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Effects of Arbuscular Mycorrhizal Inoculation and Phosphorus Application on Yield and Nutrient Uptake of Yam

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*To be sustainable, production in the traditional yam cropping system, faced with declining soil fertility, could benefit from yam–arbuscular mycorrhizal (AM) symbiosis, which can improve nutrient uptake, disease resistance, and drought tolerance in plants. However, only limited information exists about AM colonization of yam. A pot experiment was conducted to collect information on the response of two genotypes (*Dioscorea rotundata *accession TDr 97/00903 and* D. alata *accession TDa 297) to AM inoculation (with and without) and phosphorus (P) (0, 0.05, 0.5, and 5 mg P kg^{-1} soil). Factorial combinations of the treatments were arranged in a completely randomized design with four replicates. The percentage of AM colonization was significantly lowered at 5 mg P kg^{-1} soil rate in mycorrhizal plants of both genotypes. TDr 97/00903 showed more responsiveness to AM inoculation than TDa 297. The greatest AM responsiveness for tuber yield (52%) was obtained at 0.5 mg P kg^{-1} soil rate for TDr 97/00903. Mycorrhizal inoculation significantly increased root dry weight and tuber yield of TDr 97/00903 with the greatest values obtained at the 0.5 mg P kg^{-1} soil rate. Arbuscular mycorrhizal inoculation did not lead to significant ($P < 0.05$) changes in root length and area. Phosphorus application significantly increased the shoot dry weight and root diameter of TDa 297. Uptake of P was greatest at 0.5 mg P kg^{-1} soil in both genotypes and was significantly influenced by AM inoculation. Nitrogen (N) and potassium (K) uptake were greatest in mycorrhizal plants at 0.05 mg P kg^{-1} soil for TDr 97/00903 but at 0.5 mg P kg^{-1} soil of nonmycorrhizal plants of TDa 297. The increased tuber yield and nutrient uptake observed in the mycorrhizal plants indicate the potential for the improvement of nutrient acquisition and tuber yield through AM symbiosis.*

Keywords Arbuscular Mycorrhizal inoculation, nutrient acquisition, yam-based systems