



Research Article

SINGLE NODE SEEDLING TECHNOLOGY: A LOW COST AND POTENTIAL TECHNOLOGY FOR SUGARCANE CULTIVATION

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Abstract: Sugarcane is an important cash crop of Andhra Pradesh utilized as a raw material for sugar and bioethanol production. It is a vegetatively propagated crop and is cultivated by planting multi budded setts directly into the field. This method requires 6-8 tonnes of seed material per hectare which is very expensive and accounts for around 20 per cent of the total cost of cultivation. An alternative method to reduce the large amount of seed material utilized in conventional sugarcane planting is the use of single node seedlings. In this context, Front Line Demonstrations (FLD) at three farmer's fields were conducted during 2017–2018 and 2018–2019 cropping seasons in Visakhapatnam district of Andhra Pradesh. The objective of the study is finding out the advantages of single node seedling method of cane cultivation over three budded setts planting in sugarcane. The results of FLD's showed that the fields planted with single node seedlings produced cane yield of 87 t/ha which was 6.9 % higher than that of conventionally planted cane crop (81 t/ha). The cultivation cost was Rs. 1,84,775 in farmers practice as against Rs.1,70,020 under single node technology. Single node seedling technology produced 45.14 % higher net returns compared to the farmer's practice. Sugarcane cultivation by single node seedling technology has thus proved to be more productive when compared to farmers practice with reduced cost on seed material, more yields and net returns. This method could be a better alternative for the farmers of North Coastal Zone of Andhra Pradesh under assured irrigation.

Keywords: Node seedlings, Bioethanol production, FLD

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Introduction

Sugarcane is a high value and important cash crops in Andhra Pradesh. However, the net returns obtained through sugarcane cultivation are very low. Among several reasons for low net returns, high cost of cultivation, poor management practices, and increased cost of labour, seed and other inputs play a major role [1]. The cost of seed material contributes to almost 25% of the production costs. The large quantity of planting material required in traditional planting systems also leads to problems with transportation, storage, and loss of bud viability [2]. Research Stations have developed new methods to overcome some of the disadvantages of conventional farmer's practices. One alternative method to reduce the seed rate and production costs with better seed quality is the use of single node seedlings for planting [3].

This technology as a principle in the sustainable sugarcane production involves use of less seed, less water and optimal utilization of land to attain more yields and income. The aim of the present study is to demonstrate the advantages of single node seedling technology to the farmers of Visakhapatnam district over conventional method of planting.

Material and Methods

Regional Agricultural Research Station, Anakapalle, ANGRAU has conducted front line demonstration (FLD) on sugarcane single node seedling method at five farmers' fields at Lakkavaram village, Chodavaram mandal of Visakhapatnam district consecutively during 2017-2018 and 2018-2019 cropping seasons in view of knowing the comparative growth performances in the farmers field and the cost economics of farmers practice vs single node seedling technology in sugarcane. For conducting this FLD, sugarcane seedlings were raised by growing seedling nursery in pro- trays with single nodes.

Single nodes were obtained from the seed cane by cutting single bud along with nodal region on both sides of the bud with electrical node cutting machine. In this case, seed cane was broken into pieces. The crop was planted with seedlings (single node seedlings of around one month age) and three budded setts simultaneously in the main field in the respective treatment plots, following normal row spacing (75cm) in all the plots and using the seed rate of 25,000 seedlings/ha in seedlings (Single node) planting and 10t/ha in conventional three budded setts planting. Comparative performance of conventional planting with three budded setts vs single node seedlings planting tested at two locations (January planted crop with variety, 87A298 at Lakkavaram and March planted crop with variety, 2009A107 at Lakkavaram was studied by taking the parameters of plant growth differences, cane growth parameters and finally cane yield. Comparative cost economics of these two technologies was also studied. Field observations for different parameters were noted and calculation of cost of cultivation, gross returns, net returns and benefit cost ratio were calculated by using simple statistic tools.

Results and Discussion

Seedling Survival percentage

Seedling survival percentage was recorded at 15 days after planting in case of single node seedlings and one month after planting in farmers practice. From the [Table-1] it was evident that significant variation in survival of seedlings was observed due to different planting methods. Highest per cent survival was observed in planting of single node seedlings (92.2%). The performance of single node seedlings was better than the three budded setts in field condition. Normal planting of three budded setts recorded 86.1% germination which is higher than single node seedlings.

Table-1 Effect of single node seedling technology on yield attributes and yield

Methods practiced	Survival %	Number of tillers/ plants	Number of millable canes/ clump	Yield (t /ha)	% of increase in grain yield over local check
T1=single node seedlings	92.2	17	10.2	87	6.9 %
T2=conventional (3 budded sets)	86.1	9	6	81	-

Table-2 Comparative economics of single node seedling technology and farmers practice

Treatments	Cane yield (t/ha)	COC (Rs/ha)	GR (Rs/ha)	NR Rs/ha)	B:C ratio
T1=single node seedlings	87	1,70020	2,39250	69,230	1.4 :1
T2=conventional (3 budded sets)	81.0	1,84775	2,22750	37,975	1.2:1

Studies in Egypt revealed more than 80% survival of bud chip seedlings raised through portrays in Egypt [4].

Number of millable canes

Comparison of data on number of millable canes [Table-1] have shown variation in number of millable canes due to different planting materials used. Single node seedlings planted in normal spacing registered comparatively more number of millable canes (10.2 millable canes/clump) than the conventional method. Normal planting practiced by the farmers recorded lowest number of millable canes (6/clump). Previous studies advocated that the ability of producing tillers and millable canes is low in farmers practice, i.e., in conventional method of planting using three budded sets. Further type of planting material influenced the number of millable canes and cane yields in sugarcane crop [5].

Cane yield

Due to different planting materials there was a difference in cane yield [Table-1]. Planting of single node seedlings showed comparatively more yield as compared to the normal planting (81 t ha⁻¹). Sugarcane planting with single node seedlings increased the cane yield by 6.9 per cent. Previous study on single node seedlings recorded more cane and sugar yields than farmers practice (use of 3 budded sets) [6]. The study on interactive effect of seed type and sowing dates had no significant effects on sugar recovery but significantly affected germination and tillers per plant, height and cane diameter [7].

This adoption gap should be addressed by promoting new technologies developed by research stations. This emphasized the importance of field level demonstrations to create awareness among farmers regarding new technologies and promising varieties to bridge the extension gap. Adoption of new technologies will help to bridge the adoption gap and also helps to replace the traditional practices in farming.

Single node seedlings planted crop recorded 6.9 % yield improvement (cane yield 87.0 t/ha with B:C ratio of 1.40:1) over that of 3 budded sets planted crop (cane yield 81.0 t/ha and B: C ratio 1.2 :1) because of high germination percent and initial vigour at nursery stage. The difference in net returns and benefit-cost ratio may be because of the difference in the price of inputs and produce. Similar differential response was observed between bud chip and single bud seedlings planted crop [8]. Sugarcane cultivation with single node seedlings increased the cane yield to the tune of 5.0% in comparison to the normal planting.

Conclusion

The present study establishes that sugarcane single node seedling method could be a viable and economical alternative for reducing the cost of cultivation of sugarcane production, if proper measures are taken in raising and transportation of seedlings and their establishment and survival in the field. This saves several thousand tonnes of cane that could be used for preparation of jaggery. Additionally, transporting the single node seedlings instead of whole cane from one location to other would greatly reduce its cost and help in utilization and multiplication of new and improved cane varieties. Seedlings raised in portrays is recommended due to their higher survival percentage in the main field. The use of single bud seedlings saves 60-70% of the seed cost apart from better growth and yield. The per cent increase in yield of sugarcane is 6.9 % in demonstration plot over the farmers field and the increase of net returns percentage to the extent of 45.2 % created greater awareness and inspired the other farmers to adopt the single node seedling technology of sugarcane cultivation.

Application of research: The conventional method used by the farmers can be replaced with the low cost single node seedling production technology for getting higher productivity and profitability.

Research Category: Seedling technology

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