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Effect of Age and Transplanting Technique on Survivality of Sugarcane Seedlings

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ABSTRACT

An experiment was conducted at Sugarcane Research & Training Institute (SRTI) to find out the optimum age and effective method of transplanting technique for sugarcane seedling survival. Seedlings of crosses I.24/76XC.I.96/80 and B.60-31X B.34/231 aged 21, 31, 41, 51 and 61 d were transplanted in cell-u-Pak using direct and hole techniques. Data were recorded on seedling survival at 7, 14 and 21 d after transplanting. It was observed that seedling survival in direct transplanting technique was significantly higher than hole technique. On the other hand, regression analyses showed the maximum survival of 34 and 48 d old seedlings after transplanting in I.24/76 X C.I. 96/80 and B.60-31 X B. 34/231 crosses respectively. It is suggested that 5-7 weeks old seedlings may be used for first transplanting using direct method.

INTRODUCTION

Mortality of sugarcane seedlings raised from true seeds is usually observed after transplanting in nursery bed where mortality ranges from 10—12%. Sometimes, the mortality rate increases to 20%, and even more depending on environmental conditions. But survivality of these seedlings is very important since more seedlings survived, greater is the scope of developing variability in the development of high yielding variety. During first transplanting, usually 30 d old seedlings are considered at SRTI. These seedlings are transplanted by finger pressure either by making hole or without hole. In the both techniques, it is necessary to remain soil in close contact with the root zone for establishment and growth of seedlings. However, optimum age of seedlings and effective method of transplanting for better establishment are not known. As such, an experiment was undertaken to find out optimum age and effective transplanting technique for survivality of sugarcane seedlings.

MATERIALS AND METHODS

Seedlings were raised using true seeds of the crosses I.24/76 X C.I. 96/80 (C_1) and B.60-31 X B.34/231 (C_2). Seedlings aged 21, 31, 41, 51, and 61 d old were used as experimental materials, and transplanted directly by finger pressure or making hole. In direct system, seedlings were pricked from trays and transplanted in media in cell—u—pak by finger pressure, while in hole system seedlings were placed in holes made in media in cell—u—pak by small stick, and then pressed by finger. From each group, 180 healthy seedlings per cross were transplanted singly in each method at SRTI in 1988. The seedlings were trasplanted in three replications with 60 seedlings in each replicate. Normal cultural practices were done. Data on seedling survival at 7, 14 and 21 d after first transplanting were recorded and analysed statistically.

RESULTS AND DISCUSSION

Analyses of variance showed that the seedling survival was significantly affected by treatment at 1% level (Table 1). The cross, age and method also affected the seedling survival individually at 1% level. Age with cross and method had been found to exhibit qudratic and linear affect on seedling survival at 1% level, respectively. The combined action of age, method and cross also affected the seedling survival significantly at 1% level. This significant affect might be due to the major contribution of age or interaction of age and method since the combined action of cross and method was statistically insignificant. Table 2 shows that the mean seedling survival of C_2 cross was significantly higher than that of C_1 cross. In case of transplanting technique, the seedling survival in direct system was statistically higher compared to hole system.

Regression analyses show that the percentage of seedling survival decreased with the increase of age in different techniques (Fig. 1). The regression lines revealed the significant negative trend in both the direct and hole transplanting techniques. But the later method showed a sharp fall in regression line compared to former technique. However, the seedling survival ranged from 93.87 to 96.42 and 88.65 to 97.07% in direct and hole transplanting techniques, respectively. The higher survivality of seedlings in direct transplanting compared to hole method indicates the superiority of the former over the later. This superiority may be due to close contact of seedlings roots with soil.

Survivality of seedlings increased with the increase of age upto a certain period and then decreased in both the crosses (Fig. 2). The quadratic regression analyses show maximum seedling survival at 34 and 48 d in C_1 and C_2 crosses respectively. It is also observed that seedling survival ranged from 79.85 to 99.31, and 92.19 to 99.20 in C_1 and C_2 crosses respectively. The minimum range of survivality of seedling of the cross C_2 compared to C_1 indicates the better tolerance of the former than the later in first transplanting. But lower survivality of seedling from cross C_1 in older age indicates that seedling of this cross are suitable for transplanting arround 34 d old. On the other hand, comparatively lower survivality of seedlings from cross C_2 in younger age reveals that seedlings of this cross are suitable for transplanting arround 48 d old. These differences in seedling survivality between C_1 and C_2 may be due to different genetic make-up of the seedlings. The result partially corroborated with the report of Breemen *et al* (1965) who used sugarcane seedlings of 6-8 weeks old in first transplanting. The result was also in partial agreement with the report of Dutt and Hussainy (1956) who used sugarcane seedlings of 45 d old in first transplanting. Rao (1965) used seedlings of 6 weeks old in first transplanting which also partially supports the present results.

Seedling survival in both the direct and hole transplanting technique showed the negative trend at different ages in C_1 cross while in C_2 cross it showed slightly positive trend (Fig. 3). It may be mentioned that the regression lines revealed a sharp fall in seedling survival in direct transplanting of C_1 cross.

From the results of the experiment, it is suggested that seedlings of 5-7 weeks old should be used in first transplanting to cover a wide range of survivality in different crosses. Direct technique is better than hole technique in seedling transplantation.

Table 1. Analyses of variance for seedling survival at different ages in two crosses and two methods.

Source	df	ss	mss	F
Replication	2	8.339	4.169	—
Treatment	19	2364.000	124.421	18.36**
Error	38	257.513	6.777	—
Total	59	2679.873	—	—
Non-additivity	1	7.504	7.504	1.11
Cross (C)	1	129.564	129.564	19.12**
Method (M)	1	78.505	78.505	11.58**
Age (A)	4	933.062	233.266	34.42**
A-Linear	1	225.007	225.007	33.20**
A-Quadratic	1	478.223	478.223	70.57**
A-Cubic	1	228.859	228.859	33.77**
A-Quartic	1	0.973	0.973	0.14
C x M	1	16.457	16.457	2.43
C x A	4	961.145	240.286	35.46**
C x A -Linear	1	636.998	636.998	94.00**
C x A -Quadratic	1	160.915	160.915	23.75**
C x A-Cubic	1	0.638	0.638	0.09
M x A	4	113.128	28.282	4.17**
M x A -Linear	1	64.880	64.880	9.57**
M x A -Quadratic	1	2.268	2.268	0.33
C x M x A	4	132.138	33.035	4.87**
C x M x A-Linear	1	61.589	61.589	9.09**
C x M x A -Quadratic	1	18.134	18.134	2.68

** Indicates significant at 1% level.

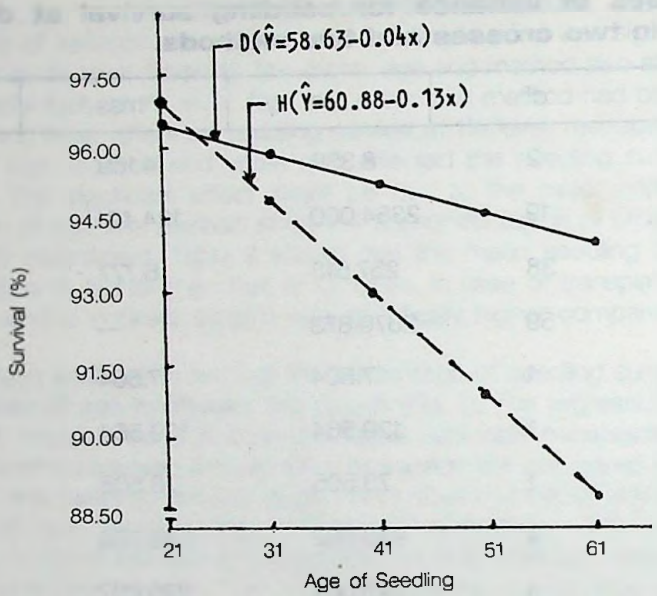

Figure 1. Seedling survival at different ages in direct and hole methods.

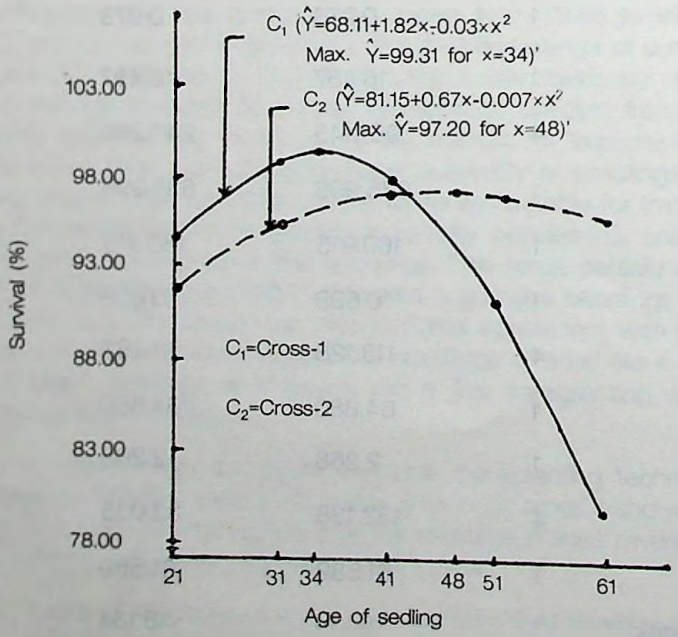

Figure 2. Seedling survival at different ages in two crosses.

Table 2. Mean survival of seedlings in two crosses and two methods.

Crosses	Mean	Methods	Mean
I.24/76 x C.I.96/80 (C_1)	92.54 b*	Direct	95.13 a
B.60-31 x B.34/231 (C_2)	95.45 a	Hole	92.87 b

* Figures with same letter do not differ significantly at 5% level as per DNMR test.

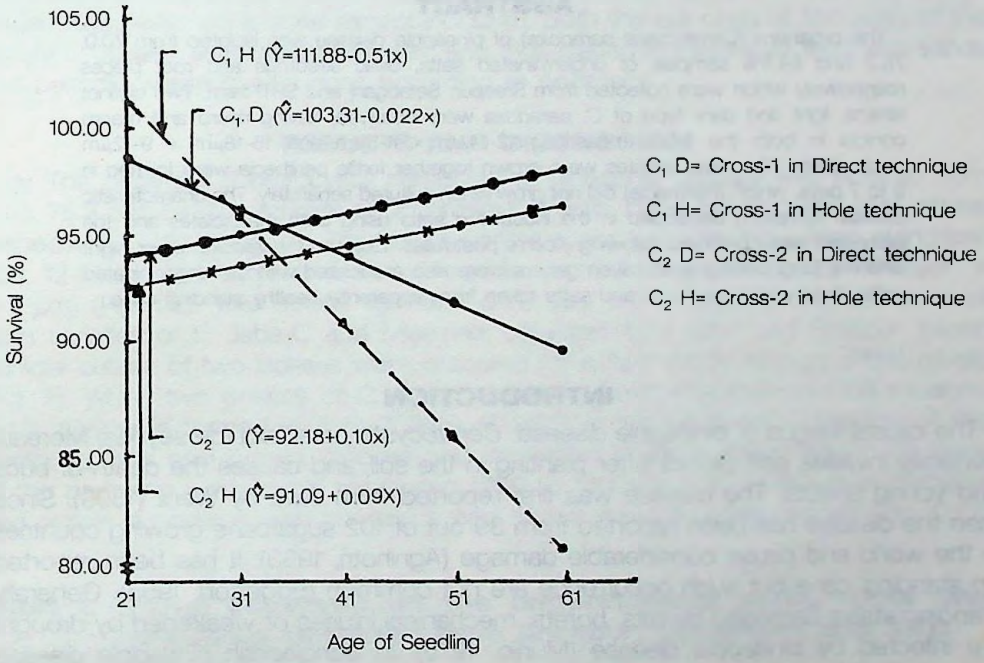

Figure 3. Seedling survival at different ages in two crosses and methods.

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