Chapter 43

Biosolubilization of rock dust phosphorus by inoculation of isolates of Trichoderma spp

https://doi.org/10.56238/methofocusinterv1-043

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Keywords: Sustainability, Fertilization, Rock phosphate, MSF, filamentous fungi.

Unsustainable agricultural practices are linked to dependence on indiscriminate and excessive applications of chemical phosphate fertilizers that can have negative effects on the sustainability of soil safety and the environment. A modern alternative to reduce dependence on conventional chemical fertilizers is the use of rock dust in agriculture, a product that is easy to handle, with a greater residual effect and less impact on the environment. The use of Phosphate Solubilizing Microorganisms (MSF) plays an important role in making this essential macronutrient available for maintaining plant growth and development, thus making them a useful tool in the management of phosphorus fertilization. Thus, this study sought to evaluate the phosphorus solubilization of ground rock using inoculation of Trichoderma spp. The fungi used for the tests were isolated from the soil where vegetables were grown and identified by their macroscopic and microscopic characteristics. The test procedure for phosphate solubilization was carried out through fermentation in a SAMPAIO culture medium adapted with rock dust, residue from crushed stone production, as the only source of phosphorus. The presence of soluble phosphorus in the liquid culture medium was evidenced by the formation of yellowish color when performing the mixture with the ammonium molybdate-vanadate reagent and also by the formation of a halo in the solid NBRIP culture medium. Isolates B1 and B2 showed a high solubilization index (5.50 cm and 4.87 cm respectively), calculated by the ratio between the mean diameter of the halos and the mean diameter of the colonies of each isolate after 5, 10, and 15 incubation days. Regarding the time factor, the best results were verified at 15 days of incubation, which differed statistically from the others. These results prove the high rate of solubilization of the inorganic phosphate present in the ground rock powder promoted by the Trichoderma spp isolates, evidencing the promising potential of this research for the formulation of ecological, productive, and low-cost tools for agriculture.