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Study on Different Planting Materials of Sugarcane

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ABSTRACT

An experiment was conducted at Bangladesh Sugarcane Research Institute, Ishurdi, Pabna (BSRI) farm under irrigated condition during 2007-2008 cropping season to find out the best suited planting materials in sugarcane cultivation. There were sixteen types of planting material viz. whole cane stalk, three budded sett, two budded sett, single budded sett, bud chip sett, bag settling, single budded bed settling, two budded bed settling, rayungun single slip, rayungun two budded slip, stalkless settling, bud chip settling, gunny bag settling, pre-germinated single budded sett, pre-germinated two budded sett and bud chip bag settling. Significantly the highest number of tillers (153.70 x 10^3 ha^{-1}) and millable cane (78.33 x 10^3 ha^{-1}) were found in bag settling while the highest cane yield (74.00 t ha^{-1}) was recorded in bag settling and rayungun two budded slip. The highest gross return with maximum benefit cost ratio of 1:1.83 was also obtained by using bag settling and rayungun two budded slip as a planting materials.

Key words: Sugarcane, planting materials, cane yield, benefit cost ratio (BCR).

INTRODUCTION

Sugarcane (*Saccharum officinarum*, L.) is one of the major foods cum industrial crop in Bangladesh. But the average yield (49.20 t ha^{-1}) of the crop is too low in context of world (64.40 t ha^{-1}) average (Anwar *et al.*, 2004). The major causes of such low yield are insufficient millable cane per unit area and lower unit stalk weight (Rahman *et al.*, 1987). Effective tiller is the principal functional attributes of millable cane which ultimately contributes to yield. Production of tillers are affected by several factors such as date of planting/transplanting, variety, spacing, nutrition, soil moisture level, intercultural operations etc. (Matin *et al.*, 1989). Tiller production and degree of its survivability also linked with planting/transplanting techniques (Miah and Sarkar, 1982; Rahman *et al.*, 1987). In Bangladesh, sugarcane growers mostly follow conventional method of planting where three budded setts are planted directly in trenches. Germination of cane in this method is very low and irregular, resulting in lower plant population and ultimately causes lower yield. In order to minimize the requirement of seeds per hectare and to ensure optimum plant population for higher yield, different planting techniques were developed. Out of which Spaced Transplanting (STP) is a planting method which received considerable attention in recent years. In STP techniques different types of settlings viz. bag settlings, bed settlings, rayungun settlings etc. are transplanted in the field. The present investigation has been designed to study the comparative performance of different planting materials of sugarcane cultivation and their contribution on yield and economic benefit.

MATERIALS AND METHODS

The experiment was conducted during 2007-2008 cropping season at the experimental farm of Bangladesh Sugarcane Research Institute (BSRI), Ishurdi, Pabna under irrigated condition. The site represents the High Ganges River Floodplain soil under Agro-Ecological zone-11 with medium high land of typical sandy loam with pH 7.6. The following treatments were included in this experiment:

T_1 : Whole cane stalk
T_2 : 3 budded sett
T_3 : Two budded sett
T_4 : Single budded sett
T_5 : Budchip sett
T_6 : Bag settling
T_7 : Single budded bed settling
T_8 : Two budded bed settling
T_9 : Rayungun single slip
T_{10} : Rayungun two budded slip
T_{11} : Stockless settling
T_{12} : Budchip settling
T_{13} : Gunny bag settling
T_{14} : Pre-germinated single budded sett
T_{15} : Pre-germinated two budded sett
T_{16} : Bud chip bag settling

The experiment was laid out in a randomized complete block design with three replications. The plot size was 12.0m x 4.0m. Sugarcane variety used in the experiment was Isd 36. Chemical fertilizers like Urea, TSP, MP, Gypsum and $ZnSO_4$ were applied @ 326, 250, 180, 189 and 10 kg ha^{-1} respectively (BARC, 2005). Insect and pest management were done by both mechanically and chemically. Other intercultural operations like weeding, earthing-up, tying etc. were done as and when required. Tiller population was recorded at 150 Days after transplanting (DAT). Millable cane, cane yield and pol % cane were recorded at harvest. Data collected on different parameters were analyzed following the standard statistical procedures.

RESULTS AND DISCUSSION

Germination/Establishment (%)

In direct plantation following conventional system, the highest germination was recorded in two budded sett (76.0%) following three budded setts (69.9%) and the lowest was in bud chip sett (24.9%) and in transplanted settlings the highest establishment rate was found in bag settling (97.0%) and the lowest (43.1%) was in pre-germinated setts (Table 1).

Table1. Germination/Establishment (%), tiller, millable cane and cane yield under different planting materials

Treatments	Germination/ Establishment (%)	Tiller (x 10^3 ha^{-1})	Millable cane (x 10^3 ha^{-1})	Yield (t ha^{-1})
T_1 : Whole cane stalk	29.80	99.00	59.33	50.33
T_2 : 3 budded sett	69.90	127.30	74.67	70.00
T_3 : Two budded sett	76.00	119.00	71.00	54.33
T_4 : Single budded sett	67.00	66.67	59.67	57.33
T_5 : Budchip sett	24.90	57.00	44.67	36.33
T_6 : Bag settling	97.00	153.70	78.33	74.00
T_7 : Single budded bed settling	75.00	130.70	70.00	63.33
T_8 : Two budded bed settling	77.00	144.30	61.33	64.33
T_9 : Rayungun single slip	88.00	123.00	64.67	54.33
T_{10} : Rayungun two budded slip	54.00	122.70	77.67	74.00
T_{11} : Stockless settling	56.00	111.30	69.00	64.33
T_{12} : Budchip settling	69.30	116.30	68.00	61.00
T_{13} : Gunny bag settling	80.00	104.30	63.67	65.33
T_{14} : Pre-germinated single budded sett	43.10	74.00	63.00	47.00
T_{15} : Pre-germinated two budded sett	52.60	125.30	73.33	71.33
T_{16} : Bud chip bag settling	82.20	140.30	75.67	65.00
LSD (5%)	-	22.08	14.27	19.36

Tiller populations

Comparatively higher tillers were produced in transplanted treatments and it was the highest in T_6 (153.70 x 10^3 ha^{-1}) where settlings raised in bag were transplanted following STP method. The lowest tillers among transplanted treatments were found in T_{13} (104.30 x 10^3 ha^{-1}) where settlings raised in gunny bags were used as planting materials. Tillers produced in other transplanted materials were statistically identical. Significant lower tillers were produced in direct planted setts than transplanted settlings except T_2 where three budded setts were planted end to end. The single bud sett could not avail to produce satisfactory number of tiller among the direct sett plantings. This was happened due to week condition especially low reserved food in smaller single bud sett. Again, these treatments gave the lowest tillers compared to all other studied planting materials (Table 1). Spaced Transplanting (STP) with polybag settlings showed higher synergistic effect on tiller production which was agreement with the findings of Rahman *et al.* (1994).

Millable cane stalks

The numbers of millable cane stalks were also significantly affected by planting materials. The highest number of millable cane stalks (78.33 x 10^3 ha^{-1}) was recorded in the T_6 (bag settling) followed by the T_{10} (rayungun two budded slip) which was (77.67 x 10^3 ha^{-1}). On the contrary, the lowest number of millable cane (44.67 x 10^3 ha^{-1}) was found from the T_5 (bud chip sett) than direct planted setts. The number of millable cane was found comparatively higher in all transplanted treatments. It might be due to higher tillers produced from initial buds in of settlings. The reasons for lower number of millable cane production in the conventional planting technique might be due to poor or insufficient germination. The similar results were found in the work of Kabir *et al.* (1999), Khan *et al.* (1998) and Imam *et al.* (1993).

Cane yield

The highest cane yields were found in bag settling and rayungun two budded slip (74.00 t ha^{-1}) which was statistically similar with the pre-germinated two budded sett (71.33 t ha^{-1}) while the lowest in bud chip sett (36.33 t ha^{-1}). Higher yield in bag settling, rayungun two budded slip and pre-germinated two budded sett was occurred due to higher number of settling establishment, uniform rate of tiller production and conversion of tiller into millable cane. The yield increase due to the use of polybag technique is in agreement with the findings of Khan *et al.* (1998), Rahman *et al.* (1994) and Imam *et al.* (1993).

Pol % cane

There was significant effect on pol% cane among the different treatment combinations (Figure 1).

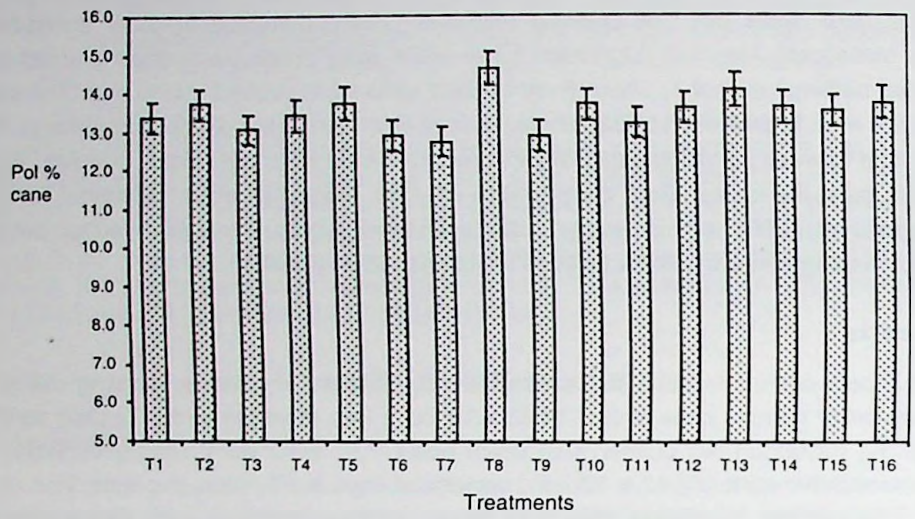

Figure 1. Pol (%) cane as affected by different planting materials

The highest pol % cane (14.63 %) was recorded from the T_8 (two budded bed settling) followed by the T_{13} treatment (gunny bag settling). On the other hand, the lowest pol % cane (12.77 %) was from the T_7 (single budded bed settling) treatment. Pol % cane was statistically identical as the same variety was used under all the planting condition.

Economic analyses

Economic performance of different planting materials is presented in Table 2. It has been found that total variable cost of Tk. 65,000 ha^{-1} were spent for T_6 and T_{10} treatment where transplanted sugarcane were grown with bag settlings and rayungun two budded slip . The same treatments also gave the highest gross return (Tk. 1,19,140 ha^{-1}), gross margin (Tk. 54,140 ha^{-1}) and BCR (1.83). The lowest economic return was recorded from the planted bud chip setts. Furthermore, all the transplanting materials were found economically superior compared to other planting material of sugarcane cultivation.

Table 2. Economic analysis of sugarcane under different planting materials

Treatments	Total variable cost (Tk. ha^{-1})	Gross return (Tk. ha^{-1})	Gross margin (Tk. ha^{-1})	BCR
T_1 : Whole cane stalk	60,000	81,031.30	21,031.30	1.35
T_2 : 3 budded sett	68,000	1,12,700.00	44,700.00	1.65
T_3 : Two budded sett	56,000	87,471.30	31,471.30	1.56
T_4 : Single budded sett	55,500	92,301.30	36,801.30	1.66
T_5 : Budchip sett	55,000	58,491.30	3,491.30	1.06
T_6 : Bag settling	65,000	1,19,140.00	54,140.00	1.83
T_7 : Single budded bed settling	60,000	1,01,961.30	41,961.30	1.70
T_8 : Two budded bed settling	61,000	1,03,571.30	42,571.30	1.70
T_9 : Rayungun single slip	60,000	87,471.30	27471.30	1.45
T_{10} : Rayungun two budded slip	65,000	1,19,140.00	54,140.00	1.83
T_{11} : Stockless settling	63,000	1,03,571.30	40,571.30	1.64
T_{12} : Budchip settling	60,000	98,210.00	38,210.00	1.63
T_{13} : Gunny bag settling	62,000	1,05,181.30	43,181.30	1.70
T_{14} : Pre-germinated single budded sett	60,000	75,670.00	15,670.00	1.26
T_{15} : Pre-germinated two budded sett	64,000	1,14,841.30	53,841.00	1.79
T_{16} : Bud chip bag settling	62,000	1,04,650.00	42,650.00	1.69

Price of sugarcane: 1,610 Tk. t^{-1}

The results revealed that different types of settlings used as planting materials gave higher tiller, millable cane as well as cane yield compared to direct planted setts. Moreover, polybag settlings rayungun two budded slip and Pre-germinated two budded sett were superior as compared to conventional 3 budded sett in respect of all studied characters. Therefore, transplanted sugarcane with polybag settlings, rayungun two budded slip and Pre-germinated two budded sett can be recommended for large scale adoption in farmers' field.

REFERENCES

Anowar, M. S.; Walayat, H.; Khan, A. and Chattha, A. A. 2004. Integrated management of sugarcane disease and insect in Pakistan. Proc. Intern. Symp. on sustainable sugarcane and sugar production Techn. Nanning, P.R. China. pp. 486-471.

BARC (Bangladesh Agricultural Research Council), 2005. Fertilizer Recommendation Guide , Pub. by BARC New Air Port Road, Farmgate, Dhaka, 1207,pp.97-136.

Imam, S. A.; Hossian, A. H. M. D.; Ali, M.; Matin, M. A.; Rahman, M. K. and Shaheen, M. 1993. Comparative performance of different STP techniques under irrigated condition. *Bangladesh J. Sugarcane*, **12-15**: 108-111.

Khan, N. U.; Pal, S. K. and Hossain, A. H. M. D. 1998. Comparative performance of different planting and transplanting techniques of sugarcane under irrigated and rainfed conditions. *Bangladesh J. Sugarcane*, **18-20**: 61-64.

Kabir, M. L.; Matin, M. A. and Ali, S. M. H. 1999. Time and techniques of planting of yield and economics of sugarcane. *Bangladesh J. Training and Development*. **12** (1&2): 191-198.

Matin, M. A.; Hossain, M. A. and Miah, M. A. S. 1989. Tiller dynamics in sugarcane variety Isd 16. *Bangladesh J. Sugarcane*, **11**: 1-6.

Miah, M. A. S. and Sarkar, M.A.A. 1982. Effect of artificial defoliation and stalks binding on the cane quality. *Bangladesh J. Sugarcane*, 4: 51-53.

Rahman, A. B. M. M.; Matin, M. A. and Ali, M. Y. 1987. Tillering and productivity of Autumn and summer transplanted sugarcane. *Bangladesh J. Sugarcane*, **9**:1-8.

Rahman, M. K.; Hossain, A. H. M. D.; Alam, M. J. and Imam, S. A. 1994. Effect of plant spacing in transplanted sugarcane. *Bangladesh J. Sugarcane*, **16**:152-158.