

PERFORMANCE OF NEW MID LATE SUGARCANE GENOTYPES UNDER DIFFERENT NITROGEN LEVELS IN NORTH COASTAL ZONE OF ANDHRA PRADESH

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ABSTRACT

A field experiment was conducted at Regional Agricultural Research Station farm, Anakapalle with an objective to determine ideal amount of nitrogen requirement for mid-late Sugarcane genotypes during the year 2024-25. Three new sugarcane genotypes viz., 2015A230 (CoA20325), 2015A233 (CoA20326), 2015A93 (CoA) along with check variety 2009A252 (CoA14323) were tested at four nitrogen levels viz., FYM @ 25 t ha⁻¹ + 100% recommended dose of Nitrogen (F1), FYM @ 25 t ha⁻¹ + 125% recommended dose of Nitrogen (F2), FYM @ 25 t ha⁻¹ + 150% recommended dose of Nitrogen (F3) and application of 100% recommended dose of Nitrogen + *In situ* incorporation of sunhemp sown as intercrop (F4). The recommended dose was 168 kg N ha⁻¹. The trial was conducted in Factorial RBD with three replications. The findings of the study showed that, the genotypes 2015A233 (85.6 t ha⁻¹) and 2015A230 (82.1 t ha⁻¹) recorded considerably greater cane yield in comparison to the other genotype 2015A93 (77.7 t ha⁻¹) and check variety 2009A252 (79.2 t ha⁻¹). Among the four nitrogen levels new mid late sugarcane genotypes produced superior cane yield with application of FYM @ 25 t ha⁻¹ + 150% RDN (84.3 t ha⁻¹) and 100% RDN + Sunhemp grown as intercrop and *in situ* incorporation (83.4 t ha⁻¹). Application of FYM @ 25 t ha⁻¹ + 100% Recommended dose of Nitrogen recorded significantly lower cane yield of 76.9 t ha⁻¹. There was no difference in the juice quality parameters for different treatments, however 2015A233 recorded high sucrose percent of 18.8. Among nitrogen levels, application of 100% RDN + Sunhemp grown as intercrop and *in situ* incorporation recorded high sucrose percent of 18.1.

Key words: FYM, Nitrogen levels, Sugarcane genotypes, Sunhemp incorporation

INTRODUCTION

In Andhra Pradesh, the cultivated area of sugarcane is gradually decreasing due to several reasons. Identification of suitable high yielding sugarcane genotypes is need of the hour to increase the cultivated area and cane productivity under current situation. Several

studies (Ahmed *et al.*, 2020, Yousif *et al.*, 2021 and Yousif *et al.*, 2023) showed significant variation in yield and juice quality across sugarcane genotypes. Promising genotypes are being developed through various approaches of plant breeding and suitable agro-techniques holds the key for realizing high sugarcane

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productivity of the new genotypes. New genotypes may need different management requirements, nutrient management in particular. The primary causes for lower cane yield are a lack of high-potential cultivars, restricted irrigation supplies and technology (Bahadar *et al.*, 2002). Larger cane output is the function of higher genetic potential of a variety. India's sugarcane yield is relatively low due to a number of problems, including inadequate crop management, poor soil conditions, biotic and abiotic stresses, etc. Balanced use of plant nutrients is essential for maintaining the soil and crop productivity (Yadav *et al.*, 2014). A trial was conducted during 2024-25 with an objective to identify suitable new mid late sugarcane genotypes and their performance at different nitrogen levels in North Coastal Zone of A.P.

MATERIAL AND METHODS

An experiment was conducted during 2024-25 at Regional Agricultural Research Station, Anakapalle to assess the performance of three new mid late sugarcane genotypes namely 2015A230, 2015A233 and 2015A93 along with the check 2009A252 (Naveen) under four different nitrogen levels i.e F1- Application of FYM @ 25 t ha⁻¹+100% Recommended Dose of Nitrogen, F2- FYM @ 25 t ha⁻¹+125% Recommended Dose of Nitrogen, F3-FYM @ 25 t ha⁻¹+150% and F4- Application of 100% N + sunnhemp intercrop and *in situ* incorporation with a view to identify suitable genotype and its response to varied levels of nitrogen. The experiment was laid out in factorial randomized block design with three replications. Trial was conducted at Regional Agricultural Research Station, Anakapalle during the final week of March, 2024. The soil type of the experimental site was sandy loam with a pH of 7.1, E.C 0.57 dSm⁻¹, OC 0.60, available nitrogen (263 Kg ha⁻¹) phosphorus (90.5 Kg ha⁻¹) and potassium (267 Kg ha⁻¹). All the suggested package of

practices are used for raising a good and healthy crop. Number of tillers were counted at 90 and 120 DAP and shoot population was counted at 180 and 240 DAP. Ten canes were chosen at random from each plot and data were recorded on yield parameters like cane length, girth and number of internodes. These samples were crushed and juice quality (brix, sucrose and purity) was analyzed. Number of millable canes and cane yield were observed at harvest on plot basis and reported in numbers and tons / hectare respectively. Sugar yield was determined based on cane yield and CCS percent. Available sucrose percent in cane juice was calculated by using the following formula:

$$\text{Available sugar percent (CCS)} = \{S - \{0.4(B - S)\} \times 0.73$$

Where, S = Sucrose percent in juice ,
B = Corrected brix of juice, and
0.4 & 0.73 are constants

The sugar yield per hectare at harvesting stage was computed as follows:

$$\text{Sugar Yield} =$$

$$\frac{\text{Available sugar percent (CCS)} \times \text{Cane Yield (t/ha)}}{100}$$

RESULTS AND DISCUSSION

Germination Percent

Percentage of germination was recorded at 35 days after planting expressed as % and presented in table-1. Germination percentage did not vary significantly due to use of different doses of nitrogen fertilizers. Among the new sugarcane genotypes, 2015A233 (82.0 %) and 2015A230 (81.3%) recorded significantly higher germination percentage than the check variety 2009A252 (79.7%). 2015A93 genotype recorded significantly lower germination percent of 74.2%.

No. of millable canes

2015A233 recorded significantly higher number of millable canes ($73,550 \text{ ha}^{-1}$) followed by 2015A230 ($72,024 \text{ ha}^{-1}$) as compared to the check variety 2009A252 ($67,245 \text{ ha}^{-1}$). 2015A93 recorded lowest number of millable canes ($67,892 \text{ ha}^{-1}$) as compared to the 2015A230 and 2015A233. Among different nitrogen levels, application of 100% N + Sunnhemp intercrop and *in situ* incorporation ($72,832 \text{ ha}^{-1}$) and FYM @ $25 \text{ t ha}^{-1}+150\%$ ($72,129 \text{ ha}^{-1}$) recorded greater cane yield as compared to the FYM @ $25 \text{ t ha}^{-1}+100\%$ RDN. Higher dose of nitrogen reduced tiller mortality besides improving tiller production capability of the genotypes, nitrogen nutrition also helped and maintained the retention of tillers (Shukla, 2003).

Cane Yield (t/ha)

Genotype 2015A233 recorded noticeably increased cane yield (85.6 t ha^{-1}) followed by 2015A230 (82.1 t ha^{-1}) as compared to the check variety 2009A252 (79.2 t ha^{-1}). Higher cane length, more number of inter nodes, greater number of millable canes coupled with higher girth (Table 1) contributed to higher cane yield of 2015A233 genotype. Among all, 2015A93 recorded lowest cane yield of 77.7 t ha^{-1} (Fig.1). Among different nitrogen levels application of FYM @ $25 \text{ t ha}^{-1}+150\%$ RDN recorded significantly greater cane yield (84.3 t ha^{-1}) but comparable with the 100% RDN + Sunnhemp intercrop and *in situ* incorporation (83.4 t ha^{-1}) and application of FYM @ $25 \text{ t ha}^{-1}+125\%$ RDN (81.1 t ha^{-1}) as compared to the application of FYM @ $25 \text{ t ha}^{-1}+100\%$ Recommended dose of Nitrogen (76.9 t ha^{-1}). The increase in cane yield with increase in nitrogen application in sugarcane was due to the increase in yield attributing characters like number of millable canes, number of inter nodes, length of internodes etc., The role of nitrogen in chlorophyll formation and carbohydrate

metabolism is well known. Hence, improvement in millable cane count and yield at high doses of N application might be due to more availability and absorption of the nutrients nitrogen and in build character of the genotypes to respond to high levels of fertilizer 'N' (Shankar *et al.*, 2018). Pandey and Shukla (2001) also reported the increased cane yield due to the interventions of effective agro-techniques particularly nitrogen management on productivity of sugarcane genotypes.

Juice Quality

Sucrose content is the most crucial quality indicator for sugar milling, hence the higher the better. Under the conditions of the present study, 2015A233 genotype showed increased sucrose content and application of 100% N + Sunnhemp intercrop and *insitu* incorporation recorded highest juice sucrose per cent of 18.1. The greater N supply will lead to the decrease of sucrose content in cane (Deo *et al.*, 2011). These outcomes are consistent with Chitkala Devi *et al.*, 2022 and Gouri *et al.*, 2017.

Sugar Yield (t ha⁻¹)

Cane yield and sugar yield both showed a similar pattern. New mid late genotype 2015A233 recorded higher sugar yield (11.7 t ha^{-1}) followed by 2015A230 (10.0 t ha^{-1}) as compared to the check variety 2009A252 (9.8 t ha^{-1}). High sucrose content coupled with high cane yield resulted in greater sugar yield of 2015A233. Among all, 2015A93 recorded lowest sugar yield of 9.7 t ha^{-1} . Among various nitrogen levels, 100% RDN + Sunnhemp intercrop and *in situ* incorporation (11.1 t ha^{-1}) and application of FYM @ $25 \text{ t ha}^{-1}+150\%$ RDN (10.5 t ha^{-1}) recorded higher sugar yield which was comparable with the application of FYM @ $25 \text{ t ha}^{-1}+100\%$ Recommended dose of Nitrogen (9.8 t ha^{-1}). Singh *et al.*, 2001 also

Table 1. Growth parameters of sugarcane genotypes as influenced by different levels of nitrogen (Plant Crop) during 2024-25

Treatment	Percent germination	No. of Internodes	Girth of the cane (cm)	Length of Millable cane (cm)	NMC ha ⁻¹	Cane yield (t ha ⁻¹)
V1-2015A230	81.3	22.0	2.14	178.1	72,024	82.1
V2-2015A 233	82.0	23.0	2.17	209.4	73,550	85.6
V3-2015A 93	74.2	19.0	1.70	131.3	67,892	77.7
V4-2009A252	79.7	21.0	2.13	190.8	67,245	79.2
SEm+	1.54	0.741	0.068	9.843	928	1.12
C.D. (0.05)	4.5	2.141	0.196	28.428	2679	3.24
F1- FYM @ 25 t/ha+100% Rec. N	76.0	21.0	2.04	177.733	66,643	76.9
F2- FYM @ 25 t/ha+125% Rec. N	78.5	22.0	2.03	184.233	69,107	81.1
F3-FYM @ 25 t/ha+150% Rec. N	81.9	23.0	2.10	181.708	72,129	84.3
F4- 100% N + Sunnhemp intercrop and <i>insitu</i> incorporation	80.8	22.0	2.00	165.933	72,832	83.4
C.D. (0.05)	NS	2.141	0.196	28.428	2679	3.24
C.V. %	6.4	12.1	11.6	12.0	6.0	5.3
Interaction	NS	NS	NS	NS	NS	NS

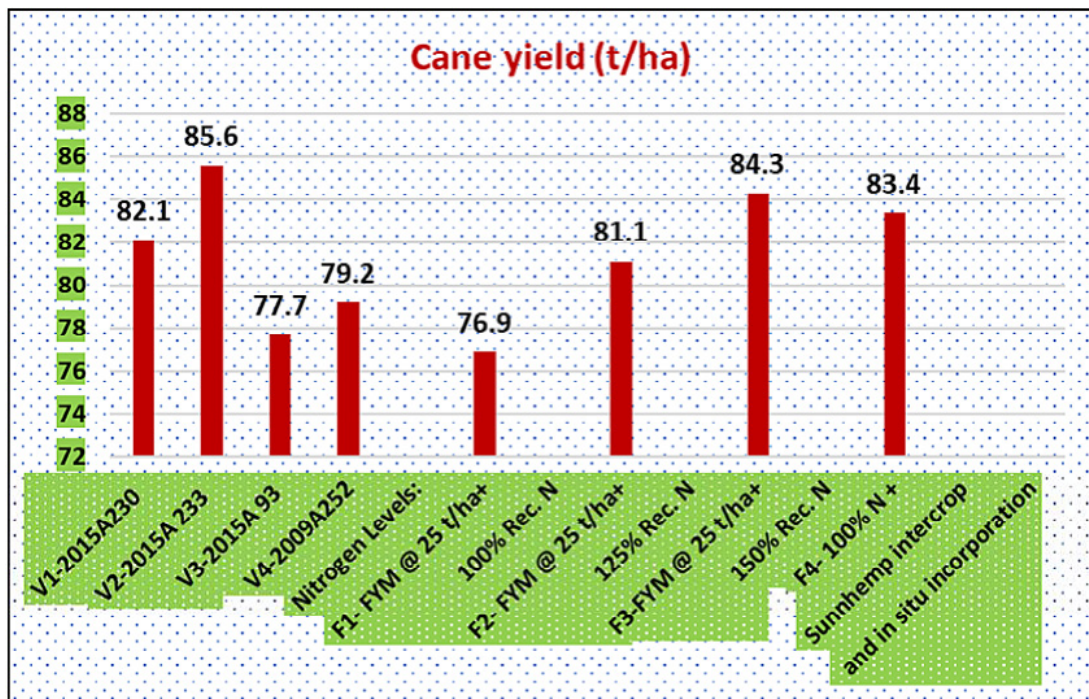
**Fig.1 Cane yield of sugarcane genotypes as influenced by different levels of nitrogen during 2024-25 (Plant Crop)**

Table 2. Quality of sugarcane genotypes as influenced by different levels of nitrogen during 2024-25 (Plant Crop)

Treatment	Percent juice sucrose	CCS%	Sugar yield (t ha ⁻¹)
Sugarcane genotypes:			
V1-2015A230	17.1	12.2	10.0
V2-2015A 233	18.8	13.7	11.7
V3-2015A 93	17.8	12.8	9.7
V4-2009A252	17.3	12.4	9.8
SEm+	0.541	-	-
C.D. (0.05)	NS	NS	-
Nitrogen Levels:			
F1- FYM @ 25 t ha ⁻¹ +100% Rec. N	17.7	12.7	9.8
F2- FYM @ 25 t ha ⁻¹ +125% Rec. N	17.5	12.5	10.1
F3-FYM @ 25 t ha ⁻¹ +150% Rec. N	17.6	12.5	10.5
F4- 100% N +Sunhemp intercrop and <i>in situ</i> incorporation	18.1	13.3	11.1
C.D. (0.05)	NS	-	-
C.V. %	10.6	NS	-
Interaction	NS	NS	-

reported the variation in sugar yield among various genotypes and levels of nitrogen.

CONCLUSION

Among new mid late sugarcane genotypes tested, 2015A233 followed by 2015A230 performed well at various nitrogen levels and were found promising and are best suitable for N.C zone of A.P. Among the nitrogen levels studied, FYM @ 25 t ha⁻¹+150% RDN (84.3 t ha⁻¹) recorded greater cane yield which was comparable with 100% N + Sunhemp intercrop and *in situ* incorporation (83.4 t ha⁻¹) and FYM @ 25 t ha⁻¹+125% recommended dose of nitrogen. Application of 100% N + Sunhemp intercrop and *in situ* incorporation and application of FYM @ 25 t ha⁻¹+125% recommended dose of nitrogen is recommended for sustainable sugarcane

production as it was proven to be the most cost-effective and resource-saving.

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