

ABSTRACT

The objective of the study was to determine the amount of nitrogen losses as well as the uptake of nitrogen by plants (using ^{15}N microplots) under lowland and upland conditions where two different forms of fertilizer nitrogen were used i.e. urea and ammonium sulphate. A preliminary experiment was carried out under laboratory conditions to determine the rate of nitrification and the rate of hydrolysis of urea in three soils collected from different elevations in Mapalana. The rate of nitrification (68.1%) and the rate of urea hydrolysis (76.2%) were rapid in the first week of incubation and decreased gradually with time. There were no significant differences in the rate of nitrification as well as in the rate of urea hydrolysis among these three soils.

Field experiments using ^{15}N microplots were undertaken to investigate the losses and uptake of applied urea and ammonium sulphate under lowland and upland conditions in two consecutive seasons. Rice and maize were used as the test crops for lowland and upland soils respectively. Plant and soil samples were taken at 0, 1, 3, 5, 7, 10 and 14 days after fertilizer application and tested for N utilization parameters. ^{15}N recovery in plants, %Nitrogen derived from Fertilizer (%Ndff) and uptake of nitrogen by plants under both lowland and upland conditions were significantly higher in ammonium sulphate than urea treatments. Highest %Ndff was obtained on 14 th day after fertilizer application in maize

(38.1%) as well as in rice (39.7%) irrespective of the type of fertilizers.

Nitrogen losses from urea treatments were higher 42.0% and 36.8% for lowland and upland soils respectively compared with 39.5% and 28.5% of ammonium sulphate treatments obtained under the above conditions. This could be partly attributed to the higher volatilization losses in urea treated soils. It was also noted that loss of applied nitrogen in lowland soils was higher (40.7%) than upland soils (32.6%) irrespective of other treatments.

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The highest N% recovery was (26.1%) in ammonium sulphate treatments under lowland conditions whereas in upland soils it was (31.3%) irrespective of the season. This was due to the relatively higher nitrogen losses under lowland conditions probably due to processes such as volatilization, denitrification and leaching.