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Effect of Drip Irrigation on the Production and Economic Returns of Sorghum (*Sorghum bicolor*) in Semi- Arid Areas of Tanzania

Abstract

Field trials were conducted in a semi-arid area of Dodoma, central Tanzania with the aim of assessing the effect of three drip irrigation watering regimes on the production and economic returns of sorghum (*Sorghum bicolor*). The irrigation treatments were: EM (early in the morning), EL (late in the evening) and ELE (both early in the morning and late in the evening). Each treatment was replicated three times in a RCBD for both dry and wet seasons.

The results showed that both sorghum growth parameters and yield were significantly higher by a factor of >2 ($p < 0.05$) when the crop was irrigated early in the morning and late in the evening than when it was irrigated either early in the morning or late in the evening. The maximum yield of 13.12 ton/ha with economic returns of Tanzania shilling 6,675,900/= was obtained when sorghum was irrigated twice a day in the dry season. The results suggest that, although irrigating twice a day in the dry season resulted in higher yields, the net income was higher (7,607,780/=) for the dry-wet trial. This is because a lot of water had to be bought for irrigation during dry season, thus increasing the total cost of production.

Sorghum grown during dry and wet seasons generated more total biomass than when it was only grown in the dry season. The highest total biomass (24910 kg/ha) was recorded when the crop was irrigated twice a day. The lowest total biomass (10850 kg/ha) was harvested from the crop which was irrigated late in the evening during the dry season. Contrary to the total biomass performance, the highest water use efficiency (1.973) was recorded from the sorghum which was irrigated late in the evening in the dry season. The lowest water use efficiency (4.53) was recorded on sorghum which was irrigated twice a day in the dry-wet season. The result suggested that, although irrigating early in the morning or late in the evening resulted in greater yields than under rain fed conditions, it was economically viable to irrigate twice a day as this practice yielded more economic returns in the study area.