ISSN: 0975-833X

Available online at http://www.journalcra.com

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

International Journal of Current Research
Vol. 6, Issue, 12, pp.10394-10396, December, 2014

RESEARCH ARTICLE

EVALUATION OF PLANTING GEOMETRY AND DIFFERENT VARIETIES ON GROWTH AND YIELD OF *SPRING* PLANTED SUGARCANE

***Chaudhari, P. M., Ombase, K. C., Thorave, D. S., Ghodke, S. K. and Pawar, S. M.**

Central Sugarcane Research Station, Padegaon, Satara, Maharashtra (India) 415 521

ARTICLE INFO

Article History:
Received 20th September, 2014
Received in revised form
18th October, 2014
Accepted 04th November, 2014
Published online 27th December, 2014

Key words:
Planting geometry,
Varieties,
Growth,
Cane yield,
Juice quality.

ABSTRACT

A field experiment was conducted at Central Sugarcane Research Station, Padegaon, Tal: Phaltan, Dist: Satara, Maharashtra during 2011- 12 to 2013- 14 to evaluate planting geometry and different varieties in *spring* planted sugarcane. Four levels of planting distance *viz.* 100 cm row distance, 120 cm row distance, 150 cm row distance and 30 x 150 cm row distance in main plots and four genotypes i.e. CoM 0265, Co 86032, Co 94012 and CoC 671 in sub plots laid out in split plot design with three replications. The *spring* sugarcane planted with row spacing of 120 cm recorded significantly the highest millable height (298 cm) and found at par with 150 cm row spacing. A similar trend was noticed for the cane girth (10.6 cm) and number of millable canes ha^{-1} (89630 ha^{-1}). The row spacing of 120 cm recorded significantly the highest cane yield (122.33 t ha^{-1}) and CCS yield (17.42 t ha^{-1}) and found at par with the row spacing of 150 cm for both cane yield (116.89 t ha^{-1}) and CCS yield (16.50 t ha^{-1}). Among the varietal response, the significantly the highest cane yield (136.69 t ha^{-1}) and CCS (19.20 t ha^{-1}) yield were recorded with the genotype CoM 0265 followed by Co 86032 (121.31 and 17.27 t ha^{-1}). The sugarcane genotype CoC 671 was found to be the most superior with respect to juice quality.

INTRODUCTION

Sugarcane is the most important sugar crop contributing more than 75% to the world's sugar production. With increasing human population in the world, sugar demand has also gone up, and by the end of first decade of 21st century its requirement is projected to be around 150 million tones. In plant cludistics, it is said that only the high – sugared ones would survive any aberrance in the ecosystem and this giant grass has survival through several millennia. Now has come to stay as one of the most important crops supporting an agro-based industry in the world. India would need to produce 415 MT of sugarcane with a recovery of 11 per cent to meet per capita requirement of 35 kg sweeteners per year including 20.0 kg sugar and 15.0 kg gur and khandsari by 2020 A.D. (Singh *et al.,* 2002). Row spacing has a direct effect on plant population and plays distinct role in amount of solar radiation interception. More over, the genotypes having high or low tiller dynamics shows variable response to change in planting density/row spacing. The cane yield increases with sowing of sugarcane at wider spacing and adopting improved production techniques (Gill, 1995 and Cheema *et al.*, 2002). The proper planting technique of sugarcane is pre-requisite to enable the crop plants to fully utilize environmental conditions to exhibit their optimum potential. Densely populated sugarcane crop requires special attention for sowing at suitable distance with appropriate planting technique to increase cane yield. In this context, the present investigation was thus taken up to evaluate planting geometry and different varieties on growth and yield of *spring* planted sugarcane.

****Corresponding author: Chaudhari, P. M.***
Central Sugarcane Research Station, Padegaon, Satara, Maharashtra (India) 415 521

MATERIALS AND METHODS

Field experiment was conducted for three years at Central Sugarcane Research Station, Padegaon, Tal: Phaltan, Dist: Satara, Maharashtra. The experiment was laid out in split plot design keeping four levels of planting viz. 100 cm row distance, 120 cm row distance, 150 cm row distance and 30 x 150 cm row distance in main plots and four genotypes viz. CoM 0265, Co 86032, Co 94012 and CoC 671 in sub plots replicated thrice. The soil of the experimental site was medium black. Planting of sugarcane was done during first week of January in every years. The recommended fertilizer dose of 250 kg N/ha, 115 kg P_2O_5/ha and 115 kg K_2O/ha was applied. Nitrogen was applied in 4 splits at planting (10%), tillering (40%), grand growth stage (10 %) and earthing up (40 %). Phosphorus and Potassium were applied in 2 splits at planting (50 %) and earthing up (50 %). All the recommended plant protection measures were undertaken during the course of investigation. Data were recorded at harvest for yield and quality characters. The juice analysis was done by sampling five canes from each plot at harvest. Five canes were randomly selected from each plot for juice analysis at harvest.

RESULTS AND DISCUSSION

Effect of planting geometry

The data regarding growth and yield attributes are presented in Table 1 revealed that the effect of *spring* sugarcane planted in row spacing was found significant for the millable height, cane girth and number of millable canes. The *spring* sugarcane planted in row spacing of 120 cm recorded significantly the highest millable height (298 cm) and was at par with 150 cm row spacing. This might be due to proper orientation and establishment of plants in wider rows. The similar findings were reported reported by Shih and Gascho (1980), Lal (1988), Cheema *et al.* (2002) Muhammad *et al.* (2007). A similar trend was noticed for the cane girth (10.6 cm) and number of millable canes ha^{-1} (89630 ha^{-1}). The *spring* sugarcane planted in row spacing of 120 cm recorded significantly the highest cane yield (122.33 t ha^{-1}) and CCS yield (17.42 t ha^{-1}) and found at par with the row spacing of 150 cm for both cane (116.89 t ha^{-1}) and CCS yields (16.50 t ha^{-1}), respectively. This might be due to higher cane yield is possible with 120 cm row spacing compared with narrow rows and the higher values of growth attributes resulted into higher cane yield. These findings were reported by Dhoble and Khauspe (1983), Ahmad (2002), Cheema *et al.* (2002), Mahadevaswamy and Martin (2002), Rasker and Bhoi (2003), Devi *et al.* (2007) and Singh *et al.* (2011).

Effect of genotypes

The effect of genotypes was found significant with respect to all the growth parameters except germination percentage and number of internodes. The genotype CoM 0265 registered significantly higher tillering ratio (1.81), millable height (310 cm), cane girth (10.9 cm), number of milliable cane (94810 ha^{-1}) and the average cane weight (1.44 kg cane^{-1}). The genotype Co 86032 was the next superior genotype in respect of all the growth attributes except tillering ratio. Significantly the highest cane (136.69 t ha^{-1}) and CCS (19.20 t ha^{-1}) yields were recorded with the variety CoM 0265 followed by Co 86032 (121.31 and 17.27 t ha^{-1}). This might be the genetic potential of the variety under the study.

Table 1. Growth and yield attributes as affected by various treatments (Pooled Mean)

Treatments	Germ. (%)	Tillering ratio	Height (cm)	Girth (cm)	No. of internodes cane^{-1}	Millable canes (000ha^{-1})	Wt. cane^{-1} (kg)	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
A) Planting geometry									
100 cm row distance	74.02	1.59	295	10.3	26	84.54	1.35	114.72	16.43
120 cm row distance	74.93	1.69	298	10.6	27	89.63	1.37	122.33	17.42
150 cm row distance	74.38	1.66	297	10.4	27	85.34	1.37	116.89	16.50
30 x 150 cm row distance	71.97	1.56	281	9.7	25	82.01	1.31	108.00	15.19
S.E.±	1.24	0.07	1.06	0.10	1.60	1.53	0.03	1.78	0.35
C.D. at 5%	NS	NS	2.75	0.27	NS	4.64	NS	5.83	0.95
B) Genotypes									
CoM 0265	75.68	1.81	310	10.9	29	94.81	1.44	136.69	19.20
Co 86032	74.93	1.70	300	10.5	27	87.56	1.38	121.31	17.27
Co 94012	73.28	1.60	386	10.1	25	80.82	1.29	104.25	14.49
CoC 671	71.38	1.50	275	9.5	24	78.44	1.27	99.70	14.58
S.E.±	1.79	0.07	2.35	0.17	1.82	1.70	0.03	2.52	0.64
C.D. at 5%	NS	0.18	6.11	0.48	NS	4.93	0.08	6.80	1.72
C) Interaction									
S.E.±	3.56	0.15	4.52	0.56	2.24	3.48	0.05	4.64	0.87
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2. Juice Quality parameters as affected by various treatments. (Pooled Mean)

Treatments	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
A) Planting geometry				
100 cm row distance	21.51	19.86	86.55	13.74
120 cm row distance	21.34	19.78	89.62	13.76
150 cm row distance	21.34	19.69	91.43	13.81
30 x 150 cm row distance	21.26	19.56	91.12	13.74
SE±	0.16	0.13	1.27	0.18
C.D. at 5%	NS	NS	NS	NS
B) Genotypes				
CoM 0265	21.06	19.71	90.75	13.78
Co 86032	21.52	19.69	91.38	13.90
Co 94012	20.83	20.15	92.90	14.75
CoC 671	22.03	19.72	88.04	13.68
SE±	0.15	0.27	1.30	0.09
C.D. at 5%	0.40	NS	NS	NS
C) Interaction				
SE±	0.32	0.33	1.66	0.20
C.D. at 5%	NS	NS	NS	NS

Effect of interaction

The interaction between the planting geometry and genotypes was found to be non significant for all the growth parameters, cane and CCS yield.

Effect on juice quality parameters

The effect of planting geometry on juice quality parameters was found to be non significant. (Table 2) Juice quality was not influenced by different row spacings. Similar results were reported by Devi *et al.* (2007). The genotype CoC 671 recorded significantly higher brix (22.03) than the other genotypes. There were no significant interactions effect was found among the planting geometries and the genotypes for different juice quality parameters.

Conclusion

The *spring* sugarcane planted at row spacing of 120 cm recorded the highest cane (122.33 t ha^{-1}) and CCS yield (17.42 t ha^{-1}) and found at par with the row spacing of 150 cm for both cane (116.89 t ha^{-1}) and CCS yields (16.50 t ha^{-1}). Significantly the highest cane (136.69 t ha^{-1}) and CCS (19.20 t ha^{-1}) yields were recorded by the genotype CoM 0265 followed by Co 86032 (121.31 and 17.27 t ha^{-1}). The sugarcane genotype CoC 671 was found to be the most superior with respect to juice quality. There were no significant interactions effect was found among the planting geometries and the genotypes for growth, yield attributing characters, Cane and CCS yield and juice quality parameters.

REFERENCES

Ahmad, I. 2002. Bio-economic efficiency of spring-planted sugarcane as influenced by spatial arrangement and nutrient management. Ph.D. thesis, Department of Agronomy, UA.F. 155-158.

Cheema, I.A., Ayub M.and Abdul Jabbar. 2002. Morphological response of spring planted sugarcane to spaced arrangement and nutrient management. *Pak. Sug. J.,* 17: 6, 62-68.

Devi, T. Chitkala, M. Bharatha Lakshmi and Naidu, N. V. 2005. Response of new sugarcane genotypes to wide row spacing. *Sugar Tech.*, 7(4) : 154 – 156.

Dhoble, M.V. and Khuspe, V. S. 1983. Effect of spacing of sugarcane. *J. Maharashtra Agric. Univ.,* 8(1): 38-41.

Gill, M.B. 1995. Physio-Agronomic studies on flat verses pit plantation of autumn and spring sugarcane (*Sacharum officinarium* L). Ph.D. Thesis, Department of Agronomy, University of Agriculture, Faisalabad, Pakistan.

Lal, B. 1988. Yield, quality and root distribution pattern of sugarcane Co-1148 as influenced by method of planting *Bharatia. Sugar,* 14 (1): 57, 59-60.

Mahadevaswamy, M.G. and Martin T. 2002. Production potential for wide row sugarcane inter-cropped with aggregatum onion. *Indian J. Agronomy*, 47(3): 366.

Muhammad Umer, Ali Asghar and Muhammad Bilal. 2007. Influence of planting techniques on growth and yield of spring planted sugarcane *Pak. J. Agri. Sci.,* 44(3): 452-456.

Raskar, B.S. and Bhoi, P.G. 2003. Yield attributes of sugarcane as influenced by intra-row spacings, fertilizer levels and planting materials. *Indian Sugar,* 53: 5, 327-331.

Shih, S.F. and Gascho. G.J. 1980. Sugarcane stalk distribution in two row spacings. Proc. 44th Cong. ISSCT, 17(1): 38-51.

Singh A. K., Menhi Lal and Singh S. N. 2011. Agronomic performance of new sugarcane genotypes under different planting geometries and N levels. *Indian J. Sugarcane Tech.,* 26 (1): 6-9.

Singh, A.K., Lal, M. and Prasad, S.R. 2002. Enhancing productivity of early maturing high sugarcane genotypes through management of crop geometry and nitrogen nutrition. *Indian J. Sugarcane Tech.,* 17(12) : 43-46.

****