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Evaluation of Different Sugarcane Varieties Suitable for Sustainable Sugarcane Initiative(SSI) under Sandy Clay Loam Soils

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ABSTRACT: A field experiment was conducted during the early season for two years at the Sugarcane Research Station, Sirugamani, Trichy, Tamil Nadu the early seasons of 2016-2017 to evaluate the performance of nine different sugarcane varieties as treatments under Sustainable Sugarcane Initiative(SSI) in sandy clay loam soil type. The trial was laid out in Randomized Block Design (RBD) with three replications. The results of this study revealed that the highest mean number of economic shoots (94,440/ha) and cane yield of 129.5 t/ha was recorded by the variety CoSi(Sc) 6 variety under SSI. The highest net return (Rs.1,63,277/ha), sugar yield(22.43 t/ha) and BCR (2.17) was recorded with the variety CoSi(Sc) 6 under SSI in the sandy clay loam soils of Trichy District in Tamil Nadu.

Keywords: Sustainable Sugarcane Inititiave, Varieties, cane yield.

INTRODUCTION

Sugarcane is an important commercial crop of India which immediately follows Brazil in production and contributes about 11 percent of the Gross Domestic Product (GDP). The sugar industry is amongst the most important agro-based industries in the country engaging 5 crore farmers and their family members and 5 lakh workers directly employed with the sugar mills (Niti Ayog, 2020). Sugarcane is cultivated in an area of 58.83 Lakh hectares with a production of 494.22 million tons and an average productivity of 84.01 t/ha (GOI, 2023). Worldwide, about 177.28 million metric tons of sugar were produced in 2022-23 (Statista, 2023) and India is the leading consumer of sugar in the world. The demand for sugar is increasing every year and, by 2050, the demand will be 48 million tonnes which is about 100% higher than the present production (ICAR, 2015). The Sustainable Sugarcane Initiative (SSI) which involves use of Chip bud technology, is an alternate way to reduce the massive seed requirement and improve the quality of sugarcane over the conventional method of sett planting due to its manifold advantages. The Sustainable Sugarcane Initiative (SSI) was launched in May 2009 by the joint *Dialogue Project on Food, Water and Environment* established by the World Wide Fund for Nature (WWF) and the International Crop Research Institute the Semi-Arid Tropics (ICRISAT) "to improve sugarcane cultivation in India.

Srivastava *et al.* (1981) suggested the Spaced Transplanting (STP) in which single bud nursery was raised and seedlings were transplanted in the main field with wider spacing within the row to facilitate availability of abundant solar radiation and soil aeration to enhance high levels of tillering. Nagendran (1988) found that the 'bud chip seedling transplanting technique' was the most suitable for adoption in the wet lands of Cauvery delta. Narendranath (1992) reported that the bud chip raised seedlings were three times more cost-effective than the way sugarcane was normally planted. Prasad and Sreenivasan (1996) found the bud chip method as an easy technology for transport of cane seed material.

In the states like Tamil Nadu and Andhra Pradesh, necessary budgetary provisions were made to popularise and expand the area under SSI (The Hindu, 2011). On the whole, there is sufficient interest shown by the state governments in promoting SSI following the positive results demonstrated by the WWFICRISAT Project. The soil texture ranging from sandy loam to sandy clay loam exhibit a noticeable quantum of soil erosion every year (Edivaldo Thomaz *et al.*, 2022) respectively. Genetic tools like different markers are

available for varietal identification, utilization and management of the varieties or genotypes of sugarcane (Niraj Nath Tiwari *et al*., 2023). Different varieties would express their yield potential differently in a particular environment. Several studies on methods of planting (Dhotre *et al*., 2008), plant geometry and population (Saranraj *et al*., 2022) intercropping in sugarcane (Saranraj *et al*., 2022a) under the sustainable Sugarcane Initiative which proved the efficiency of this method of establishment in sugarcane agronomy. But, studies on evaluation of suitable varieties under SSI technology with reference to their suitability for tillering and yield potential under this new establishing method with chip buds technology were meager. Hence, the present study was conducted to evaluate different sugarcane varieties under SSI technique in sandy clay loam soils of Trichy district in Tamil Nadu.

MATREIALS AND METHODS

The trial was laid out in Randomized Block Design(RBD) with three replications. The treatments included nine different varieties of sugarcane *viz.,* T_1 -Co Si (Sc) 6, T_2 -TNAU Sugarcane Si 7, T_3 -TNAU Sugarcane Si 8, T_4 -CoC 22, T_5 -CoC 24, T_6 -CoG 94077, T_7 -Co 86032, T_8 -Co 94008 and T_9 -Co 99004. Thirty day old chip budded seedlings of selected varieties were planted as per the treatments at a spacing of 1.5 m × 0.6 m. After harvesting the planted crop, the ratoon crop was also maintained as per the same lay out. Observation on growth parameters, cane yield, sugar yield were made and economics was worked out. The data was statistically analyzed and the results were presented as follows.

RESULTS AND DISCUSSION

A. Growth and yield

The mean data on growth and yield parameters of sugarcane varieties in the planted crop and ratoon is presented in Table 1. A significantly higher number of economic shoots was recorded under the Co Si(Sc) 6 variety(94,440/ha) which was on par with that of the variety Co 86032 (93,395/ha) CoSi (Sc) 6. The variety CoSi (Sc) 6 produced the significantly highest mean cane yield of 129.5t/ha which was on par with that of CoC 24 which produced 116 t/ha. In SSI method, conversion ratio from tillers to millable canes was found to be high, and the loss was restricted, due to the practices like transplantation of young seedlings and wider spacing (Loganandhan *et al.,* 2012). It was attributed to higher cane yield b these varieties. The lowest cane yield of 94 t/ha was recorded by the variety Co94008. The variety CoSi (Sc)6 recorded the highest mean CCS yield of 22.43 t/ha, which was on par with the varieties CoC 24(19.97 t/ha), CoG 94077(19.07t/ha) and Co 86032 (18.94 t/ha). Influence of genotypes on germination and in-turn cane yield were reported by Burayu Chinawong (2006); Burayu *et al.* (2007); Budeguer *et al.* (2021), under the conventional planting system of sugarcane.

B. Economics

With regards to economics, the highest mean gross income (Rs.3,03,828/ha), net income (Rs.1,63,277 /ha) and BCR (2.17) were registered with the variety CoSi (Sc) 6 which was closely followed by the variety CoC 24 with a mean gross income (Rs.2,72,507/ha), net income (Rs1,38,620 /ha) and BCR (2.04).

Table 1: Performance of different sugarcane varieties under Sustainable sugarcane Initiative in sandy clay loam soil (Pooled mean of two years).

Varieties	Economic shoot (1000/ha)	Cane yield (t/ha)	Sugar yield (t/ha)	Gross income (Rs/ha)	Total cost of cultivation (Rs/ha)	Net income (Rs/ha)	Benefit Cost Ratio
T_1 -Co Si (Sc) 6	94.44	129.5	22.43	303828	140551	163277	2.17
T_2 -TNAU Sugarcane Si 7	86.735	107.5	18.21	252114	129548	122566	1.95
T_3 -NAU Sugarcane Si 8	74.025	107.0	17.53	252189	129564	122624	1.95
T_4 -CoC 22	79.265	96.0	15.13	226356	124068	102288	1.83
T_5 -CoC 24	78.535	116.0	19.97	272507	133888	138620	2.04
T_6 -CoG 94077	79.495	111.0	19.07	261485	131542	129943	1.98
T_7 -Co 86032	93.395	106.5	18.94	250206	129142	121064	1.94
T_8 -Co 94008	68.47	94.0	16.66	221168	122964	98205	1.80
T_9 -Co 99004	69.235	100.5	16.63	236204	126163	110041	1.88
Mean	85.42	107.5	18.28	252895	129715	123181	1.95
SEd	6.325	7.0	1.61				

CONCLUSIONS

From this study, it can be concluded that the sugarcane variety CoSi(Sc) 6 performed better under the Sustainable Sugarcane Initiative (SSI) method of sugarcane cultivation followed by the varieties CoC 24 on sandy clay loam soils of Trichy district in Tamil Nadu.

FUTURE SCOPE

In order to confirm the validity of results, the experiment must be repeated over years and locations for more accuracy and precision. Research should be carried out to test other sugarcane varieties in relation to different soil types and source sink relationships.

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Conflict of Interest. None.

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