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Improving Sweetpotato Production through Sweetpotato - Legume Intercropping and Use of Phosphorus Fertilisers in Mozambique

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Abstract

Sweetpotato yields are adversely reduced by drought and this is often exacerbated by poor soil fertility in Mozambique. Many smallholder farmers have no access to irrigation facilities and inorganic fertilisers to improve crop yields. The objectives of the study were to evaluate the effectiveness of sweetpotato-legume intercropping and phosphorus (P) fertilisation on the storage root yield and nutritional qualities of an orange fleshed sweetpotato variety, Namanga. A field experiment was carried out at Umbeluzi Research Station in southern Mozambique. The experiments were carried out during three growing seasons from 2013 to 2015 using a factorial design in a split plot arrangement. Main plot treatments were 7 crop combinations; sole sweetpotato, sole groundnut, sole soybean, sweet potato-groundnut, sweetpotato-soybean, sweet potato-groundnut-soybean, groundnut-soybeans intercropping. The subplot treatments were 0, 20 and 40 kg P ha^{-1} applied at planting. Sweetpotato storage root and vine yields were agronomic traits measured at maturity using a scale. Nutritional quality traits measured were dry matter content, fructose, glucose, starch, sucrose, β-carotene, iron (Fe) and zinc (Zn). Roots were sliced to get 100 g compound sample, freeze dried for 72 hours, weighed, milled then analysed for nutrition content using near-infrared reflectance spectroscopy. Soil fertility parameters measured were cation exchange capacity (CEC), total nitrogen (N), available N and potassium (K). Phosphorus fertilisation at 40 kg ha^{-1}produced highest dry matter content, glucose, starch, sucrose in sweetpotato storage roots, vine yield, soil CEC, total N, available N and K. Phosphorus had no effect on β- carotene, Fe and Zn content in storage roots ($p > 0.005$). Sweetpotato-soybean intercropping at 40 kg P ha^{-1} produced highest vine yield, soil nutrients and CEC. Phosphorus at 20 kg ha^{-1} produced best storage root yield of 16.3 t ha^{-1}. Sweetpotato-groundnut intercropping produced best sweetpotato storage root yield and highest land equivalent ratio of 1.6. Sweetpotato-legume intercropping produced highest Zn and Fe content in sweetpotato storage roots. Sweetpotato-groundnut intercropping at 20 kg P $ha^{-1}$was best for sweetpotato storage root yield. This research recommends sweetpotato-groundnut intercropping at 20 kg P ha^{-1} for sweetpotato storage root yield maximisation and sweetpotato-soybean at 40 kg P ha^{-1} for best sweetpotato nutritional value.

Keywords: Groundnut, intercropping, smallholder farmers, soybean, sweetpotato

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