

Sugarcane Planting Technology in India

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INTRODUCTION

Indian agriculture is still facing the problem of labour shortage and thereby it increases the cost of cultivation that leads to threatening the survival of farming community. In order to overcome such problems we have to respond immediately by adopting appropriate technological interventions in existing agricultural practices. One of the ways to increase the agricultural production is promoting intensive farm mechanisation.

Sugarcane (*Saccharum officinarum* L.) is an important cash crop and cultivated between 320N to 320S latitude covering more than 90 countries of the world. Sugarcane contributes about 64.6% of the total world sugar production. India is one of the greatest producers of sugar and has a neck-to-neck race with Brazil for the first position. The country shares about 13.25% of the World's and 41.11% of Asian sugar production and it is cultivated in 4.73 million hectares with annual production of 379.90 million tonnes of sugarcane and productivity of 80.19 tonne per hectare. In Gujarat with a total coverage of 0.18 million hectare with annual production of 12.072 million tonnes of sugarcane and productivity of sugarcane 66.03 tonne per hectare [1].

The sugarcane is labour intensive crop, requires human workers for various unit operations like planting, weeding, earthing up, fertilizer application, and harvesting. Labour shortage during planting, weeding and harvesting periods of sugarcane growing hamper agricultural operations causing crop losses. The labour intensive methods, leads to considerable losses in crop production. Analysis of the cost components of sugarcane cultivation shows that harvesting and loading of cane comprise 35% of the costs followed by land preparation (21%), planting (16%), weeding (10%), fertilizer application (10%) and irrigation (8%). Timely planting with proper application of nutrients and plant protection improves crop stand as well as sugar yield. The planting methods largely affect the economics of sugarcane production.

Sugarcane is one of the commercial crops cultivated by planting portions of cane stalk known as seed cane or cane set. For commercial cultivation, a huge quantity of cane stalk cuttings of 6-8 t/ha having 3-bud pieces is required. One of the major expenditure in sugarcane production is the seed cane, the planting

material which is required in huge quantity [2]. Now-a-days the method bud chip technology in sugar cane has become popular in comparison to the traditional method of planting, where two or three bud sets are used. Using bud chip settlings with application of improved production technology for nursery management, settling transplanting methods and time, plant spacing, weed control, nutrient requirement, irrigation scheduling and optimum time of cane harvesting, good cane yield of 100 t/ha can be realized at farmer's field. Farmers can increase their income as well as increase sugarcane yield using bud chip settlings with good management practices [3].

REVIEW OF SUGAR CANE

Chand studied the productivity and profitability of sugarcane as affected by different planting patterns. A field experiment to investigate the effect of different planting patterns on production and economics of sugarcane (*Saccharum* spp. hybrid complex) was conducted at CCS Haryana Agricultural University, Regional Research Station, Karnal-132001. Experiment consisting of five treatments viz. flat planting at row spacing of 75, 90, 105 and 120 cm and pit planting at centre to centre distance of 120 cm between two pits was conducted in randomized block design with four replications. Highest cane yield, sugar yield, variable cost, net returns and B:C ratio was recorded in pit planting followed by planting of sugarcane at row spacing of 75, 90 and 105 cm and lowest in case of planting at 120 cm spacing. Planting of sugarcane at row spacing of 75 and 90 cm being at par produced significantly higher cane and sugar yield, net returns and B:C ratio as compared to planting at 105 and 120 cm row spacing. Commercial cane sugar (%) was not affected significantly by different planting patterns [4].

Ehsanullah conducted to investigate the performance of sugarcane (*Saccharum officinarum* L.) planted at different row spacing and seeding densities [5]. The experiment was comprised of three row spacing (60 cm spaced single row, 90 cm spaced double row strips and 120 cm spaced triple row strips) and three seeding densities (60000, 75000 and 90000 double budded setts ha⁻¹). The maximum cane yield (92.27 t ha⁻¹) was achieved in row spacing of 90 cm spaced double row strips that was statistically at par with 60 cm single row. Regarding seeding density, 75000 double budded setts ha⁻¹ produced the maximum cane yield (92.54 t ha⁻¹) that was

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at par with 90000 double budded setts ha⁻¹ (89.85 t ha⁻¹), while the minimum cane yield (83.68 t ha⁻¹) was recorded at seeding density of 60000 double budded setts ha⁻¹. The maximum net return of Rs. 67046 ha⁻¹ and highest benefit cost ratio of 1.63 were obtained by planting sugarcane in 90 cm double row strips with a seed rate of 75000 double budded setts ha⁻¹.

Mishra studied on evaluation of bud chip method for enhancing yield and economics of sugarcane. The present study was conducted by Krishi Vigyan Kendra, Ganjam-II during 2015-16 in Rabi in village Giria under the jurisdiction of KVK, Ganjam-II. The results of demonstration showed that farmers could increase the sugarcane productivity notably by switching over to improved bud chip technology rather in conventional method. The demonstration results showed that the improved practice of bud chip method recorded 37.3% higher cane yield (122.6 t ha⁻¹), extension gap (33.3 t ha⁻¹) than farmer's practice of conventional method. The improved practice also recorded the higher gross return of Rs. 281980 ha⁻¹, B:C ratio (3.94) with additional net return of Rs. 210416 ha⁻¹ over local check of conventional method which can effectively be replaced in the existing farming situation for higher productivity [6].

Kumar et al. reported to modify and evaluate commercially available tractor-operated sugarcane trench planter available in Uttar Pradesh as per needs of local conditions prevailing in Punjab for sugarcane cultivation. Thereafter, the field evaluation of modified sugarcane trench planter was carried out by selecting one cutting roller(s) peripheral speed (0.69 m/s) and two forward speeds (2.26 km/h and 3.0 km/h) on above varieties. Results revealed that average sett length increased with the decrease in diameter of cane and cutting roller peripheral speed. However, bud damage (%) increased with the increase in cutting roller peripheral speed. Bud damage (%) in variety C00118 was higher due to relatively more toughness (hardness) of cane. Economic analysis showed that there was 25.01% reduction in cost of planting and 58.02% reduction in labour cost as compared to conventional method of sugarcane planting followed under Punjab conditions [7].

ADOPTION OF SUGARCANE CULTIVATION TECHNIQUES

Sugarcane planting is considered as a very crucial and critical

operation because the seed cost of sugarcane carry about 30% of the total cost of sugarcane cultivation. Improving uniformity within row spacing is expected to decrease competition between plants. Planting of sugarcane mainly includes the opening of furrows, cutting of cane into pieces (setts), transportation of setts to field and placing them in the furrows, covering the setts with soil.

In manual method of sugarcane planting, Farmer prepares the field by using disc harrows and cultivators. Row to row spacing of 65 to 75cm is most common in sugarcane. Fifty to sixty quintals of the sugarcane are required to meet the seed requirement for one hectare. The labour requirement was found to be 350 man-h/ha and bullock usage of 30.6 bullock-pair-h/ha.

The ring or pit system of planting was developed by the Indian Institute of Sugarcane Research, Lucknow. In this method of sugarcane planting, the pits are dug using specially designed tractor drawn power tillers. The pits are then filled with top soil, Farmyard Manure (FYM) and other required nutrients and are watered well before planting. Pit depth is kept at 37.5 cm to 45 cm. Under 'ring pit' system, around 670 made per acre. This technology can give a yield of 200-275 t/ha (or around three times of conventional method) if the recommended package of practices is fully adopted. The ring pit method of sugarcane cultivation is more water and nutrient efficient as well. This only reduces water use but also enhance nutrient use efficiency (Figure 1).

Many sugarcane planters have been developed in the past by various research organisations most of the sugarcane planters, cylindrical or rotary cutting mechanism was used. In most of the sugarcane planters, 2 or 3 required to operate the planter. The cost saving was considerably high with mechanical planters as compared to the manual planting of sugarcane.

Sugarcane bud/settling transplanting planting is the latest technique of sugarcane planting, where in the bud along with a portion of the nodal region is chipped off and planted. Sugarcane bud technologies has revealed that the seed rate (1 to 1.5 t/ha) in sugarcane bud planting was considerably less as compared with the mechanical (9 to 10 t/ha) and manual planting of sugarcane.



Figure 1: Ring or pit planting.

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