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Tillage and Fertiliser Effects in Sole Maize Cropping in a Degraded Nigerian Alfisol

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Abstract

The choice of appropriate tillage system is crucial for sustainable farming in tropical ecosystems. With high levels of soil erosion and nutrient leaching in the tropics, reducing tillage and good fertiliser management becomes an attractive option to consider for environmental conservation. A field study in a degraded alfisol in Ibadan (south west Nigeria), was conducted to determine the effects of four tillage systems (TS): (plow + harrow, plow, chisel + harrow and chisel) and three fertiliser NPK 15:15:15 rates: (0, 40 and 80 kg ha^{-1}) on maize grain and stover yields. Measurements showing significant response to treatment effects were root length, grain yield and hundred seed weight. Maize under plow + harrow TS had the highest mean root length (23.1 cm), which was 38 % and 28 % significantly higher than chiseling and chiseling + harrowing. Root length decreased with increasing fertiliser rates in all systems (except chisel + harrow). Grain yield showed significant increase only with increasing fertiliser rates. A grain yield of 1.4 Mg ha^{-1} was obtained when 0 NPK kg ha^{-1} was combined with plow + harrow TS. Plow alone had grain yields of 1.9 and 2.0 Mg kg ha^{-1} with 40 and 80 kg NPK kg ha^{-1} fertiliser rates. These grain yields were not significantly different from those under plow + harrow TS at the same fertiliser rates. Only hundred seed weight significantly responded to TS by fertiliser interactions. From the results, plowing TS when combined with 40 NPK kg ha^{-1} fertiliser rate was sufficient for maize production in degraded alfisols

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