

ABSTRACT

Effect of Ridging and Intercropping on Sorghum Productivity in Arid and Semi-Arid Lands of Eastern Kenya

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Sorghum is a staple food crop and essential for food security in Arid and Semi-Arid Lands (ASALs). The crop is one of the major sources of livelihood in Kenya's Eastern, Western and Rift Valley regions. Sorghum productivity has however been on a decline due to soil moisture deficit owing to erratic and erratically distributed rainfall and elevated temperatures experienced in the ASALs. It was therefore critical to explore the effects of moisture conservation practises and intercropping of sorghum with common beans on sorghum productivity, an area that has received limited research attention. The objective of this study was to evaluate the effect of ridging and intercropping on soil moisture conservation, sorghum productivity and land productivity in ASALs. The study was carried out at Agricultural Mechanization Research Institute, Kiboko sub-centre, under controlled irrigation. The experimental design was a randomized complete block design in split plot arrangement. The treatment structure constituted ridging techniques; 1) no ridging, 2) open ridging 3) tie ridging under the main plot and intercropping; sole sorghum and sorghum-bean intercropping with two bean varieties KAT Bean 1 and KAT X56 under the subplot. Soil moisture content was monitored gravimetrically. Moisture data, sorghum yield and bean yield data were collected and subjected to analysis of variance (ANOVA) using GENSTAT (version 20.1) and means were separated by fisher's protected LSD. Soil moisture content was found to increase by 25-26% and 11-13% due to tie-ridging and open-ridging respectively relative to no ridging. On the other hand, moisture content decreased by 10%-11% due to Sorghum-KAT B1 intercropping and 5-8% due to sorghum Kat X56 intercropping relative to sole sorghum. Sorghum grain yield was found to increase by 29-33% due to tie ridging and 0-28% due to open ridging relative to no ridges. Sorghum-bean intercropping was found to decrease sorghum grain yield by 34% due to sorghum-KAT B1 and 36% due to sorghum-KAT X56 intercropping. There was no significant interaction between ridging and intercropping. Ridging exhibited increase in soil moisture content, sorghum yield and sorghum equivalent yield. Intercropping sorghum and bean (additive system) exhibited a decrease in soil moisture content and component sorghum yield. Interestingly, intercropping exhibited an increase in sorghum equivalent yield ($p \leq 0.05$). The study recommends 1. the use of tie ridging for improved soil moisture content and sorghum yield. 2. Integration of ridging and sorghum-bean intercropping (additive system) for increased water use efficiency and land productivity.

Keywords: ridging, intercropping, sorghum productivity, arid and semi arid areas.