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# Comparative Performance of Different Planting Materials of Sugarcane at Farmers Field in High Ganges River Flood Plain Soils

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## ABSTRACT

The experiment was conducted at farmer's field of Muladuli, Ishurdi, Pabna, Bangladesh to study the comparative performance of different planting materials of sugarcane considering on growth, yield and sugar content during 2012-13 cropping season. There were five treatments of this experiment viz., conventional two and three budded setts, one budded soil bed settlings, two budded soil bed settlings and polybag settlings. The one budded soil bed settlings, two budded soil bed settlings and polybag setttlings were planted as spaced transplanting (STP) system and two budded and three budded setts were planted conventionally. The results revealed that highest number of tiller ($155 \times 10^3$ ha$^{-1}$), number of millable cane ($96 \times 10^3$ ha$^{-1}$), cane yield (110 tha$^{-1}$), and brix % (21) were obtained from the treatment where polybag settling was used as planting materials followed by two budded soil bed settlings. In economic point of view, the highest gross margin (1,39,500 Tk.ha$^{-1}$) and benefit cost ratio (BCR) 2.37 was found in polybag settlings. The results indicate that, polybag settlings planted in STP system might be used to cultivate sugarcane for higher yield, quality and economic benefits.

**Key words:** Sugarcane, planting materials, millable cane, brix%

## INTRODUCTION

Sugarcane is one of the most important cash crops in Bangladesh, but the average cane yield (49.20 tha$^{-1}$) is too low in context of world average (64.40 tha$^{-1}$) sugarcane yield (Anwar *et al.*, 2004). The potentiality of cane yield can not be obtained in Bangladesh due to low germination, gapped plant stand, inappropriate plant population and uneven interplant competition in the currently practiced sugarcane planting systems. Tiller production and degree of its survivability linked with planting techniques (Miah and Sarkar, 1982; Rahman *et al.*, 1987). Planting material is the most important input to determine the yield and quality of any crops. In Bangladesh, sugarcane farmers generally use three budded sett as planting material. It requires about 16% more cost of cultivation due to higher amount (7-8 tha$^{-1}$) of seed cane. Nearly 10-15% of the cane yield is utilized as planting material in conventional system of cane plantation (Yadava, 1993). Germination of cane in this method is very low, resulting in lower plant population and

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ultimately causes lower yield. On the other hand, three budded sett plantation require more seed cane compare to Spaced Transplanting (STP). STP planting method saves nearly 4 tones in seed per hectare and seed multiplication ratio is 1:40 in STP method over 1:10 in conventional system of cane planting (Yadava, 1993). In order to minimize the germination failure or gapped in sugarcane field STP will be the better option to ensure optimum plant population for higher yield. The technique showed better performance than traditional technique. In STP techniques different types of settlings viz. single budded soil bed settling, two budded soil bed settling, polybag settling, are transplanted in the field with conventional two and three budded setts. The present experiment was conducted to select suitable planting materials of sugarcane at farmer field.

## MATERIALS AND METHODS

The experiment was conducted during 2012-13 cropping season at farmer's field of Muladuli, Ishurdi, Pabna, Bangladesh under irrigated condition to study the comparative performance of different planting materials of sugarcane. The site of this experiment represents the High Ganges River Flood Plain Soil under agro ecological zone 11 with medium high land of sandy loam soil having pH 7.6. The experiment comprised of five treatments such as:

$T_1$ : Conventional 3 budded setts
$T_2$ : Conventional 2 budded setts
$T_3$ : One budded soil bed settlings
$T_4$ : Two budded soil bed settlings
$T_5$ : Polybag settlings

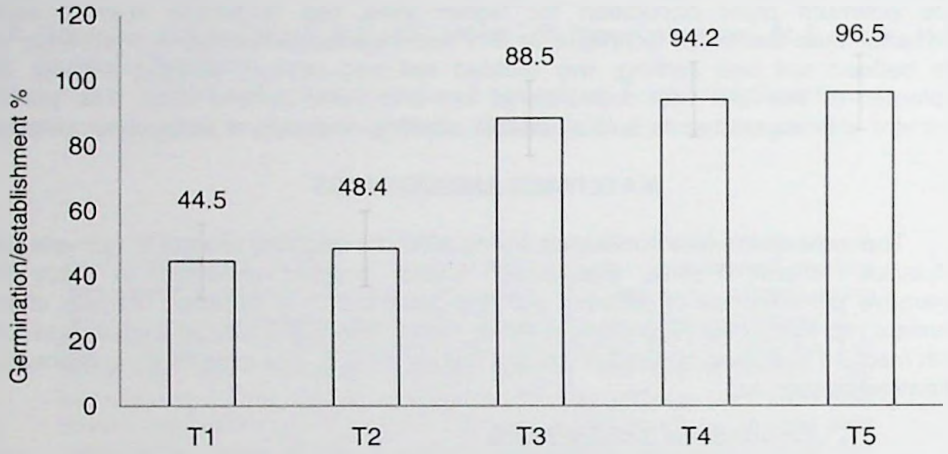
The experiment was laid out following randomized complete block design (RCBD) with four replications. The unit plot size was 8m × 6m. Sugarcane variety Isd 39 was used in this experiment. Row to row distance was 1m and plant to plant distance varied upon the treatments. In conventional system, setts were planted in end to end method and in STP system settlings were planted at 30 cm distance. The experiment was set up on 25 November, 2012 and harvested on 10 December, 2013. Chemical fertilizers like Urea, TSP, MP, Gypsum and $ZnSo_4$ were applied @ 325, 250, 180, 190 and 10 kg $ha^{-1}$, respectively following the recommendation of Handbook on Sugarcane Technologies (Basher *et al.*, 2012). Pest management and other intercultural operations like irrigation, gap filling, weeding, mulching, earthing-up and tying were done according to the requirement. Data on germination (%), tiller population (at 150 days after planting), millable cane, yield, sugar percentage were recorded. The collected data were analyzed by using Computer Package Programme MSTAT-C and the significance of the mean differences was adjudged by Duncan's Multiple Range Test with 5% level of probability.

## RESULTS AND DISCUSSION

### Germination/establishment percent

Germination (%) of sugarcane setts from conventional three budded setts ($T_1$), two budded setts ($T_2$) and establishment (%) for the one budded soil bed settling ($T_3$), two budded soil bed settlings ($T_4$) and polybag settling ($T_5$) were significantly influenced by

the planting materials. Conventional three budded setts ($T_1$) showed 44.5% and conventional two budded setts ($T_2$) showed 48.4 % germination while the $T_3$, $T_4$ and $T_5$ demonstrated 88.5, 94.2 and 96.5% establishment, respectively (Figure 1).




$T_1$ : Conventional 3 budded setts, $T_2$ : Conventional 2 budded setts,
$T_3$ : One eyed soil bed settlings, $T_4$ : Two eyed soil bed settlings
$T_5$ : Polybag settlings

Figure 1. Germination/establishment % of different planting materials of sugarcane

**Number of tiller** (000' **ha$^{-1}$**)

Number of tiller was significantly varied due to different planting materials (Table 1). The tiller dynamics of sugarcane under different planting/transplanting materials showed that tiller population increased in spaced transplanted system of sugarcane plantation. The highest tiller population of ($155.7 \times 10^3$ ha$^{-1}$) was recorded from the treatment where settlings raised in polybag were transplanted following STP method followed by two budded soil bed settlings ($141.7 \times 10^3$ ha$^{-1}$) were used as planting materials of sugarcane. On the other hand, the lowest number of tiller ($120.3 \times 10^3$ ha$^{-1}$) was found from $T_1$ (conventional 3 budded setts) which is statistically similar with $T_2$ (Conventional two budded sett). Rahman *et al.* (1994) studied that spaced transplanted (STP) showed higher synergistic effect on tiller production. Inter-plant competition and unevenly distribution of solar radiation in conventionally raised crop tend to reduce tillering and also results in higher shoot mortality. In STP planting system, stalk population exceed 1.2 lakh per hectare (Yadava, 1993).

**Number of millable cane** (000' **ha$^{-1}$**)

The number of millable cane stalks at harvest was also significantly influenced by the planting materials (Table 1). The highest millable cane stalks ($96.0 \times 10^3$ ha$^{-1}$) was

obtained from the polybag settling and the lowest was in $T_1$ ($74.0 \times 10^3$ ha$^{-1}$) treatment where three budded sett was used as planting material of sugarcane following conventional plantation method. The number of millable cane was found comparatively higher in spaced transplanted planting materials (polybag and soilbed settlings) might be due to higher tiller produced earlier as compare to conventional method. The reasons for lower number of millable cane production in conventional planting technique might be due to poor germination of bud of sugarcane. The similar results were also found from Kabir *et al.* (2003), Khan *et al.* (1998) and Imam *et al.* (1993).

**Table 1. Tiller population, millable cane, cane yield and brix % of sugarcane using different planting materials at farmers field, 2012-13**

| Treatments | Tiller ($\times 10^3$ ha$^{-1}$) | Millable cane ($\times 10^3$ ha$^{-1}$) | Cane yield (tha$^{-1}$) | Brix (%) |
|---|---|---|---|---|
| $T_1$: Conventional three budded sett | 120.3 d | 74.00 d | 78.00 d | 18.00 b |
| $T_2$: Conventional two budded sett | 123.0 d | 78.00 cd | 80.33 d | 19.00 ab |
| $T_3$: One budded soil bed settlings | 131.3 c | 82.67 c | 90.00 c | 20.00 ab |
| $T_4$: Two budded soil bed settlings | 141.7 b | 89.33 b | 95.67 b | 19.33 ab |
| $T_5$: Polybag settlings | 155.7 a | 96.00 a | 110.0 a | 21.00 a |
| LSD (0.05) | 5.844 | 5.793 | 5.141 | 1.922 |

**Cane yield**

The yield of sugarcane depends on germination or establishment %, number of tiller populations, number of millable cane. Cane yield varied due to different treatments (Table 1). The highest cane yield (110 tha$^{-1}$) was found in $T_5$ (polybag settling) while the lowest yield (78 tha$^{-1}$) was in $T_1$ where conventional three budded setts were used as planting materials of sugarcane. About 40 % yield enhancement was investigated where polybag settlings were used as planting material over conventional three budded sett. Higher cane yield in spaced transplanted technique (polybag settling) was achieved due to higher number of settlings establishment, uniform tiller production and conversion of tiller to 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). In STP method uniform crop stand, with higher unit stalk weight favor higher cane yield per unit area and the cumulative yield benefit under STP could range from 20-25 % in high yield areas and over 50 % in low yield regions (Yadava, 1991).

**Brix percent**

Sugar percent (Field brix %) more or less similar in the treatments where different planting materials were used as planting materials of sugarcane. The highest brix % (21) was found in $T_5$ (polybag settling) which was statistically more or less similar (19 to 20) with the soil bed settlings and two budded sett. The lowest brix % (18) was noted in $T_1$ (conventional 3 budded setts). Minimum lodging and lower incidence of pest and diseases in STP method helps to increase sugar percent in sugarcane (Yadava, 1993).

**Cost and return**

Economic performance of different planting materials is presented in table 2. Results reveal that total cost was higher (97,000 Tk. $ha^{-1}$) in $T_5$ where Polybag settlings was used as planting material followed by $T_4$ (94,000 Tk. $ha^{-1}$) where two budded soil bed settlings was used. The same treatments ($T_5$ and $T_4$) also gave higher gross return (2,36,500 and 2,05,690 Tk. $ha^{-1}$), gross margin (1,39,500 and 1,11,690 Tk. $ha^{-1}$) and BCR (2.37 and 2.14), respectively. The lowest economic return was recorded in $T_1$ where conventional three budded sett was used as planting material. Furthermore, both spaced transplanted (Polybag and soil bed settligs) materials were found economically superior compare to conventional planting materials for sugarcane cultivation. The similar economic results were also supported by the work of Alam *et al.* (2011).

**Table 2. Cost and return of sugarcane using different planting materials**

| Treatments | Total cost (Tk. $ha^{-1}$) | Gross return (Tk. $ha^{-1}$) | Gross margin (Tk. $ha^{-1}$) | Benefit cost ratio |
|---|---|---|---|---|
| $T_1$: Conventional three budded sett | 92,000 | 1,67,700 | 75,700 | 1.81 |
| $T_2$: Conventional two budded sett | 90,000 | 1,72,710 | 82,710 | 1.92 |
| $T_3$: One budded soil bed settlings | 91,000 | 1,93,500 | 1,02,500 | 2.06 |
| $T_4$: Two budded soil bed settlings | 94,000 | 2,05,690 | 1,11,690 | 2.14 |
| $T_5$: Polybag settlings | 97,000 | 2,36,500 | 1,39,500 | 2.37 |

Price of sugarcane: 2150.00 Tk. $t^{-1}$

From the above results it can be concluded that higher number of tiller, number of millable cane, cane yield, and sugar percentage were recorded in spaced transplanting technique (polybag and soil bed settling) compare to conventional planting materials. So, Spaced Transplanting (STP) systems (polybag and soil bed settling) might be used to cultivate sugarcane for higher yield, quality and earning more income.

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