

Mugwe J, **Mugendi DN**, Mucheru-Muna M, Kung'u JB (2011). Soil Inorganic N and N uptake by maize following application of legume biomass, tithonia, manure and mineral fertilizer in central Kenya In: Bationo et al. (eds.), Innovations as key to the green revolution in Africa, pp 605-616, Springer, Dordrecht, NL

## **Abstract**

In the smallholder farms of central Kenya soils suffer from nitrogen (N) deficiency due to inability to replenish it through application of chemical fertilizers and/or manure. This study evaluated the effect of some organic materials such as *Mucuna pruriens*, *Crotalaria ochroleuca*, *Calliandra calothyrsus*, *Leucaena trichandra*, cattle manure and *Tithonia diversifolia* applied solely or combined with inorganic fertilizer on soil mineral N dynamics and N uptake by maize. Soils and maize samples were taken at 0, 2, 4, 6, 8, 12, 16 and 20 weeks after planting maize (WAP) during 2002 long rain (LR) and 2004 LR seasons and analysed. The study showed that amounts of soil inorganic N and uptake of N by maize varied among the different sampling dates, treatments and between seasons. There was a general increase of mineral N after the start of the season followed by a drastic reduction during 6 and 4 WAP during 2002 and 2004 LR, respectively. This trend was attributed to the decomposition of organic materials at the beginning of the season followed by leaching due to intense rainfall during this period. Treatments that had tithonia, leucaena and calliandra applied recorded the highest amounts of soil inorganic N and also the highest N uptake by maize. Poor rainfall in 2004 LR restricted N uptake and was responsible for lower N uptake by maize in 2002 LR than in 2004 LR. At the end of the growing season, there were high amounts of mineral N at 100–150 cm soil depth that was probably due to leaching. This mineral N is below the rooting zone of most maize plants, consequently not available to maize crop and is therefore of concern.