

SUSTAINABLE SEEDLING BLOCK PRODUCTION THROUGH THE INTEGRATION OF TEA PROCESSING WASTE AND ORGANIC MATERIALS

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Abstract: The purpose of this study is to utilize waste tea from tea processing industries to prepare seedling blocks incorporating other organic materials. Refused tea waste was obtained from a leading commercial tea factory in the Sabaragamuwa province of Sri Lanka. Various media materials, such as tea waste only (T1), tea waste: biochar (2:1) (T2), tea waste: goat manure (2:1) (T3), tea waste: vermicompost (2:1) (T4), and tea waste: poultry manure (2:1) (T5), were used to prepare these biodegradable seedling blocks. The materials were naturally air-dried, crushed, and sieved by a 2 mm mesh. To prepare one seedling block, 15 g of ingredients were hand-mixed, including 12 mL of starch solution (5%) and 12 mL of water with 1.5% CuSO₄ solution. Seedling blocks were prepared by compression with a load of 200 N using a compression cylinder. The average dry mass of the seedling block was 22 g, which served as a reference. A depression was created in the centre to place the cabbage seeds, and the experiment was replicated four times. Seedling blocks were oven-dried at 60°C for 24 hours, and the blocks were 5 cm in diameter and with a height of 3 cm. The parameters, such as relaxation density, porosity, volume change ratio, and seedling emergence, were evaluated at 5% significance level. Based on the analyzed data, relaxation density, which reflects the stability of the seedling blocks after 48 hours of relaxation, was not significantly influenced among all the tested treatments. It was noted that T2 treatment resulted in higher porosity (0.99%) and a volume change ratio of 2.12 compared to all other treatments. Additionally, 80% of seedling emergence was observed in the T2 treatment, indicating good performance compared to all other treatments. Hence, integration of the tea processing waste and other organic materials can be used as potential raw materials to produce sustainable seedling blocks.

Keywords: Biochar; Manure; Seedling emergence; Tea waste; Vermicompost