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# Influence of Ratooning on Yield in Sugarcane

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## ABSTRACT

Effects of ratooning on yield in sugarcane were investigated using two sugarcane varieties. Ratooning was found uneconomical in terms of yield and sucrose content at the fifth cycle. By the end of the 5th ratoon crop, 75.3 and 78.9% yield losses were recorded for varieties Co 1001 and Co 957 respectively. There was a continuous decrease in yield in ratoon crop cpmpared to plant cane. There were no significant varietal differences in yield in the plant, 2nd and 5th ratoon crops. Variety Co 1001 gave the highest yield at each crop. Significant differences in respect of dry matter were obtained between varieties when combined analyses were carried out. Sucrose % cane decreased with the ratoon croppings and conversely fibre % cane increased with each ratoon cropping. The implication of the findings for the sugar industry and farmers are discussed.

## INTRODUCTION

Ratooning has been progressively used in many sugarcane growing countries of the world as a device to cut down cost of production (Humbert, 1968). The growing of solitary plant cane is a costly farming since one crop must bear all the cost of seeds, land preparations, and planting. It is therefore customery to grow a plant crop, and some ratoon crops before ploughing out the stubbles. The cost of seeds, land preparation, and planting are in this way spread over the ratoon crops, and cost of production minimised accordingly (King, *et al*, 1965).

Sugarcane, being a perennial crop is able to regenerate shoots from stubbles producing successive crops known as ratoon crop. However, the number of ratoon crops that can profitably be grown varies depending on local environmental conditions and practices. In Nigeria, the number of ratoon crops which can profitably has not been ascertained. The experiment reported here was, therefore an attempt to determine the ratooning potential of two sugarcane varieties (Co 1001,Co. 957) in Nigeria.

## MATERIALS AND METHODS

The trial was carried out on a plant and five ratoon crops beginning in the 1979-80 cropping season which served as the plant crop and five subsequent ratoons extending from 1980-81 to 1984-85 cropping seasons. The trial was laid out in a randomised block design with two sugarcane varieties (Co 1001 and Co 957) replicated four times on two soil series (pH 6.3, total N 0.10%, organic matter content 1.47% and cation exchange capacity 3.11 meq/100 g soil) at the experimental plots of National Cereals Research Institute at Moor Plantation, Ibadan. The plot size was 6×6 m with an interrow spacing of 1.5m. Planting was done on 16th April, 1979.

Land was prepared with one ploughing and two rotavations. Fertilizers were applied as basal dressings at the rate of 125 kg/ha ammonium sulphate, and 56 kg/ha each of single superphosphate and muriate of potash. The final germination data were recorded at 3 weeks after planting, while other agronomic data (number of nodes/cane, weight/cane, stalk height, millable cane number, and yield) were recorded for each plot at harvest, 12 months after planting. Yield loss due to ratooning was expressed as percentage difference between the plant crop and the ratoon crops.

Six months after planting and at subsequent sampling dates (9 and 12 months), five cane stalks were randomly selected from each plot and cut at ground level. Each set of the five stalks was ground in a Jeffco-cutter grinder and 50g samples of the resultant "brei" (ground cane) were put into a jar with 100 ml alcohol. The alcoholic extracts were later analysed in the laboratory for sucrose using the Berlin Institute method (1964). The residue remaining after extraction (the fibre) was expressed as a percentage of fresh weight.

Similar data were recorded for the ratoon crops. All the operations of ratoon crop were plant crop except that there were no ploughing or rotavations, and fertilizers were applied around the ratoon stubbles.

## RESULTS AND DISCUSSION

Table 1 shows the yield and components of dry matter in the plant and ratoon crops. Significant differences ($p = 0.05$) in yield were obtained between the plant crops and the subsequent five ratoon crops when combined data analyses were carried out. Varietal differences in yield were also obtained throughout the six crops. The trend in yield was a gradual decrease in the first ratoon crop when copared with plant crop followed by a sharp decrease in the 4th and 5th ratoon crops. During each crop, however, only in the 1st, 3rd and 4th ratoon crops were there significant varietal differences in yield. Except in the 5th ratoon crop, Co 1001 consistently gave the highest yield throughout the five ratoon crops and the plant crop. As for the components of dry matter (sucrose and fibre), significant differences were obtained between varieties across the crops and between plant, and ratoon crops ($p= 0.05$). Sucrose % cane decreased with each ratoon cropping except in the plant crop while fibre % cane increased with each ratoon croping (Table 1).

The effect of ratoon cropping on other agronomic characters is shown on Table 2. These characters have been shown to have direct influence on yield (Oworu, 1978). Except for the millable cane number in the plant crop, 4th and 5th ratoon crops, and stalk height in the 2nd ratoon crop, there were no significant differences between varieties in each crop for these characters. However, when the combined data were statistically analysed, significant differences between the plant and ratoon crops for all the characters were obtained. Only in the millable cane number and weight/cane were there significant varietal differences across the crops and these were reflected in the yield values in each crop.

The results suggest that ratoon cropping was uneconomical in terms of yield at the 5th cycle. By the end of the 5th ratoon crop, 75.3% and 78.9% yield losses were

## Table 1. Effect of ratooning on yield and components of dry matter.

| Variety | TCH | | | | | | sucrose % cane | | | | | | Fibre % cane | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P* | 1R | 2R | 3R | 4R | 5R | P | 1R | 2R | 3R | 4R | 5R | P | 1R | 2R | 3R | 4R | 5R |
| Co 1001 | 118.1 | 113.9 | 95.8 | 82.1 | 52.5 | 29.1 | 17.3 | 21.5 | 18.5 | 16.2 | 14.8 | 12.6 | 13.6 | 14.8 | 15.6 | 16.4 | 17.0 | 17.4 |
| Co 957 | 116.0 | 93.4 | 81.1 | 71.8 | 49.2 | 24.4 | 18.9 | 21.8 | 19.2 | 17.8 | 13.6 | 10.8 | 15.1 | 15.5 | 16.8 | 17.1 | 17.6 | 18.9 |
| LSD (P = 0.05) | | | | | | | | | | | | | | | | | | |
| Between varieties in each crop | NS | 9.1 | NS | 5.6 | 1.8 | NS | NS | NS | NS | NS | 0.5 | 0.7 | NS | NS | NS | NS | NS | NS |
| Between varieties across the crops | | | 15.9 | | | | | | 2.8 | | | | | | | 3.5 | | |
| Between plant and ratoon crops | | | 22.8 | | | | | | 4.6 | | | | | | | 5.1 | | |

*P - Plant crop

1R - 1st ratoon crop 4R - 4th ratoon crop
2R - 2nd ratoon crop 5R - 5th ratoon crop
3R - 3rd ratoon crop NS - Not significant.

## Table 2. Effect of ratooning on some agronomic characters and yield.

| Variety | No. of Joints/cane | | | | | | Wt/cane (kg) | | | | | | No. of millable cane (1000/ha) | | | | | | Stalk height (m) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P* | 1R | 2R | 3R | 4R | 5R | P | 1R | 2R | 3R | 4R | 5R | P | 1R | 2R | 3R | 4R | 5R | P | 1R | 2R | 3R | 4R | 5R |
| Co 1001 | 18 | 17 | 13 | 14 | 12 | 10 | 1.10 | 0.86 | 0.81 | 0.68 | 0.57 | 0.51 | 77.8 | 75.1 | 63.5 | 60.5 | 57.2 | 49.5 | 2.1 | 2.0 | 1.8 | 1.3 | 1.0 | 0.8 |
| Co 957 | 17 | 16 | 12 | 14 | 12 | 9 | 1.13 | 0.92 | 0.75 | 0.71 | 0.55 | 0.46 | 70.2 | 68.5 | 60.1 | 59.2 | 51.4 | 45.2 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.0 |
| LSD (p = 0.05) | | | | | | | | | | | | | | | | | | | | | | | | |
| Between varieties in each crop | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | 3.0 | NS | NS | NS | 2.5 | 1.8 | NS | NS | 0.4 | NS | NS | NS |
| Between varieties Across the crops. | | | NS | | | | | | NS | | | | | | 1.9 | | | | | | 0.2 | | | |
| Between plant and ratoon crops | | | 2.9 | | | | | | 0.25 | | | | | | 2.1 | | | | | | 0.4 | | | |

P* - Plant crop

1R - 1st ratoon crop 4R - 4th ratoon crop
2R - 2nd ratoon crop 5R - 5th ratoon crop
3R - 3rd ratoon crop NS - Not significant.

**Table 3. Yield loss (%) due to ratooning of sugarcane.**

| Variety | 1R | 2R | 3R | 4R | 5R |
|---|---|---|---|---|---|
| Co 1001 | 3.5 | 18.8 | 30.5 | 55.5 | 75.3 |
| Co 957 | 19.4 | 30.1 | 38.1 | 57.6 | 78.9 |

1R - 1st ratoon crop
2R - 2nd " "
3R - 3rd " "
4R - 4th " "
5R - 5th " "

recorded for varieties Co 1001 and Co 957 respectively (Table 3). The sharp decline in yield from the 2nd to the 4th ratoon crops must have contributed to these losses. Using the percent yield loss as an index for ratoon performance, it is suggested that farmers and sugar estates should grow sugarcane up to the 4th ratoon cycle before stubble are ploughed in for fresh plant cane.

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**REFERENCES**

Humbert, R.P. 1968. The growing of sugarcane. Elsevier Publishing Company. New York. 779 p.

International Commission for uniform methods of sugar analysis (ICUMSA). ed. Dr. H.C.S. de Whalley. Elsevier Sci. Publ. Co. New York. 251 p.

King, N.H. ; Mungomery, R.W. and Hughes, C.G. 1965. Manual of suragcane growing. Elsevier Publishing Company. New York. 375 p.

Oworu, O.O. 1978. Preliminary evaluation of the agronomic potentials of some Nigerian local sugarcane clones. Proc. International Symposium on Sugarcane Research and Production. pp. 81-91.