

Maytinee Neamkaew 2011: Effect of Irrigation and Fertilizer on Growth and Yield of Sugarcane Clone LK92-11. Master of Science (Soil Science), Major Field Soil Science, Department of Soil Science. Thesis Advisor: Associate Professor Kumut Sangkhasila, Ph.D. 87 pages.

Sugarcane responses to irrigation and fertilizer practices, namely rates of transpiration and photosynthesis, leaf water potentials, growth and yield, were reported. Monthly responses were obtained from treated sugarcane, LK92-11 variety, which were grown at experimental plots located in Kasetsart University at Kamphang Saen, Nakhon Pathom province during February 2008 to January 2009. Split plot with randomized complete blocks design with 3 replications was applied to investigate the responses. The main plot factor consisted of the 3 irrigation rates. Natural rainfall was treated to be the rainfed rate (W1), while the 2nd and the 3rd rates were additional amounts of water, equivalent to the weekly evapotranspiration rate of the areas, applied weekly (W2) and every other week (W3) to the treated sugarcane. The irrigation treatments started when sugarcane was 4-month old. The sub-plot factor consisted of 3 fertilizer rates, i.e. 5 kg-N rai^{-1} -1 kg-P₂O₅ rai^{-1} -10 kg-K₂O rai^{-1} (F1), 10 kg-N rai^{-1} -2 kg-P₂O₅ rai^{-1} -20 kg-K₂O rai^{-1} (F2) and 15 kg-N rai^{-1} -3 kg-P₂O₅ rai^{-1} -30 kg-K₂O rai^{-1} (F3) respectively. Raw data of diurnal courses of transpiration rates, photosynthesis rates, and leaf water potential were recorded every two hours (6:00 A.M.-6:00 P.M). Diurnal data was collected from treated sugarcane once a month, during their ages of 4-12 months. Results showed no statistically significant effect of irrigation rates on sugarcane yield. This could be caused by the high amount of rainfall (1,634.5 mm) along the course of this experiment which was high enough to reach the demand for sugarcane production. The additional water did not play any role to yield. There was statistically effect of fertilizer rates on the sugarcane yield. The F3 rate gave the highest yield of 25.74 tons rai^{-1} while F2 and F1 rates gave yield of 25.01 and 22.51 tons rai^{-1} , respectively. Irrigation and Fertilizer rates set in this experiment did not affect the diurnal rates of transpiration and photosynthesis, as well as diurnal courses of sugarcane total leaf water potential. Rates of transpiration and photosynthesis reached their maximum during 11 A.M. - 12 P.M., while their leaf water potentials reached their minimum during 12 A.M. - 4 P.M. Transpiration and photosynthesis rates were varying between 2.68-7.08 mm d^{-1} and 0.28-0.70 $\text{mol m}^{-2} \text{d}^{-1}$, respectively. The minimum leaf water potential were ranging from -155 to -505 kPa.

Student's signature

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