

Decomposition and nutrient release from maize (*Zea mays* L.) residues and N uptake by groundnut (*Arachis hypogaea*) in a crop rotation system

ABSTRACT

Incorporation of crop residues in agricultural systems is an important factor in the control of soil fertility and nutrient cycling, and may contribute significant amounts of nitrogen to the succeeding crop. Decomposition and nutrient release from maize residues applied on the soil surface in tubes inserted into the ground was studied during the fallow and growth period of groundnut. Dry matter weight (DMW) loss of residues was fast in the initial two weeks. Generally, decomposition is best described using the single exponential model ($W_t = W_0 e^{-kt}$) with rate constants (k) of 0.101% week⁻¹ ($r^2=0.95$), and 0.106% week⁻¹ ($r^2=0.92$) with 50% DMW loss at 7.2 and 7.5 weeks in maize plots of chemical fertilizer and in plots with combined chemical fertilizer and chicken manure with residue. Nutrient release was in the order of (fast to slow) $K > N = P > Mg > Ca$. Total soil mineral nitrogen (NH_4-N and NO_3-N) during residue decomposition showed maximum accumulation (65 μg^{-1} , in the top 0-20 cm) on the 8th week. Residue incorporation slightly increased flesh pod yield and N uptake. Groundnut growth, in terms of dry matter yield and N accumulation, was most active between the 5th and 9th weeks after sowing. These results indicate that better synchrony between N release from residue decomposition and uptake by the subsequent crop (groundnut) could occur if the crop was sown between 4 - 8 weeks after returning the previous crop residue to the field.

Keyword: Decomposition; Groundnut; Maize residues; N uptake