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**Effect of planting geometry on growth and yield  
of sugarcane**

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**Abstract**

A field experiment was conducted at Surgi Farm of Krishi Vigyan Kendra, Rajnandgaon during 2016-17 to optimize the planting geometry for getting higher yield in sugarcane. Eight treatments were laid out in randomized block design replicated thrice. The treatments comprised of two row spacing 120 and 150 cm with three plant to plant spacings 60, 90 and 120 cm and farmer's practice with two and three budded setts. Single eye bud set is placed in Poly bags (6 x 5 inch) in the month of December, 2016 and planted in the month of February in main fields under drip irrigations system. The results revealed that the spacing of 120 x 60 cm registered significantly higher sugarcane yield followed by 150 x 90 cm spacings. Sugarcane planted in all the planting geometry of 120 and 150 cm row spacings produced significantly higher yield over farmer's practice of 90 cm spacing with 2 or 3 eye bud. Net return and benefit cost ratio was also higher in 120 x 60 cm spacing followed by 150 x 60 cm spacing whereas it was the lowest under farmer's practice.

**Keywords:** Bud, planting geometry, spacing, yield

**Introduction**

Sugarcane (*Saccharum officinarum* L.) is an important commercial crop of the country and cultivated over an area of 4.44 million hectares producing 306.07 million tonnes of sugarcane with an average productivity of 69.00 t/ha in the country. In Chhattisgarh state it is grown in 0.21 lakh hectares area with the production of 8.48 lakh tonnes and the average productivity is 40.4 t/ha (2016-17) (Anonymous, 2016) [1]. Sugarcane is a long duration crop takes about 12-16 months. Direct sowing of cane setts in the field takes about 30-45 days for sprouting of bud. This time can be utilized in taking another season crop by planting the single sprouted bud at optimum distance in the field. Depletion of ground water in many areas, intermittent and long dry spell of rainfall is becoming common now days. Irrigation water is the most limiting factor in the region. Hence, use of irrigation water as economical as possible without affecting production and productivity of sugarcane is highly important. Most of the farmers are adopting surface method of irrigation leading to heavy loss of water in conveyance and low water use efficiency. Drip irrigation saves 40-50 percent irrigation water (Solomon, 2012) [3]. Another factor responsible for high crop yield is the proper crop geometry. Planting geometry may influence the tillering pattern and other growth parameters (Kumawat *et al.* 2015) [4]. Adoption of suitable crop geometry, design and quality of components used may reduce the initial capital and installation cost of drip irrigation system. Keeping these in view, the present investigation was carried out to study the response of sugarcane variety Co 86032 with transplanting of single eye bud set on different spacings under drip irrigation.

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## Materials and Methods

The experiment was conducted at Krishi Vigyan Kendra, Surgi Farm during 2016-17. The nursery was prepared in polybags, in which the single eye bud set is placed in polybag of 6 x 5 inch in the month of December, 2016 and planted in the month of February, 2017 in main field under drip irrigations system. The design of the experiment is RBD with eight treatments replicated thrice. The treatments comprised of planting geometry 120 cm x 60 cm, 120 cm x 90 cm, 120 cm x 120 cm, 150 cm x 60 cm, 150 cm x 90 cm, 150 cm x 120 cm, farmers practice with direct placement of 3 budded setts with 90 cm row spacing and farmers practice with 2 budded setts with 90 cm row spacing. Sugarcane variety is Co86032 were planted with fertilizer dose of 250:80:50 kg NPK/ha. Plant height, number of tillers, nodal length and girth was recorded at harvest.

## Results and Discussion

Planting geometry significantly influenced the growth parameters of sugarcane. Number of tillers per plant was the highest under 150 x 120 cm spacing followed by 150 x 90 cm and 120 x 120 cm spacing, which was the effect of broader spacing, provide sufficient space, nutrient and moisture to the plant. However, the difference in number of tillers per plant under different planting geometry planted with single eye bud set was not significant. Farmer's practice either with 2 eye bud or 3 eye bud produced significantly less tillers over rest of the treatments. All the plants placed on 120 and 150 cm row spacings produced taller plants, higher nodal length and girth over farmer's practice of 2 or 3 eye bud set (Table 1).

Among different spacings under single bud set, 150 x 60 cm gave the highest cane weight (1.70 kg) followed by 120 x 60 cm (1.65 kg) but different spacings were at par and all the treatments under transplanting of cane with single bud set produced higher cane weight over farmer's practice. Sugarcane yield was significantly the highest under 120 x 60 cm spacing which was at par with 150 x 60 cm and these treatments produced significantly higher sugarcane yield over other planting geometry (Table 2). This was the result of optimum plant population in the field under these treatments. Farmer's practice with 2 eye bud set was not significant with farmer's practice with 3 eye bud set but these treatments produced significantly lower sugarcane yield over plants placed under different planting geometry under drip irrigation with 120 or 150 cm row spacings planted with single bud set. The result indicates the inverse relationship between planting density and weight of cane. Less cane weight at higher seeding density under farmer's practice was due to the enhanced interplant competition (Bell and Garside, 2005). The gross and net monetary returns was highest under 120 x 60 cm spacing followed by 150 x 60 cm and 120 x 90 cm spacings whereas it was the lowest under farmer's practice with 3 eye bud set. The cost of cultivation was varied as per the requirement of planting material used under different treatments. The cost of cultivation was the highest under 120 x 60 cm spacing followed by 120 x 90 cm and 150 x 60 cm spacing and it was the lowest under farmer's practice with 3 eye bud set due to less planting material utilized for sowing. The benefit cost ratio was the highest under 120 x 90 cm whereas it was the lowest under farmer's practice with 2 eye bud set.

**Table 1:** Effect of planting geometry on growth parameters of sugarcane under Drip irrigation

Treatments	Number of tillers	Plant height (m)	Nodal length (cm)	Girth (cm)
T <sub>1</sub> - 120 cm x 60 cm	15.50	3.41	14.35	8.78
T <sub>2</sub> - 120 cm x 90 cm	15.67	3.62	14.43	8.10
T <sub>3</sub> - 120 cm x 120 cm	16.33	3.67	14.63	8.27
T <sub>4</sub> - 150 cm x 60 cm	16.00	3.55	14.50	8.57
T <sub>5</sub> - 150 cm x 90 cm	16.67	3.48	14.55	8.35
T <sub>6</sub> - 150 cm x 120 cm	17.33	3.75	14.98	8.11
T <sub>7</sub> - Farmer's practice with 2 eye bud	9.33	2.92	13.17	7.13
T <sub>8</sub> - Farmer's practice with 3 eye bud	7.50	2.07	12.65	7.27
LSD(P=0.05)	2.30	0.55	0.67	0.78

**Table 2:** Effect of planting geometry under drip irrigation on yield and economics of sugarcane

Treatments	Single cane weight (kg)	Sugarcane yield (t/ha)	Gross Return (Rs/ha)	Cost of cultivation (Rs/ha)	Net return (Rs/ha)	B:C ratio
T <sub>1</sub> - 120 cm x 60 cm	1.65	158.00	513500.00	81356	432144	5.31
T <sub>2</sub> - 120 cm x 90 cm	1.61	137.67	447427.50	80560	366867	4.55
T <sub>3</sub> - 120 cm x 120 cm	1.56	125.13	406672.5	78150	328522	4.20
T <sub>4</sub> - 150 cm x 60 cm	1.70	146.78	477035.00	79678	397359	4.98
T <sub>5</sub> - 150 cm x 90 cm	1.54	116.33	378072.50	75990	302082	3.97
T <sub>6</sub> - 150 cm x 120 cm	1.51	114.00	370500.00	75180	295320	3.92
T <sub>7</sub> - Farmer's practice with 2 eye bud	1.15	109.10	354575.00	73470	281105	3.82
T <sub>8</sub> - Farmer's practice with 3 eye bud	1.26	106.37	345702.50	70380	275322	3.91
LSD (P=0.05)	0.25	8.65				

## Conclusion

On the basis of above findings, it may be concluded that transplanting of single bud set at spacing of 120 x 60 cm with drip irrigation is most suitable and profitable planting geometry for sugarcane cultivation in Rajnandgaon district of Chhattisgarh.

## References

1. Anonymous. Sugarcane in India: State wise area,

production and productivity, 2016. <http://sugarcane.dac.gov.in>statistics>

- Bell MJ, Garside AL. Shoot and stalk dynamics and the yield of sugarcane crops in tropical and subtropical Queensland, Australia. Field Crop Research. 2005; 92:231-248.
- Solomon S. Cost effective and input efficient technologies for productivity enhancement in sugarcane. (In) 25<sup>th</sup> meeting of sugarcane research and development workers

of A. P. held at Visakhapatnam on, 2012, 1-10.

4. Kumawat PD, Kachal DJ, Dahima NU. Effect of crop geometry and drip irrigation levels on sugarcane in south Saurashtra region of India. Indian Journal of Agricultural Research. 2016; 50(4):366-369.