

ABSTRACT

The effect of Polaris, GA and Ethrel on growth, photosynthesis, translocation and sugar storage in four month old plants of two sugarcane clones was studied.

GA dramatically increased stem elongation and stem and shoot fresh weight whereas Polaris inhibited stem elongation and reduced shoot growth. Ethrel decreased leaf fresh weight, but increased stem fresh weight and stimulated pronounced side shooting.

The rate of CO_2 fixation of the top most fully expanded leaf was increased by GA in both varieties at one and three weeks after treatment whereas it was reduced by Polaris to varying degrees depending on variety, rate of chemical application and the time interval between treatment and harvest.

Translocation was increased by GA and Polaris in both varieties up to four weeks after treatment.

Acid invertase activity was decreased by Polaris and increased by GA and Ethrel.

Quality (sucrose per cent cane) was increased by Polaris which resulted in an increase in sucrose per stalk though stem fresh weight was reduced. In contrast GA and Ethrel decreased the sucrose per cent cane but GA tended to increase the sucrose per stalk by increasing the stem fresh weight. This indicates that the results of chemical ripening should be assessed in terms of both sucrose per cent cane and sucrose per stalk.

It is suggested that the ripening activity of Polaris results from a combination of growth inhibition, increased translocation and a reduction

in acid invertase activity. Since GA increased the total sucrose per stalk it can also be considered as a ripener but its mode of action involves an increase in the storage capacity of the cane which is accompanied by an increase in photosynthetic rate. Ethrel stimulated side shooting which under field conditions will adversely affect the quality if harvest was postponed beyond a certain period.

The results are consistent with the view that chemical ripening may involve sugar synthesis and transport processes in addition to the growth regulatory effects.

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