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Towards Nutritional Security through Agroecological Practices in Orange-Fleshed Sweetpotato Systems in Mozambique

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Abstract

The introduction of orange-fleshed sweetpotato (OFSP) varieties in Mozambique is a successful food-based strategy to reduce malnutrition in rural communities. Specifically, due to its higher beta-carotene content, the precursor of vitamin A in the human body, and micronutrients such as zinc (Zn) and iron (Fe), the consumption of OFSP enhances the nutritional value of children's diets. To sustain sweetpotato production, large amounts of soil nitrogen (N) and potassium (K) are required. Thus, continuous cultivation without soil nutrient replenishment leads to soil degradation threatening a continuing food production. This issue is very important in limited-resource areas, where the lack of soil fertility management furthers soil degradation and food insecurity. Agroecological practices (i.e., intercropping, crop rotation, and fallow) that increase the diversity of agroecosystems can boost soil fertility and agricultural performance through increased nutrient supply.

This study investigated low and high plant diversity arrangements during three growing seasons in a field experiment conducted in Maputo, Mozambique. Four treatments in a range of low to high diversity arrangements were compared, respectively: (i) continuous OFSP monoculture, (ii) OFSP and mazie rotation, (iii) continuous OFSP-legume intercropping and (iv) OFSP-legume intercrop in a rotation with maize-legume intercrop.

We quantified soil N, K, phosphorus (P), Zn and Fe to identify if high diversity cropping system supply and preserve soil nutrients to sustain future cropping season. Additionally, we evaluated storage root yield and beta-carotene, starch, protein, Fe and Zn contents to determined if improved soil fertility can enhance nutritional quality of sweetpotato.

Our results show an increment in available K content after the first season in sweetpotato-legume intercrop. Storage root yield remained similar between treatments in each season. Sweetpotato-legume intercropping showed increased contents of starch and protein and the highest iron concentration after the third season, exhibiting the potential of higher diversity cropping systems to enhance nutritional quality of roots. Furthermore, we observed soil K accumulation in highly diverse systems revealing increased potential to supply nutrients for the following growing seasons.

Keywords: Agroecosystems, food security, soil fertility

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