



Water Runoff, Soil Nutrient and Sediment Loss as Affected By Erosion Barriers and Nutrient Source in Semi-Arid Burkina Faso

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In semi-arid Sahel, soil erosion by water is one major factor accounting for negative nutrient balances in agricultural systems. A field experiment was conducted on a Ferric Lixisol in Burkina Faso to assess the effects of soil and water conservation barriers (stone rows or grass strips of *Andropogon gayanus*), the sole use of organic (compost) or mineral (urea) source of nitrogen (N) and the combined use of barriers and compost or urea nitrogen on water runoff, soil nutrient and sediment erosion. The runoff barriers were put along contours. water runoff, organic carbon (OC) and nutrients losses through runoff and sediments were monitored during 2000 and 2002. Compared with the control plots, the average reduction in runoff was 59% in plots with barriers alone, but reached 67% in plots with barriers + mineral N and 84% in plots with barriers + organic N. Carbon and nutrient concentrations of generated sediments were very high, of 14–29 g kg⁻¹ OC, 1.0–3.7 g kg⁻¹ N and 0.32–0.71 g kg⁻¹ total P. NO₃-N concentration in runoff water reached 0.023 g L⁻¹ in stone rows treatments compared to only 0.002 g L⁻¹ with treatments without barriers. Annual losses of organic C, N, P and K were high and greatly dependant on soil loss magnitude. Compared to the control plots, soil losses were reduced on average during the two years by 84% with stone rows treatments while by 71% with grass strips treatments. Compost application reduced soil loss by 75% in plots without barriers and by 89% in plots with stone rows as compared to control plots. With urea application, soil loss decrease was on average 13% lower than in plots with compost. Integrated water and nutrient management can effectively alleviate soil, carbon and nutrients losses by water erosion, therefore may contribute to intensifying crop production in Sahelian smallholder farming.

Keywords: Compost, Grass strip, Water runoff, Nutrient loss, Soil erosion, Stone row, Urea, Sahel