Asian Journal of Biological and Life Sciences | Original Research

Wide row planting in sugarcane - New vistas for augmenting cane production

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Submitted : 19.01.2015 Accepted : 22.03.2015 Published : 30.04.2015

Abstract

An experiment conducted at Zonal agricultural research station, V.C.Farm, Mandya with wide row planting of 5 feet spacing in comparison with conventional 3 feet spacing and 20 per cent reduced seed rate with wide row spacing with five varieties of sugarcane has revealed that there exists statistically non significant difference in cane yield with wide row spacing (131.85 t ha-1 144.5 t ha-1 and respectively). The sugar percent was genetic in nature and Co 86032 exhibited higher sugar content and recorded higher sugar yield in both the spacings. Co 86032 (21.77 t ha-1) and Co62175 (20.46 t ha-1) have recorded higher sugar yield with wider spacing and lesser seed rate indicating the suitability for wide row planting of cane and Co 8371 is unsuitable for wide row planting of cane due to its poor tillering ability. As there is no reduction in cane yield to a significant level, wide row planting is useful due to many other advantages that accrue to wide row planting.

Key words : wide row planting, reduced seed rate, varieties of sugarcane

INTRODUCTION

Sugarcane productivity has seen a decline in the command areas owing to the continuous mono cropping, injudicious irrigation & nutrient management and ill managed crop geometry. The row spacing followed is too narrow for the crop to manifest its fullest potential being a C4 plant. High density planting does not guarantee the increase in cane productivity. Reduction in spacing warrants higher seed rate considering the volume of seed material to be handled, it is prudent to minimize the seed material requirement and at the same time not to compromise with respect to yield of cane to a significant level. In this background it is better to go in for wide row spacing of 5 feet between the rows instead of normal conventional planting of 3 feet between the rows. As sugarcane exhibits plasticity in its growth habit, it can very well adopt to wider planting geometry. The insignificant difference in yield of cane between narrow and wide row is encouraging trend to go in for wider spacing due to its manifold advantages The similarity in yield across the range of row spacings and planting densities within experiments was largely due to compensation between stalk number Garside and bell, 2009 [1]. The advantages include improvement in quality of cane owing to the better penetration of light and air, better option for intercropping with more available space, possibility of mechanization, more importantly ideal situation for incorporation of trash. With this background an experiment was conducted at Zonal Agricultural Research Station, V.C.Farm, Mandya to explore the possibility of growing cane under wide row planting of 5 feet in comparison with 3 feet conventional planting and its effect on cane yield, sugar content and sugar yield.

MATERIAL AND METHODS

An experiment was conducted during 2005 in a plant crop of sugarcane at Zonal Agricultural Research Station, V.C.Farm, Mandya under the University of Agricultural Sciences, Bangalore with 2 seed rates testing five varieties of sugarcane responding to 3 feet and 5 feet spacing geometry. The experiment was laid out in double split plot design with seed rate in main plots, spacing in sub plot and varieties in sub sub plot replicated thrice making 20 treatment combinations (2x2X5). The soil of the experimental site was red sandy loam with low in soil nitrogen, medium in phosphorus and high in potash. Water holding capacity of the soil is low by virtue of lower clay content. The experiment is laid out as given below.

The recommended spacing for sugarcane is 30000 three eye budded setts per hectare and spacing between the sets is arranged in an end to end sett pattern. The recommended fertilizers @ 250:100:125 Kg N P_2O_5 K_2O were applied the experimental plot and all the cultivation practices were followed as per the recommended package of practices. The yield data was recorded after the harvest of the crop after 12 months of planting and sugar content was analysed using polarimetric sugar analysis method. The data recorded were subjected to statistical analysis using the procedure envisaged by Gomez and Gomez (1984) [2]..

RESULTS AND DISCUSSION

Cane yield recorded with wide row planting in comparison with conventional planting is presented in Table 1. The cane yield recorded with reduction in seed rate by 20 per cent has resulted in on par yield (139.65 t ha^{-1}) with recommended seed rate (136.69 t ha^{-1}). This implies that we can reduce the seed rate 20 per cent thereby saving in seed cost. With respect to spacing the cane yield recorded with 5 feet spacing between the rows (131.85 tha^{-1}) did not differ significantly with that of 3 feet spacing (144.50 tha^{-1}) though numerically it was slightly lower. This is a trend which is well compensated by the increase cane girth, number of tillers with better light and air penetration. As regards the varieties response to wide row planting there exists a varietal difference to spacing. Co 62175 variety of sugarcane recorded significantly higher cane yield with 3 feet (151.08 tha^{-1}) as well as 5 feet spacing (138.71 tha^{-1}) over all other three varieties which were on par except Co 8371 which is a shy tillering variety. Gaddanakeri et.al., (2007)[4]. also confirm these results as Shy tillering varieties cannot compensate the wider space provided which results in reduction in yield as it is established with Co 8371 variety of

Replication I

100% seed rate

V1	V5	V4	V3	V2	**3' spacing**
V3	V5	V1	V2	V4	**5 ' spacing**

80% seed rate

V1	V3	V4	V2	V5	**5' spacing**
V3	V2	V1	V5	V4	**3 ' spacing**

Replication II

80% seed rate

V5	V2	V1	V4	V3	**3' spacing**
V3	V5	V2	V1	V4	**5 ' spacing**

100% seed rate

V5	V1	V4	V2	V3	**3' spacing**
V3	V2	V4	V1	V5	**5 ' spacing**

Replication III

100% seed rate

V3	V2	V5	V1	V4	**5' spacing**
V3	V1	V4	V5	V4	**3 ' spacing**

80% seed rate

V1	V4	V2	V3	V5	**3' spacing**
V2	V5	V3	V4	V1	**5 ' spacing**

The treatment details are as under

Main plot treatment: **Seed rate**
SR1 : 100% recommended seed rate
SR 2: 80% recommended seed rate

Sub Plot treatments : **Spacing**
SP1 : 3 feet spacing between rows
SP2 : 5 feet spacing between rows

Sub Sub plot treatments: **varieties**:
V1: Co 62175
V2: Co 86032
V3: M1
V4: Co 8371
V5: CoVc 99263

sugarcane. it is found that the significantly superior cane yield was recorded with 3ft row spacing (95.42 t/ha) over 5ft wide row spacing (74.70 t/ha). M1 variety of cane recorded lowest cane yield with wider spacing indicating its unsuitability for wide row planting. Yadav (1991) [5]. has reported that wide row planting of cane resulted in higher millable cane number and in turn higher yield of cane (143 t ha^{-1}) over narrow spacing (138 t ha^{-1}).

Table 2 gives the data on the quality parameter like sucrose per cent with respect to spacing and varieties grown. The sucrose per cent did not differ significantly either due to change in spacing or due to varied seed rate. However, the varieties of cane did differ significantly with sucrose as Co 86032 recorded significantly higher sucrose per cent over all other varieties which was on par with rest of the varieties except Co 86032 which recorded lowest sucrose content. The interaction of spacing and variety did differ significantly with respect to sucrose content. With narrow spacing of 3 feet spacing the varieties differ significantly with sucrose. However, under wider row spacing of 5 feet, three varieties showed on par sugar content. Similar trend was noticed with interaction of seed rate and varieties. Table 3 gives the data on sugar yield of varieties with wide row planting. The sugar yield

Table 1: Cane yield (t/ha) with sugarcane varieties as influenced by wide row spacing

	Spacing		Mean
Seed rate	**3 feet**	**5 feet**	
100% seed rate	142.77	130.61	136.69
80% seed rate	146.23	133.08	139.65
Mean	**144.50**	**131.85**	-
Varieties	**Spacing**		
	3 feet	**5 feet**	
Co 62175	151.08	138.71	144.90
Co 86032	146.91	132.40	139.65
M1	140.58	123.30	131.94
Co 8371	138.88	131.47	135.18
CoVc 99263	145.06	133.33	139.19
Mean	**144.50**	**131.85**	-
Varieties	**Seed Rate**		
	100% Seed rate	**80% Seed rate**	
Co 62175	143.51	146.29	144.90
Co 86032	137.65	141.66	139.65
M1	130.71	133.18	131.94
Co 8371	137.65	132.71	135.18
CoVc 99263	133.95	144.44	139.19
Mean	139.09	139.65	-
	SEm±	**CD @5%**	
Spacing	5.07	NS	
Seed rate	3.652	NS	
Spacing X seed rate	5.164	NS	
Varieties	4.213	8.15	
Spacing X variety	4.958	12.14	
Seed rate X variety	5.958	12.14	

was significantly different either with respect to spacing or seed rate variation. By virtue of the difference in cane yield with respect to varieties, they differ significantly with sugar yield. Sugar yield per unit area was highest with Co 86032 by virtue of higher sugar content but as the cane yield recorded is higher with Co 62175, it has recorded on par sugar yield with Co 86032. The main aim of sugarcane variety is to look for sugar yield per unit area than the sugar content per se. the interaction of seed rate and varieties was significant as wider spacing has resulted in higher sugar yield as compared to narrow spacing. Out the varieties tried,

Table 2: Sucrose per cent with sugarcane varieties as influenced by wide row spacing.

	Spacing		Mean
Seed rate	**3 feet**	**5 feet**	19.27
100% seed rate	19.13	19.41	19.54
80% seed rate	19.50	19.59	
Mean	**19.31**	**19.50**	
Varieties	**Spacing**		
	3 feet	**3 feet**	
Co 62175	18.46	19.00	18.73
Co 86032	20.15	20.10	20.13
M1	19.50	19.81	19.65
Co 8371	19.58	19.45	19.52
CoVc 99263	18.88	19.14	19.01
Mean	**19.31**	**19.50**	-
Varieties	**Seed Rate**		
	100% Seed rate	**80% Seed rate**	
Co 62175	18.33	19.12	18.73
Co 86032	19.83	20.42	20.13
M1	19.91	19.39	19.65
Co 8371	19.50	19.53	19.52
CoVc 99263	18.76	19.26	19.01
Mean	19.27	19.54	-
	SEm±	**CD @5%**	
Spacing	0.392	NS	
Seed rate	0.263	NS	
Spacing X seed rate	0.372	NS	
Varieties	0.274	0.56	
Spacing X variety	0.388	0.79	
Seed rate X variety	0.388	0.79	

Co 86032 (21.77 t ha^{-1}) and Co62175 (20.46 t ha^{-1}) have recorded higher sugar yield with wider spacing and lesser seed rate. Results confirm the relative insensitivity of cane yields to crop row spacing and suggest considerable flexibility in developing row spacings to suit controlled traffic farming systems. There were significant differences between varieties in cane yields, CCS and sugar yields. Cane yields for Q205A and Q222A (124 t/ha and 121 t/ha) were significantly higher than Q188A (115 t/ha) and Q138 (112 t/ha) (Bell et.al., 20017) [3].

Table 3: Sugar yield (t/ha) with sugarcane varieties as influenced by wide row spacing

	Spacing		Mean
Seed rate	**3 feet**	**5 feet**	19.50
100% seed rate	20.20	18.79	20.26
80% seed rate	21.13	19.40	-
Mean	**20.66**	**19.10**	-
Varieties	**Spacing**		
	3 feet	**3 feet**	
Co 62175	20.63	19.68	20.15
Co 86032	21.96	19.80	20.88
M1	20.29	18.12	19.20
Co 8371	20.16	18.96	19.56
CoVc 99263	20.27	18.92	19.60
Mean	**20.66**	**19.10**	-
Varieties	**Seed Rate**		
	100% Seed rate	**80% Seed rate**	
Co 62175	19.54	20.77	20.15
Co 86032	20.30	21.46	20.88
M1	19.21	19.20	19.20
Co 8371	19.87	19.26	19.56
CoVc 99263	20.66	20.13	19.59
Mean	19.92	20.16	
	SEm±	**CD @5%**	
Spacing	0.934	NS	
Seed rate	0.582	NS	
Spacing X seed rate	0.823	NS	
Varieties	0.714	1.45	
Spacing X variety	1.01	NS	
Seed rate X variety	1.01	2.06	

CONCLUSION

Sugarcane is a long duration crop which is plastic in nature with respect to the crop geometry. The crop responds to wider row spacing without compromising the yield of the crop as is evident from the results. The crop can compensate better with higher tillering and reduced tiller mortality at the later stage of the crop as seen in the closed spaced crop. The results suggest that sugarcane considering its plasticity can be planted at wider rows without compromising on the yield of the crop with added advantage of intercropping, trash management, mechanization and other benefits that accrue to wide crop geometry.

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