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Potential of potassium polyacrylate polymer and shrimp pond sludge for enhancing water retention capacity of sandy regosols

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Water retention in soil is vital for the uninterrupted supply of essential nutrients to the plants. Materials that enhance moisture retention in soil are becoming scarce with the present climate change. Sandy regosols is a highly permeable soil type with less water retention capacity (WCR). This study attempts to evaluate the amendment of shrimp pond sludge (SPS) which is a waste material, and potassium polyacrylate which is a super absorbent polymer (SAP) on the water retention capacity of sandy regosols. The treatments were T1 – Control with no added amendments, T2 – Soil with SAP applied at the rate of 0.2 %, T3 – Soil with SAP applied at the rate of 0.4 %, T4 – Soil with SPS applied at the rate of 10 %, T5 – Soil with SPS applied at the rate of 20 %. All the treatments each with three replicates were arranged in a completely randomized design. The WRC was evaluated on a weight gain basis. A microbial growth assay was done to evaluate the effect of these amendments on soil microorganisms. Analysis of variance (ANOVA) was used to analyze the data using R statistical software (version 3.2.4). Initial analysis of soil indicated the organic matter content of this soil is as low as 0.3% which indicates an extremely poor contribution from organic matter content for its WRC and the Initial WRC was 28.9%. Significantly high WRC was shown in 0.4% of SAP amended soil throughout the experiment, while the lowest was shown in the control. The WRC of the treatment of SAP added at the rate of 0.4% soil has been increased to a level of 36.12% which was a 29% increment compared to the control. WRC of the shrimp pond sludge added treatment has been increased by 8% compared to control. There was no significant difference in the microbial population of SAP and SPS amended soils. The results indicate the potential of using SAP and SPS to enhance the water retention capacity in soil.

Keywords: Shrimp pond sludge, Super absorbent polymer, Water retention capacity

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