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*International Journal of Current Research*
*Vol.3, Issue, 5, pp.202-204, May, 2011*

**INTERNATIONAL JOURNAL OF CURRENT RESEARCH**

**ISSN: 0975-833X**

## RESEARCH ARTICLE

# INFLUENCE OF DIFFERENT PLANTING TECHNIQUES ON MAXIMISATION OF YIELD IN SUGARCANE

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**ARTICLE INFO**

***Article History:***
Received 21st February, 2011
Received in revised form
29th March, 2011
Accepted 25th April, 2011
Published online 14th May 2011

***Key words:***
Sugarcane, Wide row,
Normal row,
Inter cropping,
Black gram.

**ABSTRACT**

'Field experiment was conducted during 2008 to 2009 to evolve the suitable planting techniques for yield maximization of sugarcane. The field experiment was laid in a randomized block design with three replications viz.,T1 - 120 cm row spacing (Wide row) with end to end method of planting, T2 - 120 cm row spacing (Wide row) with cross planting method (setts placed across the furrow), T3 - T1 + intercropping (black gram), T4 - T2 + intercropping (black gram), T5 - 80 cm row spacing (normal row) with end to end method of planting (conventional planting method), T6 - 80 cm row spacing (normal row) with cross planting method (setts placed across the furrow), T7 - T5 + intercropping (black gram), T8 - T6 + intercropping (black gram). The treated setts were planted in the furrows at the rate of 60,000 setts ha-1 in 120 cm row spaced (wide row) and 75,000 setts ha-1 in 80 cm row spaced (normal rows). The black gram (Vigna mungo) were selected and dibbled in levelled ridges at the rate of 2 to 3 seeds hill-1. In 80 cm row spacing (normal row) of sugarcane, the black gram was sown in single row. While in 120 cm row spacing (wide row), the black gram was sown in 3 rows. The growth and yield parameters of sugarcane were favourably influenced by planting technique. T7 - T5 + intercropping recorded higher no. of germinant (1,09,090 ha-1), Tiller production (2,68,460 ha-1), Plant height at 270 DAP ( 260.99 cm), LAI at 270 DAP(5.25) and NMC (1,14,950). T4 - T2 + intercropping recorded higher individual cane weight of 1.50 kg, Cane yield of 151.93 t ha-1 and Sugar yield of 17.78 t ha-1.



**Citation:** ***Dr. Manimaran, S.*** **2011.** "Influence of different planting techniques on maximisation of yield in sugarcane." *International Journal of Current Research*, 03, (05), 202-204.

## INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is an important commercial crop in India and plays pivotal role in agricultural and industrial economy of our country. In Tamil Nadu the area under sugarcane is nearly 3.2 lakh hectares with a production of 32 million tonnes. The productivity is 105 t $ha^{-1}$ with a recovery of 9.92 per cent. Since, the scope for the expansion of area under sugarcane is limited, the production has to be enhanced only through effective crop managements techniques. Attempts to optimize row spacing of sugarcane for enhanced yield have probably been made ever since sugarcane become a commercial crop in India. Hunsigi (1993) observed that row spacing ranged from 0.6 to 2.4 m is in practice in different countries. Wider row spacing (>1.2 m) is adopted in countries where mechanized cultivation is in practice, while in countries where human labour is extensively employed, comparatively a narrow spacing of 0.6 to1.2 m is adopted.

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A study on optimizing management practices for sugarcane to compensate yield loss under wider row spacing had indicated that increasing seed and fertilizer rate per unit area would help in obtaining cane yield equal to that of conventional row spacing of 90 cm (Sundara, 1997). In wider spacing, tiller per clump is more and canes are thick, while in closer spacing tiller per clump is less and canes are thin (Gururaj Hunsigi and Satpute, 2000). The sugarcane rhizosphere occupies less than one third of the soil volume during the formative phase period. Under these circumstances, we can profitably exploit the three valuable natural resources *viz*., radiant energy, soil and space by growing short duration intercrops (Sundara, 2004). Intercropping with legumes in sugarcane not only improved soil fertility and also provided additional income (Lakshminarayana *et al.,* 2000). Sugarcane produces heavy tonnage and tends to remove substantial quantum of plant nutrients from the soil. Unless adequate supplies of plant nutrients are ensured, the sugarcane yield tend to decline even in most fertile soils. To preserve the soil fertility and for sustainable productivity, the balanced supply of major, secondary and micronutrients are essential.

Research information on wide row spacing with different planting methods, intercropping of pulse and green manure is limited in sugarcane. The present investigation has been formulated with the objective to study the influence of different planting techniques in sugarcane.

## MATERIALS AND METHODS

The field experiment was conducted during 2008 to 2009 to evolve the suitable planting techniques for yield maximization of sugarcane. The sugarcane variety Co 86032 was chosen for the experimentation and black gram variety ADT 5 was used as intercrop. The field experiment was laid in a randomized block design with three replications and eight treatments *viz*., $T_1$ - 120 cm row spacing (Wide row) with end to end method of planting, $T_2$ - 120 cm row spacing (Wide row) with cross planting method (setts placed across the furrow), $T_3$ - $T_1$ + intercropping (black gram), $T_4$ - $T_2$ + intercropping (black gram), $T_5$ - 80 cm row spacing (normal row) with end to end method of planting (conventional planting method), $T_6$ - 80 cm row spacing (normal row) with cross planting method (setts placed across the furrow), $T_7$ - $T_5$ + intercropping (black gram), $T_8$ - $T_6$ + intercropping (black gram).

The furrows were formed at a spacing of 80 cm and 120 cm as per the treatment schedule. The treated setts were planted in the furrows at the rate of 60,000 setts $ha^{-1}$ in 120 cm row spaced (wide row) and 75,000 setts $ha^{-1}$ in 80 cm row spaced (normal rows) (Gopalasundaram, 2000).

The setts were placed along the furrow and across the furrow as per the treatments. The healthy seeds of black gram (*Vigna mungo*) were selected and dibbled in levelled ridges at the rate of 2 to 3 seeds $hill^{-1}$, immediately after planting the sugarcane setts with an inter row spacing of 10 cm apart. In 80 cm row spacing (normal row) of sugarcane, the black gram was sown in single row. While in 120 cm row spacing (wide row), the black gram was sown in 3 rows with 30 cm inter row spacing.

## RESULTS AND DISCUSSION

**Number of germinants:** Number of germinants influenced by the planting techniques were recorded at 35 DAP in plant crop. Significant difference in number of germinants existed due to planting techniques. The 80 cm row (normal row) spacing cane produced higher germinants of 1,05,900 ($T_8$-80 cm row spacing with cross planting method + intercropping) to 1,09,090 $ha^{-1}$ ($T_7$-80 cm row spacing with end to end method of planting method + intercropping). The number of germinants was on par in 80 cm row (normal row) spacing treatments. 120 cm row (wide row) spaced cane produced less number of germinants compared to 80 cm row spacing and it ranges from 84,570 ($T_4$-120 cm row spacing with cross planting method + intercropping) to 86,120 $ha^{-1}$ ($T_1$ - 120 cm row spacing with end to end method of planting) and was comparable to each other.

**Tiller production at 90 DAP:** The data on tiller count was recorded at 90 DAP. Planting techniques of cane significantly influenced the tiller production at 90 DAP. 120 cm row spacing sugarcane treatments recorded lesser number of tillers ranging from 2,19,930 ($T_3$-120 cm row spacing with end to end method of planting + intercropping) to 2,25,960 $ha^{-1}$ ($T_2$- 120 cm row spacing with cross planting method). Where as 80 cm row spacing sugarcane treatments recorded higher number of tillers which ranged from 2,62,060 ($T_5$- 80 cm row spacing with end to end method of planting) to 2,68,460 $ha^{-1}$ ($T_8$-80 cm row spacing with cross planting method + intercropping). In 120 cm row spacing treatments, intercropping (black gram) ($T_4$ and $T_3$) recorded lesser tillers compared to non intercropped treatments ($T_2$ and $T_1$). 120 cm row spacing with cross planting method ($T_2$) recorded higher tillers (2,25,960 $ha^{-1}$) followed by 120 cm row spacing with end to end method of planting($T_3$) (2,24,540 $ha^{-1}$), which was on par with other 120 cm row spacing treatments. Among the 80 cm row spacing, the cane with black gram intercropping ($T_8$ and $T_7$) recorded higher tillers (2,68,460 and

**Table 1. Effect of planting techniques on No. of germinant, tiller production, plant height at 270 DAP and LAI at 270 DAP**

| Treatments | No. of germinant ('000 $ha^{-1}$) | Tiller production ('000 $ha^{-1}$) | Plant height at 270 DAP(cm) | LAI at 270 DAP |
|---|---|---|---|---|
| $T_1$ - 120 cm row with end to end method | 86.12 | 224.54 | 272.74 | 4.55 |
| $T_2$ - 120 cm row with cross method | 85.44 | 225.96 | 276.69 | 4.59 |
| $T_3$ - $T_1$ + intercropping | 85.95 | 219.93 | 278.07 | 4.80 |
| $T_4$ - $T_2$ + intercropping | 84.57 | 221.92 | 282.48 | 4.86 |
| $T_5$ - 80 cm row with end to end method | 107.19 | 262.06 | 256.59 | 5.01 |
| $T_6$ - 80 cm row with cross method | 107.05 | 263.91 | 253.15 | 5.07 |
| $T_7$ - $T_5$ + intercropping | 109.09 | 268.46 | 260.99 | 5.25 |
| $T_8$ - $T_6$ + intercropping | 105.90 | 264.69 | 256.92 | 5.15 |
| SEd | 2.20 | 5.57 | 6.09 | 0.11 |
| CD (p=0.05) | 4.73 | 11.96 | 13.06 | 0.23 |

**Table 2. Effect of planting techniques on NMC ('000 $ha^{-1}$), individual cane weight, Cane yield and sugar yield**

| Treatments | NMC ('000 $ha^{-1}$) | Individual cane weight (kg) | Cane yield (t $ha^{-1}$ ) | Sugar yield (t $ha^{-1}$ ) |
|---|---|---|---|---|
| $T_1$ - 120 cm row with end to end method | 104.30 | 1.41 | 140.40 | 15.71 |
| $T_2$ - 120 cm row with cross method | 106.92 | 1.42 | 141.60 | 16.04 |
| $T_3$ - $T_1$ + intercropping | 104.95 | 1.49 | 149.88 | 17.36 |
| $T_4$ - $T_2$ + intercropping | 107.78 | 1.50 | 151.93 | 17.78 |
| $T_5$ - 80 cm row with end to end method | 113.30 | 1.29 | 135.20 | 14.86 |
| $T_6$ - 80 cm row with cross method | 112.37 | 1.27 | 133.98 | 14.86 |
| $T_7$ - $T_5$ + intercropping | 114.95 | 1.31 | 138.07 | 15.76 |
| $T_8$ - $T_6$ + intercropping | 114.50 | 1.28 | 137.12 | 15.75 |
| SEd | 2.50 | 0.03 | 3.21 | 0.36 |
| CD (p=0.05) | 5.37 | 0.06 | 6.90 | 0.78 |

2,64,690 ha$^{-1}$ respectively) than without intercropping ($T_6$ and $T_5$) (2,63,910 and 2,62,060 ha$^{-1}$ respectively).

**Cane height at 270 DAP:** Cane height was significantly influenced by the planting techniques at all stages of crop growth. 120 cm row spacing with cross planting method + intercropping ($T_4$) registered highest cane height of 282.48 cm at 270 DAP. This was followed by 120 cm row spacing with end to end method of planting + intercropping ($T_3$) (278.07 cm). At 270 DAP the lower cane height was recorded in 80 cm row spacing with cross planting method ($T_6$) (253.15 cm), which was on par with other 80 cm row planting treatments.

**Leaf area index (LAI):** Leaf area index was recorded at 270 DAP index was significantly influenced by the planting techniques. Among the planting techniques, the $T_7$ recorded higher LAI compared to other treatments (5.25), which was on par with 80 cm row spacing treatments ($T_8$ and $T_6$).

**Number of millable cane (NMC):** Significant effect on number of millable cane **(**NMC) was noted due to planting techniques. In general, 80 cm row spacing treatments recorded higher number of millable cane **(**NMC) than 120 cm row spacing. 80 cm row spacing with end to end method of planting + intercropping ($T_7$) registered higher number of millable cane **(**NMC) of 1,14,950 ha$^{-1}$ at harvest, which was on par with other 80 cm row planting method ($T_8$ , $T_5$ and $T_6$ respectively). In 120 cm row spacing, cross planting method + black gram intercropping ($T_4$) recorded higher number of millable cane **(**NMC) of 1,07,780 ha$^{-1}$ at harvest, which was on par with other 120 cm row spacing planting method ($T_2$ , $T_3$ and $T_1$ respectively). 120 cm row spacing with end to end method of planting without intercropping ($T_1$) registered the lowest number of millable cane **(**NMC) of 1,04,300 ha$^{-1}$.

**Individual cane weight (kg):** Significant variation was observed on individual cane weight due to planting techniques. Individual cane weight was significantly influenced by the planting techniques. 120 cm row spacing treatments recorded higher individual cane weight than 80 cm row spacing treatments. 120 cm row spacing with cross planting method + intercropping ($T_4$) produced heavier cane weight (1.50 kg), which was on par with 120 cm row spacing with end to end method of planting + intercropping (T3). 80 cm row spacing with cross planting method without intercropping (T6) produced lesser cane weight of 1.27 kg. Due to inter node length and grith leads to higher individual cane weight.

**Cane yield:** Cane yield was recorded at harvest from the net plot area and converted to per hectare yield. The different planting techniques had a profound influence on cane yield. Among the different planting techniques, 120 cm row (wide row) spacing treatments recorded higher cane yield than 80 cm row (normal row) spacing treatments. 120 cm row spacing with cross planting method + intercropping ($T_4$) registered highest cane yield of 151.93 t ha$^{-1}$, which was on par (149.88 t ha$^{-1}$) with 120 cm row spacing with end to end method of planting + intercropping ($T_3$). This was followed by $T_2$ (120 cm row spacing with cross planting method without intercropping). 80 cm row spacing with cross planting method without intercropping ($T_6$) recorded lowest cane yield (133.98 t ha$^{-1}$). The individual cane weight leads to higher cane yield. Similar findings were observed by Manimaran and Kalyanasundaram (2006).

**Sugar yield:** Sugar yield is the resultant products of cane yield and CCS per cent. Planting techniques significantly influenced the sugar yield. Intercropped cane produced significantly higher sugar yield in 120 cm row (wide row) and 80 cm row (normal row) spacing than sole crop of sugarcane. At the same time 120 cm row spacing without intercrop registered higher sugar yield than 80 cm row spacing. Among the planting techniques, 120 cm row spacing with cross planting method + intercropping ($T_4$) recorded significantly higher sugar yield (17.78 t ha$^{-1}$). This was followed by 120 cm row spacing with end to end method of planting + intercropping ($T_3$), which registered 17.36 t ha$^{-1}$. 80 cm row spacing with cross planting method without intercropping ($T_6$) recorded the lowest sugar yield (14.86 t ha$^{-1}$), which was at par with treatments $T_5$ - 80 cm row spacing with end to end method of planting without intercropping. The cane yield leads to sugar yield.

**Conclusion**

120 cm row (Wide row) spacing in sugarcane is effective in achieving higher yield and it also increase the scope for mechanization in sugarcane cultivation. Cross planting method under 120 cm row spacing was found to be the best planting method for the maximizing the cane and sugar yield. Inclusion of black gram (pulse) as intercrop enhanced the cane yield and improved the soil fertility substantially. 120 cm row spacing with cross planting + intercropping (black gram) is the best planting techniques for sugarcane to maximize cane yield and sugar yield.

## REFERENCES

Gururaj Hunsigi and P.G.Satpute. 2000. Sugarcane spacing regimes: some myths and realities. Proc. STAI. 61: 95-103.

Hunsigi,G. 1993. Production of Sugarcane-Theory and Practice. Springer-Verlag, Berlin. p.57.

Lakshminarayana, M.T., K.S. Krishna and T.N. Anand. 2000. Adoption of sugarcane based cropping system by farmers. *Curr. Res.,* 29: 114-115.

Maniamaran.S. and D.Kalyanasundram. 2006. Effect of spacing, planting techniques, intercropping and nutrient management on the yield and macronutrient uptake of sugarcane. *Indian Sug.* 56 (7): 23-27.

Sundara,B. 1997. Wide row spacing. In: Annual Report for 1996-97, Sugarcane Breeding Institute, *Coimbatore.* p.51.

Sundara,B. 2004. Sugarcane based intercropping systems for tropical India. *Coop. Sug.,* 35(5): 377-385.

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