

Tiller Management and its effects on Sugarcane Production

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ABSTRACT

An investigation was conducted at experimental farm of North Regional Station, Thakurgaon of Bangladesh Sugarcane Research Institute to study the effects of tiller management on sugarcane yield under spaced transplanting technique of sugarcane cultivation. The experiment comprised of the treatments, control (no removal of excess tillers), removal of excess tillers leaving 12 No. of healthy tillers per clump, removal of excess tillers leaving 10 No. of healthy tillers per clump, removal of excess tillers leaving 8 No. of healthy tillers per clump and removal of excess tillers leaving 6 No. of healthy tillers per clump. Removal of excess tillers significantly influenced percentage of tiller mortality, millable cane production and yield. The highest yield of cane was obtained (111.6 TCH) where 30 percent of total tillers were removed leaving eight healthy tillers per clump. Removal of excess tillers contributed unit stalk weight of sugarcane. No differential responses due to removal of excess tillers was found on recoverable sucrose content of sugarcane.

INTRODUCTION

The yield of sugarcane in Bangladesh is at 40 TCH (BBS 1993). The major causes of such poor cane yield has been identified to be insufficient number of millable cane per unit area resulting from gappy germination and poor nutritional management (Matheme, 1974; Khairwal and Babu 1975). Tillers are the principal functional unit of sugarcane contribute to millable canes and ultimately to yield (Kanwar and Sharma 1974; Bull, 1975). It has been reported that tiller production progressively increases and attains their peak during the month of May, and there after a gradual reduction in tiller number increase the tiller mortality till harvest (Matin *et al.* 1989). Sugarcane has a vast potentiality of producing 114 tillers from a single bud (Nickel, 1977) but all tillers produced do not necessarily come up as millable cane resulting a huge loss of photosynthate and applied nutrients. Earlier studies in Bangladesh and elsewhere showed that 30-70 percentage tillers die out as a result of interplant competition for light, space, nutrients and moisture (Anon. 1981; Miah and Sarkar, 1982; Srivastava *et al.* 1985; Miah *et al.* 1983. Rahman and Matin, 1988; Anon. 1993; Miah *et al.* 1994).

Khairwal and Babu (1975) reported that number of millable cane had the strongest direct effects on cane yield followed by cane weight. In closer row spacing tiller mortality is relatively higher than wider spacing (Kanwar and Sharma 1974, Matin *et al.* 1989).

In recent years, attempts were made to increase number of millable cane stalks per unit area (Miah *et al.* 1994). Since, earlier findings showed that higher production of tiller particularly the late tillers do not contribute much to yield, therefore, the present investigation was undertaken to optimise productive tillers through turning non productive tillers into millable cane.

MATERIALS AND METHODS

An experiment was conducted during 1989-90 at experimental farm of North Regional Station, Thakurgaon of Bangladesh Sugarcane Research Institute. The experiment was laidout in a randomised complete block design with four replications. Row to row distance was maintained one meter, and interplant spacing 45 cm at 8mX6m plot size. Single budded polybag settling of fortyfive days old of variety Isd16 were used as planting material. The settlings were transplanted during mid November and the crop was harvested in January at the age of 14 month. Variable plant densities were maintained according to treatment used. Removal of late tillers (secondary and tertiary) were made twice in May and June with 30 d interval. During this period no new tiller was allowed to grow. Recommended rates of fertilizer and pesticides were used. Intercultural operations like weeding, mulching, irrigation, earthing up, diseases and pests control etc. were done as and when necessary. The experiment comprised of the following treatments:-

- T₀: Control (No removal of tillers)
- T₁: Tiller removal leaving 12 healthy tillers per clump.
- T₂: Tiller removal leaving 10 healthy tillers per clump.
- T₃: Tiller removal leaving 8 healthy tillers per clump.
- T₄: Tiller removal leaving 6 healthy tillers per clump.

Data on tiller production, millable cane and yield of cane and sugar were recorded and statistically analysed.

RESULTS AND DISCUSSION

Results on tiller production and removal are shown in the Table 1 & Figure 1. It is seen from the Table 1 that tiller production attained their peak in May and tiller removal had positive effects on yield. These results confirm the findings of Matin *et al.* (1989) where they found peak plant population during the month of May and thereafter a gradual reduction till harvest. It is also evident from the Table 1 that a total of 6.5% to 49.0% tillers were removed from different treatments. The highest number of tillers was obtained in treatment where 12 healthy tillers were kept per clump removing excess tillers ($302.9 \times 10^3 \text{ ha}^{-1}$) and the lowest was recorded in T₃ where eight tillers were kept per clump ($269.7 \times 10^3 \text{ ha}^{-1}$). It is seen from the Figure 1 that tiller mortality percentage is the highest in T₀ treatment (69.4%) where no tiller removal was done and the lowest mortality was found in T₄ treatment (38.8%) where 51.1% of total tiller produced were allowed to grow for millable cane production. Percentage of tiller mortality directly varied with the number of tiller kept finally to turn into millable cane. Removal of excess tiller reduced the percentage of tiller mortality. This indicated that most of the tillers particularly the late tillers come up with no bearing and ultimately died before harvesting. Rao and Prasad (1962) reported that apart from inherent capacity of variety, tillering of sugarcane is usually influenced by several other factors such as light, nutrient level, time of planting, soil moisture etc. Rahman *et al* (1987) found higher tiller mortality under closer spacing with the highest plant population.

Data on number of millable cane and yield are presented in the Table 2. It is seen from the table that removal of excess tiller significantly influenced the number of millable cane. The highest number of millable cane was found where excess tillers were removed leaving 12 number of healthy canes per clump. Similar number of millable cane were produced in the treatment where no tillers were removed (T₀) and where excess tillers were removed leaving 6 number of tillers per clump (T₄). Significantly the

highest yield was obtained when excess tillers were removed leaving 8 healthy tillers per clump. Similar yield was recorded when excess tillers were removed leaving 12 or 6 healthy tillers per clump.

Table 1. Total number of tiller removed from different treatments.

Treatment	No. of tiller removed ($\times 10^3 \text{ ha}^{-1}$)			Total No. of tiller produced ($\times 10^3 \text{ ha}^{-1}$)	Total No. of tiller allowed to grow ($\times 10^3 \text{ ha}^{-1}$)	Total percentage of tiller removed
	In May	In June	Total			
T_0	-	-	-	287.5	287.5	-
T_1	9.6	10.0	19.6	302.9	283.3	6.5
T_2	40.4	9.8	50.2	285.1	234.9	17.6
T_3	66.8	13.9	80.8	269.7	188.9	30.0
T_4	114.1	22.9	137.0	279.4	142.4	49.0

Table 2. Effect of tiller removal on yield and yield contributing parameters of sugarcane.

Treatment	Total No. of tillers allowed to grow ($\times 10^3 \text{ ha}^{-1}$)	No. of millable cane ($\times 10^3 \text{ ha}^{-1}$)	Yield (TCH)	Unit wt. per stalk (kg)	Recoverable sucrose content (%)
T_0	287.5	87.9	99.3	1.12	9.1
T_1	283.3	99.6	103.8	1.04	9.1
T_2	234.9	98.7	106.3	1.08	9.0
T_3	188.9	95.1	111.6	1.17	9.1
T_4	142.4	87.1	102.5	1.17	8.8
LSD at 5%	-	4.7	7.5	-	-

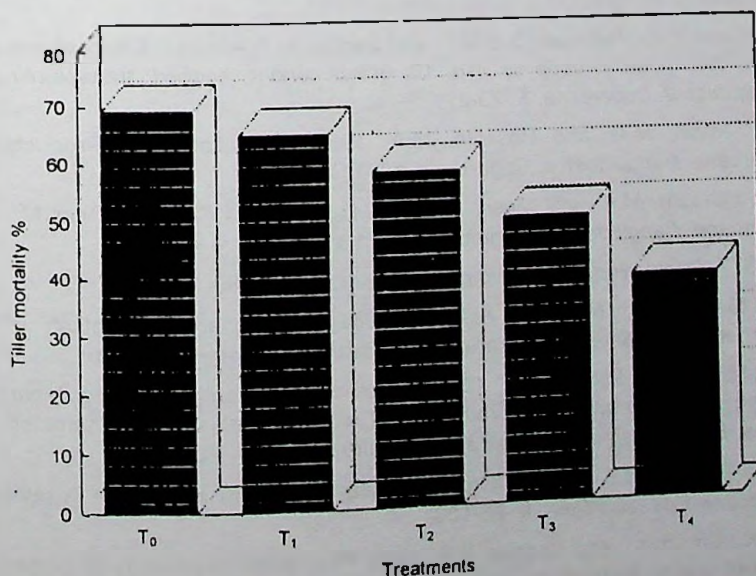


Figure 1. Effects of tiller removal on tiller mortality.

This indicates that allowing of 12 tillers per clump was excess which died out during the development phase. These results agree with the report of Miah *et al.* (1984). Mean stalk weight was found to be little higher under lower population compare to higher population indicating that inter-plant competition for light, space, moisture, nutrient etc. (Miah *et al.* 1983, 1988; Matin *et al.* 1989). There was virtually no differential response due to variable removal of excess tillers on recoverable sucrose content of sugarcane. In the light of the results obtained it could be concluded that removal of surplus secondary and tertiary tillers leaving 8-10 number of tillers per clump in the month of May and June might have some positive effects on sugarcane yield.

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