

ORIGINAL ARTICLE

Effect of the integrated use of legume residue, poultry manure and inorganic fertilizers on maize yield, nutrient uptake and soil properties

A. O. Amusan · M. T. Adetunji · J. O. Azeez ·
J. G. Bodunde

Received: 31 August 2010 / Accepted: 26 March 2011 / Published online: 7 April 2011
© Springer Science+Business Media B.V. 2011

Abstract Identification of a sustainable integrated soil fertility management option in the tropics will not only salvage the degraded soils but also enhances the attainment of the goal of food security. This study was conducted in 2004 and 2005 on a degraded tropical Alfisol in south western Nigeria to evaluate the effect of legume residue, poultry manure and inorganic fertilizers on maize yield, nutrient uptake and soil properties. The treatments consisted of two rates of poultry manure (0 and 5 t ha⁻¹), three rates of N fertilizer (0, 50 and 100 kg N ha⁻¹ applied as urea), three rates of P fertilizer (0, 30 and 60 kg P ha⁻¹ applied as single super phosphate) and two soybean treatments (with or without incorporation of legume residue) in various combinations as a factorial experiment in Randomized Complete Block design with three replicates. Results showed that poultry manure alone led to significant increase in maize yield (60%) and soil organic matter (45%). In contrast, legume

residue incorporation gave significantly lower increase in yield (7%) and soil organic matter (11%). However, the combined application of poultry manure and legume incorporation led to 72% increase in maize yield as opposed to 63 and 10% increase recorded when manure alone or legume alone were incorporated, respectively. Optimal maize yield was achieved when manure application was integrated with P fertilizer application. The interaction of P fertilizer and legume incorporation indicated that soil phosphorus and maize P concentration were significantly increased with the application of the P fertilizer and legume incorporation. Hence, the application of P fertilizer alone is most likely to be economical compared with its integration with legume incorporation.

Keywords Integrated nutrient management · Soil fertility · Nutrient cycling · Degraded soil