# Selection of Promising Sugarcane Clones for Cultivation in Madhupur Tract

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## ABSTRACT

The experiment was conducted at farmer's field at Kapasia, Gazipur under irrigated condition in three consecutive years from 2012-2015 to evaluate some promising sugarcane clone for profitable cultivation in Madhupur Tract area. The experiment was laid out in randomized complete block design with four replications. Five sugarcane clones such as VMC 86-550, I 99-01, Isd 18 $T_2$, I 257-06 and I 257-02 were tested along with Isd 16 as check variety. Among them Isd 18 $T_2$, I 99-01 and I 257-02 significantly performed better for yield and yield contributing characters together with high BCR. Though the yield was good but due to presence of pith pipe, I 257-02 was comparatively less preferred by cane grower. Therefore, Isd 18 $T_2$ and I 99-01 can be recommended for commercial cultivation upon further investigation to release as site specific variety for profitable cane cultivation in Madhupur Tract.

**Key words**: Sugarcane clone, clonal selection, Madhupur tract

## INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is cultivated as chewing, juice and jaggery purpose in non mill areas. Acreage and production of sugarcane gradually decreasing due to its long duration, highly labour intensive and cultivation of traditional or obsolete varieties for long time. Sugarcane varieties gradually degenerate over a considerable period of cultivation and decline its yield and vigour (Viswanathan, 2016 ; Barnes, 1954; Humbert, 1959). The production of cane and sugar will be improved successfully by cultivating newly released improved and site specific cane varieties (Chattha *et al.*, 2006). Miah (2006) noted that variety plays a key role for increasing yield of cane and sugar per unit area. In sugarcane, clonal selection within the variant population is commonly practiced for varietal development with the objectives of high yield potential including sugar and jaggery yield. Selection of an appropriate cane variety in a particular agro ecological zone is primary requisite to explore its yield. The inherent potential of a variety to give better yield is of paramount importance for sustaining high productivity. Site specific yield trial in farmers field also include farmers in participatory selection and it is necessary to ensure the performance of promising clone which can be released as new cane variety. It is needed to select sugarcane variety or clone which is suitable for profitable cultivation in Madhupur Tract area. Therefore, the experiment was taken for selecting suitable sugarcane clone(s) for cultivation in Madhupur Tract.

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## MATERIALS AND METHODS

The experiment was conducted at farmers field at Kapasia, Gazipur under AEZ 28 (Madhupur Tract) during three consecutive years from 2012-15. The experimental field was characterized by medium high land and typical loamy soil with pH below 7.5. The experiment was laid out in randomized complete block design with four replications. Four BSRI bred sugar and jaggery producing clones viz., I 99-01, Isd 18 $T_2$, I 257-06 and I 257-02 with one exotic sugarcane clone VMC 86-550 were evaluated with sugarcane variety Isd 16 as check variety. The unit plot size was 8m x 6m. Sugarcane setts treated with 0.1% Bavistin (Carbendazim) were planted directly in the experimental field with conventional method of planting. Manures and fertilizers were applied as per Fertilizer Recommendation Guide' 2012. Application of Regent 3GR (Fipronil) @ 16.66 kg $ha^{-1}$ was done for controlling termites. Furadan 5G (Carbofuran) @ 40 kg $ha^{-1}$ was applied in two equal splits with 1$^{st}$ and 2$^{nd}$ top dressing of fertilizers for controlling top shoot borer and other insect pests. Cidan 4G (Cartap) was applied @ 75 kg $ha^{-1}$ for controlling stem borer. Intercultural operations like weeding, irrigation, mulching, earthing up, detrashing and tying of cane were practiced as and when necessary. Regular inspection of diseases and insect pests also practiced. Data on yield and yield contributing characters were collected and analysed by using Statistix 10 program.

## RESULTS AND DISCUSSION

### Germination %

Average percent of germination of three consecutive years of experimentation with six sugarcane genotypes was presented in Figure 1. The standard variety Isd 16 showed the highest germination (82.45%) in all three years followed by Isd 18 $T_2$ (76.72%). The lowest germination was recorded in case of clone VMC 86-550 (59.62%). All the five clones together with standard variety showed higher germination in respect of some BSRI bred latest sugarcane varieties stated by Sohel *et al.*(2013) at Madhupur Tract area.

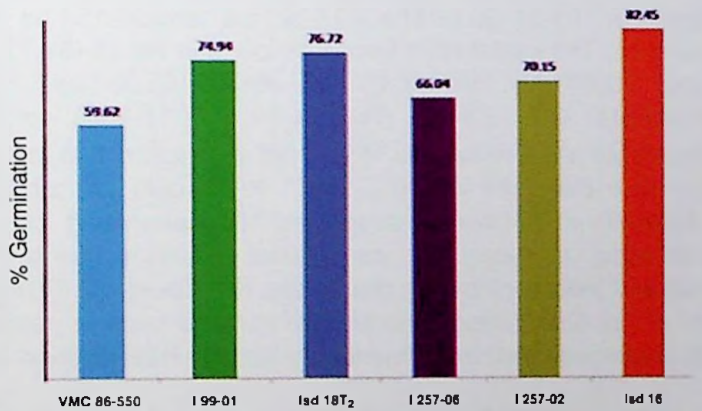


Figure 1. Germination percent of tested sugarcane genotypes (2012-15)

**Number of tillers**

Because of optimal yield depends on establishing sufficient culm density, tillering can be a major yield increasing process. Number of tillers optimized the number of millable cane and excessive tillering may reduces the diameter and weight of stalk. The rate of tiller initiation under identical conditions differs between cultivars (Karno, 2007) but can be manipulated by temperature and light.

Significant difference in tiller population was observed among the tested clones (Table 1). During three planting season standard variety Isd 16 showed the highest tiller population ($94.02x10^3$ $ha^{-1}$, $100.67x10^3$ $ha^{-1}$ and $108.67x10^3$ $ha^{-1}$) and statistically similar with the clones I 257-02 ($67.0x10^3$ $ha^{-1}$, $97.09x10^3$ $ha^{-1}$ and $97.12x10^3$ $ha^{-1}$) and Isd 18 $T_2$ ($81.87x10^3$ $ha^{-1}$, $90.12x10^3$ $ha^{-1}$ and $94.27x10^3$ $ha^{-1}$) in 2014-2015. The clone VMC 86-550 ($65.13x10^3$ $ha^{-1}$, $84.18x10^3$ $ha^{-1}$ and $82.18x10^3$ $ha^{-1}$) produced the lowest tiller population. Razzak *et al.* (2015) and Kabir *et al.* (2014) also reported the variation of sugarcane genotypes in respect to tiller population. Seasonal variation in tiller population was higher in 1$^{st}$ year (2012-2013) and more or less similar in last two years (2013-2014 and 2014-2015).

**Number of millable canes**

Significant difference was observed in millable canes population among the clones (Table 1). The highest millable cane population was found in Isd 16 ($73.4x10^3$ $ha^{-1}$, $83.6x10^3$ $ha^{-1}$ and $83.59x10^3$ $ha^{-1}$) followed by Isd 18 $T_2$ ($70.81x10^3$ $ha^{-1}$, $80.83x10^3$ $ha^{-1}$ and $82.97x10^3$ $ha^{-1}$) and I 257-02 ($59.88x10^3$ $ha^{-1}$, $79.92x10^3$ $ha^{-1}$ and $77.92x10^3$ $ha^{-1}$). The clone VMC 86-550 ($52.08x10^3$ $ha^{-1}$, $69.23x10^3$ $ha^{-1}$ and $68.57x10^3$ $ha^{-1}$) showed the minimum cane population. Similar variations were found in millable cane population among different sugarcane genotypes by Razzak *et al.* (2015) and Alam *et al.* (2006).

**Cane yield**

Yield potentiality greatly varies among different sugarcane genotypes. The yield and yield contributing characters of tested clones were shown in Table 1. The highest cane yield was observed at Isd 18 $T_2$ (96.99 t $ha^{-1}$, 108.79 t $ha^{-1}$ and 111.54 t $ha^{-1}$ respectively) followed by I 99-01 (99.69 t $ha^{-1}$, 97.29 t $ha^{-1}$ and 99.15 t $ha^{-1}$ respectively) in three consecutive years. The lowest cane yield was found in Isd 16 (68.77 t $ha^{-1}$, 75.23 t $ha^{-1}$ and 77.56 t $ha^{-1}$ respectively) followed by VMC 86-550 (63.03 t $ha^{-1}$, 81.75 t $ha^{-1}$ and 81.08 t $ha^{-1}$ respectively) and I 257-06 (76.95 t $ha^{-1}$, 75.17 t $ha^{-1}$ and 74.97 t $ha^{-1}$ respectively). Perfomance of the variety Isd 16 was not satisfactory due to its low individual cane weight. Therefore the clone Isd 18 $T_2$ and I 99-01would be subjected to further investigation to Kabir *et al.* (2014) also suggested some promising clones for further investigation for releasing as variety for commercial cultivation due to their significant differences in yield and yield contributing characters. Razzak *et al.* (2015), Sohel *et al.* (2013) and Jamil *et al.* (2007) also reported the variation in cane yield among varying sugarcane genotypes through their experiments. select potential location specific variety of sugarcane.

**Table 1. Yield performance of some promising sugarcane clones at Kapasia, Gazipur (2012-2015)**

| Variety or Clone | 2012-2013 | | | 2013-2014 | | | 2014-2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Tiller ($x 10^3 ha^{-1}$) | Millable cane ($x 10^3$ $ha^{-1}$) | Yield of cane ($tha^{-1}$) | Tiller ($x 10^3 ha^{-1}$) | Millable cane ($x 10^3$ $ha^{-1}$) | Yield of cane ($tha^{-1}$) | Tiller ($x 10^3 ha^{-1}$) | Millable cane ($x 10^3$ $ha^{-1}$) | Yield of cane ($t ha^{-1}$) |
| VMC 86-550 | 65.13 c | 52.08 c | 63.03 c | 84.18 b | 69.23 bc | 81.75 bc | 82.18 b | 68.57 b | 81.08 bc |
| I 99-01 | 62.24 c | 57.26 c | 99.69 a | 91.55 b | 73.9 abc | 97.29 ab | 91.92 b | 75.21 ab | 99.15 ab |
| Isd 18 $T_2$ | 81.87 b | 70.81 a | 96.99 a | 90.12 b | 80.83 a | 108.79 a | 94.27 ab | 82.97 a | 111.54 a |
| I 257-06 | 83.06 b | 68.0 ab | 76.95 b | 82.91 b | 64.0 c | 75.17 c | 82.91 b | 68.0 b | 74.97 c |
| I 257-02 | 67.0 c | 59.88 bc | 96.48 a | 97.09 ab | 79.92 ab | 90.6 bc | 97.12 ab | 77.92 ab | 90.6 bc |
| Isd 16 | 94.02 a | 73.4 a | 68.77 bc | 100.67 a | 83.6 a | 75.23 c | 108.67 a | 83.59 a | 77.56 c |
| CV | 7.35 | 8.94 | 8.33 | 8.59 | 7.18 | 11.25 | 8.56 | 7.45 | 11.59 |

**Brix %**

The field brix % of tested clones showed significant difference among the genotypes. They showed similar pattern in three production seasons (Figure 2). The clone VMC 86-550 showed the highest brix % (21.02%, 21.42% and 21.31% respectively) followed by Isd 18 $T_2$ (18.65%, 19.64 % and 20.31% respectively) and I 99-01 (18.22%, 19.79 % and 19.53% respectively). The lowest brix % was observed in Isd 16 (17.2%, 17.5 % and 18.88% respectively). Field brix reflex the recovery of jaggery and sugar which varies with sugarcane genotypes proven also by other studies (Razzak *et al.*, 2015; Kabir *et al.*, 2014 and Sohel *et al.*, 2013)

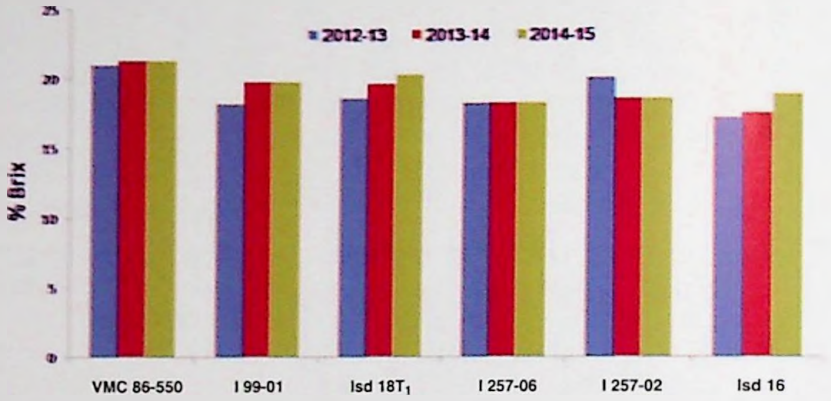


Figure 2. Brix % observed in six sugarcane clones over three production seasons

**Profitability**

The cost-return analysis of the treated sugarcane genotypes is shown in Table 2. Among the tested clones, Isd 18 $T_2$ performed better in respect to benefit cost ratio (1.88) followed by I 99-01 (1.69) and I 257-02 (1.52). The lowest benefit cost ratio (1.05) was found in VMC 86-550 followed by standard variety Isd 16 (1.01). Similar records were found as total cost of production and benefit cost ratio in Sirajganj (Islam *et al.*, 2016) and Ishurdi, Pabna (Razzak *et al.*, 2015) area of Bangladesh.

**Table 2. Cost and return analysis of tested sugarcane clones**

| Variety or Clone | Cost of production (tk. $ha^{-1}$) | Cane yield ($tha^{-1}$) | | | | Gross return (tk) | Net return (tk) | BCR |
|---|---|---|---|---|---|---|---|---|
| | | 2012-13 | 2013-14 | 2014-15 | Mean | | | |
| VMC 86-550 | 110000 | 63.03 | 81.75 | 81.08 | 75.29 | 225860 | 115860 | 1.05 |
| I 99-01 | 110000 | 99.69 | 97.29 | 99.15 | 98.71 | 296130 | 186130 | 1.69 |
| Isd 18 $T_2$ | 110000 | 96.99 | 108.79 | 111.54 | 105.77 | 317320 | 207320 | 1.88 |
| I 257-06 | 110000 | 76.95 | 75.17 | 74.97 | 75.70 | 227090 | 117090 | 1.06 |
| I 257-02 | 110000 | 96.48 | 90.6 | 90.6 | 92.56 | 277680 | 167680 | 1.52 |
| Isd 16 | 110000 | 68.77 | 75.23 | 77.56 | 73.85 | 221560 | 111560 | 1.01 |

*Price of cane: Tk. 3000 $ton^{-1}$

Most of the jaggery producing farmers in Madhupur Tract cultivated Isd 16 and some local varieties for long time with traditional cultivation practices. But with time the varietal vigor of Isd 16 declined. It's imperative need to replace the obsolete variety with most promising new cultivar or site specific variety. The sugarcane clones named Isd 18 $T_2$, I 99-01 and I 257-02 performed better in yield and yield contributing characters together with high BCR. In-case of I 257-02, small pipe was observed, so farmers did not prefer this clone for cultivation. Considering above points it would be assumed that, Isd 18 $T_2$ and I 99-01 deserve further investigation to release as site specific variety for Madhupur Tract. Farmers of this area might be benefited economically by getting higher cane as well as Jaggery yield through cultivating these two promising clones as commercial cultivar with optimum management packages.

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