Water requirements of sugar cane under different levels of nitrogen fertilization

Abdallah Mohamed Abdallah Elshafai

Two field experiments were conducted at Shandaweel Research Station (Sohag governorate) in Upper Egypt in the two successive growing seasons of 1994/1995 and 1995/1996 to study the effect of some irrigation regimes, N fertilizer levels and planting densities on yield and quality of sugarcane. Each experiment included 18 treatments which represent the combination between three irrigation regimes, three Nlevels and two planting densities. The levels of studied factors were as follows: 1- Irrigation Regimes: 1- Traditional irrigation regime followed by cane growers [irrigation at IO-day intervals in Summer, I5-day intervals in Spring and Autumn (Moderates), and IS-day intervals in Winter]. The plant cane crop was supplied with a total of 23 irrigations during the whole growing season. 2- Irrigation at 7-day intervals in Summer, 14-day intervals in Spring and Autumn, and 2I-day intervals in Winter. The plant cane crop wassupplied with a total of 28 irrigations during the whole season growing season. 3- Irrigation at I4-day intervals in Summer, 2 l-day intervals in Spring and Autumn, and 28-day intervals in Winter. The plant cane crop was supplied with a total number of 17 irrigations during the whole growing season. II. Nitrogen Fertilizer Levels: 1- 120 kg N/ted. 2- 180 kg N/fed. 3- 240 kg N/fed.III. Planting Densities: 1- Double drills of three-budded sugarcane cuttings, making a total number of 50400 buds/fed. 2- One and half drill of three-budded sugarcane cuttings, making a total number of 37800 buds/fed. The 18 treatments were arranged in a split plot design with 5 replications. inigation regimes were allocated randomly in the main plots and the combination between N levels and planting densities were randomly distributed in the sub-plots. The sub-plot area was 35 square meters. Two replications were assigned for the periodical data throughout the growing season and the other three replicates were left for yield, yield components, juice quality and chemical contents of sugarcane stalks. Sugarcane was planted during the first week of April while harvesting was done after 12 months in both seasons. Urea (46% N) was the nitrogenous carrier used. Both experiments were supplied with phosphorus and potassic fertilizer at the reconunended doses. The soil of the experiment was clay loam and is considered as fertile soil. Results could be summarized as follows: I. Effect of Irrigation Regime: 1 - Irrigation at shorter intervals in the second regime insignificantly increased number of sugarcane plants/m at 120 and ISO days from planting, compared with the first and the third regime whereirragtion was followed at longer intervals. 2 - Stalk height at different growth stages was not significantly affected by irrigation regime at the different growth stages in both seasons. However, considerable increases in stalk height were observed by applying the second irrigation regime as a result of irrigation atshorter intervals (7-14-21) compared with the traditional regime (10- 15-20) and the third regime (14-21-28). 3 - Irrigation at shorter intervals of the second regime increassed stalk diameter of sugarcane at the different growth stages in both seasons, compared with the first and the third regimes. The increase in stalk diameter due to applying the second regime reached the level of significance at 135 and 200 days in 1995/1996 season. 4 - Irrigation regime had no significant effect on elongation rate of canestalk at the growth stages in both seasons. Slight increases in thistrait were observed by applying the second regime throughout the growth periods in second 1995/1996 season. 5’- Prolognging the irrigation intervals in the third regime increased TSS% at 265 days from planting in both seasons compared with the first and second regimes. Slight increases in TSSO/Owere associated with the third regime atthe other growth stages. 6 - Brix% as well as

sucrose% of juice at harvest were slightly reduced due to scheduling irrigation at shorter intervals in the second regime compared with irrigation at longer intervals. 7 - Purity percentage of sugarcane juice at harvest was significantly affected by irrigation regime in 1995/1996 season. Scheduling irrigation at longer intervals, in the third regime (14-21-28) increased purity%. On the other hand, the short irrigation intervalsin the second regime (7-14-21) reduced purity% in both seasons. 8- Prolonging the irrigation intervals in the third regime insignificantly decreased reducing sugarOhin both seasons. 9 - Sugar recovery% was not significantly influenced by irrigation regime. The highest recovery% was recorded with the third regime but without significant differences compared with the other regimes. - Irrigation regime had no significant effect on N content in cane stalk at harvest. J 1- Fiber% in cane stalk at harvest significantly increased by irrigation.