Residual tillage and bush-fallow effects on soil properties and maize intercropped with legumes on a tropical Alfisol

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Abstract

After six years of bush-fallow, residual effects on soil productivity of tillage practices prior to the fallow were investigated on an Alfisol in south western Nigeria. In 1996 fallow was followed by maize intercropped with cover crops of Pueraria phaseoloides, Mucuna pruriens or cowpea (Vigna unguiculata) and no intercrop. Parameters measured included soil properties, ground cover, crop growth and yield, rainfall erosivity, runoff and soil loss.

In spite of six-years of bush-fallow and establishment of cover crops, soil erosion was significantly greater on plots that had been conventionally cultivated previously using disc ploughs, harrows and mechanical rotovators (1.78 t ha−1season−1) compared to previously no-till plots (1.34 t ha−1season−1). Crop growth and yields were least and soil loss greatest (2.83 t ha−1season−1) on the previous bare plot.

Maize grain yield was highest using Pueraria phaseoloides as an intercrop (2.15 t ha−1) followed by a cowpea intercrop (1.92 t ha−1), maize without intercrop (1.87 t ha−1) and Mucuna pruriens intercrop (1.71 t ha−1). The maize grain yields reflected levels of competition from the cover crops. Cowpea–maize intercrop may be most suitable for farmers because maize yields were satisfactory and cowpea grain serves as additional subsistence. Cowpea yields were 390 kg ha−1. Soil erosion was also moderate using cowpea as an intercrop (1.71 t ha−1season−1). However, Pueraria phaseoloides gave the best erosion control with a soil loss of 1.34 t ha−1season−1.

Keywords: Fallow; erosion; legumes; intercropping; soil degradation; residual effects; tillage

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