

Effect of mixed organic-inorganic fertilizer on growth and phosphorus uptake of setaria grass (*Setaria splendida*).

Abstract

Increasing phosphorus (P) availability in tropical P deficient soils is a challenging task. Vermicomposting of organic wastes in the presence of phosphate rock facilitates the release of P and this has the potential to address crop P needs. A study was conducted to assess and compare the effects of application of gafsa phosphate rock (GPR) alone and GPR in combination with empty oil palm fruit bunches, earthworms (*Pontoscolex corethrurus*), arbuscular mycorrhiza fungi (*Glomus mosseae*), and P-enriched vermicompost, in fulfilling the P requirements of the setaria (*Setaria splendida* L.) grass. Application of mixed organic fertilizer combined with GPR was effective in increasing dry matter yield of grass, with 19% higher dry matter production as compared to the use of GPR alone. Among the organic fertilizers, application of P-enriched vermicompost was the best to support the grass growth. Nitrogen, P, Ca, and Mg uptake of the grass treated with P-enriched vermicompost was higher. Nitrogen and P utilization efficiency of the setaria grass treated with P-enriched vermicompost was also high. Residual P in soil treated with GPR was higher as compared to that treated with P-enriched vermicompost. However, plant available P was higher than that for the other GPR application techniques. The different types of earthworms had no effect on the quantum of nutrient uptake and the dry matter yield of the setaria grass. Application of a mixture of GPR and empty oil palm fruit bunch to the soil increased the dry matter of setaria compared to the use of inorganic fertilizer alone. We conclude that soil treated with P-enriched vermicompost was an efficient treatment for increasing availability of P (24.28 mg kg⁻¹), N, P, Ca and Mg uptake (53.76, 41.83, 13.58 and 15.16 mg pot⁻¹, respectively); which ultimately enhanced root volume (163 cm³) and dry matter yield (5.75 to 6.46 g pot⁻¹).

Keyword: Phosphate rock; Vermicompost; Earthworm; Arbuscular mycorrhizae; Dry matter yield; *Setaria splendida*.