SHORT COMMUNICATION

EFFECT OF DIFFERENT VARIETIES AND PLANTING METHODS ON GROWTH, YIELD AND QUALITY OF SUGARCANE UNDER NORTHERN HILL ZONE OF CHHATTISGARH

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Abstract: A field experiment was conducted during cropping seasons of 2015–16 and 2016-17 at Instructional cum research farm RMD CARS Ambikapur to evaluate sugarcane mid–late varieties (Co 86032,Co 62175, CoT 8201) under 12 treatment combinations related to three sugarcane varieties viz.(V_1), CoT 8201, (V_2), Co-86032, (V_3), Co 62175 in main plots and four planting methods (P_1) Flat planting at 75 cm row spacing (P_2) Flat planting at 90 cm row spacing (P_3) Trench planting at 75 cm(P_4) Pit planting in sub plot were tested in split plot design with three replication. The result on sugarcane varieties exhibited no significant variation on growth attributes viz. Germination percentage, cane height, No. of shoots, No. of nodes, length of nodes, and yield attributes viz. No. of millable cane, cane weight, and cane yield were the highest with Co 86032 (V_2). Quality parameters were non-significant due to variety. Among the planting methods, pit planting (P_4) recorded maximum cane yield (96.74 t ha^{-1}) Highest NMC was (84.54x 10^{-3} ha^{-1}) under pit planting method. The sugarcane quality parameters in terms of pol %, purity %, Brix % were no significant variations due to various planting methods and varieties. In case of economics, gross income (Rs 290090 ha^{-1}) and maximum net income (Rs 215862 ha^{-1}) in pit planting and benefit cost ratio (3.07) was registered under (P_1) Flat planting at 75 cm row spacing.

Keywords: Sugarcane, Planting method, Chhattishgarh

INTRODUCTION

Sugarcane is an important cash crop grown in India an area of 47.74 lakh hectares with an annual production of 3550 lakh tonnes and the average productivity is 74.41 t ha^{-1}. In Chhattisgarh, it occupies an area of 0.30 lakh ha, with the production of 12.47 lakh tones and productivity is 41.6 t ha^{-1} (Anonymous 2018). Despite all the attempts, productivity of sugarcane in state is quite less than the national productivity.

Sugarcane (*Saccharum spp*.) crop occupies an important position in Indian agriculture, as it is the second largest organized agro-industry in the country, next only to textiles. Recently the plateauing yield levels and increasing cost of producing sugarcane has posed serious concerns on the sustainability of this crop. Determination of precise planting technique to improve uniformity in plant population and crop stand is an important issue for improving the sugarcane-system productivity. Planting method plays a crucial role in sustaining higher number of millable canes and sugarcane yield in both plant and ratoon crops. The variation in planting techniques in different regions aims to improve the growth, increase the plant density and reduce the tiller mortality to obtain higher number of heavier millable canes per unit area. In North India, spring sugarcane is generally planted on flat beds in single rows spaced 75 cm apart. However, planting of sugarcane in paired rows compared with that in planting in single rows has proved beneficial in India (Yadav et al., 1997)

MATERIALS AND METHODS

An experiment was conducted during spring seasons of 2016 and 2017 at Instructional farm, RMD College of agriculture and research station Ambikapur to find out the suitable mid late varieties with integrated nutrient management for northern hill zone of Chhattisgarh condition. The soil was sandy loam in texture, acidic in reaction pH 5.6, 0.33% organic carbon, 195.5, 8.3 and 276.0 kg/ha available N, P and K, respectively. To evaluate sugarcane mid–late varieties under 12 treatment combinations related to three sugarcane varieties viz.(V_1), CoT 8201, (V_2), Co-86032, (V_3), Co 62175 in main plots and four planting methods (P_1) Flat planting at 75 cm row spacing (P_2) Flat planting at 90 cm row spacing (P_3) Trench planting at 75 cm(P_4) Pit planting in sub plot were tested in split plot design with three replication during spring season. Urea, Single super phosphate and muriate of potash were taken as sources of nitrogen, phosphorus and potassium, respectively. Full dose of P and K were applied as basal at the time of planting and full N in two equal splits during first and second earthling up during both the seasons in each year. The sugarcane was planted in second week of February during spring season respectively and harvested on second week of February during both the years. The mean rainfall received during the crop growth period was

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mm.1223.23.Cane juice was extracted with power crusher machine and juice quality was estimated as per method given by Spencer and Meade (1955). Net returns was calculated by deducting the total cost of cultivation from the gross returns for each treatment and expressed as per hectare on the basis of cost of inputs and prices of outputs in experimentation year. The benefit: cost ratio was calculated as ratio of gross return to cost of cultivation.

RESULTS AND DISCUSSION

The data pertaining those different varieties of sugarcane had no significant effect on germination percentage. Sugarcane variety 'Co-86032' had recorded the highest germination per cent (65.97%) at 45 DAP. Among the planting methods significantly highest germination per cent (65.74) was recorded with pit planting at 45 DAP. The variation in germination percentage was owing to chemical composition of soluble solids in juice as well as enzymes and hormones present in cell sap, which varies from genotype to genotype. Sugarcane variety 'Co 86032' showed significantly highest number of shoots (121.34 $x10^3$ ha^{-1}) at 120 DAP but it was comparable to 'Co 62175' (120.32 $x10^3$ ha^{-1}) and CoT 8201 (119.60 $x10^3$ ha^{-1}).

Planting methods had significant influence on number of shoots. Highest numbers of number of shoots (122.74 $x10^3$ ha^{-1}) at 120 DAP was recorded under pit planting. While lowest under flat planting at 90 cm row spacing. Highest numbers of number of shoots (122.74 $x10^3$ ha^{-1}) at 120 DAP was recorded under pit planting. The variation in number of tillers among different variety might be due to genetic characters of varieties. Sinare *et al. (*2006) also observed higher number of tillers at closer row spacing this might be due to higher dose of chemical fertilizers which increased the population of tillers due to immediate and quick supply of plant nutrients. The highest cane girth (8.36 cm) and average cane weight (2.56 kg $cane^{-1}$) was recorded under pit planting found significantly superior over rest of the treatments assured and efficient utilization of nutrients to sugarcane for growth and development. This result is agreement with the finding of Manickam *et al.* (2008).Improvement in average diameter of cane was due to increased metabolic processes in plant, resulting in greater metabolic activity thereby improving the sink size which manifested in to thicker canes.

Table 1. Growth yield attributes of sugarcane as influenced sugarcane varieties and nutrient management

Treatment	**Germination (%) at 45DAP**	**No. of shoots ($x10^3$ ha^{-1})**	**Cane girth (cm)**	**Cane weight (kg $cane^{-1}$)**	**NMC (x 10^{-3} ha^{-1})**	**Cane yield (t ha^{-1})**
Varieties						
V_1 CoT 8201	65.26	119.60	8.23	2.33	81.11	92.22
V_2 Co 86032	64.74	121.34	8.31	2.63	82.96	94.63
V_3 Co 62175	64.97	120.32	8.29	2.56	82.28	93.20
SEm±	0.45	0.65	0.08	0.01	0.51	1.37
CD (P=0.05)	NS	**NS**	NS	0.04	NS	NS
Planting methods						
P_1 Flat planting at 75 cm row spacing	64.45	119.44	8.20	2.40	82.42	90.68
P_2 Flat planting at 90 cm row spacing	63.72	118.70	8.24	2.49	77.19	89.84
P_3 Trench planting at 75 cm row spacing	66.06	122.74	8.31	2.53	83.85	96.18
P_4 Pit planting	65.74	120.88	8.36	2.56	84.54	96.70
SEm±	0.46	0.67	0.06	0.02	1.39	1.45
CD (P=0.05)	1.38	1.99	NS	0.05	4.12	4.30

The data pertaining to cane yield (94.63 t ha^{-1}) was recorded by Co 86032 found superior over Co 62175 and CoT 8201. Pit planting of sugarcane recorded highest NMC was (84.54x 10^{-3} ha^{-1}) and significantly higher cane yield (96.70 t ha^{-1}) at par with trench planting at 75 cm spacing. Sugarcane variety had different potentialities and hence caused significant variation in cane yield. This may be due to inherent

superiority of various growth characters and assimilating apparatus in some varieties. Performance of different varieties with variation in the yield was reported by kadam et al. (2008).

Table 2. Quality prameters and economics of sugarcane as influenced sugarcane varieties and planting methods

Treatment	Brix (%)	Pol (%)	Purity (%)	Net return (Rs ha^{-1})	B. C. ratio
Varieties					
V_1 CoT 8201	18.53	15.52	83.85	208217	2.91
V_2 Co 86032	18.60	15.66	84.17	213932	3.01
V_3 Co 62175	18.56	15.53	83.95	210167	2.95
SEm±	0.25	0.05	1.15	3295.08	0.06
CD (P=0.05)	NS	NS	NS	**NS**	**NS**
Planting methods					
P_1 Flat planting at 75 cm row spacing	18.54	15.51	83.85	211302	3.07
P_2 Flat planting at 90 cm row spacing	18.53	15.40	84.17	203802	2.94
P_3 Trench planting at 75 cm row spacing	18.58	15.57	83.95	212122	2.96
P_4 Pit planting	18.60	15.57	83.85	**215862**	2.85
SEm±	0.30	0.06	1.15	5811.89	0.06
CD (P=0.05)	NS	NS	NS	17260.46	0.18

Varieties of sugarcane influences non significant variation in juice quality with respect of brix percentage, pol percentage, and purity percentage. Among the varieties showed highest brix (18.60%), pol (55.66%) purity (84.17%) was recorded under variety Co 86032. This might be due to genetic ability of this variety due to accumulate more sucrose in juice.

Sugarcane 'Co 86032 recorded significantly higher net returns (Rs 213932ha^{-1}) and benefit: cost ratio (3.01). Pit planting recorded highest net return. While lowest B:C ratio under flat planting at 75 cm row spacing.

CONCLUSION

It concluded that highest net return under pit planting and B: C ratio under flat planting at 75 is the best option to achieving the productivity and profitability of sugarcane.

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