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Organic management of soil fertility for sustainable sweetpotato production

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Orange-fleshed sweetpotato (Ipomoea batatas) is a nutritious staple food in Mozambique. However, current cultivation practices lack proper soil fertility management causing depletion of soil nutrients. Adequate soil fertility management can improve nutrient use efficiency and enhance the soil capacity of soils to sustain long-term cropping, which are particularly important for resource-limited rural communities.
Using Integrated Soil Fertility Management (ISFM) practices, we evaluated soil and plant nutrient status under two weed biomass treatments (removal or incorporation), receiving three organic fertilizers treatments: (i) cowpea residues, (ii) poultry manure, (iii) cowpea residues + poultry manure. Inorganic fertilizer treatments were also tested to compare the performance of sweetpotato under organic and inorganic soil fertility management: inorganic fertilizer alone; (iv) urea, potassium cloride and supertriple phosphate; and in combination with ; (v) poultry manure + inorganic fertilizer, (vi) cowpea residues + inorganic fertilizer, and (vii) non-fertilized control treatments.
Soil samples were collected at planting and harvest and analysed for available and total nitrogen (N), potassium (K) and phosphorus (P). Plant biomass was sampled at harvest to evaluate if organic fertilizer and weed biomass incorporation translate into higher storage root yield and improved nutrient supply, meeting sweetpotato's needs during crop growth, and ensuring soil nutrient replenishment for sustainable cropping.
Our trials show that (K) and (P) can be replenished through weed biomass incorporation, particularly when combined with poultry manure fertilizer in comparison to all other treatments.
Moreover, comparing soil samples from the beginning versus the end of the season, organic N was preserved in treatments when organic fertilizers and weed biomass incorporation were combined. However, the use of organic amendments alone or together with inorganic fertilization decreased 18% of soil organic N.
Even though soil nutrient was preserved in organically fertilized treatments, plant uptake did not differ between the fertilization treatments, thus resulting in similar nutrient use efficiency for N, P and K.
This study shows that incorporation of weed biomass is important to preserve long-term soil fertility. However, weed biomass incorporarion in combination with organic or inorganic fertilization have the same effect on plant uptake and nutrient use efficiency. Therefore, our findings support the use of locally available organic resources and alternative soil management practices that have the potential to increase sustainability of the OFSP production in Mozambique.