

Abstract

The aim of this work is to investigate the consequences of selected soil and water conservation techniques and tillage practices on runoff amounts, sediment yield and maize yields under semi-arid and sub-humid environments. Field trials were set in Kigogo primary school in Meru South Sub-County, Tharaka Nithi County, representing the sub-humid conditions, and Machang'a secondary in Mbeere South Sub-County, Embu County (semi-arid) in the central highlands of Kenya. The experiment layout was a randomized complete block design and the treatments were implemented in runoff plots. Tied ridging (TR) was the most efficient technique in reducing runoff and sediment yield and at the same time boosting crop yields in the semi-arid region. It significantly ($p < 0.05$) reduced sediment yields by 94% compared to the conventional tillage (CT) during the study period. The effects were particularly strong in periods of below average rainfall (dry seasons). During the drier season of short rains 2010 (SR10), grain yield under TR was 7 times higher compared to CT ($p < 0.01$). In the sub-humid region, minimum tillage (MT) generated high runoff but relatively low sediment yield compared to CT. During periods of enough rainfall (over 450 mm per season) in the drier site, intercropping suppressed maize yields significantly ($p < 0.01$) by 42% compared to conventional tillage in the drier site. The results on the magnitude of runoff and sediment under the different soil and farm management practices are crucial in selection and promotion of valid farm management practices and tillage alternatives that not only abate soil erosion but also boost agricultural productivity in both sub-humid and semi-arid agro-ecological zones.