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Investigation of Solubility of Eppawala Rock Phosphate Using Jeevamrutham

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Abstract

Phosphorus is one of the most essential nutrients for plant growth. It is usually supplied by phosphorus fertiliser. Rock Phosphate (RP) is the main source to produce phosphorus fertiliser. Sri Lanka has a good quality Apatite mineral deposit at Eppawala, which can be utilised as a source for phosphorus fertiliser after increasing its capacity for water solubility. Hazardous acids are commonly used in order to produce more soluble forms of phosphate fertiliser. However; it is not an economically feasible and environmentally friendly method in a country like Sri Lanka. Hence, use of biological process, as using microbes to increase the water solubility of RP is recommended. Jeevamrutham is an Indian traditional organic fertiliser that contains a mixture of microorganisms. This study investigates the suitability of Jeevamrutham which contains natural inoculums to increase the solubility of Eppawala RP. Five undisturbed forests (Sinharaja and Badagamuwa conservation forests, Nonperial Pine, Girandurukotte Teak, and Diyathalawa Turpentine plantations) were selected in order to obtain the soil samples (n=30) using simple random sampling as bio inoculums to prepare Jeevamrutham. Available phosphorus content of selected soil samples with (5 replicates of each) were determined using the Vandomolybdate method. Five different Jeevamrutham were prepared using the selected soil conditions. High-grade Eppawala rock phosphate (HERP) were treated by prepared Jeevamrutham. Available phosphorus content of each of the samples were determined using the Vandomolybdate method within 2 months in 7 days intervals. Randomised complete block design was used as an experimental design and data was analysed by using Two-way ANOVA and Turkey pairwise comparison tests. The results revealed that the all selected soil samples, which act as bio inoculum were contained higher available phosphorus than 1 ppm. Available phosphorus percentage was increased until 6 weeks for all treatments and then it had reduced gradually. Highest available phosphorus percentage was recorded in Pinus soil+Jeevamrutham treated HERP with 0.83% by mass after 6 weeks of treating. Teak soil+Jeevamrutham treated HERP showed high phosphorus percentage over a long period of time due to nature of the contained microorganisms. Thus, bio inoculum which grows in the Jeevamrutham supports to increase the water solubility of phosphorus in HERP.

Keywords: Available phosphorus, Jeevamrutham, HERP, Microorganisms