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Seasonal profitability of soil and water conservation techniques in semi-arid agro-ecological zones of Makanya catchment, Tanzania

Aluku, Hellen

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Hellen Aluku, Hans Charles Komakech, Ann van Griensven, Henry Mahoo, Steven Eisenreich

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Abstract

Soil and water conservation techniques are known to be profitable and widely promoted in sub-Saharan Africa. However, how their profitability vary across cropping seasons has not been fully explored. Thus, farmers are often faced with the dilemma of which agricultural technique(s) and/or combination(s) thereof to implement in which cropping seasons, and for which crops to maximize profits. In this paper, we investigated the profitability of two soil and water conservation techniques (terraces and borders) and compared them against the conventional flat cultivation in Makanya catchment Tanzania. Farmers in the area grow maize, beans, lablab and cowpeas over three cropping seasons (locally called masika, vuli and chamazi/kipupwe). Based on field survey of 382 farmers in 2019, it was found that aggregate yields were generally higher on fields with intercrop than those with monocrop with more than 0.5 ton/ha of total grain yields. Borders were generally more profitable (399 USD/ha) than terraces and flat cultivation during all three cropping seasons while flat cultivation was more lucrative during the masika than vuli season. Terraces was only lucrative for rainfed beans with Benefit Cost Ratio of 1.5 (208.7 USD/ha) and 1.2 (90.5 USD/ha) in masika and vuli respectively. Beans grown on borders during chamazi season had the highest profitability with Benefit Cost Ratio of 1.9 (399 USD/ha) compared to terraces and flat cultivation in all three cropping seasons. Whereas it was more profitable to grow maize, beans and lablab on borders, farmers could still realize appreciable profits by growing these crops as purely rainfed on flat cultivation especially during the masika season. It was concluded that in semi-arid zones, soil and water conservation techniques used in combination with other auxiliary practices such as irrigation, intercropping with legumes, mulching and manure application could greatly enhance profitability, but that depends on cropping season and market factors.

Keywords

Smallholder farmers; Irrigation; Water management; Agricultural productivity; Evapotranspiration