Cost-effective and appropriate soil fertility and plant nutrition technologies



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In this key result area, several achievements have been recorded during SAPs I, II and III. Two consultancy reports submitted in 2005 had revealed lack of coherent soil fertility database. Following this observation, soil fertility evaluation was carried out in 5 coffee growing zones and district reports submitted, which include ISFM recommendations down to ward level. Review and compilation of ISFM packages continued, and a new coffee yield model was developed. The model, called SAFERNAC, was tested with soils of Hai and Lushoto and found to work well (Figure 1). It is now under preliminary validation with the countrywide soil data, to be followed by field trials.

A screenhouse experiment was done to test the nutrient (NPK) release potential of various organic substrates (Figure 2) in two contrasting soils (Nitisols of Lyamungu, Hai District, and Acrisols of Yoghoi, Lushoto District). Organic substrates tested were in three categories: farmyard manure, coffee farm by-products (pulp, husks and droppings from a common leguminous shade tree, *Albizzia maranguensis*) and green manure plants (*Mucuna pruriens*, *Lupinus albus*, *Canavalia ensiformis* and *Crotalaria ochroleuca*). The green manure plants proved to be the best sources of NPK, followed by Albizzia. Pulp, husks and manure did not differ significantly (Figure 3). Partial ISFM recommendations involving the test organics were outlined for organic and conventional farmers in Hai and Lushoto.

Priority research area for SAP IV, most of which are brought forward from SAP III, include the following:
- Research on lime requirement for the acid coffee soils
- Response function of different levels of NPK fertilizers on new varieties
- Assessing the benefits of tonic application of micronutrients
- Nutritional potential of coffee by-products and other farm substrates
- Continue with soil fertility survey to fill database gaps Southern Highlands.
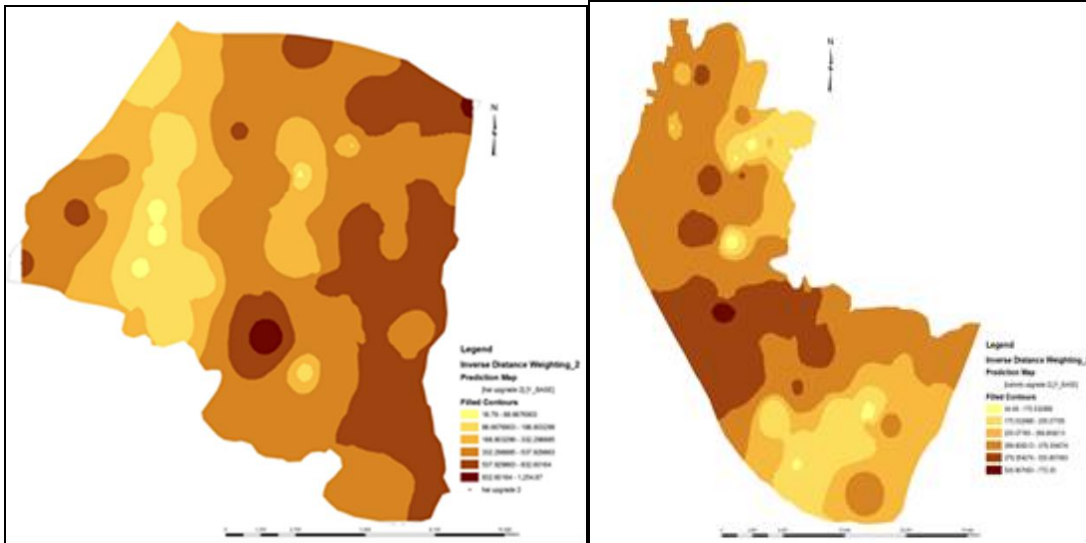
*Figure 1: Estimated yield of parchment coffee with SAFERNAC model, Hai (left) and Lushoto (right)*



*Figure 2: Crotalaria and Canavalia green manure plants (left), setting the screenhouse experiment (right)*
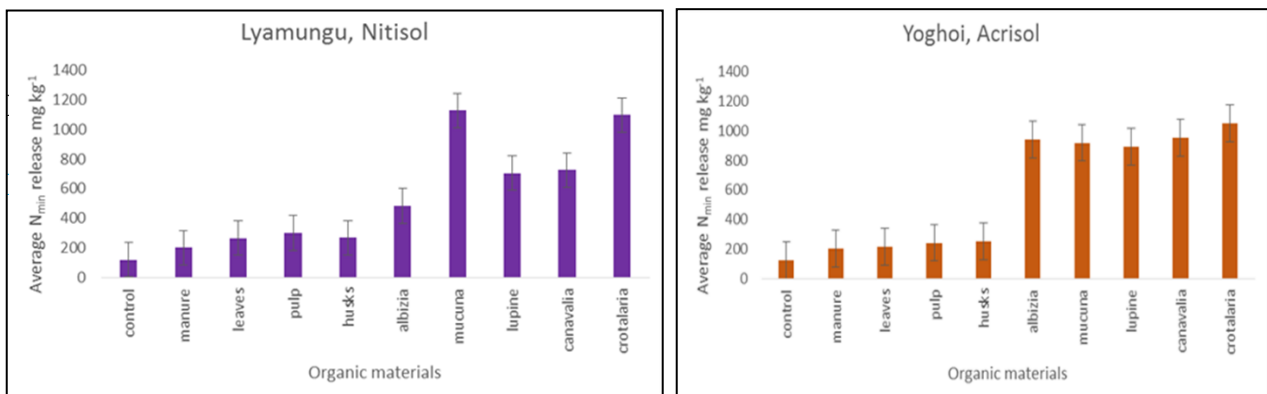


*Figure 3: The Nitrogen release potential of different organic substrates*