

The central highlands of Kenya is generally densely populated and declining land productivity with reduced crop yields has been a major problem facing the smallholder farmers in the region. Land sizes are small and this promotes continuous cropping with limited scope for crop rotation and inadequate soil fertility replenishment. Efficient use of soil N amendments in maize (*Zea mays* L.) production is necessary to maximize producer's economic returns and maintain soil and water quality. An experiment was carried out on the humic nitisols in Mucwa location, Meru South District, with the objective of determining maize grain yields and N uptake under different soil N amendments. The experiment was set in randomized complete block design (RCBD) with three replicates. The results reveal that maize grain yields in the organics and/or mineral N soil amendments was higher than the yields obtained where the recommended mineral fertilizers were used alone. The nitrogen (N) concentration in different parts of the maize crop varied, with the grain having the highest, followed by the stover during the 2005 short rain season. Sole application of calliandra recorded the highest N uptake (170.8 kg N ha⁻¹) while the control gave the lowest (49.31 kg N ha⁻¹). It is therefore concluded that differences in nutrient release by the organic-mineral N soil amendments can alter net rate of nutrient uptake during crop growth and therefore assist in synchronization of nutrient release and uptake by the growing crop.