

# INFLUENCE OF ROW SPACING, SEED MATERIAL TYPE AND PLANT DENSITY ON GOWTH AND YIELD OF SUGARCANE UNDER DUAL ROW PLANTING

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## ABSTRACT

Field experiment was conducted to study influence of row spacing and plant density on growth and yield of sugarcane under dual row planting in plant ratoon system at Regional Agricultural Research Station, Anakapalle, during the year 2023-24. The experimental soil was sandy loam in texture. Row spacings of 150 cm, 165 cm and 180 cm were tried with sett and seedling planting under three different plant densities of 100 %, 125% and 150%. Studies on plant crop of sugarcane revealed that sugarcane yield under dual row planting of 150 cm (79.2 t ha<sup>-1</sup>) and 165 cm (77.8 t ha<sup>-1</sup>) were found to be statistically similar but significantly higher over 180 cm row spacing (71.9 t ha<sup>-1</sup>). Higher cane yield of 78.2 t ha<sup>-1</sup> recorded with seedling planting which was found on par with sett planting (74.3 t ha<sup>-1</sup>). There is no significant difference in yield with respect to plant densities of 100 % (75.6 t ha<sup>-1</sup>) 125% (76.5 t ha<sup>-1</sup>) and 150 % (76.7 t ha<sup>-1</sup>). In ratoon crop indicated that dual row planting of 150 cm and 165 cm gave statistically on par cane yield of 67.2 t ha<sup>-1</sup> and 64.8 t ha<sup>-1</sup> respectively and significantly superior over cane yield at 180 cm row spacing (62.8 t ha<sup>-1</sup>). Cane yield was not influenced either due to type of planting material or plant densities in ratoon crop of sugarcane.

**Key words:** Dual row planting, Plant densities, Sugarcane seedlings, Sugarcane setts.

## INRODUCTION

Sugarcane is traditionally planted at a row spacing of 80-90 cm and spacing between sugarcane rows play an important role for realizing higher yields (Nalawade *et al.*, 2018). In recent years, farmers are adopting different planting methods like paired row, wide row and dual row to facilitate mechanical weeding, earthing up, machine harvesting etc., to overcome labour problem and to reduce cost of cultivation. Irrespective of planting method,

a spacing of 5 feet between rows / pairs is recommended to facilitate mechanization. However, working with mini tractor for intercultivation, earthing up etc., is becoming difficult in grown up crop at formative phase especially in ratoons. A seed rate of 40,000 three bud setts under sett planting or 18,750 seedlings per ha under seedling transplantation is recommended for Sugarcane. Therefore, the present study has been proposed to study the influence of row

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spacing, type of seed material and plant densities on yield and quality of sugarcane under dual row planting.

## MATERIAL AND METHODS

Experiment was conducted during 2023-24 at Regional Agricultural Research Station, Anakapalle. The experimental site was located in North Coastal Zone of Andhra Pradesh with average annual rainfall of 520 mm and geographical coordinates of the site are approximately 17° 38' N latitude and 83° 01' E Longitude. The experimental soil was sandy loam and it was laid out in split-split plot design replicated thrice. The three main plot treatments include row spacing of 150 cm, 165 cm and 180 cm, the two sub plot treatments consisting of setts and seedlings as planting material and the three sub sub plots consists of plant population of 100%, 125% and 150% of recommended population of 40,000 and 18750 setts and seedlings respectively. Sugarcane variety 2009 A 107 was taken as the test variety. In plant crop of sugarcane 112 kg of nitrogen 100 kg of phosphorous and 120 kg of potassium ha<sup>-1</sup> was applied. Entire phosphorous and potassium was applied as basal and nitrogen was applied in two equal splits at 45 and 90 days after planting. In ratoon crop of sugarcane, 224 kg of nitrogen 100 kg of phosphorous and 120 kg of potassium ha<sup>-1</sup> was applied. Entire phosphorous, potassium and half of nitrogen was applied at the time of ratooning and remaining half of Nitrogen was applied at 45 days after ratooning.

## RESULTS AND DISCUSSION

In plant crop of sugarcane, dual row planting of 150 cm and 165 cm gave statistically on par cane yield (79.2 t ha<sup>-1</sup> and 77.8 t ha<sup>-1</sup> respectively) and significantly superior over 180 cm row spacing (71.9 t /ha) (Table 1).

Christy Nirmala Mary *et al.*, (2019) also reported highest yield with wider spacing of 150 cm between sugarcane rows. Higher cane yield of 78.2 t ha<sup>-1</sup> recorded with seedling planting which was found on par with sett planting (74.3 t ha<sup>-1</sup>). There is no significant difference in yield with respect to plant densities of 100 % (75.6 t ha<sup>-1</sup>) 125% (76.5 t ha<sup>-1</sup>) and 150 % (76.7 t ha<sup>-1</sup>). The variation in seed rate did not influence the population of millable canes statistically. Sucrose per cent and CCS % were found non-significant among the different treatments under test. The interaction between spacing and planting material was significant and the results showed that planting of seedlings in combination with 150 cm dual row planting gave highest cane yield of 83.2 t ha<sup>-1</sup> (Table. 2) Gouri *et. al.*, 2019 and Sathiya *et. al.*, (2024) also reported that planting of single node/bud chip seedlings is viable and economical alternative in reducing the cost of sugarcane production (ANY SPECIFIC REASON FOR HIGHER YIELD).

Data on ratoon crop indicated that dual row planting of 150 cm and 165 cm gave statistically on par cane yield of 67.2 t ha<sup>-1</sup> and 64.8 t ha<sup>-1</sup> respectively and significantly superior over cane yield at 180 cm row spacing (62.8 t ha<sup>-1</sup>) (Table. 3) . Highest cane yield of 65.9 t ha<sup>-1</sup> was recorded with seedling planting which was on par with sett planting (64.0 t ha<sup>-1</sup>). Bhullar *et. al.*, (2008) also reported similar results with respect to type of planting material. There is no significant difference in yield with respect to plant densities of 100 % (63.6 t ha<sup>-1</sup>) 125% (65.1 t ha<sup>-1</sup>) and 150 % (66.1 t ha<sup>-1</sup>). Sucrose per cent and CCS % were found non-significant among the different treatments under test.

## CONCLUSION

The results of the study indicated that, dual row planting of 150 cm or 165 cm in

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**Table 1. Number of Millable canes, Quality and Yield of sugarcane as influenced by different treatments (Plant crop) during 2023-24**

Treatments	NMC ha <sup>-1</sup>	Sucrose (%)	CCS (%)	Cane Yield (t ha <sup>-1</sup> )	Sugar yield (t ha <sup>-1</sup> )
<b>Spacing</b>					
150cm	83,012	19.33	14.03	79.2	11.1
165cm	80,012	19.26	14.85	77.8	11.6
180cm	74,635	18.90	13.63	71.9	9.8
SEm+	662	0.17	0.15	0.83	-
C.D @5%	2585	NS	NS	3.2	-
<b>Type of seed material</b>					
Setts	81,274	19.22	13.90	74.3	10.3
Seedlings	77,166	19.11	13.78	78.2	10.8
SEm+	573	0.22	0.18	0.62	-
C.D @5%	1977	NS	NS	2.1	-
<b>Population</b>					
100%	77,533	19.55	14.19	75.6	10.7
125%	79,513	18.81	13.47	76.5	10.3
150%	80,613	19.13	13.87	76.7	10.6
SEm+	578	0.29	0.27	0.53	-
C.D @5%	1687	NS	NS	NS	-
<b>Interaction</b>					
AXB	NS	NS	NS	Sig	-
AXC	NS	NS	NS	NS	-
BXC	NS	NS	NS	NS	-
AXBXC	NS	NS	NS	NS	-

sugarcane with single node seedlings @ 18750 ha<sup>-1</sup> realized higher cane yield. Dual row planting of sugarcane facilitates mechanization for taking up weeding and harvesting operations as mechanization is need of the hour. Raising sugarcane crop with single node seedlings helps in reducing the seed material when compared to sett planting.

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**Table 2. Sugarcane yield (t ha<sup>-1</sup>) as influenced by type of seed material and spacing**

<b>Spacing</b>	<b>Cane yield (t ha<sup>-1</sup>)</b>		
	<b>Setts</b>	<b>Seedlings</b>	<b>Mean</b>
150cm	75.1	83.2	79.1
165cm	77.1	78.4	77.8
180cm	70.6	73.1	71.9
Mean	74.3	78.3	-
SEm+		1.10	
C.D @ 5%		3.7	

**Table 3. Number of Millable canes, Quality and Yield of sugarcane as influenced by different treatments (Ratoon crop) during 2023-24**

<b>Treatments</b>	<b>NMC ha<sup>-1</sup></b>	<b>Sucrose (%)</b>	<b>CCS (%)</b>	<b>Cane Yield (t ha<sup>-1</sup>)</b>	<b>Sugar yield (t ha<sup>-1</sup>)</b>
<b>Spacing</b>					
150 cm	90611	18.59	13.18	67.2	8.86
165 cm	83714	18.77	13.51	64.8	8.75
180 cm	80739	18.96	13.43	62.8	8.43
SEm+	1136	0.3	0.27	0.74	-
C.D @ 5%	4438	NS	NS	2.9	-
<b>Type of seed material</b>					
Setts	85194	18.73	13.23	64.0	8.47
Seedlings	84848	18.83	13.51	65.9	8.90
SEm+	1127	0.29	0.28	0.94	-
C.D @ 5%	NS	NS	NS	NS	-
<b>Population</b>					
100%	81970	19.14	13.74	63.6	8.74
125%	85394	18.34	12.92	65.1	8.41
150%	87700	18.86	13.46	66.1	8.90
SEm+	789	0.25	0.23	0.81	-
C.D @ 5%	2306	NS	NS	NS	-
<b>Interaction</b>	NS	NS	NS	NS	

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