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Effects of Agronomical Practices on Sugarcane Yield

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Summary

Ten agronomical practices such as early planting, optimum row spacing, deep trench, recommended rates of fertilizer, gap filling, use of organic manure, weed control, earthing up, harvesting by spade at ground level and irrigation were compared with control* for their effects on yield components of sugarcane. Different practices showed their effects differently in varying degrees. Among them early planting, deep trench, recommended rates of fertilizer, gap filling, use of organic manure and irrigation showed significantly higher germination and tillers over control. The highest number of millable cane (68900/ha) was produced in the irrigated plot, followed by early planting (64300/ha), but the highest yield of cane (54.00t/ha) was produced in the recommended rates of fertilizer treated plot (37.80% yield was increased over control), while the lowest cane yield (39.20t/ha) was obtained in the control plot. Early planting produced cane yield 49.90t/ha (27.30% increased yield over control), followed by irrigation (48.60t/ha), where 24.00% yield was increased over control.

The highest sucrose content was found (10.90%) in early planted cane and organic manure applied cane, followed by recommended rates of fertilizer applied cane (10.80%). The recommended rates of fertilizer also produced the highest tonnage of sugar (5.83t/ha, which was 48.72% increased yield over control), followed by early planted cane (5.54t/ha, where 41.33% increased yield was found over control). This investigation indicates that agronomical practices have positive effects on yield components of sugarcane.

Introduction

The major objectives of sugarcane agronomy are to increase sugarcane and sugar yield through cultural practices. Although a few is known about agronomy of sugarcane, the average Bangladeshi sugarcane growers have not adopted improved cultural practices therefore, they are getting lower yield (42.00t/ha) of sugarcane (FAO,1982).

The poor yield of sugarcane is often believed to be associated with the poor management

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practices. It is impossible to get higher yields without first giving favourable environment in which to grow (Humbert, 1968). Many researchers reported the positive effect of different management practices (Gilfillan, 1971; Fogliata, 1974;Matherne,1974; Hoey and Hossain, 1981; Chowdhury *et al*. 1982; Garcia and Sancher, 1982). Hoey and Hossain (1981) reported the highest yield of cane when planted in early November than December, January or February. It has also been reported the increased yield by planting in deep trench (Irvine and Benda, 1980). Reduction of sugarcane yields in compact soil due to poor cultural practices has been demonstrated by Cleasby (1964).

In Bangladesh most of the farmers give less attention and use poor cultural practices. Nowadays the Sugar Corporation encouraging farmers to grow more sugarcane to feed mills in order to increase sugar production. It is necessary to educate the farmers in correct way of cane cultivation. In order to know the effect and contribution of management practices singly on cane yield, this investigation was therefore, undertaken.

Materials and methods

The experiment was conducted at the Sugarcane Research and Training Institute (SRTI) farm, Bangladesh during the cropping season 1986−87. The size of the unit plot was 12mx8m. Being laid out in a randomized complete block design with four replications, the experiment involved the following treatments:

To= ＊Control− Planting in late January at 75cm row spacing in shallow trench (15cm), use of below recommended rates of fertilizer (use 33% of the recommended rates), no gap filling, no use of organic manure, weed control only once, no earthing up, harvesting by sickle and no irrigation.

T1= To + Planting in November instead of late January.

T2= To + Planting at 100 cm row spacing instead of 75 cm.

T3= To + Planting in deep trench (25cm) instead of shallow (15cm) trench.

T4= To + Use of recommended rates of fertilizer instead of below rates.

T5= To + Gap filling by pre−germinated settlings.

T6= To + Use of organic manure (Cow dung 10.00t／ha).

T7= To + Weed control as and when necessary.

T8= To + Earthing up in June.

T9= To + irrigation (at planting and in May).

T10= To + Harvesting by spade at ground level instead of sickle harvest.

Sugarcane variety Ishurdi−16 (Isd−16) was used in the experiment. The experiment was set in 1986−87 cropping season. The three eyed setts were planted end to end method of sett placement. Fertilizers and organic manure were used and intercultural operations were done as per requirement of the treatments. The experiment was harvested in January, 1988. The data on germination was recorded at 45 days after planting while the tillers were counted at 180 days after planting. The data on millable cane, weight and sucrose content were recorded at harvest. The collected data were statistically analysed and significance of mean differences were adjusted as per LSD test.

Results and discussion

Significant differences were obtained among the different treatments in respect of germination, tiller, millable cane, weight of cane and sugar production (Table 1). Early planting, planting in deep trench, recommended rates of fertilizer, gap filling, use of organic manure, weed control and irrigation showed significantly higher germination and tiller production varying degrees from 20.50 to 60.27 per cent over control (Table 1 &Fig. 1). This observations are in

Table 1: Effect of agronomical practices on germination, tiller, millable cane, sucrose content, yield of cane and sugar.

Treatments	Germination (%)	Tillar (1000/ha)	Millable Cane (1000/ha)	Yield of Cane (t/ha)	Recovery (%)	Yield of Sugar (t/ha)
To	22.40NS	97.50NS	59.20NS	39.20NS	10.00	3.92NS
T1	35.90**	122.00**	64.30**	49.90**	10.90	5.54**
T2	22.60NS	126.00**	61.20NS	42.00NS	10.02	4.20NS
T3	28.20**	121.00**	60.90NS	41.00NS	10.10	4.14NS
T4	29.00**	132.20**	62.20NS	54.00**	10.80	5.83**
T5	29.40**	133.40**	63.20*	41.90NS	10.00	4.19NS
T6	30.00**	129.90**	63.70*	42.20NS	10.90	4.60**
T7	27.30**	119.90**	63.80*	40.30NS	10.10	4.10NS
T8	22.30NS	96.70NS	62.40NS	43.20NS	10.40	4.50**
T9	28.00**	135.20**	68.90**	48.60**	10.00	4.86**
T10	23.00NS	98.00NS	59.40NS	40.40NS	10.20	4.12NS

*, **and NS indicate significance of difference between control and other treatments at 5%, 1% and non.

conformitory with those of Ramdial (1974), Hoey and Hossain (1981), Chowdhury *et al.* (1982), Valdes *et al.* (1982) and Patil and Kale (1983). The probable cause of such higher result with mentioned treatments might be due to the application of improved cultural ptractices.

The highest number of millable cane (68900/ha) was recorded in the irrigated cane, followed by early planted cane (64300/ha) where 16.40 and 8.60 per cent yield was increased respectively over control (Table 1 & Fig. 1). The number of millable cane in every treatments were found higher than control varying degrees from 0.30 to 16.40 per cent which might be the effect of cultural practices (Fig. 1).

The highest yield of cane (54.00t/ha) and sugar (5.83t/ha) were produced in the treatment where recommended rates of fertilizers were applied followed by early planted cane (49.90t/ha cane and 5.54t/ha sugar) and irrigation (48.60t/ha and 4.68t/ha cane and sugar respectively) (Table 1). The different practices individually contributed 3.10 to 27.80 per cent cane yield and 5.10 to 48.72 per cent sugar yield over control (Fig. 1). This study indicates that agronomical practices have positive effect on cane and sugar yield. Similar results were obtained by Humbert

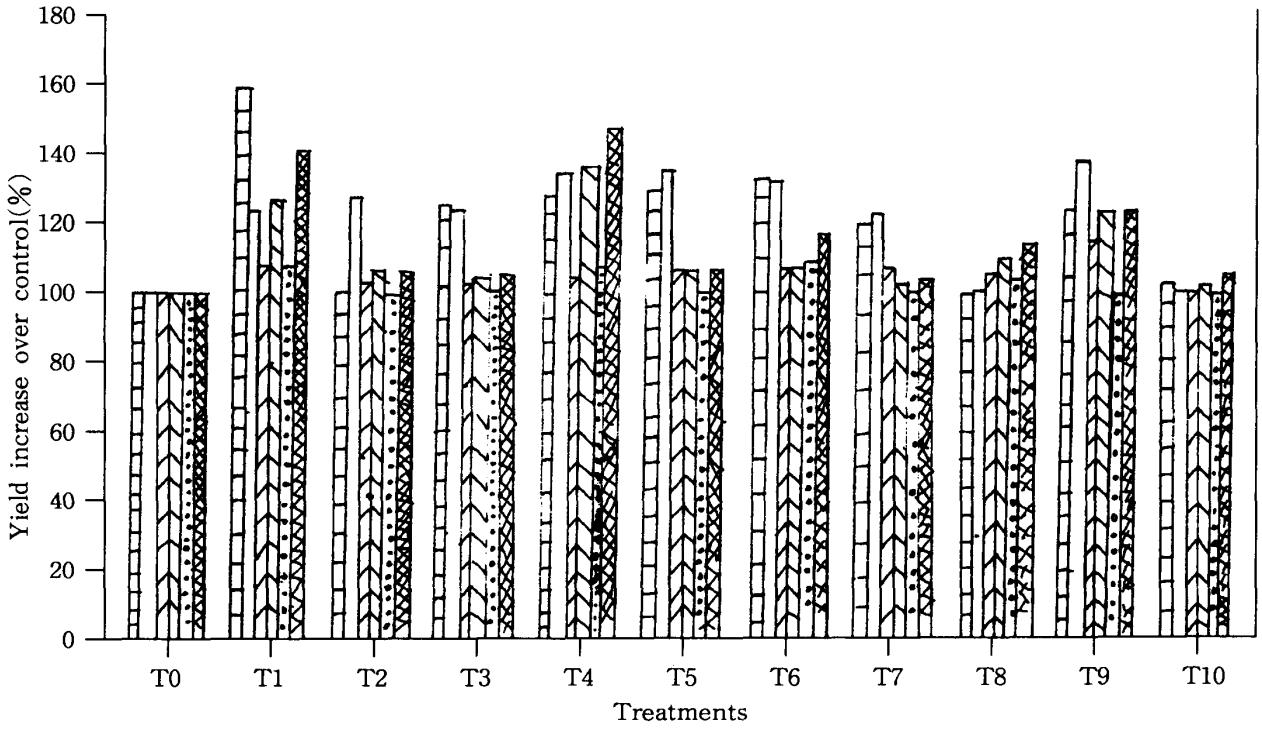

Fig. 1. Effect of some agronomical practices on some growth parameters of sugarcane.

Note: To = *Control, T1 = T0 + Planting in November, T2 = T0 + Planting at 100 cm row spacing, T3 = T0 + Planting in 25 cm deep trench, T4 = T0 + Use recommended rates of fertilizer, T5 = T0 + Gap filling, T6 = T0 + Use organic manure, T7 = T0 + Weed contro as and when necessary, T8 = T0 + Earthing up, T9 = T0 + Irrigation two times and T10 = T0 + Harvesting by spade.

(1986), Ramdial (1974), Lonsdale (1977) and Verma and Yadav (1985).

The results from this investigation indicates that agronomical practices have positive effects on yield components. Significantly higher germination was found in early planting, deep trench, recommended rates of fertilizer, gap filling, organic manure, weed control and irrigation. In case of tiller production every practices produced significantly higher numver than control except earthing up and harvesting by sickle. Early planting, recommended rates of fertilizer, gap filling, organic manure and irrigation also had the significant effect on millable cane production, while significantly higher yield was obtained in early planting, recommended rates of fertilizer and irrigation. Early planting, recommended rates of fertilizer, organic manure and earthing up were found to increase the sucrose content. Therefore, this investigation idicates that agronomical practices should be adopted for higher yield of cane with special emphasis on the use of recommended rates of fertilizer, early planting, irrigation, earthing up, use of organic manure, planting at optimum row spacing in deeep trench.

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栽培方法がサトウキビの収量に及ぼす影響

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要　約

早植、適性な畦幅、深耕、標肥栽培、補植、堆肥施用、除草、培土、鍬による地際刈り及びかんがい栽培した場合サトウキビの収量形質にどのような影響を及ぼすかについて検討した。その結果、早植区、深耕区、標肥栽培区、補植区、堆肥施用区および潅水区では発芽率及び単位面積当り分けつ数が対照区（バングラディシュにおける平均的農家の栽培の実状に合わせた試験区）より有意に優れていた。原料茎数の最高値は潅水区において得られ（68,900本／ha）、次いで早植区が多かった。しかし、収量の最高値は標肥栽培区で得られ（54.00t／ha）、対照区より37.80％の増収であった。一方、対照区では最低収量（39.20t／ha）を示した。シュクロース含量は早植区と堆肥施用区の10.90％が最も高かった。また、堆肥施用区では最も高い産糖量（5.83t／ha）を示し、対照区に比べて48.72％の増収であった。

以上のように、サトウキビの収量形質は栽培法の違いによって大きな影響を受ける。

Treatments

To＝＊Control－ Planting in late January at 75 cm row spacing in shallow trench (15cm), use of below recommended rates of fertilizer (use 33 % of the recommended rates), no gap filling, no use of organic manure, weed control only once, no earthing up, harvesting by sickle and no irrigation.

T1＝To ＋ Planting in November instead of late January.

T2＝To ＋ Planting at 100cm row spacing instead of 75cm.

T3＝To ＋ Planting in deep trench (25cm) instead of shallow (15cm)trench.

T4＝To ＋ Use of recommended rates of fertilizer instead of below rates.

T5＝To ＋ Gap filling by pre－germinated settlings.

T6＝To ＋ Use of ofganic manure (Cow dung 10.00t／ha).

T7＝To ＋ Weed control as and when necessary.

T8＝To ＋ Earthing up in June.

T9＝To ＋ irrigation (at planting and in May).

T10＝To ＋ Harvesting by spade at ground level instead of sickle harvest.