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Effects of level soil bunds and stone bunds on soil properties and its implications for crop production: the case of Bokole watershed, Dawuro zone, Southern Ethiopia

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ABSTRACT

Level soil bunds (LSB) and stone bunds (SB) have been widely implemented in the Bokole watershed since 2000 through support of the World Food Program (WFP). However, the performance of them against the target of the structure has not been studied. This study analyzed the effect of LSB and SB on selected soil properties, when compared with nonterraced cropland. The Bokole watershed was divided into two units. From upper watershed, three croplands with LSB (aged 4, 6, and 9 years) and three nonterraced croplands each adjacent to one of the LSB were selected. Similarly, in lower watershed, SB aged 4, 6, and 8 years and three nonterraced croplands each adjacent to one of the SB were selected. From each cropland with LSB and SB, three composite soil samples (replicates) were collected systematically in X designed rectangular plot. From each nonterraced cropland, three composite soil samples (replicates) were collected in X designed square plot. A total of 36 soil samples were analyzed for Soil Organic Carbon (SOC), Total Nitrogen (TN), Available Phosphorus (AP), Available Potassium (AK), pH, and Cation Exchange Capacity (CEC) following standard laboratory procedures. Most soil parameters were not significantly different in cropland with LSB and SB compared to nonterraced. However, in LSB aged 4 years and SB aged 6 years AP and pH were significantly less than their adjacent-nonterraced cropland. In SB aged 8 years, SOC, AP, AK, and pH were also significantly less than adjacent-nonterraced cropland. Past erosion, and past land uses are likely factors contributed to the observed result. It was inferred that the mean contribution of LSB and SB alone for crop production with regard to analyzed soil parameters was not significant in the considered sites. Additional soil fertility management practices should be incorporated for better effect.

KEYWORDS

Crop Yield; Level Soil Bund; Nonterraced; Soil Fertility; Stone Bund; Water Erosion; Watershed

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