



Impacts of terracing on soil erosion control and crop yield in two agro-ecological zones of Rwanda

Jules Rutebuka (1,2), Nick Ryken (1), Aline Uwimanzi (1), Olive Nkundwakazi (1), and Ann Verdoodt (1)

(1) Soil Degradation and Conservation Unit, Department of Soil Management, Faculty of Bioscience Engineering, Ghent University, Ghent, Belgium (ann.verdoodt@ugent.be), (2) Rwanda Agriculture Board, Department of Land, Irrigation and Mechanization, Kigali, Rwanda (Jules.Rutebuka@UGent.be)

Soil erosion remains a serious limiting factor to the agricultural production in Rwanda. Terracing has been widely adopted in many parts of the country in the past years, but its effectiveness is not yet known. Besides the standard radical (bench) terraces promoted by the government, also progressive terraces (with living hedges) become adopted mainly by the farmers. The aim of this study was to measure short-term (two consecutive rainy seasons 2016A and 2016B) run-off and soil losses for existing radical (RT) and progressive (PT) terraces versus non-protected (NP) fields using erosion plots installed in two agro-ecological zones, i.e. Buberuka highlands (site Tangata) and Eastern plateau (site Murehe) and determine their impacts on soil fertility and crop production. The erosion plot experiment started with a topsoil fertility assessment and during the experiment, maize was grown as farmer's cropping preference in the area. Runoff data were captured after each rainfall event and the collected water samples were dried to determine soil loss.

Both erosion control measures reduced soil losses in Tangata, with effectiveness indices ranging from 43 to 100% when compared to the NP plots. RT showed the highest effectiveness, especially in season A. In Murehe, RT minimized runoff and soil losses in both seasons. Yet, the PT were largely inefficient, leading to soil losses exceeding those on the NP plots (ineffectiveness index of -78% and -65% in season A and B, respectively). Though topsoil fertility assessment in the erosion plots showed that the soil quality parameters were significantly higher in RT and NP plots compared to the PT plots on both sites, maize grain yield was not correlated with the physical effectiveness of the erosion control measures. Finally, the effectiveness of soil erosion control measures as well as their positive impacts on soil fertility and production differ not only by terracing type but also by agro-ecological zone and the management or maintenance adopted by farmers. Terracing should be complemented by continuous fertility amendments (organic material inputs), use of improved agronomic and management practices considering agro-ecological zone conditions. In general, radical terracing was found to be the most effective soil erosion control measure on both sites.