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Assessment of suitable sugarcane variety for black cotton soils of Varaganadhi river basin area in Theni district

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Abstract

The on farm testing (OFT) experiment was conducted at five different farmer field of Varaganadhi river basin in Theni district during Kharif 2017. The soil texture of the trail plot is clay loam. The trail plot received 981 mm of the rainfall. The experiment was laid out in Randomized Block Design and replicated in thrice with following treatments. T₁ - Sathanai India 309, T₂ - Si 8 and T₃ - CO 0212. There are two improved sugarcane varieties was used in this experiment which are high yielding varieties and highly suitable for Theni district. Each trail plot was conducted 0.25 acre. The trail plot comes under Varaganadhi river basin. Observations on growth, yield attributes and yield were recorded in randomly selected plants. Among the different varieties of sugarcane the higher number of productive tiller/plant, weed count / m² (45 DAS), plant height (cm), number of internodes/cane, millable cane height (cm), number of millable cane/ha and yield (t/ha) were recorded in Si 8 followed by CO 0212. In economics, highest B: C ratio of 5.05 was recorded in Si 8 sugarcane variety. Based on the experimental results, Si 8 variety could be considered as better option for achieving higher productivity and profitability of Sugarcane in Block cotton soils of Varaganadhi river basin area in Theni District.

Keywords: Sugarcane, improved variety, sugarcane booster, yield and b:c ratio

Introduction

Sugarcane (*Saccharum officinarum*) family *Gramineae* (Poaceae) is widely grown crop in India. It provides employment to over a million people directly or indirectly besides contributing significantly to the national exchequer. Sugarcane is the main source of sugar in India and holds a prominent position as a cash crop. Sugarcane is an oldest crop known to man, a major crop of tropical and sub-tropical regions worldwide. Sugarcane is a glycophyte, sucrose storing member of tall growing perennial monocotyledonous grass. Across the world 70 % sugar is manufactured from Sugarcane (Statistics report, Cooperative Sugar, 2017). India is the second largest country in sugarcane production in the world. Sugarcane is a major source of raw material for sugar industries and other allied group of by-product industries. The main byproducts of the sugarcane industry are bagasse and molasses. Sugar industry in India is next in importance only to the textile industry and provides gainful employment to a large number of people. Cultivation of sugarcane in India dates back to the Vedic period. The earliest mention of sugarcane cultivation is found in Indian writings of the period 1400 to 1000 B.C. It is now widely accepted that India is the original home of *Saccharum* species. The Sugarcane productivity and juice quality are profoundly influenced by weather conditions prevailing during the various crop-growth sub-periods. Sugar recovery is highest when the weather is dry with low humidity; bright sunshine hours, cooler nights with wide diurnal variations and very little rainfall during ripening period. These conditions favor high sugar accumulation. Sugarcane is a high biomass crop with high water requirements. Sustained sugarcane production depends upon efficient water and fertilizer management throughout the crop growth period. Large variations in cane yields are noticed from year to year and place to place due to untimely availability of irrigation water and fertilizers based on need of the crop. Sugarcane grows up to 12 months duration and cutting order from sugar mills delayed due to administrative problem of Sugar mills. Harvest after cane maturity leads to depletion of sugar content which results cane weight drastically reduced. Due to long duration and nature of the crop such as amount of water requirement is more during the cane maturity period leads to poor yield and quality (Chidambaram, 2017) [1]. Farmers spend more cost for saving the crops during last 2- 3 months by the incidence of drought. It's affect the net profit of the farmers. Avoidance of the problem farmers decided to grow the short duration high yielding sugarcane varieties. The ICAR introduce the on farm testing (OFT) for evaluation of suitable varieties for specific localities to enhance the yield and income of the farmers.

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The main objective of the trail is evaluating newly released varieties, technologies and management practices at farmers field under the real farming situation under different agro climatic regions. In Theni district past one decade continuous cultivation of same variety and lack of adopting short duration high yielding varieties loss the economics of the sugarcane growers in the regions. The present study has been undertaken to study the performance of different short duration and high yielding sugarcane varieties that are suitable for Black cotton soils of Varaganadhi River basin in Theni District.

Materials and Methods

The on farm testing (OFT) experiment was conducted at five different farmer field of Varaganadhi river basin in Theni district during Kharif 2017. The soil texture of the trail plot is clay loam with low organic carbon (0.18 - 0.37 %), available Nitrogen is (249 - 298 kg ha⁻¹), available Phosphorus (9.41 - 11.65 kg ha⁻¹) and available Potassium is (164 - 175 kg ha⁻¹). The trail plot received 981 mm of the rainfall. The experiment was laid out in Randomized Block Design and replicated in thrice with following treatments. T₁ - Sathanai India 309, T₂ - Si 8 and T₃ - CO 0212. There are two improved sugarcane

varieties was used in this experiment which are high yielding varieties and highly suitable for Theni district. Each trail plot was conducted 0.25 acre. The trail plot comes under Varaganathi river basin. The recommended dose of fertilizer (275 kg N, 100 kg P₂O₅ and 200 kg K₂O) was applied as a basal and top dressing. Regarding weed management practices, pre-emergence herbicide metribuzine @ 1 kg a.i/ha followed by 2, 4-D @ 1 kg a.i/ha were applied at 45 days after planting. Earthing up, detrashing, propping and others practices was done as per recommended practice of package (Crop Production Guide, TNAU, 2014) [4]. Pink Pigmented Facultative Methylobacterium (PPFM) 1 percent was applied through foliar spray for avoiding moisture stresses. The primary data collected from the farmers with the help of the interviews schedule and direct field measurement.

Under the OFT, the testing varieties viz., Sathanai India 309, Si 8 and CO 0212 (Table 1.) were planted at the rate of 75000 two budded setts/ha. Appropriate need based plant protection measures were taken up to control the pest and diseases following the recommended packages of practices as per the crop production guide.

Table 1: Difference between testing packages and farmers practices

Treatments	Variety releasing year	Duration	Characteristics
T ₁ - Sathanai India 309	-	12 months	Yield: 118t/ha, commercial sugar content 11.5%
T ₂ - Si 8	2012	11 months	Yield: 146 t/ha, commercial cane sugar 12.9%, high sugar yield: 18 t/ha, tolerant to red rot and drought.
T ₃ - CO 0212	2016	11 months	Yield: 165 t/ha, Sugar yield 19.27 t/ha, tolerant to drought and water stagnation and red rot.

Results and Discussion

Growth and yield parameters

The data pertaining growth and yield parameters of sugarcane as significantly influenced by different varieties are presented in Table 2.

Number of productive tiller/plant

The highest number of productive tillers per plant of 21.2 was recorded in Si 8 sugarcane variety (T₂) followed by, CO 0212 with value of 18.6 (T₄). This might be due to high tillering capacity in nature and vigorous vegetative growth intake more nutrients from soil (Paul *et al.*, 2005) [7]. The lowest number of productive tillers per plant of 9.7 was recorded in Sathanai India 309 (T₁).

Weed count / m² (45 DAP)

The least weed count of 128.4 / m² at 45 days after planting (DAP) was recorded in Si 8 sugarcane variety (T₂) followed by, CO 0212 with value of 131.7 (T₄). This might be due to high tillering capacity and fastest growth of sugarcane variety at early stages which results suppressed weed growth. The

highest weed count of 141.4 per m² at 45 DAP was recorded in Sathanai India (T₁) due to the slow growth rate and higher weed infestation (Mahima Begum, 2016) [5].

Plant height (cm)

The higher plant height of 262.4 cm was recorded in Si 8 sugarcane variety (T₂) followed by, CO 0212 with value of 254.8 cm (T₄). This might be due to foliar application sugarcane booster helps availability of more nutrients for crop growth and less weed infestation (Rana *et al.*, 2002) [8]. The lowest plant height of 234.6 was recorded in Sathanai India 309 (T₁).

Number of internodes per cane

The highest number of internodes per cane of 23 was recorded in Si 8 sugarcane variety (T₂) followed by, CO 0212 with value of 21 (T₄). This might be due to uptake of more amounts of nutrients from the soils and less amount of weed infestation during critical period of crop growth (Rana *et al.*, 2002) [8]. The lowest number of internodes per cane of 18 was recorded in Sathanai India 309 (T₁).

Table 2: Growth and yield parameters of different sugarcane variety

Treatments	No. of productive tiller/plant	Weed count / m ² (45 DAS)	Plant height (cm)	No. of internodes/ cane	Millable cane height (cm)	No. of millable cane/ha	Yield (t/ha)
T ₁ - Sathanai India 309	9.7	141.4	234.6	18	164.6	93450	90.2
T ₂ - Si 8	21.2	128.4	262.4	23	197.3	105750	138.5
T ₃ - CO 0212	18.6	131.7	254.8	21	182.9	103200	126.1
S Ed	1.1	1.2	3.5	0.9	5.7	1177	4.4
CD (P=0.05)	2.4	2.7	7.5	1.9	12.1	2460	9.4

Millable cane height (cm)

The highest millable cane height of 197.3 cm was recorded in Si 8 sugarcane variety (T₂) followed by, CO 0212 with value of 182.9 cm (T₄). This might be due to foliar application of

sugarcane booster increases the internode length and diameter of the cane (Chinnusamy *et al.*, 2002) [2]. The lowest millable cane height of 164.6 was recorded in Sathanai India 309 (T₁).

Number of millable cane/ha

The highest number of millable cane/ha of 105750 was recorded in Si 8 sugarcane variety (T₂) followed by, CO 0212 with value of 103200 (T₄). This might be due to more

amounts of productive tillers per plant leads to increases number of millable canes (Singh and Singh 2002) [11]. The lowest number of millable cane/ha of 93450 was recorded in Sathanai India 309 (T₁).

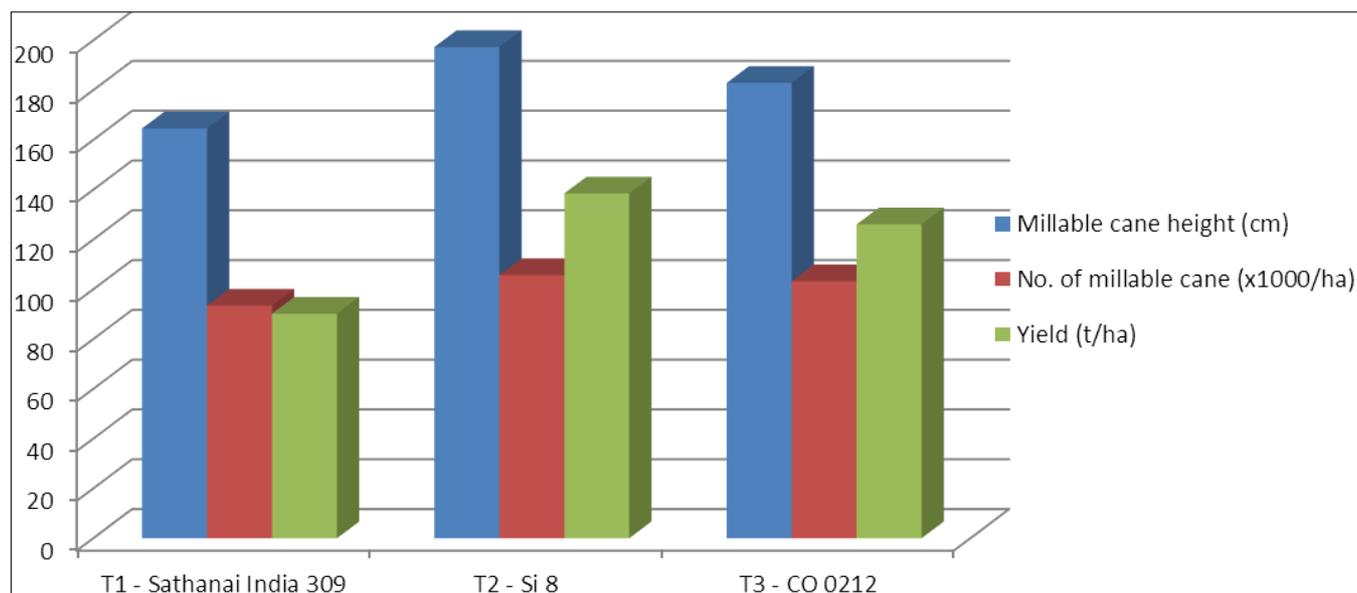


Fig 1: Yield and yield attributes of different varieties of Sugarcane

Yield (t/ha)

The highest yield of 138.5 t/ha was recorded in Si 8 sugarcane variety (T₂), followed by CO 0212 with value of 126.1 t/ha (Fig 1.). This might be due to high tillering capacity and low rate of weed infestation resulted higher utilization of natural resources and fertilizer application (Shanmuganathan, 2017) [9]. Less weed infestation and foliar application of Sugarcane booster increases the internode length and diameter of the cane which results increases yield. The lowest yield of 90.2 t/ha was recorded in Sathanai India (T₁) due to their low tillering capacity and higher weed infestation during initial growth period.(Shukla, 2017) [10].

Economics

Economics of raising a Sugarcane crop play a vital role in making recommendation for adoption of new variety or technologies to the farmers due to their long duration nature.

Table 4: Economic parameters of different varieties of Sugarcane in Theni District

Treatments	Gross cost (Rs./ha)	Gross return (Rs/ha)	Net return (Rs/ha)	BCR
T ₁ - Sathanai India 309	71540	248215	176675	3.46
T ₂ - Si 8	75300	380875	305575	5.05
T ₃ - CO 0212	72530	346967	274437	4.78

Data statistically not analyzed

The data pertaining to gross returns, net returns and B: C ratio as influenced by foliar application of Sugarcane booster is presented in Table 3. The highest gross return (Rs. 380875 /ha) and net return (Rs. 305575 /ha) was recorded in Si 8 (T₂) due to obtained higher yield compared to other treatments. The lowest net return (Rs. 176675 /ha) was recorded in Sathanai India 309 (T₁) due to less number of productive tillers and higher weed density affects the yield. The highest B: C ratio 5.07 was recorded in Si 8 (T₂) due to highest net return of the treatments (Mahima, 2016) [5]. The lowest B: C ratio 3.46 was recorded in Sathanai India 309 (T₁).

Conclusion

Over all, from the experiment results, it could be concluded that Si 8 variety along with recommended package of practices in Sugarcane recorded higher yield. It could be considered as better option for achieving higher productivity and profitability of Sugarcane in Block cotton soils of Varaghanadhi river basin area in Theni District.

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