POSTER SUMMARY

EFFECT OF PLANT DENSITY ON SEEDCANE YIELD OF TISSUE CULTURED CANE PLANTLETS

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Abstract

Tissue cultured plantlets of two sugarcane (*Saccharum* spp.) cultivars were planted at three interrow spacing of 0.5 m, 1.0 m and 1.5 m in a randomised complete block design, replicated four times in Mtwapa (Kenya). Measurements of agronomic parameters that included brix, girth, stalk height and millable stalk population were recorded. Data were subjected to analysis of variance, and preliminary results show that for variety KEN 82-808 highest mean values in terms of attributes measured were realised at an interrow spacing of 1.5 m. For variety Phil 54-60, most attributes were realised at an interrow spacing of 1.0 m.

Key words: Saccharum spp., seedcane, tissue culture, row spacing, variety, Kenya

Introduction

Sugarcane breeding programmes around the world include as a component of their research one or more aspects of cell and tissue culturing. While *in vitro* manipulations cannot replace conventional breeding practices, they are valuable complements to breeding programmes. Numerous reports on the potential benefits of tissue culture techniques have been published (e.g. Lyrene, 1976; Heinz *et al*., 1977; Nickell, 1977; Liu, 1983,1984). Several reviews have sought to summarise progress with sugarcane at some particular juncture (Heinz *et al*., 1977; Liu,1984). The tissue culture method has been used with success to eliminate viruses in progeny from infected donors. Thus, apical meristems were used by Hendre *et al*. (1983) as well as Coleman (1970) to obtain virus-free plants, and sugarcane was included in the meristem culture procedures proposed by Mori *et al*. (1977).

Sugarcane (*Saccharum* spp.) propagation materials are conventionally bulked using setts. However, this method is slow and requires vast land areas. A rapid seedcane multiplication technique using tissue cultured sugarcane plantlets was introduced at the sugarcane research centers at Kibos and Mtwapa in Kenya. This technique was expected to produce clean and healthy planting materials for the sugar industry. However, little information on the agronomic requirements for the propagation of tissue cultured sugarcane plantlets in the field is available.

The interrow spacing usual for the commercial crop is preferred by most stations for growing sugarcane seedlings in the field nursery. Seedlings are thus grown at the same row spacing at which varieties selected from them would be grown (Anon, 1981). Although interrow spacings at the various stations ranged from 0.5 m to 3 m, most of the stations use spacing of between 1.25 m and 1.75 m. The minimum distance required depends on growth rate and age of seedlings at selection. Distance between seedlings on the row varies from 25 cm to 90 cm.

Intrarow spacing is optimised by experimentation and/or experience at each location where seedlings are grown.

The aims of this experiment were to investigate the effect of plant density on seedcane yields when using tissue cultured plantlets rather than convention setts at planting, and to determine the important agronomic traits of plantlets cultured from the commercial varieties Phil 54-60 and KEN 82-808.

Materials and Methods

Tissue cultured seedlings of varieties Phil 54-60 and KEN 82-808 were planted at three different interrow spacing of 0.5 m, 1.0 m, and 1.5 m. The distance between plants within the row was the same at 30 cm, giving 30 plants per 9 m row. The experiment was planted at Mtwapa Sugarcane Breeding Center in Kenya, using the randomised complete block design with four replicates. Calcium Ammonium Nitrate (CAN) was applied as a top-dressing at the rate of 10 g/plant one month after planting. The experiment was weeded thrice. At eight months, data on various agronomic parameters were recorded. A sample of 10 stalks randomly selected was used to measure brix, stalk length and diameter. The data were subjected to analysis of variance and means separated using the LSD test.

Results and Discussion

Analysis of variance revealed significant differences between the varieties in brix and stalk height in all the various plant densities. However, no significant differences were observed in the various plant populations in all parameters except internodes/stalk. In variety Phil 54-60, the number of internodes/stalk decreased significantly when plant density increased beyond 300 000 plants/ha. However, this high plant density also achieved the highest number of millable stalks. In KEN 82-808, brix was significantly reduced at the highest population density. Significant differences were also observed in number of internodes/stalk and number of millable stalks in this variety.

Table 1. Estimated cane yield in tissue cultured sugarcane at 12 months.

Variety	Plant density	Row spacing	Population in 54 m^2	Weight/stalk (kg)	Yield (t/ha)
Phil 54-60	550 000	0.5 m	332	0.6	36.9
	330 000	1.0 m	323	0.7	41.7
	250 000	1.5 m	281	0.6	31.2
KEN 82-808	550 000	0.5 m	576	0.6	64.0
	300 000	1.0 m	420	0.7	54.4
	250 000	1.5 m	451	0.8	66.8

Conclusions and Recommendations

Considering variety KEN 82-808 for all the variables analysed, i.e brix, girth, height, internodes and stalk population, the highest mean values were obtained at an interrow spacing of 1.5 m, whereas an iterrow spacing of 0.5 m recorded the lowest mean values.

However, with Phil 54-60, the variables analysis showed that an interrow spacing of 0.1 m gave the highest brix, height and internode values, with a spacing of 0.5 m between the rows registering the highest millable stalk population.

In conclusion, under the conditions of the experiment, variety KEN 82-808 should be planted at an interrow spacing of 1.5 m. Variety Phil 54-60 should be planted at an interrow spacing of 0.1 m. Note that at present there is no standardised (control) interrow spacing for sugarcane seedlings.

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