

EFFECTS OF DRINKING WATER SLUDGE APPLICATION FOR CAPSICUM (*Capsicum annuum*) CULTIVATION AS A SOIL AMENDMENT UNDER CONTROLLED CONDITION

W.A.G. Sanjeewa¹, D.M.S. Duminda¹ and K.V. Chandani²

¹Department of Agricultural Engineering and Soil Science, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka.

²School of Agriculture, Anuradhapura, Sri Lanka.

This study investigated the potential of using sludge from drinking water treatment plants as a soil amendment to enhance soil properties in Capsicum (*Capsicum annuum*) growth and yield. A completely randomized design (CRD) with six treatments and five replicates tested using various sludge-to-fertilizer ratios: T1 (100% sludge), T2 (75% sludge + 25% chemical fertilizer), T3 (50% sludge + 50% chemical fertilizer), T4 (25% sludge + 75% chemical fertilizer), T5 (100% chemical fertilizer), and T6 (control). Soil parameters, including pH, electrical conductivity (EC), and soil nutrients (N, P, K, Ca), were measured at initial, 50% flowering, and harvest stages. Plant growth parameters (plant height, canopy diameter and leaf count) were recorded weekly, with yield assessed across three harvests. Data analysis was conducted using R Studio software and mean separation was carried out using the Least Significant Difference (LSD) test. Initial sludge analysis showed the sludge provided substantial nutrients, with neutral to slightly alkaline pH and moderate EC. At 50% flowering, 100% chemical fertilizer treatment had significantly higher ($p < 0.05$) available P and N levels while at harvest, available P peaked in the 25% sludge + 75% chemical fertilizer and 100% chemical fertilizer treatments, Nitrogen was higher in the 50% sludge + 50% chemical fertilizer treatment while exchangeable soil K was the highest with 100% chemical fertilizer at the flowering stage. Soil exchangeable Ca and Na levels peaked in the 50% sludge + 50% chemical fertilizer treatment at flowering but showed no significant differences ($p > 0.05$) at harvest. Higher fertilizer levels notably improved growth, with 50% sludge + 50% chemical fertilizer and 100% chemical fertilizer treatments enhancing capsicum growth and yield.

Keywords: Chili growth, Chili yield, Fertilizer ratios, Sludge application, Soil nutrients