

EFFECTS OF DIFFERENT PROPORTIONS OF OYSTER SHELL POWDER ON PHOSPHORUS RETENTION IN A SANDY REGOSOL

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Abstract

Nutrient leaching is a phenomenon, where essential elements that important for the plant growth are lost from the soil with percolating water through the soil profile. Sandy regosols are characterized by inadequate water and nutrient retention, which poses significant challenges in crop cultivation. To address the shortcomings of low-fertility soils, the application of oyster shell powder (OSP) as a soil amendment is a viable solution to enhanced soil quality. This natural product offers several benefits to soil health, including enhanced pH balance and increased nutrient levels. This study was conducted to determine the effects of different proportions of OSP on phosphorus retention in a sandy regosol. An indoor leaching column experiment was carried out at the Soil Science Laboratory, Eastern University, Sri Lanka. The experiment consisted of five treatments, such as the control without OSP (T₁) and 0.6% (T₂), 0.7% (T₃), 0.8% (T₄), and 0.9% (T₅) of OSP amendment by weight. Urea, Triple Super Phosphate and Muriate of Potash were used as recommended chemical fertilizers. All the treatments were replicated four times in a Completely Randomized Design. The leachate was measured for phosphorus (P) from four leaching cycles within two months period. At the end of the study, available P content in soils was measured. Statistical analysis and mean separation were done by Turkey test at a 5% significance level. The leachate analysis indicated the absence of phosphorus in the OSP treated treatments due to the formation of compounds such as $\text{Ca}_3(\text{PO}_3)_2$ and $\text{Ca}_{4.885}(\text{PO}_4)_3(\text{OH})_{0.654}$. And also, the available P content was significantly high in soils where OSP was added in higher proportions due to the solubility of the insoluble phosphate compounds by the action of microorganisms. Results revealed that T₅ demonstrated the highest P retention capacity, highlighting the potential of oyster shell powder as a soil amendment.

Keywords: Oyster shell powder, P retention, Sandy soil

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