

**RESEARCH ARTICLE :**

Effect of planting geometry on cane yield and water productivity under sub-surface drip fertigation system

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SUMMARY : Field experiments were conducted at Agricultural Research Station, Bhavanisagar, Tamil Nadu from 2008 to 2011 to optimize the row spacing and planting geometry under sub-surface drip fertigation system. The experiment was laid out in a Randomized Block Design and replicated thrice. The treatments imposed were Lateral spacing of 120 cm, 135 cm, 150 cm, 165 cm and 180 cm of either single row or dual row planting. The result indicated that among the different crop geometry lateral spacing of 180 cm planted in dual row recorded significantly the higher cane yield (165.2 t ha^{-1}) and was comparable with both single and double row planting of 150 lateral spacing than the lateral spacing of 120 cm planted in single row (101.6 t ha^{-1}).

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KEY WORDS :

Sub surface, Planting geometry, Yield, Yield attributes, Sugarcane

BACKGROUND AND OBJECTIVES

Sub surface drip irrigation is a combination of drip irrigation and fertigation technology which would save the water and fertilizer and also improve crop yield and quality with lesser costs and increase the efficiency of crop production. Sub-surface drip irrigation offers many advantages as a method of water application and also for controlled release of nutrients into the root-zone. Altering the crop geometry by providing wider spacing of 150 cm increased the cane growth and productivity and more feasibility for mechanical harvesting reported by Thiagarajan *et al.* (2011). Improved crop

geometry are crucial not only for upgrading the productivity but also lowering the cost of production (Raskar and Bhoji, 2003). Moreover, N application rate could probably be reduced by 25 to 50% by using subsurface drip irrigation compared to conventional management in sugarcane (Thorburn *et al.*, 2003). Hence the present investigation was initiated.

RESOURCES AND METHODS

Field experiments were laid out at Northern Block Farm, conducted at Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar, Erode

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Table 1 : Effect of planting geometry on economic yield and water use efficiency and BC ratio of sugarcane under sub-surface drip fertigation

Treatments	Economic shoot count (No./ha) (7 th month)	Yield (t ha ⁻¹)	WUE (kg ha ⁻¹ mm)	BC ratio
120 cm – Single row planting	104180	101.6	57.37	1.65
120 cm – Dual row planting	105848	110.4	62.34	1.86
135 cm – Single row planting	109063	111.5	62.96	1.97
135 cm – Dual row planting	118075	128.2	72.39	2.40
150 cm – Single row planting	128054	145.4	82.10	2.94
150 cm – Dual row planting	128731	152.3	86.00	3.11
165 cm – Single row planting	129913	155.8	87.97	3.28
165 cm – Dual row planting	133500	162.5	91.76	3.55
180 cm – Single row planting	128738	162.1	91.53	3.67
180 cm – Dual row planting	129542	165.2	93.28	3.70
C.D. (P=0.05)		12.9		

district of Tamil Nadu from 2008 to 2011. The farm is geographically located at 11° 29' N latitude and 77° 08' E longitude at an altitude of 256 m above MSL. The soil type was sandy loam in texture. The soils were neutral pH of 7.30. The electrical conductivity of the soil was 0.243 dSm⁻¹, low in available nitrogen (166 kg/ha), medium in available phosphorus (14.6 kg/ha) and high in available potassium (380 kg/ha) The treatments imposed were Lateral spacing: 120 cm, 135 cm, 150 cm, 165 cm and 180 cm of single row and dual row planting. The experiment was laid out in a Randomized Block Design and replicated thrice.

OBSERVATIONS AND ANALYSIS

Among the different crop geometry, lateral spacing of 180 cm – Dual row planting recorded significantly the higher cane yield (165.2 t ha⁻¹) and was comparable with both single and double row planting of 150 lateral spacing. The lateral spacing of 120 cm - Single row planting recorded the lowest yield (101.6 t ha⁻¹). Similarly Shanthy and Muthusamy (2012) reported that planting of sugarcane in wider row spacing (150 cm) gave higher cane yield, gross and net income as compared to normal row spacing (90 cm).

With regard to water use efficiency (WUE) in sugarcane, maximum WUE of 93.28 kg/ha.mm was recorded in 180 cm – Dual row planting whereas the minimum WUE of 57.37kg / ha.mm was observed in 120 cm – Single row planting.

Among the different planting geometry, 180 cm – dual row planting recorded higher BC ratio (3.70) followed by 180 cm – single row planting. Ghaffar *et al.* (2012)

Faisalabad in Pakistan noticed that higher gross income and net return with planting of sugarcane setts at 120 cm row spacing as compared to 75 cm row spacing.

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REFERENCES

- Ghaffar, A.,** Ehsanullah, Akbar, N., Khan, S.H., Jabran, K., Hashmi, R.Q., Iqbal, A. and Ali, M.A. (2012). Effect of trench spacing and micronutrients on growth and yield of sugarcane (*Saccharum officinarum* L.). *Australian J. Crop Sci.*, **6** (1):1-9.
- Raskar, B.S.** and Bhoji, P.G. (2003). Effect of Intra –row spacing, Fertilizer levels and planting materials on yield and economics of Pre seasonal sugarcane under drip irrigation. *Sugar Tech.*, **5**(4) : 305-309.
- Renato campos de Oliveira,** Ferando nobre Cunha, Nelmicio Furtado da Sila and Clarice Aparecida Megguer (2014). Productivity of fertigated sugarcane in subsurface drip irrigation system. *African J. Agric. Res.*, P.No.993 - 1000
- Shanthy, Rajula T.** and Muthusamy, G. R. (2012). Wider row spacing in sugarcane: A socio-economic performance. *Sugar Tech.*, **14**(2):126-133.
- Thiyagarajan, G.,** Vijayakumar, M., Selvaraj, P.K., Duraisamy, V.K. and Yassin, M. Mohamed (2011). Evaluation of irrigation systems for cost reduction in wide spaced sugarcane. *Internat. J. Bio Res. & Stress Mgmt.*, **2**(4)394-396
- Thorburn, P.J.,** Dark, I.K., Biggs, I.M., Baillie, C.P., Smith, M.A. and Keating, B.A. (2003). The fate of nitrogen applied to sugarcane by trickle irrigation. *Irrigation Sci.*, **22**(3-4):201-209. <http://dx.doi.org/10.1007/s00271-003-0086-2>

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