

Abstract

Declining soil fertility, caused mainly by continuous cultivation without adequate replenishment of nutrients, is a major factor contributing to low crop yields in the arid and semi-arid areas of Kenya. Development of appropriate nutrient management strategies for sustainable agricultural production in these areas is, therefore, a priority. In the study reported here, analyses of the current nutrient management practices were carried out using the nutrient monitoring (NUfMON) approach in order to create farm household awareness on nutrient management aspects. The procedure involved participatory drawing of soil and nutrient flow maps and soil sampling at farm level. Laboratory analysis of the soil samples was later carried out. Structured questionnaires were used for systematic collection of information on farm management practices in order to quantify flows of materials with emphasis on soil nutrients and cash. Results of the laboratory soil analysis were also presented to farmers and discussed, during feed back sessions. Nutrient levels were low in 96, 26 and 96percent of the farms in Kibwezi, Kasikeu and Kiomo, respectively. Phosphorus (P) was deficient in 56percent of the farms in Kibwezi, 78percent of the farms in Kasikeu and 52percent of the farms in Kiomo. Potassium (K) levels were adequate in all the farms in the 3 clusters. Soil organic carbon was low in all the farms in Kibwezi and Kasikeu and in 48percent of the farms in Kiomo. The total stocks of N, P and K in the upper 30 cm of the soil, were 6857.4, 4077.4 and 3457.8 kg ha⁻¹ for Kasikeu, Kibwezi and Kiomo, respectively. Phosphorus values were 449.9, 1797.4 and 1049.6 kg ha⁻¹, while K stocks were 6115, 11866 and 9939 kg ha⁻¹ respectively. Average full balances for nitrogen (N) and K for Kasikeu and Kibwezi were negative and positive for Kiomo while P balances were positive for the 3 clusters. The major losses were mainly due to the hard-to-quantify flows, i.e. leaching, erosion and gaseous losses. At plot level, under rainfed conditions, negative balances for N and K were mainly due to removal of crop products and residues. Under irrigated conditions, high N outflows occurred through the sale of vegetables. Leaching was also an appreciable source of N loss. Average farm incomes were positive in Kasikeu and Kiomo and negative in Kibwezi. In all the three clusters, off-farm income was an important component of the total family income. Farm net cash flow was highest in Kibwezi cluster due to horticultural crop production activities. Household net cash flow was highest in Kasikeu, largely originating from off-farm income. It was concluded that the NUfMON methodology is a suitable tool for the diagnostic phase of the farming system analysis and design in the arid and semi-arid lands of Kenya.