

EFFECT OF HOT WATER TREATMENT ON THE GERMINATION OF SOME EAST AFRICAN SUGARCANE VARIETIES

By G. I. B. ONGOMA

National Sugar Research Centre Kibos, Kisumu, Kenya

Abstract

The effect of hot water treatment (HWT) at 50°C for 2,5 h on the germination of 3-budded setts of two commercial and five pre-release varieties was investigated. The results show that one of the commercial varieties, Co331, and a pre-release variety (EAK 69-47), reacted negatively to HWT in terms of percentage germination and tillering capacity. The reaction of Co331 was particularly marked. Differences in growth vigour between the untreated checks and both positively and negatively reacting varieties diminished with time. EAK 70-153 responded to HWT, which increased its germination by 35% compared with a 13% reduction in Co331.

Introduction

Pre-planting heat therapy is a routine exercise in most sugarcane growing countries, the main purpose of which is to control ratoon stunting disease (RSD). The recommended hot water treatment (HWT) for RSD in Kenya (50°C for 2,5 h) is also a means of eliminating latent smut in seedcane (Gupta, 1979, James, 1972, Srinivasan, 1971). Sugarcane smut (*Ustilago scitaminea*) and RSD (*Clavibacter xyli* subsp *xyli*) are among the diseases of economic importance in Kenya. A rapid decline in sugarcane yields with ratooning may indicate the presence of RSD. This phenomenon was first reported in Kenya by Early (1975). As a control measure against RSD, HWT was recommended (Bungey, 1972, Early, 1975).

In an experiment conducted at the National Sugar Research Centre Kibos in 1972, it was established that HWT at 50°C for 2,5 h enhanced germination in some varieties whereas it suppressed germination in others.

The use of HWT on seedcane before planting as a means of controlling RSD and smut has been widely reported (James, 1972, Srinivasan, 1971 and Thomson, 1970). Besides this primary objective, it has been observed that HWT of seedcane enhances germination and increases yield (Gupta, 1979).

The object of the investigation reported here was to determine the reactions of promising unreleased varieties to HWT. Two commercial varieties, the reactions of which have already been studied, were included in the experiment.

Material and methods

Three-budded setts of commercial varieties Co421 and Co331 and three promising lines, EAK 69-47, EAK 70-97 and EAK 70-153, were taken from eleven month old cane. The setts were subjected to HWT at 50°C for 2,5 h and planted immediately in a trial of split-plot design in which control (no HWT) and hot water treated plots were replicated four times.

The following were assessed: per cent buds germinated and number of tillers produced. Germination counts started 17 days after planting and continued for three weeks at weekly intervals. Tiller count records were started two months after planting and continued for 10 weeks at two-weekly intervals.

Results and discussion

The final germination counts at one month expressed in percentages are shown in Figure 1. Variety EAK 70-153 had a marked positive response to HWT, with a 35% increase in buds germinated. There was an approximate 10% increase in germination in varieties EAK 69-40 and EAK 69-41. HWT had little effect on the germination of Co421, EAK 69-47 and EAK 70/97. The germination of variety Co331 was reduced by 13% (Figure 1).

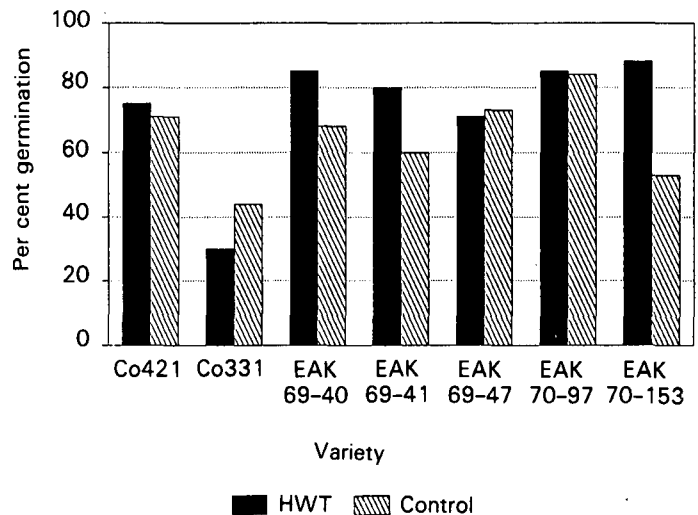


FIGURE 1 Effect of HWT (2,5 h at 50°C) on germination one month after treatment.

Growth of the treated setts of the varieties that reacted positively to HWT was generally better and more rapid than that of the control setts. A remarkable difference in plant height between the two treatments was observed initially, although these differences did not last more than three months.

The growth of Co331 in the control plots was faster than that in the HWT treated plots, although the differences in growth between the two treatments were not as marked as those in varieties which reacted positively to HWT.

Figure 2 shows the cumulative mean tiller counts for all varieties. For the varieties that reacted positively to HWT, there were generally more tillers in the treated than the untreated plots, whereas the reverse was the case for Co331. Pre-release variety EAK70-153 and commercial variety Co331 recorded the greatest differences in tiller counts, an increase of 17,2% and a decrease of 37,2% respectively.

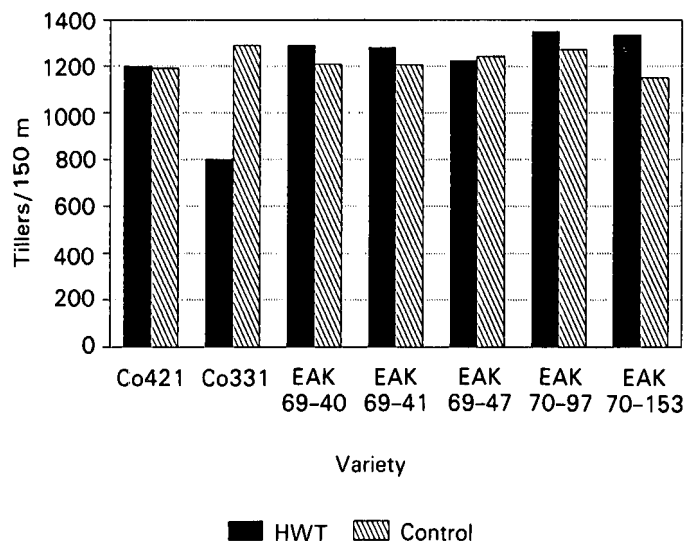


FIGURE 2 Effect of HWT (2,5 h at 50°C) on tiller numbers at 20 weeks after treatment.

Acknowledgements

The author is indebted to the director of the Kenya Agricultural Research Institute (KARI), Dr C Nderitu, and the director of National Sugar Research Centre Kibos, Dr MO Osoro, for permission to present this paper at the South African Sugar Technologists' Congress.

REFERENCES

- Anon. (1972). Ministry of Agriculture, Kenya. *A Rep.* 284-285.
 Bungey, CK (1972). Sugarcane diseases in Kenya. *Sugarcane Pathl Newsl* 9: 18.
 Early, MP (1975). Ratoon stunting disease of sugarcane in Kenya. *East Afr Agric and For J* 41: 106-109.
 Gupta, MR (1979). Control of smut disease of sugarcane through hot water treatment. *Int Sug J* 81: 149.
 James, GL (1972). Hot water treatment and smut. *Sugarcane Pathl Newsl* 6: 11-12.
 Srinivasan, NV (1971). Hot water treatment for disease control. *Sugarcane Pathl Newsl* 6: 46.
 Thomson, GM (1970). Smut disease and hot water treatment. *Sugarcane Pathl Newsl* 5: 48.