded

significantly higher number of millable canes (74.58 thousand/ha) and cane yield (64.53 t/ha) than the other two nitrogen levels

Table AS-42-02: Effect of genotypes (early group) and fertilizer levels on performance of Sugarcane. (Ratoon crop)

Treatments	No.of shoots (000/ha)	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes							
CoBln 04172 (17/99)	63.40	70.24	2.53	2.37	16.69	56.71	10.98
CoBln 05501 (185/00)	65.15	68.86	2.54	2.39	16.43	57.74	10.88
CoBln03172	71.45	77.77	2.57	2.41	16.12	66.25	10.67
CoBln07501	71.18	73.84	2.58	2.47	15.73	63.87	10.03
CD at 5%	4.94	2.80	NS	NS	NS	4.75	NS
Fertility Levels							
F ₁ (75% of Recommended N)	65.16	69.88	2.49	2.34	16.29	57.64	10.68
F ₂ (100% of Recommended N)	68.46	73.58	2.60	2.42	16.10	62.74	10.89
F ₃ (125% of Recommended N)	69.78	74.58	2.57	2.47	16.34	64.53	10.32
CD at 5%	NS	2.4	0.07	0.06	NS	4.12	NS

Pooled data of two plant crop and ratoon crop presented in table AS-42-03 indicated that there was no significant difference on cane yield was recorded among four genotypes. However, application of 125% RD of N recorded significantly the higher cane yield (75.23t/ha) followed by application of 100% RD of N (73. 87t/ha). Among the four genotypes, CoBln 04172 recorded significantly higher sucrose content (17.27%) followed by CoBln 05501 (16.96%), but no significant difference on CCS% was recorded due to genotypes, nitrogen levels and their interaction as well.

Table AS-42-03: Pooled data of two plant crop and one ratoon crop

Treatments	NMC (000/ha)	Yield (t/ha)	Sucrose%	CCS%
<u>Genotypes</u>				
CoBln 04172 (17/99)	75.87	70.51	17.27	11.50
CoBln 05501 (185/00)	81.10	72.78	16.96	11.13
CoBln03172	83.73	73.45	16.90	11.35
CoBln07501	82.61	72.76	16.19	10.44
CD at 5%	5.27	NS	0.75	NS
<u>Fertility Levels</u>				
F ₁ (75% of Recommanded N)	76.70	69.03	16.89	11.07
F ₂ (100% of Recommanded N)	82.11	73.87	16.77	11.19
F ₃ (125% of Recommanded N)	82.92	75.23	16.83	11.06
CD at 5%	4.56	4.91	NS	NS

Title: Agronomic Evaluation of Promising Sugarcane Genotypes (Mid-late group).

The experiment was conducted to work out the agronomy of Sugarcane genotypes of advanced varietal trial (AVT) with the following genotypes:

V1: CoBln 07502

V2: CoBln 07503

V3:CoBln04174 (12/99)

V4: CoBln05502 (11/00)

In the experiment, there were three levels fertilizers viz.-

F1: 75% of the recommended dose of N

F2: 100% of the recommended dose of N

F3: 125% of the recommended dose of N

The genotypes were planted on 28 March, 2013 and harvested on 8th April, 2014. The experimental field was clay loam in texture, poor in organic carbon (0.35%), low in available P (16.4 kg P₂O₅/ha) and medium in available K (172 kg K₂O/ha) with ph 4.5.

Results: Among the four mid-late genotypes, CoBln 04174 recorded significantly the highest cane yield (79.28t/ha) which is statistically at par with CoBln 07503 (79.14 t/ha). The same genotypes also recorded significantly the highest number of shoots (101.42 thousand/ha) and number of millable canes (93.41 thousand/ha), respectively.

In case of different levels of nitrogen significant differences on cane yield and its attributing characters were recorded. Application of 125% RD of N recorded significantly the higher number of millable canes (93.72 thousand/ha) and cane yield (82.71 t/ha) which is at par with the application of 100% RD of N which registered NMC (90.23 thousand/ha) and cane yield (80.11 t/ha), respectively. But, there was no significant differences observed on juice quality parameters among the four genotypes, nitrogen levels and their interaction as well.

Table AS-42-04: Effect of genotypes (mid-late group) and fertilizer levels on performance of Sugarcane. (Plant crop)

Treatments	Germination (%)	No. of shoots (000/ha)	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
<u>Genotypes</u>								
CoBln 07502	43.34	86.48	80.33	2.46	2.36	17.60	69.21	11.38
CoBln 07503	43.26	98.63	91.40	2.51	2.40	17.62	79.14	11.38
CoBln04174 (12/99)	43.55	101.42	93.41	2.49	2.45	17.95	79.28	11.71
CoBln05502 (11/00)	40.02	92.73	87.94	2.54	2.48	17.22	74.17	11.06
CD at 5%	1.84	4.08	4.48	NS	NS	NS	8.46	NS
<u>Fertility Levels</u>								
F ₁ (75% of Recommended N)	39.82	90.40	86.13	2.50	2.43	17.84	68.66	11.66
F ₂ (125% of Recommended N)	43.24	97.44	90.23	2.49	2.42	17.58	80.11	11.39
F ₃ (125% of Recommended N)	44.58	103.27	93.72	2.51	2.42	17.36	82.71	11.10
CD at 5%	1.59	4.34	2.81	NS	NS	NS	7.32	NS

Ratoon crop: The crop was harvested on 8.04.2014

The data on cane yield, its attributing characters and juice quality parameters of first year ratoon crop is presented in Table AS-42-05. From the table it is depicted that there was no significant difference observed on cane yield and its quality parameters observed among the four genotypes. However, application of different nitrogen levels showed significant difference on cane and juice quality parameters. The highest cane yield (67.17t/ha) was recorded when 125% RD of N was applied which is statistically superior to 75% RD of N which recorded cane yield (57.17 t/ha) but statistically at par with 100 % RD of N which registered cane yield (65.21 t/ha).

Table AS-42-05: Effect of genotypes (mid-late group) and fertilizer levels on performance of Sugarcane. (Ratoon crop)

Treatments	No. of shoots (000/ha)	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes							
CoBln 07502	82.13	72.26	2.48	2.40	16.22	65.11	10.70
CoBln 07503	85.14	75.96	2.49	2.40	16.15	64.12	10.56
CoBln04174 (12/99)	81.27	73.29	2.52	4.45	16.03	64.51	10.46
CoBln05502 (11/00)	75.65	65.93	2.51	2.39	15.80	59.47	10.46
CD at 5%	4.58	4.95	NS	NS	NS	NS	NS
Fertility Levels							
F ₁ (75% of Recommended N)	77.77	68.49	2.46	2.35	16.12	57.53	10.64
F ₂ (100% of Recommended N)	81.82	73.08	2.50	2.43	15.96	65.21	10.27
F ₃ (125% of Recommended N)	83.56	74.01	2.55	2.45	16.14	67.17	10.73
CD at 5%	3.96	4.29	NS	0.07	NS	4.538	0.30

Pooled data of two plant crop and ratoon crop presented in table AS-42-06. Among the four mid-late genotypes, CoBln 07503 significantly recorded the highest cane yield (71.19 t/ha) which is statistically at par with CoBln 04174 (70.59 t/ha). In case of nitrogen levels, application of 125% RD of N recorded significantly higher yield (73.65 t/ha) which is statistically at par 100% RD of N (72.06t/ha). However there was no significant difference observed on Juice quality among genotypes, nitrogen levels and their interaction as well.

Table AS-42-06: Pooled data of two plant and one ratoon crop

Treatments	NMC (000/ha)	Yield (t/ha)	Sucrose%	CCS%
<u>Genotypes</u>				
CoBln 07502	81.8	67.68	11.36	11.36
CoBln 07503	83.06	71.19	11.33	11.33
CoBln04174 (12/99)	81.75	70.59	11.22	11.22
CoBln05502 (11/00)	77.08	65.38	11.11	11.11
CD at 5%	2.4	4.35	NS	NS
<u>Fertility Levels</u>				
F ₁ (75% of Recommended N)	77.71	63.61	11.29	11.29
F ₂ (100% of Recommended N)	81.38	72.06	11.25	11.25
F ₃ (125% of Recommended N)	83.68	73.65	11.22	11.22
CD at 5%	2.1	3.77	NS	NS

Project No: AS-64

Title: Response of sugarcane crop to different plant nutrients in varied agro ecological situations

The experiment was laid out with the objective to study the differential response of sugarcane crop to different nutrients. The experimental crop var. Borak (Co Bln 9103) was planted on 5th April 2013 and harvested on 7th March, 2014. The experimental field was clay loam in texture, poor in organic carbon (0.46%), low in available P (18.22 kg P₂O₅/ha) and medium in available K (174 kg K₂O/ha) with pH 4.8. The available Fe, Mn and Zn in experimental plot were 68.4 ppm, 5.8 ppm and 0.71 ppm respectively.

The treatments for the experiments were as follows:

1. Control (No Fertilizer)
2. N
3. NP
4. NPK
5. NPK+S
6. NPK+Zn
7. NPK+Fe
8. NPK+Mn
9. NPK+S+Zn
10. NPK+S+Zn+Fe
11. NPK+S+Zn+Fe+Mn
12. Soil test based fertilizer application
13. FYM@20 t/ha

Results: Application of different plant nutrients (Table-AS-64-01) showed significant variances in number of shoots, number of millable canes (NMC) , cane length ,cane diameter, cane yield. The maximum cane yield (98.6 t/ha) was obtained when S, Zn, Fe, Mn was applied along with the recommended dose of fertilizer (T₁₁) which is statistically at par with the soil test based fertilizer application (97.6 t/ha). However, application of different plant nutrients recorded statistically superior yield over control (T₁).

Similar trend was recorded in case of other yield attributing parameters. However no significant difference was recorded on juice quality parameters.

Table AS-64-01: Effect of different plant nutrients on growth and yield of sugarcane

Treatments	Germination%	No of shoots ('000/ha)	NMC ('000/ha)	Cane Length (m)	Cane Diameter (cm)	Yield (t/ha)	Sucrose (%)	CCS (%)
T ₁	39.7	78.00	75.2	2.4	2.4	56.6	18.4	11.7
T ₂	41.7	81.12	80.2	2.4	2.5	66.2	18.8	12.3
T ₃	37.9	75.34	75.0	2.6	2.5	76.1	19.0	12.6
T ₄	47.4	87.49	85.6	2.5	2.5	88.3	19.4	12.9
T ₅	47.4	90.16	90.6	2.6	2.5	91.4	19.3	12.9
T ₆	46.5	88.30	87.2	2.5	2.5	96.8	19.2	12.7
T ₇	48.0	91.20	89.0	2.6	2.5	87.2	19.8	13.1
T ₈	45.1	85.76	85.8	2.5	2.6	88.2	19.6	12.8
T ₉	44.1	83.91	84.6	2.6	2.6	95.0	19.5	12.8
T ₁₀	47.4	89.12	89.1	2.6	2.7	93.4	19.4	12.7
T ₁₁	50.4	94.96	92.7	2.7	2.7	98.6	19.6	12.9
T ₁₂	49.0	92.47	90.0	2.7	2.7	97.6	20.1	13.3
T ₁₃	40.7	81.36	78.9	2.5	2.4	79.4	19.2	12.8
SEM (±)	7.43	5.90	5.33	0.06	0.05	5.86	0.71	0.54
CD (5%)	NS	9.95	8.98	0.10	0.09	10.58	NS	NS

Project No: AS-66

Title: Priming of cane node for accelerating germination.

The experiment was conducted with a view to find out suitable cane node priming technique and to assess the effect of cane node on acceleration of germination.

The experimental crop var. Kolong (CoBln 9102) was planted on 9th of April, 2013 and was harvested on 17th of March, 2014. The experimental soil was clay loam in texture, poor in organic carbon (0.48 %) and low in available P (19.55 kg P₂O₅/ ha) and medium in available K (176 Kg K₂O/ ha) with pH 5.1.

The treatments were:

T₁ : Un- primed cane node

T₂ : Treating cane node in hot water at 50⁰ C for 2 hours.

T₃ : Treating cane node in hot water (50⁰ C) and urea solution (0.3 %) for 2 hrs.

T₄ : Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio.

T₅ : Conventional 3-bud sett planting.

T₆ : Primed and sprouted cane node (incubated for four days after priming)

Results: Priming of cane node showed varied germination percentages as data shown in the Table AS-66-01. Out of different treatments, conventional 3-bud sett planting (T₅) showed significantly higher germination% at different days after planting than all other treatments. The germination percentages 13.0, 37.6, 44.1 and 47.9 were recorded in 10, 20, and 30 and 40 days after planting respectively which were statistically significant in comparison to other cane node treatments.

Table AS-66-01: Effect of primed cane node on germination

Treatments	Germination (%)			
	10 DAP	20 DAP	30DAP	40 DAP
T ₁	4.2	17.7	28.70	37.80
T ₂	6.4	20.3	32.20	38.50
T ₃	9.2	22.4	33.10	38.80
T ₄	8.7	26.0	34.1	40.2
T ₅	13.0	37.6	44.1	47.9
T ₆	4.7	11.4	16.8	27.20
SEm	1.5	2.56	2.7	3.11
CD 5%	2.26	3.85	4.07	4.68

Application of different treatments showed significant differences in other parameters such as number of shoots as well as number of shoots / clump recorded at different days after planting.

Out of different treatments, conventional 3 bud- sett planting technique recorded significantly higher number of shoots 81.4, 91.0, 95.3 and 104.4 thousand/ha, respectively at 60, 90, 120 & 150 DAP. Similarly, the same treatment recorded highest number of shoots / clumps 2.8, 3.0 respectively at 120 DAP & 150 DAP. However no significant differences in number of shoots / clump were observed in early growth stage.

Table AS-66-02: Effect of primed cane node on numbers of shoots and shoots per Clump

Treatments	No. of shoots(*000/ha)				No. of shoots per clump			
	60 DAP	90 DAP	120 DAP	150 DAP	60 DAP	90 DAP	120 DAP	150 DAP
T ₁	65.8	72.5	77.5	88.9	1.3	1.5	2.2	2.4
T ₂	66.6	74.3	80.5	92.2	1.3	1.5	2.3	2.5
T ₃	68.1	76.6	83.6	94.1	1.3	1.5	2.5	2.8
T ₄	69.4	77.7	84.5	95.5	1.3	1.5	2.5	2.7
T ₅	81.4	91.0	95.3	104.4	1.4	1.6	2.8	3.0
T ₆	55.6	59.0	65.5	75.1	1.4	1.5	1.9	2.2
SEm	5.69	4.02	3.73	2.89	0.08	0.06	0.11	0.16
CD5%	8.56	6.05	5.61	4.35	NS	NS	0.17	0.24

Table AS-66-03. Effect of primed cane node on yield and quality parameters

Treatments	NMC ('000/ha)	Cane length (m)	Cane Diameter (cm)	Yield (t/ha)	Sucrose (%)	CCS (%)	Purity (%)
T ₁	81.3	2.5	2.5	61.4	20.0	13.1	79.6
T ₂	85.1	2.5	2.6	79.2	20.0	13.1	80.3
T ₃	86.6	2.5	2.6	82.5	19.9	13.3	79.6
T ₄	87.7	2.5	2.4	85.8	19.8	12.9	79.3
T ₅	96.1	2.5	2.5	90.4	19.7	12.8	78.6
T ₆	71.0	2.5	2.4	71.7	19.9	13.1	80.5
SEM	2.78	0.11	0.07	8.67	0.29	0.27	1.14
CD 5 %	4.18	NS	0.11	13.06	NS	NS	NS

Moreover, similar trend was observed in case of other yield attributing parameters such as NMC ('000/ha), cane Diameter (cm) & yield (t/ha). Result showed that conventional 3 bud sett planting recorded significantly higher NMC (96.1 thousand/ha), cane diameter (2.5cm) and yield (90.4 tonnes/ha), respectively than all other treatments (Table AS-66-03). However, all other priming technique showed significantly higher yield than the un-primed cane node.

Table: Meteorological Data

Month/year	Temperature (°C)			RH%	Rainfall (mm)	No of rainy days
	Max	Min	Avg			
March/13	34	13	22	70.53	98.2	8
April/13	35	16	23	81.6	90.6	17
May/13	36	19	26	87.6	291	26
June/13	40	24	29	85.5	245	12
July/13	38	24	29	89.4	389	25
August/13	39	23	29	88.9	393	22
September/13	39	23	28	90.00	194	9
October/13	35	16	25	90.70	153	9
November/13	30	7.5	18	86.5	5.6	1
December/13	30	2.8	15	88.1	10.2	2
January/14	30	3.7	15	85.9	7.8	2
February/14	31	5.8	17	83	25.6	5