

Effect of Artificial Defoliation and Stalks Binding on the Cane Quality

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ABSTRACT

An experiment was undertaken at the Sugarcane Research & Training Institute Farm following split design with three replications to study the effects of artificial defoliation and stalks binding on the cane quality. Varieties Isd. 16 and Co. 1158 were used for the present investigation. Differences were observed in different treatments in respect of number of millable cane, yield and recoverable sugar per cent. Higher yield may be obtained if 50% leaves are removed and stalks are not tied up or 25% leaves are removed and stalks are tied up together once in the month of July.

INTRODUCTION

Stalk binding is being practiced to keep the cane erect to avoid consequent losses on lodging by the cane growers in some areas of Bangladesh. This practice is specially done in low-lying areas. Farmers twist the dry trash round each clump systematically in a bundle. Similar practice is being followed also in India to avoid lodging (Parthasarathy, 1972). During stalks binding cane growers defoliate old and dry leaves including some photosynthetically active leaves. This defoliation of green leaves affects plant growth and development though it largely depends on some factors of defoliation like timing, frequency, severity and position of the leaves removed (Cook *et al.*, 1958; Nandihalli and Singh, 1982).

Defoliation and stalks binding have some indirect effect on the cane quality (Miah and Sarkar, 1981; Parthasarathy, 1972). In Bangladesh, no work has been done on effects of defoliation or stalks binding on the ultimate growth, yield and sucrose accumulation. Therefore, an experiment was carried out to determine the effects of artificial defoliation and stalks binding on the cane quality.

MATERIALS AND METHODS

An experiment was conducted at the Sugarcane Research & Training Institute Farm following split plot design with three replications. Varieties Co.1158 and Isd. 16 were used for the present investigation. Varieties were considered in the main plots and treatments in the sub-plots. Plants were raised in a plot size 6m x 4.2m maintaining row to row distance 1.05m. Recommended doses of fertilizers were applied and intercultural operations were practised as and when necessary.

Following six treatments were given :—

T₀—No removal of leaves and stalks not tied up together (control).

T₁—No removal of leaves and stalks tied up together.

T₂—25% leaves removed and stalks not tied up together.

T₃—25% leaves removed and stalks tied up together.

T₄—50% leaves removed and stalks not tied up together.

T₅—50% leaves removed and stalks tied up together.

Defoliation and stalks binding were practised once in a crop year in the month of July at the age of approximately eight months from the date of planting. In all the cases of defoliation, lower leaves were removed. The % mortality was calculated with the following formula.

$$\% \text{ Mortality} = \frac{(A-B)}{A} \times 100$$

where,

A=Number of tillers obtained in the month of May

B=Number of millable cane obtained at harvest.

Chemical analysis was carried out in the month of November and December, 1981 at an interval of 30 days taking a sample of five randomly selected stalks for each replication. Statistical analysis of data was done on number of millable canes, yield and recoverable sugar.

RESULTS AND DISCUSSION

Differences were observed in different treatments in respect of number of millable cane, yield and recoverable sugar percent (Table 1). Highest yield of cane and sugar and number of millable cane were obtained in the treatment where 50% defoliation and no stalks binding were practised but did not differ significantly from the control (no defoliation and no stalks binding), while differed significantly from the treatment where 25% leaves were removed and stalks not tied up together at the 5% level of significance (Table 1).

It was found that maximum tillering completed by the month of May and 54-66% tillers died by the following months. This rate of mortality of tillers was found to be lower when defoliation was done resulting in higher number of millable cane in the defoliated cane plot (Table 2). This relationship between defoliation and cane mortality was not statistically significant. Highest yield was obtained perhaps due to the free air movement, light transmission in the cane canopy and reduction of sink area. Panje and Rao (1965-1966) found increased yield as well as sucrose content in the defoliated cane through the suppression of flowering due to defoliation.

Table 1. Effect of different treatments on the yield of cane, sugar, number of millable cane and per cent recoverable sugar.

Variable Treatments	No. of millable cane/plot	Yield of cane/ plot (Kg)	Yield of sugar/ plot (Kg)	Percent recoverable sugar
T ₀	202.5ab*	212.9bc	23.7ab	11.12ab
T ₁	207.5b	202.7abc	22.3a	10.99ab
T ₂	183.0a	187.5a	21.1a	11.24b
T ₃	203.0ab	208.8abc	22.6ab	10.81ab
T ₄	214.5b	226.3c	25.3b	11.20ab
T ₅	215.0b	198.5ab	21.2a	10.68a
S. E. of means	6.58	6.50	0.91	0.16

*Figures followed by the same letter are not significantly different at 5% level of probability as determined by the Duncun's New Multiple Range test.

According to Miah and Sarkar (1981) some differences were found in the levels of defoliation in different varieties. Highest percent recoverable sugar was found at 25% level of defoliation and stalks not tied up, while lowest at 50% level of defoliation and stalks tied up together but none of them (these results) differed significantly from the control though they differed significantly between each other (Table 1).

Higher yield and number of millable cane obtained in 50% level of defoliation than the 25% level of defoliation in both the varieties, while higher per cent recoverable sugar obtained at the 25% level of defoliation. These results agree with the results obtained by Miah and Sarkar (1981) where they found differences at the level of defoliation. According to Parthasarathy (1972) detrashing increased the cane yield and improved the cane quality. He noted that detrashing increased the unit cane weight and number of millable cane. Alexander (1973) stated that various field practices like topping, water regulation etc. encourage the plants to ripen a little earlier. However, the results of the present investigation differed from those of Yamasaki and Arikado (1937) and Dillewijn (1952) where they observed that the defoliation permanently decreased sucrose content of defoliated canes. Greater effect was found when young leaves were removed. But none of the authors mentioned the level of defoliation causing decrease in sucrose content.

Table 2. Effect of different treatments on the tillers mortality and production of millable cane/plot.

Treatments.	Variety	No. of tillers produced in different months.						% Mortality
		May	June	July	August	Sept.	At harvest	
T ₀	Isd.16	510	341	324	239	220	209	59.0
	Co.1158	517	347	300	250	209	196	62.0
	Mean	513.5	344.0	312.0	244.5	214.5	202.5	60.5
T ₁	Isd.16	631	388	316	249	230	222	65.0
	Co.1158	445	348	294	257	231	193	56.0
	Mean	538.0	368.0	305.0	253.0	230.5	207.5	60.5
T ₂	Isd.16	535	354	300	256	214	179	66.0
	Co.1158	460	354	308	261	222	187	59.0
	Mean	497.5	354.0	304.0	258.5	218.0	183.0	62.5
T ₃	Isd.16	565	371	337	238	221	213	60.0
	Co.1158	494	342	299	269	258	193	60.0
	Mean	529.5	356.5	318.0	253.5	239.5	203.0	60.0
T ₄	Isd.16	510	375	346	226	215	215	56.0
	Co.1158	471	351	290	262	249	214	54.0
	Mean	490.5	363.0	318.0	244.0	232.0	214.5	55.0
T ₅	Isd.16	493	348	315	255	232	223	54.0
	Co.1158	453	357	317	256	247	207	54.0
	Mean	473.0	352.5	316.0	255.5	239.5	215.0	54.0

Cane growth was affected due to the stalks binding practice in the present experiment. Higher number of millable cane was obtained when stalks tied up together (Tables 1 & 2) for the low rate of tillers mortality. It was found that tillers mortality reduced when stalks tied up together (Table 2). But the percent recoverable sugar was found to be lower in the treatment where stalks binding practice was done (Table 1). Yield of cane and sugar was found to be reduced due to the stalks binding practice except at the 25% defoliation level where yield of cane and sugar was increased though the percent recoverable sugar reduced (Table 1.) But none of the results differed significantly from the results of control. It was observed that propping increased yield and maintained better cane quality keeping the cane erect as compared to the lodged cane (Lakshmikanthan, 1960; Parthasarathy, 1972). Increased yield was obtained at 25% defoliation level and when stalks were tied up together perhaps for the interaction effects between defoliation (25% level) and stalks binding.

In conclusion, it can be stated that defoliation and stalks binding have some effects on the cane quality particularly in respect of number of millable cane, yield, per cent recoverable sugar etc. Effect, however, varies depending on the level of defoliation and the condition under which the stalks binding is done though it also varies with the varieties due to the varietal characteristics. Higher yield may be obtained if 50% leaves are removed and stalks are not tied up or 25% leaves removed and stalks are tied up together once in the month of July.

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