ABSTRACT

Sweet potato (*Ipomoea batatas* (L) *Lam*) yields are low in Uganda recording 4.5 t ha^{-1}, which is about 10 % of attainable yield. The low yields are attributed to infertile soil especially a deficiency in phosphorus (P) in tropical soils. Arbuscular mycorrhizal fungi (AMF) enhance P mobilization for plant uptake. However, most soils have a low AMF abundance and require inoculation. Therefore, specific objectives of the study were to determine i) the diversity and abundance of AMF in dominant sweet potato producing regions in Uganda; ii) the effectiveness of local AMF species on sweet potato production; iii) the sparing value of AMF on P fertilizer in sweet potato production, and iv) to evaluate the effectiveness of AMF in enhancing P uptake under moisture stress. Assessment of the diversity and abundance of AMF in dominant sweet potato zones revealed a similarity in the AMF communities with *Glomus* and *Acaulospora* species accounting for 38 and 20 %, respectively of the enumerated spores. Locally isolated *Acaulospora* sp2 was competitively effective as the commercial species *Glomus etunicatum*, *G. mosseae*, and *G. claroideum* in root colonization intensity, apparent P recovery efficiency (APRE), and biomass. *Glomus etunicatum* combined with 45 kg P ha^{-1} resulted in the highest root colonization intensity, APRE, and biomass at varying soil moisture levels followed by *Acaulospora* sp2. However, increasing moisture stress increased root colonization while reducing moisture stress increased nutrient uptake, and biomass/yield. Multiple AMF species inoculation increased root colonization, nutrient uptake and biomass as compared to single species. Four species AMF (*G. etunicatum*, *G. mosseae*, *G. claroideum*, and *G. intraradices*) gave tuber yields that were statistically similar to those of 45 kg P ha^{-1} when 90 kg N ha^{-1} and 100 kg K ha^{-1} were applied showing AMF sparing value of 25 % on inorganic P. It is recommended that local superior AMF species are isolated and identified for efficacy testing and multiplication which will reduce the cost of biofertilizer in Uganda and her neighbors.