

Prediction of percentage of yield reduction due to water stress in Sugar cane using yield response factor

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Abstract

Sugar cane is cultivated mainly in the dry zone of Sri Lanka on reddish brown earth soil with rainfall. In rainfed cultivation, planting is done in the rainy season, either during October – November (*Maha*) or during March – April (*Yala*) to be harvested after 12 months. Due to erratic rainfall, the crop undergoes moisture stress in different growth period, which affects the yield of the sugar cane plant. An investigation was undertaken to find the percentage of yield reduction due to water stress. The potential changes in soil moisture storage was estimated using daily rainfall data of 17 rainfall stations from 1982 – 1996 and daily pan evaporation for a period of 1990 – 1996 of Pelwatte sugar cane plantation. The potential change of soil moisture storage was correlated with actual soil moisture storage with the use of specified soil moisture content (root constant value). Then actual evapotranspiration (ET) was calculated using the value of actual soil moisture storage, runoff and precipitation. Percentage of yield reduction was estimated from the relationship of actual, potential yield to actual, potential evapotranspiration (Yield response factor).

Soil moisture stress period mostly affects the *Yala* planting crop than *Maha* planting crop because the extended stress period mostly occurs during June – September and as the crop is in vegetative phase at the time. Occurrence of moisture deficit at various critical stages of sugar crop leads to varying levels of crop yield losses. Reduction of ET of sugarcane during the period of active growth has a much greater negative effect on yield than when experienced during late growth stage. Average yield reduction during the period of *Maha* and *Yala* were 5.96 and 38.79% respectively of actual production. The average yield of sugar cane of Pelwatte was 55.9 mt/ha under rainfed conditions but the average yield of sugar at Sevanagalle under irrigation was 137 mt/ha. Since the percentage yield loss was considerable during the period of *Yala*, moisture conservation measures and numbers of irrigations are very important to overcome the yield reduction. Therefore the production of sugar cane can be considerably increased than the present yield at Pelwatte with cultural practices; soil moisture conservation and supplementary irrigation.

Key words: Yield reduction, Water stress, Sugar cane

Mikunthan, T. (2001). Prediction of percentage of yield reduction due to water stress in sugar cane using yield response factor. Proceedings of the 9th Annual sessions of the Jaffna Science Association, held on April 4th – 6th 2001, 9 (1): 4