

Response of low-nitrogen tolerant maize genotypes to nitrogen application in a tropical Alfisol in northern Nigeria

J.O. Azeez, M.T. Adetunji and S.T.O. Lagoke

Abstract

In the dry savannas of west and central Africa, where low soil fertility is major constraint to maize production, the development of tropical maize genotypes with high and stable yield under low-nitrogen condition is very important, since access to these improved genotypes may be the only affordable alternative to many small scale farmers.

Field trials were conducted at Samaru (Typic Haplustalfs) to investigate the response of low-N tolerant maize cultivars to nitrogen (N) fertilizer. Nitrogen application rates were 0, 30, 60, 90 kg N ha⁻¹ and four maize cultivars (Low-N pool C2, ACR 8328 BN C7, Super Oba II and TZR-SR). Maize leaf area index, intercepted radiation, leaf area and stover weights were increased due to nitrogen application at flowering. For most of the parameters, 60 kg N ha⁻¹ appeared to have the significantly high values. However, there was no significant difference between application rates of 60 and 90 kg N ha⁻¹ in stem weight, stover weight, grain yield and shelling percent at harvest. Genotypic variation observed in the maize agronomic traits were not significant except in leaf weight and grain yield. The amount of nitrogen taken by maize increased with increase in fertilizer rates. Application of 30 and 90 kg N ha⁻¹ to soil increased the maize grain N concentration and total N uptake. About 45.3 kg ha⁻¹ and 8.8 g N kg⁻¹ nitrogen uptake was obtained in maize shoot and grain, respectively, at the application of 90 kg N ha⁻¹. Low-N pool C2 genotype had the highest grain N concentration and shoot uptake significantly higher than TZR-SR. Nitrogen fertilizer applied accounted for 97% variation in soil nitrate. There existed a positive and significant correlation between maize grain yield and leaf nitrogen uptake ($r = 0.33$, $P < 0.01$). Averagely, nitrogen fertilizer applied accounted for 86% variations in maize grain yield.

Keywords: Low-N tolerant maize; Nitrogen application; Tropical Alfisol