

Effects of Time and Methods of Planting on Yield and Quality of Sugarcane

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ABSTRACT

An experiment was conducted in Old Himalayan Piedmontplain soils at North Regional Station farm to investigate effects of time and methods of planting on yield and quality of sugarcane. There were two planting methods such as transplanting of 45 d old two budded soil bed settlings, and planting of three budded fresh setts with five different planting times with one month interval starting from 15th August. STP method produced higher yield than conventional method at all dates of planting. In case of STP, yield level and yield contributing factors were found to decrease as the planting time proceeded. Conventional method produced the highest yield in October and the lowest yield in August and September. Both planting methods gave almost similar yield in December. Planting methods and time had no significant effects on the sucrose content of sugarcane.

INTRODUCTION

In sugarcane, stalk population is positively correlated with cane yield in sub-tropical cane growing areas (Kanwar and Sharma, 1974; Bull, 1975; Miah and Rahman, 1981). Germination of sugarcane bud is extremely important to achieve higher yield through minimizing gaps and maximizing plant population (Miah *et al.* 1988). Temperature and soil moisture are two important factors affect germination of sugarcane buds under field condition (Miah *et al.* 1988; Hossain *et al.* 1989; 1993). Both the factors are variable during planting period of sugarcane. Spaced transplanting (STP) of sugarcane settlings received considerable research attention for increasing number of millable cane stalks (Rahman and Rahman, 1979; Srivastava *et al.* 1985). Besides, planting method and time play an important role to increase stalk population. Therefore, the present investigation was undertaken to find out suitable planting method and appropriate time for sugarcane cultivation in Old Himalayan Piedmontplain soils.

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MATERIALS AND METHODS

A field experiment was carried out on Old Himalayan Piedmontplain soils at North Regional Station (NRS) farm, Thakurgaon during 1988-89 and 1989-90 cropping seasons to determine the effects of different planting time and methods on yield and quality of sugarcane. The experiment was laid out following factorial randomized complete block design with two planting methods and five planting times with four replications. The treatment combinations were as follows:

- T_0 = Mid August X STP,
- T_1 = Mid August X Conventional,
- T_2 = Mid September X STP,
- T_3 = Mid September X Conventional,
- T_4 = Mid October X STP,
- T_5 = Mid October X Conventional,
- T_6 = Mid November X STP,
- T_7 = Mid November X Conventional,
- T_8 = Mid December X STP,
- T_9 = Mid December X Conventional.

The sugarcane variety Isd 16 was used as test crop and plot size was 8m x 6m. The two budded soil bed settlings of 45d old was used for spaced transplanting method and three budded fresh setts for conventional planting. In August and September, the setts/settlings were planted/transplanted in the trench directly without land preparation. In October, November and December planting/transplanting, land preparation was done. In case of STP, plant to plant distance was maintained 45 cm in all dates of transplanting. In case of conventional planting, end to end method of sett placement was followed. Row to row distance was maintained 100 cm. Recommended doses of NPKS fertilizers such as 170 kg N ha⁻¹ as urea, 125 kg P₂O₅ ha⁻¹ as triple super phosphate, 222 kg K₂O ha⁻¹ as muriate of potash, and 33 kg S ha⁻¹ as gypsum were applied equally to all plots, Furadan 5G was applied @ 100 kg ha⁻¹ to control white grub. Irrigation were applied twice during February and March. Necessary intercultural operations, and mechanical control of insects were done. Tiller counts were taken for each plot at peak period of tiller production. Data on millable cane, and yield were recorded for each plot at harvest. The recoverable sucrose content was determined at harvest according to Hornes Dry Lead Method (Meade, 1963). Temperature and rainfall distribution at experimental site were recorded during planting/transplanting period and presented in the Appendix a, b and c.

RESULTS AND DISCUSSION

The results of the experiment have been presented in the Table 1. It is seen from the table that tiller, millable cane, and yield of cane were higher in transplanted sugarcane over conventionally planted cane in both the years. These results confirmed the previous reports published elsewhere (Rahman and Rahman, 1979; Narasiman *et al.* 1981, Rahman *et al.* 1993). The main reason for low yield was indentified as the insufficient number of millable stalks in conventional sugarcane (40-78 thousand per hectare) compared to transplanted sugarcane (60-88 thousands per hectare). It is evident from the experiment that planting method, planting time, and interaction of method and time had significant effect on tiller, millable cane, and yield of cane. In case of conventional planting, production of tillers as well as millable cane were significantly lower in both early and late planted cane i.e., August to September and November to December. Cane yield was also sharply declined in those months and was found the lowest during August and September planted cane. The cause of low yields in earlier months was, a good number of setts were rotten due to heavy rainfall. It is reported that around 70% of the total rainfall (1200-2500mm) occurs during monsoon months, July to September in Bangladesh. In later months, germination of the setts were poor due to insufficient moisture and low temperature (Appendices a, b and c).

Table 1. Effects of time and methods of planting on tiller, millable cane, yield and recovery of sugarcane.

Time	Methods	Number of Tiller ($\times 10^3$ /ha)			Millable cane ($\times 10^3$ ha)			Yield (TCH)			Recoverable sucrose (%)		
		1988-89	1989-90	Average	1988-89	1989-90	Average	1988-89	1989-90	Average	1988-89	1989-90	Average
August	STP	184.3	191.5	187.9	82.5	82.5	82.5	83.9	82.1	83.0	9.1	10.9	10.0
	Conv.	89.1	77.5	83.3	43.9	39.7	41.8	41.3	36.3	38.8	9.1	10.7	9.9
September	STP	183.5	193.5	188.5	81.6	88.3	85.0	78.6	82.5	80.6	9.1	10.8	10.0
	Conv.	132.2	105.5	118.9	75.4	64.9	46.8	31.7	47.8	39.8	9.1	10.0	9.6
October	STP	195.0	220.0	207.5	85.6	87.4	86.5	76.0	83.0	79.5	8.8	10.6	9.7
	Conv.	194.6	182.5	188.6	78.3	75.1	76.7	66.8	68.1	67.5	9.1	10.2	9.7
November	STP	181.0	214.5	197.8	66.2	72.9	69.6	62.8	70.3	66.6	9.0	10.1	9.6
	Conv.	150.8	154.5	152.7	52.6	54.7	53.7	52.7	54.2	53.5	8.7	10.1	9.4
December	STP	179.0	178.5	178.8	68.1	60.2	64.2	54.7	52.7	53.7	8.8	10.0	9.4
	Conv.	150.0	152.0	151.0	55.5	57.2	56.4	50.4	55.1	52.8	9.3	9.9	9.6
CD at 1%													
Method (M)		32.8	23.2		18.1	7.1		7.6	7.8		NS	NS	
Time (T)		36.9	21.7		11.5	11.8		12.0	12.3		NS	NS	
M X T		52.2	48.4		25.6	11.9		17.0	17.4		NS	NS	

Lower ambient temperature and soil moisture stress were identified among the causes of germination failure under field condition (Mukerji, 1979; Yang and Chen, 1980; Hossain *et al.* 1989; 1993). Miah *et al.* (1988) pointed out that minimum and

maximum temperature should not be below 22.5 and 32.5°C respectively for better germination of sugarcane under Bangladesh condition. They also observed that minimum temperature is more critical than maximum temperature which affects germination. Higher tiller and millable cane were produced in earlier transplanted sugarcane i.e. from August to October. Production of tiller and millable cane were sharply declined in late transplanted cane. Higher cane yield was obtained by early transplanted cane during August to October whereas yield was sharply declined in November and December transplanted canes in both the years. October planted canes produced the highest tiller, millable cane and yield in the studied years but settlings transplanted in August produced the highest yield during 1988-89 and yield was declined as the transplanting time delays. In 1989-90, higher cane yield was obtained from August to October transplanted cane. Yield of October planted cane was even higher than November and December transplanted cane in the first year and also higher than December transplanted cane in the second year. However, cane yield was the lowest in August and September planted conventional cane in both years. The planting time, methods and interaction of method and time had no significant effects on recoverable sucrose content in any season.

The average results of two years showed that the highest tiller and millable cane were produced in both October transplanted and conventionally planted cane while the highest yield was obtained in August transplanted cane and in October planted conventional cane. From the results, it could be concluded that sugarcane settlings should be transplanted during August to October and in conventional method of planting the setts should be planted during early October avoiding high rainfall in August to September and low temperature in late November to December.

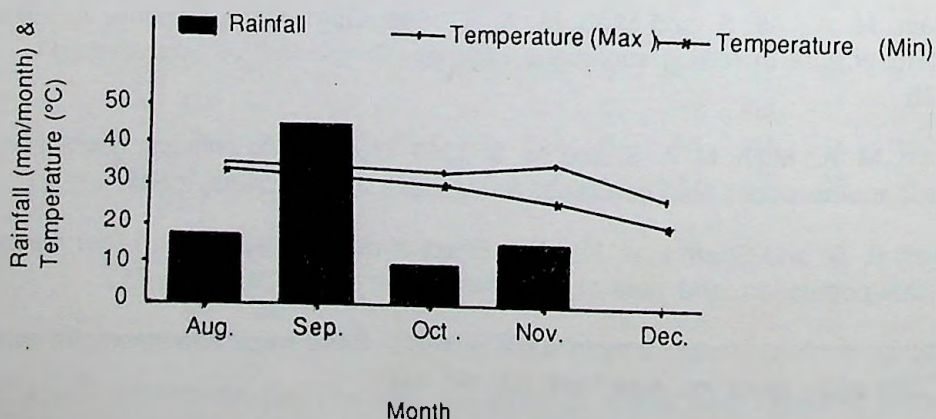
REFERENCES

- Bull, T. A. 1975. Row spacing and potential productivity in sugarcane. *Agron. J.*, 67 : 421-423.
- Hossain, M. A.; Ali, S. and Miah, M. A. S. 1989. Germination response to ambient temperature in raising sugarcane settlings. *Bangladesh J. Sugarcane*, 11 : 21-26.
- Hossain, M. A.; Miah, M. A. S. and Ali, S. 1993. Measures to enhance germination in sugarcane under field condition. *Bangladesh J. Sugarcane*, 12-15 : 19-21.
- Kanwar, R. S. and Sharma, K. K. 1974. Effect of inter-row spacing on tiller mortality, stalk population, and yield of sugarcane. *Proc. ISSCT*, 15 : 751-755.
- Meade, G. P. 1963. Polarimetry in sugar analysis. Cane sugar handbook. 9th edition. John Wiley Sons Inc. New York. pp. 401-441.
- Miah, M. A. S. and Rahman, A.B. M. M. 1981. Effect of row spacing and seed rate on the yield of sugarcane variety Isd-16. *Bangladesh J. Sugarcane*, 3 : 33-36.

- Miah, M. A. S.; Matin, M. A. and Hossain, M. A. 1988. Germination response of two sugarcane varieties to ambient temperature. *Bangladesh J. Sugarcane*, 10 : 17-21.
- Mukerji, N. 1979. Effect of soil temperature and glucose content of the planting material on the germination of periodically planted sugarcane. *Proc. Ann. Con. Sug. Techn. Asso. India*, 43 : 37-43.
- Narasiman, R.; Srivastava, K. K.; Shukla, R. K. and Singh, K. 1981. A technology for rapid multiplication of seedcane. *Indian Sugar*, 34 (5) : 435-37.
- Rahman, A. B. M. M. and Rahman, M. M. 1979. Potential of spaced transplanting of sugarcane. *Bangladesh J. Sugarcane*, 1 : 50-53.
- Rahman, M. K.; Imam, S. A.; Hossain, A. H. M. D.; Islam, M. J. and Alam, M. J. 1993. Performance of spaced transplanting method of sugarcane in Farming Systems Research sites. *Bangladesh J. Sugarcane*, 12-15 : 89-94.
- Srivastava, A. K.; Singh, K. and Saxena, Y. R. 1985. Production physiology of sugarcane cultivar Co. 1148. Tech. Bull. No. 15. Indian Institute of Sugarcane Research, Lucknow, India.
- Yang, S. J. and Chen, J. B. 1980. Germination response of sugarcane cultivars to soil moisture and temperature. *Proc. ISSCT*, 17 : 30-37.

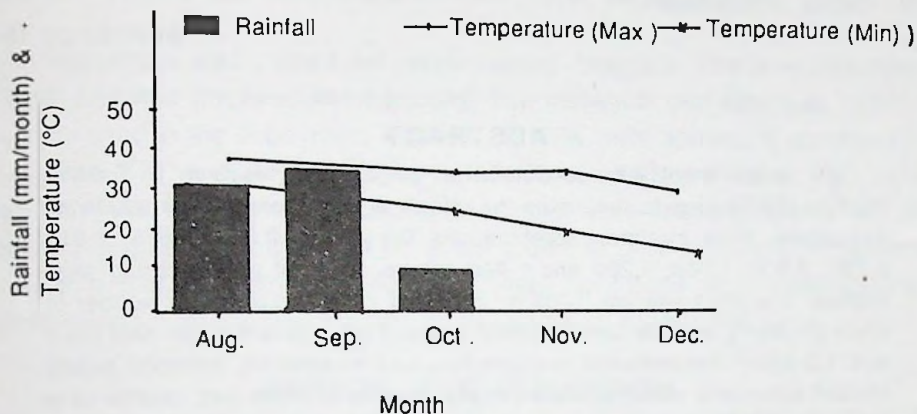
Appendix a.

Monthly temperature and rainfall distribution during planting/transplanting period of 1988-89 season.



Appendix b.

Monthly temperature and rainfall distribution during planting/ transplanting period of 1989-90 season.



Appendix c.

Average temperature and rainfall distribution of two years during planting/ transplanting period.

