POTENTIAL FOR NITROGEN MINERALIZATION AND NITRIFICATION IN AN ARABLE SOIL INCUBATED UNDER LABORATORY CONDITIONS

*Sumyya Razzaq Khan and M. Kaleem Abbasi**

ABSTRACT

Soil erosion and small annual additions of organic matter make nitrogen (N) the plant nutrient most deficient in agro-ecosystems of Azad Jammu and Kashmir. Most soils require additional N in the form of fertilizers in order to achieve the optimum yields. An incubation experiment was conducted in the soil collected from an arable field to establish relative potential rates of mineralization and nitrification. In addition, the recovery and fate of added N were also investigated. Soil samples of 0–15 cm depth were taken and incubated in the controlled environment at 20 ^{0}C for 30 days. Mineralization potential was determined from soil without added N while nitrification activity was measured following the addition of NH_4^+ –N at a rate equivalent to 250 mg N kg^{-1} soil. Net rate of mineralization over 30 days was 0.70 mg kg^{-1} day^{-1} equivalent to a mineralization of 292-kg N ha^{-1} $year^{-1}$. The rate of mineralization as percent of total N in soil was 0.44 percent. Of the total amount of NH_4^+ –N added, more than 75 percent of the NH_4^+ present initially had disappeared from the mineral N pool at the end and only 25 percent of it was converted into NO_3 –N indicating a slow and week nitrifying activity of the soil. A substantial amount (75%) of applied NH_4^+ –N remained unaccounted for at the end of incubation, which is very alarming for fertilizer use efficiency, and for agro-ecosystems of Azad Jammu and Kashmir.