

# ASSESSMENT OF THE FEASIBILITY OF USING STALK DIAMETER FLUCTUATIONS FOR AUTOMATED CENTRE PIVOT IRRIGATION SCHEDULING OF SUGARCANE IN ZIMBABWE

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## Abstract

The feasibility of a partial automatic irrigation scheduling technique for sugarcane was developed and tested against three independent methods namely: (i) the growers' current irrigation practice, based on class A-pan measurements, (ii) a climate-based approach using the ZIMsched model irrigation charts and (iii) the modified class A-pan method, using site-specific pan coefficients. The automated scheduling treatment was fitted with a relay to trigger irrigation when soil moisture reached a predetermined threshold. The threshold was determined from analysing diurnal evolution (DE) and maximum daily shrinkage (MDS) of cane stalk measurements using dendrometers. Soil moisture depletion was measured with moisture probes placed in the root zone of the cane and connected to a data logger. Treatment effects were assessed based on the water applied, power used, cane height, and yield. For the three-month period of observation from 16 December 2006 to 18 March 2007, the automated method used 9.2% less water than the growers' current class A-pan irrigation schedule, while the ZIMsched charts and the modified class A-pan used 22.4% and 10.4% more water than the control, respectively. Automatic scheduling did not reduce the cane yield, while savings on water and power were made. Irrigation efficiency was improved significantly by reducing deep percolation. Dendrometers showed great potential as a tool that can be used for stress monitoring in sugarcane plants, and hence irrigation control.