

PERFORMANCE OF SOME SUGARCANE VARIETIES FOR PLANT AND RATOON CANE PRODUCTION IN ACTIVE TISTA FLOODPLAIN

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ABSTRACT

An experiment was carried out in farmers' field of Shyampur sugar mills area, Rangpur under Active Tista Floodplain (AEZ-2) soils of Bangladesh during the year from 2013 to 2015. For this study six selected varieties viz: Isd 34 (Standard), Isd 36, Isd 37, Isd 38, Isd 39 and Isd 40 were planted following RCB design with three replications. Significant differences were observed for tiller population, millable cane, stalk diameter, single stalk height, stalk weight, yield of cane and ratoon as well as brix (%). In case of plant cane the highest cane yield of 105.78 tha^{-1} was observed in Isd 39 followed by Isd 37, while the highest ratoon cane yield (91.38 tha^{-1}) was recorded from Isd 37 followed by Isd 39. The can plant ensured the higher yield than ratoon cane, but the higher brix (%) was observed in ratoon cane. However, considering both the yield and brix (%) the release sugarcane varieties Isd 39 and Isd 37 may be recommended for sugarcane cultivation in Active Tista Flood plain (AEZ-2) of Bangladesh.

Key words: Sugarcane, plant cane, ratoon cane, yield, brix %

Introduction

Sugarcane (*Saccharum* ssp L.) is one of the most important crops in tropical and sub-tropical countries. It is the major sugar producing crop worldwide. Like other perennial grasses, it can regenerate shoots from the left-over stalk of preceding crops known as ratoon crop. Ratooning of sugarcane is a common practice throughout the world and ratoon occupies almost 50 percent of the total area under sugarcane production (Sundara, 2008). The major cane growing countries normally take two or more ratoons (Shrivastava, 1992). In Hawaii, Mauritius, Philippines and Cuba four to six ratoons are quite common (Misra and Mathur, 1983). In India, research strategies for sugarcane production through ratooning has been undertaken as an aid to cut down production cost (Shrivastava *et al.*, 1990). In Bangladesh, only 20% of the cane area is ratooned every year producing in an average 40 tha^{-1} while the potential yield has been found to be around 80 tha^{-1} (Anon, 2001). The average yield gap between plant and ratoon crop is 20%-25% (Gomathi *et al.*, 2013). Ratoon crop have often failed to produce satisfactory germination, growth and yield in Bangladesh due to lack of suitable ratooning varieties and proper management practices (Majid and Alam, 1998). Ratoon crop yields usually typically decreased with age hence, limit the economic production of sugarcane (Mirzawan and Sugiyarta, 1999). Growing ratoon is 30-40% cheaper about due to saving in irrigation, land preparation, cost of seed material and sowing operations (Akhtar *et al.*, 2003). A ratoon crop matures prior to plant cane ensuring early supply of cane to mills. Under similar conditions sugarcane ratoon have a supplementary advantage of better juice quality and sugar recovery more than plant cane of same variety (Yang and Chen, 1991). The genetic potential of a variety to give better yields in plant and ratoon cane is the focal point for sustaining high productivity and its acceptance by the farmers for good ratooning potential (Arain *et al.*, 2011). Thus, sugarcane varieties, which show good performance in plant and ratoon crop should be promoted for commercial cultivation. The objective of the present study is to evaluate the productivity and ratooning potential of some promising sugarcane varieties grown in Active Tista Floodplain areas of Bangladesh.

Materials and Methods

The experiment was carried out in farmers' field of Shyampur sugar mills area, Rangpur under Active Tista Floodplain (AEZ-2) soils of Bangladesh during the year from 2013 to 2015. The six selected sugarcane varieties viz: Isd 34 (Standard), Isd 36, Isd 37, Isd 38, Isd 39 and Isd 40 were planted following Randomize Complete Block Design with three replications. The unit plot size was 6 m × 6 m conventional two budded setts were used as the experiment. Row to row distance was 90 cm and sett placement was end to end. The setts were planted on 25th November, 2013 and harvest 15th December, 2014. Ratoon crops were raised from left over stubble of the harvested plant cane in the next cropping season (2014-2015). The inter row spacing between two cane rows were tilled well by country plough. Fertilizers were applied following the recommended rate (BARC, 2012). Pest and disease management and necessary intercultural operations like weeding, mulching, gap filling, irrigation, earthing up, tying etc. were done accordingly proper time. Tiller population was counted at 150 DAP and DAS. Millable cane, stalk height, stalk diameter, single stalk weight, cane yield, and brix (%) of cane were recorded at harvest. The collected data were analyzed statistically using analysis of variance (ANOVA) according to Gomez and Gomez (1984) procedure for a randomized complete block design with statistics 10 software package and the mean differences were compared by least significant difference (LSD) at 5% level of probability.

Results and Discussion

Responses of tiller population, millable cane and stalk diameter (cm) of sugarcane are presented in Table 1.

Tiller population: Tillering potentiality of sugarcane ultimately affects on cane yield positively. The maximum tiller population of $201.97 \times 10^3 \text{ ha}^{-1}$ was found from the variety Isd 39 (for plant cane) which was statistically similar with Isd 34. In case of ratoon cane the maximum tiller of $244.13 \times 10^3 \text{ ha}^{-1}$ was found from the variety Isd 34 which was statistically similar with the variety Isd 39. The minimum number of tiller in plant cane $150.17 \times 10^3 \text{ ha}^{-1}$ was observed in variety Isd 38 and in case of ratoon cane the minimum value ($161.87 \times 10^3 \text{ ha}^{-1}$) was found from the variety Isd 36. In this study, tiller population was higher in ratoon cane than plant cane. Similar result was observed by Karim *et al.*, (2015).

Table 1. Performance of six tested sugarcane varieties for number of tiller, number of millable cane and stalk diameter in plant cane (PC) and ratoon cane (RC)

Varieties	Number of tiller ($\times 10^3 \text{ ha}^{-1}$)		Number of millable cane ($\times 10^3 \text{ ha}^{-1}$)		Stalk diameter (cm)	
	PC	RC	PC	RC	PC	RC
V ₁ : Isd 34	195.80 a	244.13 a	116.08 a	120.17 a	1.93 d	1.87 d
V ₂ : Isd 36	156.87 bc	161.87 c	89.80 c	82.74 d	2.13 bc	2.00 bc
V ₃ : Isd 37	167.74 bc	180.74 b	100.20 abc	96.23 bc	2.37 a	2.21 a
V ₄ : Isd 38	150.17 c	182.17 b	89.89 c	88.93 cd	2.04cd	1.95 cd
V ₅ : Isd 39	201.97 a	231.63 a	111.29 ab	102.95 b	2.26 ab	2.15 a
V ₆ : Isd 40	170.29 b	190.29 b	96.94 bc	91.96 bcd	2.21 b	2.10 ab
Lsd (0.05)	18.91	14.26	17.48	11.45	0.15	0.13

In a column, figures with similar letters do not differ significantly at 5% level

Millable cane: The number of millable cane influences cane yield directly. The highest millable cane of $116.08 \times 10^3 \text{ ha}^{-1}$ and $120.08 \times 10^3 \text{ ha}^{-1}$ were found from the variety Isd 34 in both conditions but lowest millable cane of $89.80 \times 10^3 \text{ ha}^{-1}$ was found from the variety Isd 36 in plant cane and in case of ratoon cane the lowest millable cane of $82.74 \times 10^3 \text{ ha}^{-1}$ was found from the variety Isd 36. Similar finding was found by Gomathi *et al.*, (2013).

Stalk diameter: The highest cane diameters (2.37 and 2.21 cm) were recorded from the variety Isd 37 (for cane plant and ratoon cane) which was statistically similar with Isd 39. Isd 34 was given the lowest cane diameter (1.93 and 1.87 cm) in plant and ratoon cane, respectively. Similar result was found from Arain, *et al.*, (2011).

Stalk height: The study observed that higher stalk height was higher in plant cane than ratoon cane. The highest stalk height of 3.40 and 3.26m were found from the variety Isd 37 which was statically similar with Isd 39 in the both conditions. The lowest stalk height of 2.80m and 2.76m were found from the variety Isd 34 in the plant and ratoon cane conditions, respectively (Fig. 1). Similar result was agreement with Gomathi *et al.*, (2013) and Arain, *et al.*, (2011).

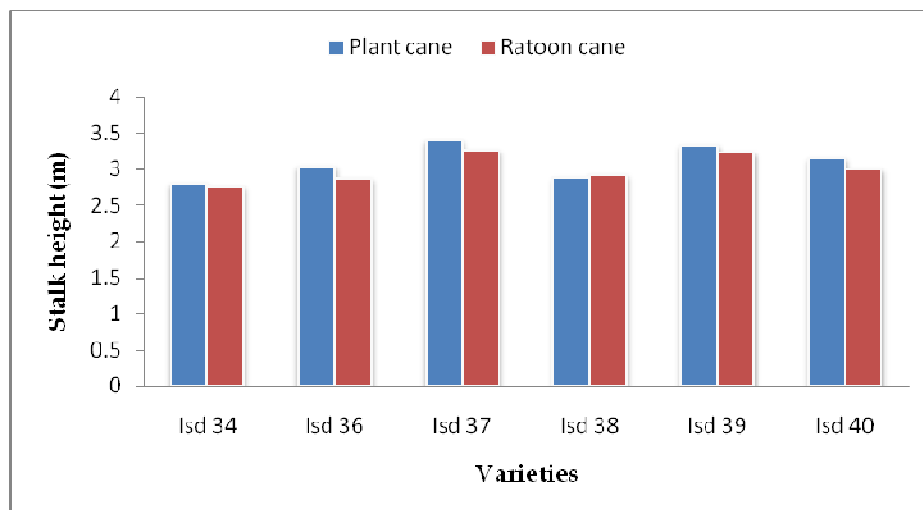


Fig. 1. Stalk height (m) of different sugarcane varieties at harvest of the plant and ratoon cane

Results from this study further indicated that all the varieties exerted significant influence on the single stalk weight, cane yield and brix % of cane presented in Table 2.

Single stalk weight: The highest single stalk weight of 0.99 and 0.94 kg were obtained in the variety Isd 37 in both conditions but lowest single stalk weight 0.67 kg and 0.62 kg was obtained in the variety Isd 34 in both conditions.

Table 2. Performance of six tested sugarcane varieties for single stalk weight, cane yield and brix % in plant cane (PC) and ratoon cane (RC)

Varieties	Single cane weight (kg)		Cane yield (tha ⁻¹)		Brix (%)	
	PC	RC	PC	RC	PC	RC
V ₁ : Isd 34	0.67 c	0.63 c	77.92 cd	74.19 bc	20.00 ab	21.07 ab
V ₂ : Isd 36	0.76 c	0.74 bc	68.80 d	60.80 c	18.53 b	19.53 c
V ₃ : Isd 37	0.98 a	0.94 a	97.84 ab	91.38 a	20.60 a	21.17 ab
V ₄ : Isd 38	0.88 b	0.80 b	79.07 cd	71.07 bc	19.00 ab	19.33 c
V ₅ : Isd 39	0.95 ab	0.86 ab	105.78 a	88.12 a	20.50 a	21.59 a
V ₆ : Isd 40	0.90 ab	0.83 ab	87.63 bc	77.13 b	19.13 ab	20.27 bc
Lsd (0.05)	0.10	0.12	15.33	13.83	1.81	1.24

In a column, figures with similar letters do not differ significantly at 5% level

Cane yield: In plant cane highest cane yield of 105.78 tha⁻¹ was found from the variety Isd 39 which was statically similar with the variety Isd 37. In case of ratoon cane, the highest cane yield of 91.38 tha⁻¹ was found from the variety Isd 37 which was statically similar with the variety Isd 39. The lowest cane yield of 68.80 and 60.80 tha⁻¹ were found from the variety Isd 36 in plant and ratoon cane, respectively. Thereby lower yield was recorded in ratoon cane than that of cane plant for all varieties. Similar report was reported by Karim *et al.*, (2015) and Gomathi *et al.*, (2013) where they found lower yield in ratoon cane than plant cane cultivated in Active Tista Floodplain areas of Bangladesh.

Brix (%): Brix % was found higher in ratoon cane than plant cane. The highest brix % (21.59) was obtained in ratoon cane from the variety Isd 39 and in plant cane the highest brix % (21.59) was obtained in Isd 37 (20.60). Similar result was observed by Karim *et al.*, (2015) and Arain, *et al.*, (2011).

Conclusion

The overall result of this experiment shows that among the selected sugarcane varieties Isd 39 and Isd 37 perform better than other varieties regarding yield and brix %. Thus it can be suggested to cultivate these sugarcane varieties in the Active Tista Floodplain. Again the lower yield was recorded in ratoon cane for all cane varieties therefore; there is a great scope for working in improving the yield for ratoon cane.

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