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PERFORMANCE OF SUGARCANE UNDER PIT METHOD OF PLANTING IN NORTH COASTAL ANDHRA PRADESH

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Abstract: *A field study was conducted during 2008-09 and 2009-10 at Regional Agricultural Research Station, Anakapalle, Andhra Pradesh in a red sandy loam soil to find out optimum spacing, seed rate and nitrogen level for sugarcane grown in North Coastal Andhra Pradesh under pit method of planting. Sixteen treatment combinations consisting of two spacings (1.5 x 1.2 m and 1.5 x 1.5m) two seed rates (15 two bud setts/pit and 30 two bud setts/ pit of 90 cm diameter) and four nitrogen levels (100, 150, 200 and 250 kg N/ha) were tested in a split plot design. Experimental results revealed that millable cane population at harvest and cane yield were significantly influenced by spacing, seed rate and nitrogen levels but quality parameters studied in terms of sucrose % and commercial cane sugar % did not vary significantly. Planting of cane setts in pits spaced at 1.5 X 1.2 m recoded higher cane yield (107.2 t/ha) than 1.5 x 1.5m (103.2 t/ha). A seed rate of 15 two bud setts / pit was found optimum for realizing higher millable stalks (82175/ha) and cane yield (107.0t/ha). Application of nitrogen at 150 kg /ha registered significantly higher millable cane population (82093/ha) and cane yield (106 t/ha) over 100 kg N/ha (96.9t/ha) during both the years of investigation and mean of two years. The two year study raveled that a spacing of 1.5 x 1.2 m and seed rate of 15 two bud setts / pit with a nitrogen dose of 150 kg /ha can be recommended for sugarcane under pit method of planting in red sandy loams of North Costal Andhra Pradesh.*

Key words: *Spacing, Method of Planting, Sugarcane.*

Introduction:

Sugarcane is one of the important commercial crops grown in Andhra Pradesh. It is being cultivated in an area of 1.5 lakh ha and producing 120 lakh tons per annum. The area and productivity of sugarcane is declining gradually due to several constraints and non adoption of suitable planting method which gives higher yields in plant crop as well as in ratoons contributes to a greater extent. Traditionally sugarcane is cultivated by adopting ridge and furrow method of planting. But, planting of cane setts under different methods like trench, deep trench, wide row, paired row, pit method, partha method etc., to suit for different situations was found profitable to realize higher yields from both plant and ratoon crops.

In recent years pit method of planting is gaining importance as it enables the crop to withstand moisture stress, uniform maturity and higher cane yield in both plant and ratoons. Yadav and Rajesh Kumar (2005) reported that ring pit planting in sugarcane improve yield by 64% over conventional flat method. Studies conducted at Regional Agricultural Research Station, Anakapalle on different planting methods to mitigate drought during formative phases pit planting was found superior with an yield advantage of 2.0 tons/acre over traditional ridge and furrow planting (Chitkala Devi *et al* 2006). Keeping this in view, the present study was takenup to find out optimum spacing, seed rate and nitrogen dose for sugarcane under pit method of planting.

Materials and methods:

A field experiment was carried out at Regional Agricultural Research Station, Anakapalle for two consecutive years during 2008-09 and 2009-10 on a red sandy loam soil. The experimental site was low in organic carbon and available nitrogen

medium in available phosphorus and high in available potassium. Experiment was laid out in a split plot design with two seed rates (15 setts/pit and 30 setts / pit), two spacings (1.5 x 1.5 m and 1.5 x 1.2 cm) and four nitrogen levels (100, 150, 200 and 250 kg N/ha). Combination of seed rate and spacing treatments were allocated to main plots and nitrogen levels were allocated to sub plots and replicated thrice. Experimental field was ploughed to attain good tilth and pits of 90cm diameter were digged with a tractor drawn mechanical pit digger as per specified spacings. Later pits were deepened to a depth of 45cm, bottom of the pits was leveled, loosened and FYM @ 5 kg/ pit was mixed in the soil. Phosphorus @ 100 kg and potassium @ 120 kg /ha were applied basally duly mixing in the digged out soil and filled to a depth of 15cm inside the pit. Two budded setts of an early maturing variety Sarada (93 A 145) were planted in a circular design as per the treatments and covered with thin layer of wet soil. Irrigation was provided through on line drip connected with micro tube and one emitter / pit was arranged for wetting the pits. Nitrogen was applied in two equal splits at 45 and 90 days after planting as per the treatments. Pits were filled with the dug out soil gradually as the growth advances and crop was kept erect by trash twist propping of canes between pits in a row. The data on yield contributing parameters like length and no. of millable canes and cane yield were recorded at harvest. Quality parameters *i.e.,* Juice sucrose percentage was recorded at harvest and commercial cane sugar % and sugar yield were computed following the standard procedures.

Results and discussion:

Millable cane population at harvest:

A critical perusal of the data furnished in table indicated that number of millable canes / ha at harvest was significantly influenced by seed rate, spacing and nitrogen levels during both the years of study. Planting of two bud setts @ 15 / pit registered relatively higher number of millable canes / ha (82175 /ha) than planting of two bud setts @ 30/pit. Similarly planting in pits at 1.5 x 1.2 m spacing gave significantly higher number of millable canes in both the years of study over planting in pits at 1.5 X 1.5 m spacing.

Millable cane population at harvest increased with increase in nitrogen level from 100 kg to 200 kg /ha. However, significant increase was noticed up to 150 kg N/ha during both the years of investigation. A mean millable cane population of 82093 /ha was recorded at 150 kg N/ha against 78093/ha. At 100 kg N/ha.

Length of millable cane at harvest (cm):

The data furnished in table no. 1 on length of millable cane at harvest indicated that the length did not differ significantly either due to spacing or seed rate during both the years of study and it ranged from 333.5 to 342.5 cm. Whereas nitrogen application at different doses exerted significant influence during 2008 wherein nitrogen application @ 150 kg/ha registered significantly higher millable cane length (382.7 cm) than 100 kg N/ha (355.8 cm). Spacing, seed rate and nitrogen levels had no significant influence on length of millable cane during 2009 and it ranged from 293.3cm to 301.1 cm in different treatments.

Juice Quality:

Sugarcane quality studied in terms of sucrose content in cane juice at harvest and commercial cane sugar % were not influenced significantly either by spacing and seed rate or nitrogen levels under pit method of planting. Juice sucrose varied from 17.14 to 17.36 during 2008 and 17.28 to 17.68 during 2009. The commercial cane sugar % ranged from 12.37 to 12.65 during 2008 and 12.44 to 12.73 during 2009.

Cane yield:

Planting of cane in pits at 1.5 x 1.2 cm spacing registered higher cane yield (107.2 t/ha) the planting at 1.5 X 1.5 cm spacing (103.2 t/ha) which was higher by 3.9%. Seed rate also exerted significant influence on cane yield. Planting of 15 two bud setts / pit recorded significantly higher cane yield (107.0 t/ha) during both the years of study than planting of 30 two bud sets pit (103.2 t/ha). On an average cane yield increased by 3.6% at 15 two bud setts/pit over 30 two bud setts /pit. This clearly revealed that planting of more number of setts/pit so as to achieve higher number of millable stalks / pit is not advantageous which might be due to more seedling mortality on account of severe competition for growth resources among seedlings at higher plant density / pit. Similar increase in cane yield under pit planting in farmers field at Faisalabad, Pakistan was reported by Mahammad Maqsood *et al* (2005) where sugarcane planted at 50 cms apart in 100

x 100 cms pit with 30 double budded setts / pit recorded higher cane yield (149.13 tonns /ha) than trench planting (120.54 tonns/ha).

Progressive increase in cane yield was observed with increase in nitrogen dose from 100 kg to 250 kg/ha. However, the response was significant up to 150 kg N/ha and application of N at higher doses beyond 150 kg did not prove beneficial in increasing the cane yield significantly. Favorable growth with higher level of nitrogen might have facilitated adequate nutrient supply and resulted in higher millable cane population at harvest and ultimately culminated in significantly higher cane yield. Yadav R.L. (2004) reported that optimum level of nitrogen for sugar cane was 4414 kg/ha in conventional method and 356 kg N/ha. in ring pit method, Higher N use efficiency under pit method of planting (2.34 kg N/ton of cane) was observed over conventional planting (8.48 kg N / ton of ane).

Sugar yield:

Sugar yield followed similar trend as that of cane yield and it ranged from 12.85 to 15.15 t/ha during 2008 and 11.37 to 12.52 during 2009. During both years planting of cane in pits. at 1.5 x 1.2 m spacing with 15 two bud setts / pit recorded relatively higher sugar yield. Similarly sugar yield at 150 kg N/ha was higher than at 100 kg N/ha but the increase was marginal beyond 150 kg/ha.

It may, therefore be concluded that a spacing of 1.15 x 1.2 m and seed rate of 15 two bud setts /pit with a nitrogen dose of 150 kg /ha can be recommended for sugarcane under pit method of planting in red sandy loams of North Costal Andhra Pradesh.

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Yield attributes, Yield and quality of sugarcane as influenced by spacing, seed rate and nitrogen level sunder Pit method of planting

Treatment	No. of Millable canes / ha at Harvest			LMC at Harvest			Juice sucrose (%)			CCS (%)			Cane yield (t/ha)			Sugar Yield (t/ha)		
	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean
Spacing:																		
1.5 X 1.2 m	91550	75769	83660	383.9	301.1	342.5	17.36	17.66	17.51	12.64	12.71	12.68	115.8	98.5	107.2	14.64	12.52	13.58
1.5 X 1.5 m	85878	71815	78862	368.5	298.5	333.5	17.16	17.50	17.33	12.37	12.60	12.49	112.9	93.4	103.2	13.97	11.76	12.87
SEm ±	923	1009		2.3	0.54		0.03	0.04		-	-		0.8	1.4		-	-	-
CD (0.05)	2770	2816		NS	NS		NS	NS		NS	NS		5.1	4.3		-	-	-
Seed rate:																		
15 two bud setts / Pit	89120	75231	82176	369.5	301.1	335.5	17.38	17.68	17.53	12.63	12.73	12.68	116.2	97.8	107	14.68	12.45	13.57
30 two bud setts / Pit	88309	72386	80348	383.0	298.5	340.8	17.14	17.48	17.31	12.38	12.58	12.48	112.5	94.1	103.3	13.93	11.84	12.89
SEm ±	408	798		6.2	1.34		0.03	0.04		-	-		0.6	0.8		-	-	-
CD (0.05)	1206	2228		NS	NS		NS	NS		NS	NS		2.4	2.5		-	-	-
Nitrogen levels:																		
100 kg N /ha	86572	69615	78094	355.8	293.3	324.6	17.25	17.46	17.36	12.44	12.57	12.51	103.3	90.5	96.9	12.85	11.37	12.11
150 kg N /ha	89815	74371	82093	368.7	299.6	334.2	17.31	17.68	17.50	12.51	12.73	12.62	115.3	96.7	106.0	14.42	12.31	13.37
200 kg N /ha	90045	75385	82715	382.7	300.1	341.4	17.18	17.36	17.27	12.42	12.48	12.45	118.9	98.0	108.5	14.76	12.23	13.50
250 kg N /ha	88425	74861	81643	397.8	300.2	349.0	17.30	17.28	17.29	12.65	12.44	12.55	119.8	98.4	109.1	15.15	12.24	13.70
SEm ±	1391	1431		9.5	1.24		0.04	0.05		-	-		1.4	1.3		-	-	-
CD (0.05)	4060	3993		28.0	NS		NS	0.16		NS	NS		4.2	3.8		-	-	-
Interaction	NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	-