EFFECT OF PLANTING TECHNIQUES ON THE YIELD AND QUALITY OF AUTUMN SUGARCANE AT DIFFERENT PLANT POPULATIONS

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Studies pertaining to the effect of some planting techniques on the yield and quality of autumn sugarcane at different plant populations were conducted. Planting techniques comprised single rows 60 cm apart, double row strips 90 cm apart, triple row strips 90 cm apart, 4-row strips 90 cm apart, double row strips 120 cm apart, triple row strips 120 cm apart, and 4-row strips 120 cm apart. The results showed that among all the seven planting techniques, sugarcane planted using the pattern of 4-row strips 90 cm apart, produced the highest cane yield of 129.12 t ha^{-1} as against 126.90, 125.17, 120.42, 109.83, 108.72 and 98.27 t ha^{-1} for the cane planted in the pattern of triple row strips 90 cm apart, 4-row strips 120 cm apart, double row strips 90 cm apart, triple row strips 120 cm apart, single rows 60 cm apart and double row strips 120 cm apart, respectively. Sucrose contents in cane juice were not affected significantly by various planting techniques used in this study.

INTRODUCTION

As a result of high yield, the practice of planting the cane crop on rows with strip spacing is gaining interest particularly among the farmers, who always do the interculture with machinery and have programme of intercropping on the strips. The conventional method of planting sugarcane in 60 cm apart rows does not permit convenient and systematic intercropping and intercultural operations because of narrow row spacing. Moreover, it is observed that the major components of sugarcane agro-technology responsible for low cane yield at farmer fields are generally low plant population and conventional planting methods. It is, therefore, required to develop new planting techniques which besides facilitating interculture, may give rise to increased plant population $unit^{-1}$ area. The present study was initiated to evaluate the comparative productive efficiency of some planting techniques as against the conventional one in autumn planted cane at different plant populations under the irrigated conditions at Faisalabad.

MATERIALS AND METHODS

The proposed study was conducted at the University of Agriculture, Faisalabad on a sandy loam soil during 1986-87. Replicated four times, the experiment was laid out in Randomised Complete Block Design. Sugarcane planting techniques comprised planting in single rows 60 cm apart, double row strips 90 cm apart, triple row strips 90 cm apart, four row strips 90 cm apart, double row strips 120 cm apart, triple row strips 120 cm apart and four row strips 120 cm apart. Sugarcane variety BL-4 was used as a medium of trial. The crop was planted on September 15. Two-budded double sets were placed in each furrow end to end. All other cultural practices were kept normal and uniform for all the treatments. A basal dose of fertilizer at the rate of 150 kg nitro-

gen, 100 kg P_2O_5 and 100 kg K_2O was applied. Observations like number of millable canes unit^{-1} area, cane length, cane girth, weight cane^{-1}, cane yield, tops weight and sucrose contents in cane juice were recorded using standard procedures. Sucrose contents in the juice were determined by Horne's dry lead acetate method of sugar analysis. The data collected were analysed statistically by using Fishers' analysis of variance technique and Duncan's New Multiple Range test at 5% probability level was applied to compare the differences among treatment means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Table 1 indicates that there were highly significant differences in the weight of millable canes among the various planting patterns under study. The highest number of millable canes (14.13 m^{-2}) was recorded in the plot planted in the pattern of 90 cm apart 4-row strips as against the lowest (8.18 m^{-2}) in plots planted in the pattern of 120 cm apart double row strips. Higher number of canes unit^{-1} area in case of 4-row strips 90 cm apart was attributed to higher initial seed rate ha^{-1}. Almost similar results were reported by Fasihi *et al.* (1974) and Akbar (1984).

It is clear from Table 1 that there were marked differences in the length of canes among the different planting techniques under study. Sugarcane planted in the pattern of 90 cm apart triple row strips produced longer canes (2.67 m) than that planted in 120 cm apart double row strips (2.48 m). However, the differences among all the planting patterns were found to be non-significant. The non-significant differences among all the planting techniques were probably attributed to almost uniform growth rate of the plants towards height in each treatment. These findings are in

Table 1. Effect of planting techniques on the yield and quality of autumn sugarcane at different plant populations

Planting techniques	Number of millable canes ha^{-1} (2)	Cane length (m) (1)	Cane girth (cm) (1)	Weight cane (kg) (2)	Stripped cane yield (t ha^{-1}) (1)	Tops weight (1)	Cane top ratio (2)	Sucrose contents (%)
Single rows 60 cm apart	107647.75 c	2.50 b	2.72 a	1.00 c	108.72 c	12.40 bc	8.94 b	1.05^{NS}
Double row strips 90 cm apart	111545.25 c	2.50 b	2.72	1.07 bc	120.42 b	14.2 ab	8.83 b	1.16
Triple row strips 90 cm apart	129177.25 b	2.67 a	2.65 a	1.03 bc	126.90 ab	16.27 a	7.91 b	1.22
Four row strips 90 cm apart	149342.50 a	1.63 a	2.48 b	1.00 c	129.12 a	15.26 ab	8.73 b	1.11
Double row strips 120 cm apart	81805.25 e	2.48 b	2.76 a	1.20 a	98.27 d	10.07 c	9.72 ab	1.05
Triple row strips 120 cm apart	92849.00 a	2.59 ab	2.69 a	1.10 b	109.83 c	11.47 c	9.97 ab	1.11
Four row strips 120 cm apart	122718.50 b	2.55 ab	2.77 a	1.02 bc	125.17 ab	10.42 c	12.43 a	1.19

NS = Non-significant.
(1) = Means followed by the same letter do not differ significantly at 5% probability level (DMRT).

agreement with those reported by Faqeer (1986).

There were significant differences in the thickness of cane among various planting techniques. Sugarcane planted in the pattern of 90 cm apart 4-row strips produced significantly thinner canes (2.48 cm) than the rest of the planting patterns which were at par with one another and recorded an average thickness of 2.65 to 2.77 cm (Table 1). The minimum cane thickness of 2.45 cm for plots planted in the pattern of 4-row strips 90 cm apart was due to relatively congested environment prevailing with strips because of closer spacing. The findings of Kanwar and Sharma (1974) are quite in agreement with these results.

The perusal of Table 1 further indicates that there were highly significant differences among the various planting treatments under study with regard to weight cane^{-1}. Sugarcane planted in the pattern of double row strips 120 cm apart recorded significantly higher weight of 1.20 kg cane^{-1} as against 1.0, 1.0, 1.02, 1.03, 1.07 and 1.10 kg for that planted in the pattern of single rows 60 cm apart, 4-row strips 90 cm apart, 4-row strips 120 cm apart, triple row strips 90 cm apart, double row strips 90 cm apart and triple row strips 120 cm apart, respectively. Almost similar results were reported by Urgal (1966).

The data given in Table 1 show highly significant differences in cane yield among various planting techniques. Sugarcane planted in the pattern of 4-row strips 90 cm apart on account of greater number of millable canes unit^{-1} area gave significantly higher cane yield of 129.12 t ha^{-1} and was closely followed by that planted in the pattern of triple row strips 90 cm apart recording on average 126.90 t ha^{-1} as against the lowest of 98.27 t ha^{-1} in case of double row strips 120 cm apart. The results further led to the conclusion that the pattern of planting sugarcane in 90 cm apart double, triple and 4-row strips yielded higher than the pattern of 120 cm apart double and triple row strips. However, sugarcane planting in the pattern of 120 cm apart 4-row strips appeared to be equally good when compared with 90 cm apart triple and 4-row strips planting systems. Urgal (1966) and Dixit and Saraj (1971) also observed that cane yield varies with change in planting pattern.

The maximum top weight of 16.27 t ha^{-1} was recorded in plots planted in the pattern of triple row strips 90 cm apart as against the minimum of 10.07 t ha^{-1} in case of sugarcane planted in the pattern of double row strips 120 cm apart, while the rest of the planting systems showed intermediate weights. The differences may be attributed to variable number of millable canes ha^{-1} in different treatments. The results further led to the conclusion that sugarcane planted in the fashion of 90 cm apart strips utilised the production resources more efficiently towards cane development than that planted in 120 cm apart strips because of relatively higher plant population unit^{-1} area.

Table 1 further reveals that cane:top ratio varied significantly with various planting treatments under study. Sugarcane planted in the pattern of 4-row strips 120 cm apart recorded the highest cane: top ratio of 12.43 as against 7.91, 8.73, 8.83, 8.94, 9.72 and 9.97 for the triple strips 90 cm apart, 4-row strips 90 cm apart, double row strips 90 cm apart, single rows 60 cm apart, double row strips 120 cm and triple row strips 120 cm apart, respectively. The data pertaining to sucrose contents in cane planted in different plant populations given in Table 1 indicate that sucrose contents in cane juice were not affected significantly which on an average varied from 13.47 to 15.28%.

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