

IMPACTS OF APPLYING DRINKING WATER SLUDGE AS A SOIL AMENDMENT FOR CHILI CULTIVATION UNDER CONTROLLED CONDITIONS

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This research investigates the potential of using sludge from drinking water treatment plants as a soil amendment and its impact on soil properties and plant growth. The study was conducted in a Completely Randomized Design (CRD), with six treatments and five replicates, using MICH HY1 chili (*Capsicum annum* L.) variety as the indicator crop. The treatments were as follows: T1 (100% sludge, 0% fertilizer), T2 (75% sludge, 25% fertilizer), T3 (50% sludge, 50% fertilizer), T4 (25% sludge, 75% fertilizer), T5 (0% sludge, 100% fertilizer) and T6 (0% sludge, 0% fertilizer). Soil pH, EC, available N, available P, exchangeable Na, K, Ca, and organic matter content were analysed at the initial and 50% flowering stages using standard analytical procedures. Plant height, canopy diameter and leaf count were measured weekly and at the 50% flowering stage. Data analysis was conducted using RStudio software. Initial analysis of soil and sludge revealed favourable soil characteristics for chili cultivation, highlighting sludge as a rich nutrient source. Soil pH ranged from slightly acidic to alkaline. Non-saline electrical conductivity ensured a favourable condition for chili growth. Available nitrogen content was significantly higher ($p \leq 0.05$) in the 100% chemical fertilizer treatment. Available phosphorus content was significantly higher ($p \leq 0.05$) in the 25% sludge + 75% chemical fertilizer and 100% chemical fertilizer treatments. Exchangeable potassium, calcium, and sodium levels varied across treatments. Soil organic matter was significantly higher ($p \leq 0.05$) at 100% sludge and 75% sludge + 25% chemical fertilizer treatments. At the 50% flowering stage, plant height was significantly higher ($p \leq 0.05$) at 100% chemical fertilizer. Leaf count and canopy diameter also varied, with higher fertilizer concentrations leading to increased values. Treatments with 25% sludge + 75% chemical fertilizer and 100% chemical fertilizer proved successful in fostering chili growth.

Keywords: Chili cultivation, Drinking water sludge, Plant growth, Soil amendments, Soil properties