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Short Term Effects of Conservation Agriculture on Soil Erosion and Agronomic Parameters of Teff (*Eragrostis tef* (Zucc.) Trotter) on the Vertisols of Northern Ethiopian Highlands

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Abstract

Agriculture in Ethiopia is dominated by rainfed farming of low productivity. Land degradation in the form of soil erosion and declining soil quality is a serious challenge to agricultural productivity and economic growth. In vertisols, being most vulnerable to erosion, the problem is exacerbated more with the lack of sustainable land management systems. A conservation agriculture (CA) experiment was conducted in 2006 at Gumselasa (Tigray, Ethiopia), one of the areas mostly affected by drought, on experimental plots established on a farmer's field. In the experiments the treatments implemented are **(1)** CA in the form of permanent raised beds (PB) with contour furrows at 60–70 cm interval combined with residue retention, **(2)** Terwah system (TERW) consisting of traditional ploughing followed by making every 1.5–2 m contour furrows and **(3)** the traditional ploughing (TRAD). The objective of the experiment was to evaluate the short term impact of the implementation of CA practices on soil erosion and agronomic components of teff (*Eragrostis tef*). PB reduced runoff volume by 50 % and TERW by 16 % compared to TRAD. PB also reduced soil loss by 86 % and TERW by 53 % in comparison to TRAD. Despite the above improvements in soil erosion, which most probably resulted in higher soil water storage in the PB than in the other treatments, yield, biomass and plant height of teff were significantly higher in the TRAD than in the PB. The significantly high weed dry matter at first weeding in the PB, the types of weeds and water use characteristics of the crop may have caused the reduced yield of teff. Herbicides have to be used while growing teff in CA experiments. Further research should be done to see the impact of the soil management techniques on soil water storage and soil quality. Rainfall intensity measurements should also be performed for complete understanding of soil erosion

Keywords: Conservation agriculture, permanent bed, soil erosion

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