ABSTRACT

Aims: Fanya juu terraces are constructed by digging a ditch and throwing the soil up-slope with the sole purpose of maintaining an embankment to slow down runoff flow. The effect of the terraces on crop yields along the slope varies with the soil type. The aim of this study was to determine the effect of Fanya juu terraces on maize (Zea mays L.) and bean (Phaseolus vulgaris L.) yields and how these yields differ with slope positions and depth of the ditches.

Study Design: Split-split plot design with four replications.

Place and Duration of Study: The trial was established on Luvisols in Mua location, Machakos County in Eastern Kenya at 37o15'E 1o29'S and 37o15'E 1o29'S during both long rain (LR) and short rain (SR) seasons of 2014 and 2015 (February 2014 to March 2015).

Methodology: Treatments consisted of three ditch depths (60 cm, 30 cm and 0 cm (control)) in the main plots and three cropping systems (maize/bean intercrop, sole maize and sole bean) in the sub plots. Grain yields were compared across the seasons at the upper, middle and lower slope positions of the terraces using analysis of variance and means separated using least significant difference at $P \leq 0.05$.

Results: There were significant differences in maize grain yields in the interactions of ditch depth and slope position ($P=0.004$) and ditch depth and season ($P<0.001$). Higher maize yields were realized when ditches were constructed than in the control. Yields increased from the lower to the upper slope position of the terraces with 30 cm ditch by 49.8% and in the 60 cm by 41.6%. Average yields from treatments with 30 cm ditch were significantly higher than from the control but non-significant from those in the 60 cm ditch. Significant differences ($P=0.037$) in bean grain yields were observed in interactions of ditch depth and slope position. Higher yields were obtained from the lower position of the 30 cm ditch than the middle and upper positions. Significant differences ($P=0.033$) were also found in interactions of ditch depths, cropping systems and seasons.

Conclusion: The results indicate that Fanya juu terraces had a significant effect on crop yields on hardsetting soils. The study recommends construction of Fanya juu terraces with a ditch depth of 30 cm and intensive management of the lower slope position for improved maize and bean production on hardsetting soils in marginal areas.