Original Research Article

ASSESSING THE PERFORMANCE OF ELITE SUGARCANE GENOTYPES UNDER DIFFERENT FERTILIZER LEVELS FOR THEIR QUANTITATIVE AND QUALITATIVE TRAITS IN PENINSULAR ZONE

ABSTRACT

Investigations were carried out at Vasantdada Sugar Research Institute (VSI), Manjari, Pune to assess the performance of elite sugarcane genotypes under agro-climatic condition of peninsular zone during 2022. Eight sugarcane genotypes along with three local checks were evaluated for their growth and yield attributes, cane yield and quality performance. The behavior of the genotypes with regard to cane yield, yield components and quality remained variable during the study. The data indicated that the application of 25% of extra fertilizer dose over RDF showed numerically higher cane and CCS yield (121.33 and 18.69 t/ha). Genotype Co 16006 recorded maximum germination (66.39%), tiller population (97.50 thousand/ha) and Cane and CCS yield (140.07 and 22.65 t/ha) compared to the rest of the genotype. Superior juice quality was observed in CoVSI 16121.

Key Words: Sugarcane, genotypes, fertilizer levels, growth, yield, quality

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is the main sources of sugar in India and holds a prominent position as a cash crop. The major challenges faced by the crop are lower productivity, low sugar recovery and higher cost of production. Elite genotypes play a pivotal role in increasing sugarcane yield. Use of inferior genotypes affects the sugarcane production negatively (Mian, 2006). Sugarcane crop has a great potential if the high yielding improved varieties are evolved with proper agronomic operations through research and experimentation. Bahadar et al. (2007) suggested that introduction of new standard sugarcane varieties on large scale would surely change the existing position. Chattha et al. (2001) reported the average cane yield of Punjab as 43 to 47 t ha^{-1} as compared with the average cane yield of improved varieties (90 to 100 t ha^{-1}) and its potential yield of 105 to 154 t ha^{-1}. Productivity of a genotype in favorable environment does not indicate its adaptability and stability, whereas, performance of a genotype in diverse environments is a true evaluation practice of its inherent potential for adaptation (Kang and Miller, 1984). Considering the importance of the study, present investigations were carried out to assess the performance of various yield and yield traits of newly developed sugarcane genotypes under agro climatic conditions of peninsular zone.

Material and Methods

The experiment was conducted at the Research Farm of Vasantdada Sugar Institute, Manjari, Pune. The experimental material consist of five genotypes viz. Co 16006, Co 16010, Co 16018, CoVSI 16121 and PI 16131 with three zonal check Co 86032, CoC 671, Co 09004 were evaluated in the factorial Randomized block design (RCBD) with three replications. The sugarcane genotypes were bought under AICRP program. The genotypes were planted in fourth week of January (suru planting) by adopting all recommended agronomical practices. Two

budded sets were planted in single row system. Recommended dose of fertilizer to suru season sugarcane crop were applied as per the treatment. (250: 115: 115 kg N, P_2O_5 and K_2O/ha). The application of nitrogen in four splits & P_2O_5 and K_2O application 50% at planting and 50% at final earthing up. The growth and yield performance and yield attributed characters were recorded as per schedule. The observations taken in field were germination percentage, plant height, tiller count, single cane weight, length of nodes, diameter of cane and CCS yield tonnes per hectare and other quality parameters viz. brix, sucrose, CCS percent. The data on cane yield and yield parameters were analyzed statistically and interpreted as suggested by Panse and Sukhatme (1978).

Results & discussion

The effect of fertilizer levels, genotypes and their interactions on growth, yield attributing characters, cane and CCS yield and juice quality parameters are presented in Table 1 &2.

Effect of fertilizer levels:

The fertilizer application @ 100 and 125% of recommendation did not make much difference in growth attributing characters, cane, CCS yield and juice quality except tiller count at 120 DAP, which was significantly higher (89.50 thousand ha^{-1}) over 100% RDF (79.17 thousand ha^{-1}). However, numerically 125% recommended dose of fertilizer recorded higher values irrespective of sugarcane genotypes grown in suru season. The minimal difference in growth and yield attributing characters indicated that addition of higher dose of fertilizers is not advisable to harness the higher yield over the recommended dose of fertilizer. These findings are in corroboration with the results of Bharathalakshmi et al. (2003) and Thakur et al. (1991).

Effect of genotypes:

The sugarcane genotypes recorded significantly higher values of growth and yield attributing characters over each other. The sugarcane genotype Co 16006 recorded significantly higher values of growth and yield attributing characters except millable cane population. However, the sugarcane genotype Co 16010 was found statically on par for tiller count (91.67 thousand ha^{-1}), number of internodes (25) and girth of internode (9.91 cm) respectively. Similarly the standard checks Co 86032 and CoC 671 was found on par for number of internodes (25.44 & 25.44) and girth of internodes (10.64 and 10.50 cm) with co 16006. The number of millable cane was found significantly higher in Co 16010 (82.67 thousand ha^{-1}). It was followed by standard check Co 86032 (75.00 thousand ha^{-1}) and statistically on par with Co 16006 (70.67 thousand ha^{-1}) and standard checks CoC 671 (70.00 thousand ha^{-1}).

The cane and CCS yield of sugarcane genotype Co 16006 was significantly higher (140.07 and 22.65 t ha^{-1}). However, the cane yield was statistically on par with genotype Co 16010, Co 16018, std. checks Co 86032 and CoC 671 (131.68, 120.31, 130.79 and 127.69 t ha^{-1} respectively) and CCS yield was found on par with Co 16010 (19.61 t ha^{-1}).

The juice quality in respect to brix, sucrose and purity was found significantly superior in CoVSI 16121 (24.17^0, 23.22% and 96.06 % respectively) over rest of the genotypes. The difference in growth attributes and cane, CCS yield and juice quality was mainly because inherent characteristics of sugarcane genotype which cannot be altered by the fertilizer application. This suggested that all sugarcane genotypes were genetically variable and a considerable amount of variability occurred among them, therefore, these sugarcane genotypes would respond positively to selection. It is accepted that sugarcane varieties are greatly affected by genetic makeup (El-Geddaway, et al., 2002). The variation in cane yield and yield

components among the varieties may be attributed due to their dissimilarity in genetic makeup (Varghese et al., 1985 and Mali and Singh, 1995). Memon et al., (2005) and Panhwar, et al., (2008) reported great variability among the sugarcane genotypes for cane yield and yield components.

Interaction:

The interaction between level of fertilizers and genotypes were found non significant for growth attributing character, cane, CCS yield and juice quality. These results revealed that the growth, cane, CCS yield and juice quality parameters are governed individually by fertilizer levels and inherent characters of sugarcane genotype.

Conclusion:

The application of 125% recommended dose of fertilizer makes not much improvement in growth attributes, cane and CCS yield and juice quality over 100% recommended dose of fertilizer. Whereas, genotype Co 16006 was the best for cane and CCS yield (140.07 and 22.65 t ha^{-1}) followed by Co 16010 (131.68 and 19.61 t ha^{-1}). Sugarcane genotype CoVSI 16121 was found superior for juice quality viz. brix (23.33^0) and sucrose (22.26%).

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Table 1 Growth and yield attributes of sugarcane as influenced by different genotypes and fertilizer levels

Treatment	Germination at 30 DAP (%)	Tiller count at 120 DAP (000'/ha)	NMC at harvest (000'/ha)	Total plant height (cm)	Single cane wt. (kg)	No. of inter nodes	Girth of inter nodes (cm)
Factor A: Fertilizer levels							
F1: 100% RDF	56.62	79.17	67.63	286.13	1.66	23.88	10.08
F2: 125% RDF	56.29	89.50	69.92	287.52	1.70	24.93	10.15
Sem±	0.97	1.88	1.18	5.58	0.045	0.47	0.12
C.D. @ 5%	NS	5.44	NS	NS	NS	NS	NS
Factor B: Genotype							
V1: Co 16006	66.39	97.50	70.67	334.50	2.06	27.00	10.06
V2: Co 16010	54.00	91.67	82.67	297.22	1.59	25.00	9.91
V3: Co 16018	49.44	82.17	63.50	287.17	1.70	22.50	10.83
V4:CoVSI 16121	50.00	81.33	68.50	262.43	1.49	23.15	9.36
V5: PI 16131	51.61	75.67	58.33	283.94	1.28	22.39	9.25
V6: Co 86032	58.32	87.17	75.00	254.89	1.74	24.33	10.39
V7:CoC 671	66.33	82.50	70.00	284.66	1.82	25.44	10.64
V8: Co 09004	55.58	76.67	61.50	289.78	1.73	25.44	10.50
Sem±	1.95	3.77	2.36	11.17	0.091	0.95	0.24
C.D. @ 5%	5.63	10.89	6.82	32.28	0.26	2.76	0.70
Interaction F×G							
Sem±	2.75	5.33	3.33	15.80	0.12	1.35	0.34
C.D. @ 5%	NS	NS	NS	NS	NS	NS	NS

Table 2 Yield and quality of sugarcane as influenced by different genotypes and fertilizer levels

Treatment	Yield (t/ha)		Brix (0^0)	Sucrose (%)	CCS (%)	Purity (%)
	Cane	CCS				
Factor A: Fertilizer levels						
F1: 100% RDF	116.04	17.93	22.34	21.38	15.54	95.70
F2: 125% RDF	121.33	18.69	22.31	21.26	15.42	95.29
Sem±	3.55	0.55	0.15	0.15	0.11	1.95
C.D. @ 5%	NS	NS	NS	NS	NS	NS
Factor B: Genotype						
V1: Co 16006	140.07	22.65	22.95	22.17	16.18	96.60
V2: Co 16010	131.68	19.61	21.75	20.63	14.93	94.85
V3: Co 16018	120.31	16.93	20.15	19.30	14.03	95.78
V4:CoVSI 16121	100.92	17.06	24.17	23.22	16.91	96.06
V5: PI 16131	90.39	13.97	22.38	21.28	15.42	95.08
V6: Co 86032	130.79	18.91	21.41	20.14	14.52	94.06
V7:CoC 671	127.69	20.65	23.33	22.26	16.15	98.41
V8: Co 09004	107.61	16.70	22.47	21.58	15.70	96.03
Sem±	7.10	1.10	0.30	0.30	0.23	2.04
C.D. @ 5%	20.50	3.18	0.86	0.87	0.67	NS
Interaction F×G						
Sem±	10.04	1.56	0.42	0.43	0.33	1.25
C.D. @ 5%	NS	NS	NS	NS	NS	NS