

ABSTRACT

Pathways of Nitrogen Loss as Affected by Soil Surface Management of an Ultisol.

Fredericka M. Deare

Four studies were conducted to assess N losses as a result of overland and downward movement on an Aquoxic Tropudults and to evaluate management practices that would minimize losses. In Study I, soil loss ranged from 0.8 to 7.9 t ha⁻¹ for individual runoff events and was accompanied by total N losses in the sediment ranging from 0.5 to 22.1 kg ha⁻¹. The presence of okra did not significantly reduce erosion. Liquid N application increased total N loss. The plants fertilized with solid (NH₄)₂SO₄ produced the highest number and fresh weight of the okra pods.

In Studies II and III, four soil management practices: 1) bare, ridge-tilled, 2) mulched ridge-tilled, 3) bare, flat-tilled and 4) mulched, flat-tilled were tested under bare-fallowed and cropped conditions. The lowest soil and N losses were obtained from the mulched flat-tilled soil and the highest from the bare, ridged soil. Urea application increased NH₄⁺-N levels in the soil and was the dominant inorganic N form noted for the first four weeks after fertilization. Ridging the soil and mulch application increased water transmission and downward movement of N. Under bare-fallowed conditions, downward movement of NH₄⁺-N was noted in the 30 to 45 cm soil layer at 7 days after fertilization, while under cropped conditions its movement is mainly restricted to the 15 to 30 cm soil layer. Nitrate-N movement occurred about four weeks after fertilization in the bare-fallowed plots and at one to three weeks in the cropped plots. Ridging the soil increased total dry matter and pod yields (number and dry weight of pods). Mulching increased pod yields in the late rainy season.

In Study IV, N downward movement occurred mainly with the fertilizer

band.

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Although, ridging increased N losses from the soil, this practice was necessary for high crop yields, however the use of a bagasse mulch can reduce losses.

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