

Effect of mosaic disease on yield and sucrose content of sugarcane

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ABSTRACT

The variety ISD-16 was tested for yield and sugar content with Mosaic free and Mosaic infected seed materials. The results obtained showed insignificant differences either in yield or in sugar content but with slight tendency of decline in sucrose recovery. This particular variety, therefore, appeared to be fairly tolerant to this strain (green type) of mosaic under Bangladesh conditions of sugarcane.

INTRODUCTION

Mosaic disease of sugarcane ranks as one of the major cane diseases of the world. The disease is caused by sugarcane mosaic virus of which several strains, producing differing symptoms have been recognized (Abbott and Tippet, 1966; Abbott and Stoke, 1966; Koike, 1967). In 1964 Stelb and Forbes stated that mosaic was the most serious disease confronting the Louisiana Sugar Industry. The epiphytotic which occurred in Puerto Rico, beginning about 1916 was responsible for bringing mosaic disease to the attention of the Sugar World (Stevenson, 1917). The losses cause by the disease vary greatly, the extent depending upon the susceptibility and tolerance of the varieties, the strains of the virus and to some extent on weather and other environmental conditions (Martin, *et. al.*, 1961). Summers (1943) measured reductions in the yield of Co. 288 variety varying from 2.5 to 33.4 percent with different strains and Co. 290 from 6 to 14.8 percent in plant cane and first ratoon crops. Gonzales and Adsuar (1953) reported 29 percent reduction in plant cane and 32 percent in ratoon. But as pointed out by Chona (1944), even a 10 percent infection involving only one percent reduction in yield could have a profound influence on sugar production in India. In tests in Louisiana with infected and healthy seed pieces of very susceptible varieties, it was found that the green or common mosaic decreased yield from 8 to 15 percent. But there was no decrease on the sucrose content of the juice.

It is to be mentioned that in Bangladesh the yields of sugarcane are very low and most of the commercial varieties are seen infested with mosaic disease (green type). Hence, it is postulated that mosaic disease may be one of the many reasons for the low yields. Accordingly in December 1979, a trial was conducted at Sugarcane Research Institute, Ishurdi with the variety ISD-16 (I-112/67) to detect the differences in yield and sugar content in infected and healthy sugarcane.

MATERIALS AND METHODS

Collection of Materials :

Mosaic affected setts and mosaic free setts of variety ISD-16 were collected from the Pathology plots at the Sugarcane Research Institute, Ishurdi by selecting, respectively, mother plants, having symptoms on leaves and mother plants without symptoms.

Methods of Plantation :

An acre of land was selected and plantation was done in four replications. Same number of infected and healthy setts were planted in each of the four replicated plots. The plot size was 117.5' X 40'. Three-eye setts were planted, having first been treated with Aretone-6. The soil was treated with Heptachlor to control soil insects. Row to Row spacing was 3 1/2'. The plots were fertilized with NPK at the rate of 3:2:2. A second top dressing was given after tillering.

Yield and Sugar Analysis :

Sugar analysis was started 10 months after plantation and was performed by the Chemical Division at a monthly interval from October, 1980 until March, 1981. The weight of cane in each plot was taken at harvest in March, 1981.

RESULTS AND DISCUSSION

The germinated plants arising from the infected setts and the healthy setts were also found infected and healthy respectively. But the infected and the healthy seeds (setts) gave equal percentages of germination which shows that infection by mosaic can not deteriorate the germination potentiality. The weight of both mosaic infected and mosaic free canes are shown in table 1.

Table 1. Effect of mosaic on weight of cane and sugar content.

Treatment	Mean weight of cane (lbs)		Mean sugar recovery %	
Mosaic free	5669.47	N. S.*	10.54	N.S.
Mosaic Infected	5401.29		10.03	

*N.S.—indicates no significant difference between the men as per t-test.

From the above yield data it is clear that difference in yields of mosaic free and mosaic infected canes of the variety ISD-16 is not significant. Results of some other workers are contrary to these experimental results, the variations may be attributed to the following reasons; (i) this strain of mosaic may have no effect on this variety ; (ii) since it is known that the effect of mosaic depends on susceptibility to infection and tolerance of the variety, the variety being tested may be tolerant (Breaux and Koike 1977). The recovery percentages of sugar content of the infected and the healthy canes are enumerated in table 1.

In respect of sugar content statistical analysis showed that although the 0.5% difference in the pair of treatments was not significant, there was a tendency of decline in overall sugar content. The results of this experiment have the confirmity with the experimental results obtained by Chona (1944).

Thus the experiment has exhibited that mosaic infection in sugarcane variety ISD-16 has caused no significant drop in yield or in sugar content. This is not surprising since similar results have been found in other countries (Rands and Summers, 1932 in Louisiana). It was also reported in an earlier investigation in Bangladesh that the green type of mosaic did not affect the crop very much (Ahmed *et. al.*, 1979). However Summers (1943) later recorded yield losses upto 33%. Other authors (Gonzales and Adsuar 1953) have also shown similar losses.

Mosaic disease is very wide spread in Bangladesh. Chona (1944) in India pointed out that even if the percentage loss caused by the disease is small, the total loss in sugar production could be enormous. Under certain environmental conditions a tolerant variety may also become susceptible or a less virulent strain may become virulent and cause substantial loss in yield. Hence further trials with other Bangladesh varieties and with the more virulent yellow strain of the virus are necessary, which are in progress at Sugarcane Research Institute, Ishurdi, Pabna.

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