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Effect of Normal and Space Planting of Single Eye Bud and Single Eye Germinated Bud on the Yield of Sugarcane

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ABSTRACT

An experiment was undertaken in the SRTI Farm in 1980-81 season to assess the potential of transplanting of single eye germinated bud (TSEGB) with conventional early planting, late planting and single bud direct planting of sugarcane setts.

Results indicated that transplanting of single eye germinated bud (TSEGB) produced statistically identical yield to that of conventional early planting with three eyed setts. The sugar content was higher. The practice (TSEGB) has allowed 39 days extra time for growing an wintercrop before planting sugarcane. The TSEGB requires only 24% seed cane than normal planting thus saving a high amount of seed cost. The result also indicates that, gap filling in conventional planting may be done most successfully with the TSEGB method and cent percent plant population at desired spacing can be ensured.

INTRODUCTION

The sugarcane fields are also planted with rice and winter crops. The latter coincides with optimum time of sugarcane plantation. Many farmers opt for late planting of sugarcane after the harvest of one winter crop (Rahman *et. al.*, 1978). In general, sugarcane plantation is done in February-March after harvesting of Aman paddy or winter crops. The soil moisture remains low during this time. The low level of moisture coupled with over mature seeds results in poor germination. As yet little is known to derive full benefit of winter crops as well as sugarcane. It is known that late planting reduces the cane yield by 25-30% probably due to the shortening of the growing period of cane.

In general 40% germination of cane is considered satisfactory when setts planted end to end with 90-120 cm spacing. In early planting, some times, residual soil moisture may not be sufficient for good germination. The poor germination may result from the use of bottom or pest-infested seeds, which considerably reduced plant population. The gap-filling is a traditional practice to overcome the reduced plant population. The cane in the conventional gap-filling system does not grow similar to that of normal planting. In such cases, transplanting of pre-germinated plantlets raised in nursery could be an effective substitute (Tang and Chen, 1974).

Research works were conducted to find out ways and means to fillup the gaps in India, Taiwan, Hawaii and other parts of the world. Panjee (1967), showed the advantages of transplantation of sugarcane by breaking the conventional belief "sugarcane plants can not survive in transplantation." According to him nursery raised cane plantlets transplanted in the field has advantage with country method of gap filling. During the last decade the Hawaiian Sugar Industry has investigated transplanting as one approach to intensive farming (Anon., 1972). Transplanting sugarcane shoots is in practice in Orissa (Subba Rao, 1912). Williums (1951) grew sugarcane successfully from single eyed slip setts. In Java, about 50% plantation was covered by single shoot setts called Rajungun in the post war period (Dellewijn, 1952). 'Rajoong' method of planting cane with double shoot setts is being successfully followed on sugarcane lands of Kolhapur since 1938 (Kale and Deshpandes, 1956). In Dhaka district too, some farmers raise young cane seedling by putting the seed bundle in water/mud and transplant the same in suitable time.

The present study was undertaken to compare the performance of single eyed germinated bud in polyethylenes bag following space transplanting in the field with conventional planting method and develop an effective method of gap filling in farmers fields.

MATERIALS AND METHODS

The experiment was conducted in the Sugarcane Research and Training Institute (SRTI) in 1980-81 crop season under rainfed condition and was laid out in a RCB design with four replications. The treatments were :

T_1 —Single eyed sett planted in polyethylene bag and transplanted the germinated bud.
T_2 —Single eyed sett planted in the field during normal planting at 30 cm plant spacing.
T_3 —Conventional planting of three eyed setts (early planting).
T_4 —Three eyed setts planted in the field at the same time of transplanting one eyed seedlings grown in a polyethylene bag (late planting).

In all treatments Co.1158 cane variety was used.

Three eyed cuttings in the end to end method and one eyed cuttings at 30 cm plant spacing with 1.05 m row spacing were planted in the field on 30th November, 1980, following all normal cultural practices. On the same day, one eyed cuttings were planted in the polyethylene bag previously filled with soil media. On 8th January, 1981 (39 days from planting), the young seedlings from polyethylene bags were transplanted in the field at a plant spacing of 30 cm without disturbing the root zones of the shoots. At the same time three eyed cuttings were planted in the field in half overlapped method. All normal cultural practices appropriate for growing the crop was provided. The individual plot size was 6.4 m x 6.4 m.

Germination of shoots were counted and percent germination was calculated 45 days after planting. Count on tillering was taken at 180 days after planting and expressed in thousand/ha. Total yield per unit area, number of millable cane and chemical analysis of the samples for sugar determination were done after harvest. The data were compiled, analysed and presented (Tables 1 & 2). An economic evaluation of the treatments per unit area were made on the seed materials used, cost of cultivation and percent of profit/loss over conventional planting methods.

RESULTS AND DISCUSSION

Survival (cent percent) of the germinated shoots transplanted at a plant spacing of 30 cm were observed. Germination in other treatments were found identical. Significantly higher number of tillers per hactare were produced by conventional early planting which was found identical to the transplanted one eye-germinated bud. Single eye bud planted directly in the field produced less number of tillers and found inferior to all other treatments. Rahman and Rahman (1979) reported that conventional planting with three budded setts produced significantly higher number of tillers at the early tillering stage.

Table 1. Date, method of planting and germination or survival in the field.

Treatments	Date of planting	Method of planting	Germination/ Survival (%)
Transplanting of single eye germinated bud (TSEGB)	30.11.80 (in poly-ethelene bag) 8.1.81 (transplanted in field)	30 cm plant spacing	100.00
Single eyed sett planted directly in the field	30.11.80	30 cm from bud to bud	59.79 a
Conventional planting of three eyed setts (early)	30.11.80	End to end method	61.87 a
Three eyed setts planted at the same time of planting germinated shoot (Late planting)	8.1.81	Half over-lapped method	47.99 a

* Figures followed by the same letters donot differ significantly.

Conventional planting produced significantly higher number of millable cane per unit area followed by the TSEGB, and conventional late planting. The latter two were statistically insignificant. Similar trend of results were also obtained from the yield of cane per unit area (Table 2).

Although highest sucrose content was found in the TSEGB, but there was no significant difference between the treatments. The corresponding yield of sugar resulted from yield of cane and sucrose content revealed that signifcantly higher TCH were produced by conventional early planting followed by the TSEGB and late planting.

The higher sucrose content in the TSEGB might be due to uniform interception of light on leaves. The use of spaced transplanting which restricts mutual shading and provides for efficient utilization of sun light, gained considerable attentien of cane scientists for obtaining higher productivity of sugarcane (Kosakia, 1961 ; Buren, 1972 and Nickel, 1967).

The economic feasibility of the TSEGB compared to the coventional early planting, late planting and single eyed setts has been estimated (Table 3). The requirement of seed in the TSEGB was 76% and 150% less than that of conventional early and late planting respectively. Highest cost of cultivation was involved with conventional late planting (TK. 10012.26/ha) followed by conventional early planting (TK. 9345.01/hg. Where as highest sale proceed of sugarcane was earned by conventional early planting followed by the TSEGB. The profit/loss estimates indicate the advantage of conventional early planting followed by the TSEGB practices.

Table 2. Production of tillers, millable canes, % recovery, TCH and TSH as influenced by different treatments.

Treatments	Tiller Production/ ha ('000')	Millable cane/ha ('000')	Yield of cane/ha (TCH)	% Recovery	TSH
Transplanting of single eye germinated bud (TSEGB)	168.34bc	94.44b	90.71ab	10.76a	9.74bc
Single eyed sett planted directly in the field.	110.60a	73.73a	70.71ab	10.71a	7.49a
Conventional planting of three eyed setts (early)	188.07c	112.31c	104.28b	10.70a	11.12c
Three eyed setts planted at the time of planting germinated shoot (Late planting)	138.84ab	95.85b	85.13ab	10.26a	8.65ab
S. E.	9.17	3.63	6.52	0.34	0.54

* Same letters in column do not differ significantly at 5% level of probability.

Table 3. Economic feasibility of TSEGB with conventional early planting, late planting and single eyed setts.

Treatments	Cost of seed/ha		Cost of seed prep. & planting		Media prep, filling and sprouting shoots	Interculture, harvesting & fertilizer cost (Tk.)	Total cost of cultivation Tk. /ha	Sale proceed of cane (Tk.)	% Profit/loss over control (conventional planting)	
	Qty. (TCH)	Amount (Tk.)	Labour/ ha(No.)	Cost (Tk.)					Early	Late
Transplanting of single eye Germinated bud (TSEGB)	1.10 (24%)	444.78	99	1089.00	597.98	6374.00	8505.76	36,465.40	(−)13.02	(+)6.55
Single eyed setts planted directly in the field.	1.10 (24%)	444.78	32	352.00	—	6027.00	6797.03	28,425.40	(−)32.19	(−)16.94
Conventional planting of three eyed setts (early)	4.61 (100%)	1853.25	62	682.00	—	6809.76	9345.01	41,920.50	—	(+)22.49
Three eyed setts planted at the time of transplanting TSEGB (late)	6.91 (150%)	2779.88	79	869.00	—	6363.38	10012.26	34,222.26	(−)18.36	—

The transplanting of germinated eye-buds were found advantageous for the following reasons :

(a) Only 24% seedcane was required compared to conventional early planting thus saving high seed cost.

(b) An extra 39 days were available for growing an additional winter corp before planting sugarcane without marked loss of cane yields.

(c) Transplanting of germinated eye-buds may be used most effectively for gap filling in conventional early planted fields.

(d) Cent percent survival of the transplanted shoots with uniform growth at desired spacings may be obtained.

(e) High sucrose content in the TSEGB system was probably due to reduced mutual shading and effective utilization of sunshine.

The advantages of spaced transplanting with germinated eye-buds has also been reported elsewhere (pearson, 1950; Rao and Prashad. 1962 ; Humbert, 1968 and Russel. 1959).

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