

## Yield Response of New Sugarcane Varieties in Farmers Field at Madhupur Tract Soils

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### ABSTRACT

An experiment was conducted at growers' field in Kapasia, Gazipur under irrigated condition during 2007-2008 cropping season to study the performance of five newly released sugarcane varieties viz. Isd 33, Isd 34, Isd 35, Isd 36 and Isd 37. As standard variety Isd 16 was used for comparison. Significant ( $P \leq 0.01$ ) differences were observed in all the parameters of yield contributing characters. It was found that all the test varieties except Isd 34 produced significantly higher cane yield compared to standard variety Isd 16. The highest ( $119.65 \text{ t ha}^{-1}$ ) cane yield was produced by variety Isd 37 followed by Isd 35 ( $108.94 \text{ t ha}^{-1}$ ). The highest brix (%) of 18.00 was obtained from variety Isd 36 while the lowest (16.00 %) was recorded from variety Isd 34. In case of economic analysis, the variety Isd 37 showed higher benefit cost ratio of 2.88 followed by Isd 35 and Isd 36. Therefore, the varieties Isd 37, Isd 36 and Isd 35 may be recommended for cultivation in farmer's field of Madhupur Tract Soils in Bangladesh.

**Key words:** Sugarcane varieties, Performance, Madhupur Tract, Brix

### INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) crop is currently facing severe crisis in the country and both farming community and the industry are striving for its sustainable existence and growth. The major challenges faced by the crop are lower than average per area production, low sugar recovery and higher cost of production. There are number of reasons for low cane yield and one of those is the planting of low yielding varieties. Therefore, it is need of time to introduce new high yielding varieties with good ratoonability in the country (Chattha and Ehsanullah, 2003). Mian (2006) reported that variety plays a key role in both increasing and decreasing of sugar yield per unit area, while use of unapproved, inferior quality cane varieties affect sugarcane production negatively as situation prevails to day. Chattha *et al.* (2006) stated that the solution of low cane yield and sugar recovery problem lies in the planting of improved cane varieties. Efforts are being made to increase cane production by introducing high yielding varieties and adoption of improved crop production techniques (Gill, 1995). Success of variety depends upon its adaptability to agro-climatic conditions of the area. Selection of a proper variety to be grown in a particular agro-ecological zone is a primary requisite to explore its yield and sugar recovery potential. The inherent potential of a variety to give better yields in plant and ratoon crops is of paramount importance for sustaining high productivity. Acceptance of a variety by the farmers depends very much on its high yielding potentiality. Thus, sugarcane varieties, which show good performance in plant

and ratoon crop should be promoted for commercial cultivation. The most of the sugarcane varieties now grown in the sugar mill zones of Bangladesh are recommended for cultivation but this variety may not show better performance in all the ecological zones due to variations of Agro-climatic factors (Anonymous, 1979). Moreover, sugarcane varieties gradually degenerate over a considerable period of cultivation and declining in yield and vigour (Barnes, 1954 and Humbert, 1959). The highest number of millable cane, height and girth might have contributed to cane yield as reported by Singh and Sangwan (1980). Miah *et al.* (1986) also observed that the varieties/clones having maximum number of millable canes have produced higher yield per unit area. In Bangladesh, most of the sugarcane farmers get low yield due to late plantation, adoption of inadequate pests and disease control practices and poor agronomic management of crop cultivation. The objective of the present study is to evaluate the cane yield performance of some new cultivar of sugarcane varieties in Modhupur tract soils.

## MATERIALS AND METHODS

The experiment was conducted at grower's field in Kapasia, Gazipur under Modhupur Tract soils (AEZ-28) during 2007-2008 cropping season. The land was medium high and typical loamy soil with pH 7.5. The experiment was laid out in a randomized complete block design (RCB) with three replications. Each variety was considered as a treatment. The unit plot size was 7.0 m × 6.0 m. The varieties used were Isd 16 (Standard), Isd 33, Isd 34, Isd 35, Isd 36 and Isd 37. Forty five days old two budded soil bed settlings of sugarcane were transplanted in main field on 18 December, 2007 and were harvested on 25 November, 2008. The land was prepared as per requirement. Trenches were made by hand spade. The settlings were transplanted in the main field at distance of 100 cm row to row and 30 cm plant to plant. Application of fertilizers for sugarcane was done @ 240, 200, 200, 165 and 9 kg ha<sup>-1</sup> as Urea, TSP, MP, Gypsum and Zinc Sulphate respectively. Full doses of TSP, Gypsum, Zinc Sulphate and 1/3rd MP were applied in trenches during the time of plantation. One third of Urea was applied as side dressing at 21 days after transplanting. The rest of MP and Urea were applied in two equal splits at early tillering stage and late tillering phase of sugarcane. Necessary intercultural operations like weeding, mulching, irrigation and pest management were done as and when required. For the control of Top shoot borer Furadan 5G @ 40 kg ha<sup>-1</sup> was applied as per recommendation. Settlings mortality (%), tiller, millable cane were recorded. The yield of sugarcane was also recorded at harvest. Brix (%) was determined by hand refractometer. Data on different parameters were analyzed by MSTATC program.

## RESULTS AND DISCUSSION

### Germination % in soil bed setts

Table 1 represents the germination percentages of different varieties in soil bed setts. One thousand (1000) two eyed cuttings of each variety were placed for raising settlings. The highest germination was found in check variety Isd 16 (74.80%) followed by



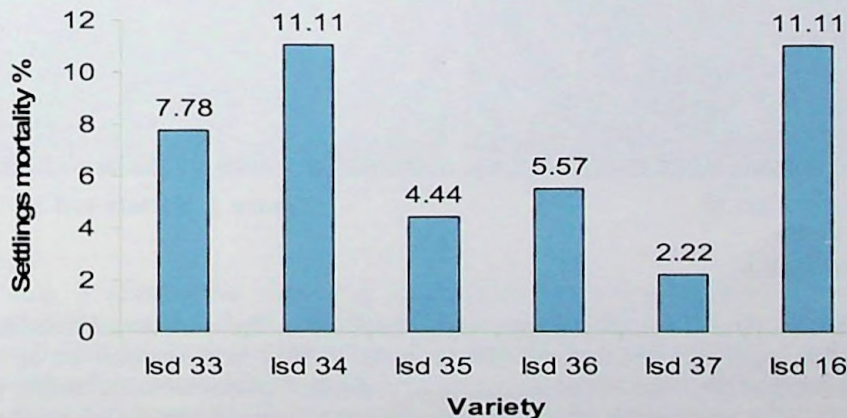
variety Ild 37 (58.90%), Ild 36 (52.00%) and the lowest germination was recorded in the variety Ild 33 (40.10%).

**Table 1. Germination (%) of six varieties of sugarcane in soil bed condition**

| Variety           | Total setts | Two eyed | Total germination | Germination (%) | Rank |
|-------------------|-------------|----------|-------------------|-----------------|------|
| Ild 33            | 1000        |          | 802               | 40.10           | 6    |
| Ild 34            | 1000        |          | 854               | 42.70           | 5    |
| Ild 35            | 1000        |          | 949               | 47.45           | 4    |
| Ild 36            | 1000        |          | 1040              | 52.00           | 3    |
| Ild 37            | 1000        |          | 1178              | 58.90           | 2    |
| Ild 16 (Standard) | 1000        |          | 1496              | 74.80           | 1    |

### Settlings mortality

Varietal characteristics, light, nutrient level, time of planting, soil moisture etc. usually influence settlings mortality (%) of sugarcane (Rao & Prasad, 1962). Among these varieties, the highest (11.11 %) settlings mortality was recorded in variety Ild 16 and Ild 34 while the lowest (2.22 %) settlings mortality was recorded in variety Ild 37 (Fig.1).



**Figure 1. Settling mortality of different cane varieties**

### Tiller population

Data on tiller population showed that there was significant difference in tiller population among the varieties (Table 2). The highest ( $174.76 \times 10^3 \text{ ha}^{-1}$ ) tiller population was found in the variety Ild 34 followed by the variety Ild 37 ( $170.71 \times 10^3 \text{ ha}^{-1}$ ) while the lowest ( $101.18 \times 10^3 \text{ ha}^{-1}$ ) tiller was in the variety Ild 16. Alam *et al.* (2006) and Rashid *et al.* (2001) reported that there was a variation in tiller production among different varieties.

**Table 2.** Tiller, millable cane, cane yield and % brix of different cane varieties in farmers field at Kapasia, Gazipur during 2007-2008 cropping season

| Varieties         | Tiller ( $\times 10^3 \text{ ha}^{-1}$ ) | Millable cane ( $\times 10^3 \text{ ha}^{-1}$ ) | Cane yield ( $\text{t ha}^{-1}$ ) | % Brix  |
|-------------------|------------------------------------------|-------------------------------------------------|-----------------------------------|---------|
| Isd 33            | 133.09 ab                                | 88.32 b                                         | 90.94 bc                          | 16.50 b |
| Isd 34            | 174.76 a                                 | 75.70 bc                                        | 83.06 c                           | 16.00 b |
| Isd 35            | 105.23 b                                 | 77.37 bc                                        | 108.94 ab                         | 16.58 b |
| Isd 36            | 138.33 ab                                | 79.04 bc                                        | 93.53 bc                          | 18.00 a |
| Isd 37            | 170.71 a                                 | 118.09 a                                        | 119.65 a                          | 16.50 b |
| Isd 16 (Standard) | 101.18 b                                 | 65.95 c                                         | 85.47 c                           | 16.75 b |
| CV%               | 17.40                                    | 11.12                                           | 12.35                             | 3.80    |
| LSD               | 43.65                                    | 17.01                                           | 21.78                             | 1.15    |

Values having common letter(s) in a column do not differ significantly at 5% level

**Figure 2.** Variety Isd 37**Figure 3.** Variety Isd 35

#### Millable cane stalks

Significant ( $P \leq 0.05$ ) differences were observed in the number of millable cane stalks amongst varieties under study. Singh *et al.* (1985) and Raman *et al.* (1985) regarded the number of canes stalks as the most important character contributing directly to cane yield. Maximum ( $118.09 \times 10^3 \text{ ha}^{-1}$ ) millable canes were exhibited in variety Isd 37 (Figure 2) against standard variety Isd 16 ( $65.95 \times 10^3 \text{ ha}^{-1}$ ) which scored the lowest position. Alam *et al.* (2006) and Paul *et al.* (1994) also reported that there was a variation on millable cane production among the varieties.

#### Cane yield

Yield is the contribution of several attributes like number of millable stalk, stalk length, girth of cane. Khan *et al.* (2003) reported that increase in cane yield might be due to maximum plant height, weight per stool and cane girth. Nazir *et al.* (1997) stated that higher cane yield is the function of high potential variety. Javed *et al.* (2002) also expressed that cane yield per hectare depend upon number of stalks per hectare and weight per stalk. Weight per stalk consequently depends upon stalk length and stalk girth.



It is evident from the table 2 that the maximum cane yield of 119.65 t ha<sup>-1</sup> in the variety Isd 37 followed by Isd 35 (108.94 t ha<sup>-1</sup>) was harvested due to increased number of millable cane and unit stalk weight (Figure 3). The lowest cane yield (83.06 t ha<sup>-1</sup>) was obtained in Isd 34 which was followed by Isd 16 (85.47 t ha<sup>-1</sup>). Variation among the sugarcane varieties in respect of cane yield have also been reported by Singh *et al.* (1999), Bahadar *et al.* (2001) and Jamil *et al.* (2007).

#### Brix (%)

Significant ( $P \leq 0.05$ ) differences were recorded in brix % amongst all the entries under trials (Table 2). The highest brix (%) 18.00 was recorded in the variety Isd 36 while the lowest (16.00 %) was obtained from variety Isd 34. Variety Isd 37, Isd 35 and Isd 33 produced almost similar brix (%) to Isd 16 (16.75 %) the standard variety. Higher brix (%) of any variety is an indication to produce higher gur and sugar. Considering the brix and yield of cane in the experimental area variety Isd 37, Isd 36 and Isd 35 were found superior to other varieties.

**Table 3. Economic analysis for different sugarcane varieties in farmer's field at Kapasia**

| Treatments        | Total production cost (Tk. ha <sup>-1</sup> ) | Gross income (Tk. ha <sup>-1</sup> ) | Net return (Tk. ha <sup>-1</sup> ) | BCR  |
|-------------------|-----------------------------------------------|--------------------------------------|------------------------------------|------|
| Isd 33            | 75,000                                        | 1,60,054.40                          | 85,054.40                          | 2.13 |
| Isd 34            | 75,000                                        | 1,46,185.60                          | 71,185.60                          | 1.95 |
| Isd 35            | 75,000                                        | 1,91,734.40                          | 1,16,734.40                        | 2.56 |
| Isd 36            | 75,000                                        | 1,64,612.80                          | 89,612.80                          | 2.19 |
| Isd 37            | 75,000                                        | 2,10,584.00                          | 1,35,584.00                        | 2.80 |
| Isd 16 (Standard) | 75,000                                        | 1,50,427.20                          | 75,427.20                          | 2.00 |

Price of cane: Tk. 1760/ton

#### Economics

Table 3 shows the economic analysis of the experiment for different cane varieties. The highest (Tk. 2,10,584.00) gross income per hectare was recorded from Isd 37 followed by Isd 35 (Tk. 1,91,734.40) and the lowest (Tk. 1,46,185.60) was from Isd 34. In case of net return same results were observed. The highest benefit cost ratio (BCR) of 2.80 was recorded from Isd 37 followed by Isd 35 (2.56) while the lowest BCR of 1.95 was from Isd 34. Variety Isd 37 showed the highest cane yield, gross income, net return and maximum benefit cost ratio followed by Isd 35.

#### Conclusion

From the present findings it might be concluded that the varieties Isd 37, Isd 36 and Isd 35 exhibited better performance for cane yield, higher economic return compared to the local degenerated varieties of Kapasia area of Bangladesh under Modhupur Tract soils.

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