



Research article

Enhancing of rock phosphate solubility and plant availability in clay soil through inoculation of the rock with phosphate solubilizing fungal cultures and the effect of the amendment of soil with inoculated rock phosphate on *phaseolus vulgaris* plant growth

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Abstract

Enhancing phosphate availability for plants stimulates early plant growth and hastens maturity. This study aimed to enhance solubility and plant availability of low soluble rock phosphate in clay soil by inoculation of the rock with phosphate solubilizing soil fungi. *A. niger* and *A. fumigatus* that showed the highest solubilizing ability among fungal species isolated from Egyptian soil. Rock phosphate was inoculated with Cultures of *A. niger* and *A. fumigatus* at different concentrations, results revealed that the best-solubilized phosphate value (63.5% & 50.9%) for *A. Niger* and *A. fumigatus*. Respectively was obtained at 30%w/v rock phosphate concentration and 15 days incubation period at 30°C. The inoculated rock phosphate was applied as phosphate fertilizer to (common bean) *phaseolus vulgaris* plant, the amount of total phosphate and plant available phosphate and water soluble phosphate of soil were determined. Soil total dissolved salt and pH were measured along the life cycle of *phaseolus vulgaris* plant and compared to those of native soil, rock phosphate, and super phosphate. It was found that the addition of rock phosphate inoculated with *A. niger* culture considerably increased soil total phosphate (by 2.5times), plant available phosphate (by 5.25 times) when compared to native soil. Rock phosphate inoculated with culture of *A. fumigates* increased soil total dissolved salts by 62.307% greater than native soil; it was also found that rock phosphate inoculated with *A. niger* enhanced the growth of *phaseolus vulgaris* plant better than rock phosphate inoculated with *A. fumigatus* culture, native soil, rock phosphate and super phosphate respectively.