

Managing green manure legumes for improved maize production in Kenyan highlands

Abstract:

Declining soil fertility and inadequate and low quality feed resources limit smallholder crop yields and dairy production in Kenyan highlands. Green manure legumes can provide an alternative to the use of commercial N sources for cereal crops and livestock production in these low external-input farming systems. Research reported in this chapter was conducted by the LRNP in the western and central highlands of Kenya to develop management practices for some adapted legumes to be used by the financially constrained small-holder farmers in Kenya, not only for soil improvement but also as a source of other benefits such as feed or food. The green manure legumes used in the studies were *Mucuna pruriens* (L.) DC, *Lablab purpureus* (L.), *Cratalaria ochroleuca* G. Don, and *Canavalia ensiformis* (L.) DC. Biomass production ranged from 2 to 15 t ha⁻¹. The N contribution from green manure legumes ranged from 35 to 150 kg N ha⁻¹. Based on N, lignin and polyphenol, the green manure legume residues were above the critical value for N (2.5percentage) and below the critical value for lignin (15percentage) and polyphenol (4percentage), suggesting a net N mineralization due to the application of green manure residue. Inclusion of the green manures in the maize-based system increased subsequent maize yields compared to the natural fallow control where no fertilizer was applied. In wetter areas, incorporating the legume biomass into the soil was better than leaving the residue as surface mulch. However, in areas where soil moisture was limiting, mulching was a better option because of its beneficial effect of soil moisture conservation. Defoliating part of legume herbage as fodder, reduced the quality of remaining residue and enhanced the synchrony between N release and uptake by maize. Combining legume residues with inorganic fertilizer increased maize grain yield by 1.5 t ha⁻¹.