

Effects of Nitrogen Application and Weed Interference on Performance of Some Tropical Maize Genotypes in Nigeria

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Abstract

Low soil nitrogen (N) and weed infestations are some of the major constraints to maize production in Nigeria. A split-split plot experiment in a randomized complete block design with three replicates was established at two sites with different agroecological zones, Ikenne (Typic Paleudalf) and Shika (Typic Tropaquept), in Nigeria in 2002 and 2003 rainy seasons to investigate the responses of four maize genotypes (Oba super II, Low N pool C2, TZB-SR, and ACR 8328 BN C7) to N fertilizer applied at four rates, 0, 30, 60, and 90 kg N ha⁻¹, and three weed pressure treatments, no weed pressure (weekly weeding), low weed pressure (inter-row weekly weeding), and high weed pressure (no weeding throughout the growing season). Growth and yield parameters of maize and weeds were taken at flowering and harvest. The results indicated that there was a significant reduction in maize leaf area, leaf area index, and photosynthetically active radiation due to weed interference at both sites. The application of nitrogen at 90 kg N ha⁻¹ significantly increased maize leaf area. Reductions in maize growth and yield at flowering and harvest were significant due to weed interference at both Ikenne and Shika, thus showing that the reductions in maize growth and yield due to weed interference were not ecological zone specific even though weed species and their seed banks may differ. Ameliorative management options could thus be the same in the two agroecological zones. Application of 90 kg N ha⁻¹ led to a significant increase in maize grain yield at Shika while there was no fertilizer effect at Ikenne on grain yield. There was no significant difference between 60 and 90 kg N ha⁻¹, suggesting that 60 kg N ha⁻¹ could be a possible replacement for the higher fertilizer rate at least for the identified maize genotypes. Low weed pressure treatment led to 26% and 35% reductions in maize grain yield at Ikenne and Shika, respectively, while 22% and 51 % reductions, respectively, were observed due to high weed pressure. Generally, maize grain yield was higher at Ikenne than Shika. The maize genotypes Low N pool C2 and ACR 8328 BN C7 performed better than the other genotypes at Ikenne while the maize genotype Oba super II had the best performance at harvest at Shika. Application of nitrogen increased weed biomass at flowering at Ikenne. The maize grain yield was highest in the N-efficient genotypes, Oba super II and Low N pool C2; the susceptible genotype TZB-SR had the least yield at Shika. There existed a negative and significant correlation between maize grain yield and weed biomass at both sites.

Key Words: maize growth; maize yield; N efficiency; soil nitrogen; weed pressure