



Research Article

PERFORMANCE OF NEW PROMISING EARLY MATURING SUGARCANE GENOTYPES UNDER GRADED LEVELS OF NITROGEN

T. CHITKALA DEVI*, M. BHARATHA LAKSHMI, MBGS KUMARI AND D. NAGARJUNA

Regional Agricultural Research Station, Anapalle, 531001, Acharya N. G. Ranga Agricultural University, Lam, 522034, India

*Corresponding Author: Email - ps.sugarcane@angrau.ac.in

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Abstract: The field experiment was conducted during three consecutive years 2018-19, 2019-20 and 2020-21 at Regional Agricultural Research Station to study the response of new promising early maturing sugarcane genotypes to graded levels of nitrogen under irrigated conditions. The experiment was laid out in factorial RBD design three replications during all the three years of experimentation. The results of the study indicated that, new promising early maturing sugarcane genotypes viz., 2010A 229 (86.9 t/ha) or 2009A 107 (83.7 t/ha) or 2006A 223 (84.1 t/ha) gave significantly higher cane yield when compared to check variety 2003A255 (83.0 t/ha.) Application of 150% recommended dose of nitrogen along with FYM @ 25 t/ha recorded significantly higher cane yield (89.1 t/ha) when compared to 100% recommended dose of Nitrogen (80.5 t/ha) or 125% recommended dose of Nitrogen (83.5 t/ha) along with FYM @ 25 t/ha. The interaction effect between sugarcane genotypes and nitrogen levels found non significant. Juice sucrose percent differed due to different genotypes under test and with different levels of nitrogen. Among the genotypes tested, higher juice sucrose value was recorded with variety 2009 A 107 (19.15 %) closely followed by 2010A 229 (18.7%). Highest juice sucrose percent was noticed with 100 % recommended nitrogen (19.11 %) and with increase in dose of nitrogen application to 150% recommended dose, the juice sucrose values tended to decrease significantly. Commercial Cane Sugar Yield followed the same trend as that of cane yield in different treatments.

Keywords: Early maturing sugarcane genotypes, Nitrogen levels, Juice sucrose, Cane yield.

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Introduction

Sugarcane is one of the important commercial crops grown in Andhra Pradesh. Balanced application of nutrients is the major factor responsible for growth and development of sugarcane. The beneficial effect of Nitrogen, Phosphorus and Potassium on yield and quality is a well-established factor. The differential response of sugarcane varieties to varied doses of NPK nutrients was noticed by many research workers [1-4]. Nitrogen is very important for sugarcane yield improvement, but the excessive application of N fertilizer brings about N pollution and a cost increase [5]. Presently, several varieties are being released and are becoming promising. Studies conducted at Regional Agricultural Research Station, Anapalle indicated that new promising early maturing sugarcane genotypes 93A 145, 97A 85 and 2001A63 responded well upto 125% recommended dose of nitrogen and recorded significantly higher cane yield than 100% recommended nitrogen. Asokan *et al.*, (2005) [6] reported that, though the uptake of nitrogen increased with increased nitrogen application, cane yield did not show any significant increase with N applications above 100 kg ha⁻¹. Sarala *et al.*, (2020) [7], reported that effect of nitrogen levels on juice quality parameters was not significant. Hence, it is necessary to work out optimum nitrogen requirement for promising sugarcane genotypes before release for commercial cultivation to exploit their yield potential to maximum extent.

Materials and methods

Field experiment to study the response of sugarcane varieties to graded levels of nitrogen was conducted during 2018-19, 2019-20 and 2020-21 years with three new early maturing sugarcane genotypes (2009A 107, 2006A 223 and 2010A 229) along with check 2003A 255 under three nitrogen levels (FYM @ 25 t/ha+100% recommended dose of Nitrogen, FYM @ 25 t/ha+125% recommended dose of Nitrogen and FYM @ 25 t/ha+150% recommended dose of Nitrogen) in factorial RBD replicated thrice.

The experimental soil was sandy loam, low in nitrogen, medium in phosphorous and high in potassium. Phosphorous @ 100 kg/ha and Potassium @ 120 kg/ha were applied as basal. Whereas, Nitrogen was applied in equal splits at 45 and 90 days after planting as per the treatments. Other cultural operations viz., weeding, earthing up and trash twist propping were followed in time. The crop was harvested manually at its physiological maturity.

Results and Discussion

Data on juice sucrose percent, number of millable canes and cane yield were recorded at harvest and presented in [Table-1]. The pooled analysis data for three years (2018-19 to 2020-21) showed that, number of millable canes at harvest varied significantly due to different sugarcane genotypes as well as levels of nitrogen. Significantly higher number of millable canes were recorded with promising genotypes 2010A 229 (76,478 /ha), 2006A 223 (74,245 /ha) and 2009A 107 (73,561 /ha) when compared to check variety 2003A 255 (72,902 /ha). Application of 150 % recommended dose of nitrogen along with 25t FYM/ha registered significantly highest number of millable canes (78,690 /ha) over 100 % recommended nitrogen and was on par with 125 % recommended dose of nitrogen. The more millable canes at higher levels of Nitrogen might be due to availability of nutrients sufficient to meet the requirement of the cane per unit area. Higher number of millable canes per unit area with increasing dose of nitrogen was also observed by Saleem, *et al.*, (2012) [8] and Zeng, *et al.*, (2020) [9].

In respect of cane yield all the new promising early maturing sugarcane genotypes viz., 2010A 229 (86.9 t/ha) or 2009A 107 (83.7 t/ha) or 2006A 223 (84.1 t/ha) gave significantly higher cane yield when compared to check variety 2003A255 (82.9 t/ha.) Application of 150% recommended dose of nitrogen along with FYM @ 25 t/ha recorded significantly higher cane yield (89.1 t/ha) when compared to 100% recommended dose of Nitrogen (80.5 t/ha) or 125% recommended dose of Nitrogen (83.5 t/ha) along with FYM @ 25 t/ha.

Table-1 Yield and quality of early maturing sugarcane genotypes as influenced by different levels of nitrogen

Treatment	Percent juice sucrose				NMC / ha				Cane yield (t/ha)				Sugar yield (t/ha)			
Varieties:	2018-19	2019-20	2020-21	Mean	2018-19	2019-20	2020-21	Mean	2018-19	2019-20	2020-21	Mean	2018-19	2019-20	2020-21	Mean
V1-2009A107	19.48	19.19	18.8	19.15	73,702	71,445	75,535	73,561	84.2	82.2	84.6	83.7	12.1	11.6	11.7	11.8
V2-2006A223	18.98	18.59	18.5	18.68	71,918	74,210	76,607	74,245	82.2	84.4	85.8	84.1	11.4	11.4	11.4	11.4
V3-2010A229	19.15	18.86	18.9	18.97	76,117	75,516	77,800	76,478	87.0	86.7	87.1	86.9	12.2	11.9	11.9	12.0
V4-2003A255	18.56	18.47	18.5	18.52	74,169	70,783	73,755	72,902	84.9	81.4	82.6	83.0	11.5	11.0	10.8	11.1
C.D. (0.05)	0.28	0.11	0.18	0.19	3,842	4,518	3,360	3,907	NS	2.9	3.3	3.10	-	-	-	-
C.V. %	10.1	3.4	2.7	7.2	10.2	7.5	9.2	8.8	6.3	8.5	7.7	9.1	-	-	-	-
Nitrogen Levels:																
F1-100% Rec. N	19.32	19.03	19.0	19.11	69,018	68,275	72,500	69,931	80.9	79.4	81.2	80.5	11.5	11.1	11.1	11.2
F2-125% Rec. N	19.11	18.79	18.8	18.89	73,810	72,087	75,060	73,652	83.5	82.9	84	83.5	11.7	11.3	11.3	11.4
F3-150% Rec. N	18.90	18.51	18.2	18.52	79,101	77,410	79,560	78,690	88.7	89.3	89.3	89.1	12.2	11.9	11.8	12.0
C.D. (0.05)	0.24	0.09	0.33	0.22	6,018	5,625	4,104	5,249	5.4	3.9	4.3	4.5	-	-	-	-
C.V. %	13.8	2.5	3.1	4.3	10.8	9.3	7.2	7.9	9.8	8.1	6.8	10.3	-	-	-	-
Interaction	NS	NS	NS		NS	NS	NS		NS	NS	NS		-	-	-	-

Rakkiyappan, 1991 [10], Abayomi, (1987) [11] and Thakur, *et al.*, (1991) [12] also reported an increased sugarcane yield with increased nitrogen application which might be due to the increased number of tillers and yield attributes like stalk length, stem diameter and number of millable canes. The interaction effect between sugarcane genotypes and nitrogen levels found non significant. Juice sucrose percent differed due to different sugarcane genotypes under test and with different levels of nitrogen. Among the varieties tested higher juice sucrose value was recorded with variety 2009 A 107 (19.15 %) closely followed by 2010A 229 (18.7%). Highest juice sucrose percent was noticed with 100 % recommended nitrogen (19.11%) and with increase in dose of nitrogen application to 150% recommended dose the juice sucrose values tended to decrease. This is in accordance with the finding of Fritz, (1974) [13], Hemlatha (2015) [14] and Wiedenfeld, (1997) [15]. Commercial Cane Sugar Yield followed the same trend as that of cane yield in different treatments.

Conclusion

From three years of experimentation, it can be concluded that, all the three promising early maturing sugarcane genotypes (2009A 107, 2006A 223 and 2010A 229) responded well upto 150% recommended dose of nitrogen along with 25 tons of FYM/ha and gave higher cane and sugar yields.

Application of research: Response of newly released sugarcane genotypes for nitrogen is to be studied to reap higher yields in the farmers fields.

Research Category: Sugarcane genotypes

Abbreviations: FYM-Farm Yard Manure

RBD-Randomized Block Design

NPK-Nitrogen, Phosphorous, Potassium

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****Principal Investigator or Chairperson of research:** Dr T. Chitkala Devi

University: Acharya N. G. Ranga Agricultural University, Lam, 522034, India

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Study area / Sample Collection: Regional Agricultural Research Station, Anakapalle, 531001

Cultivar / Variety / Breed name: Sugarcane

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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