

Application of Vermicompost municipal sewage sludge as a soil amendment

Authors: Le Hai Yen*

* Faculty of Environment, Danang University of Science and Technology

Introduction

- Municipal sludge is a heterogeneous mixture of organic and inorganic components generated from sewer systems and wastewater treatment plants. At present, Vietnam primarily manages sludge through dewatering and landfilling, leading to land scarcity, leachate generation, and greenhouse gas emissions.
- Vermicomposting is an effective, rapid, and environmentally friendly method that facilitates aerobic biodegradation, producing vermicompost rich in nutrients and beneficial microorganisms.
- Vermicompost has great potential for improving nutrient-deficient soils at mining dumpsites, contributing to land restoration.

Methodology

Experimental model for evaluation of quarry waste dump soil reclamation

Model	Composition	Mixing ratios
M1	Soil – worms – sludge	1:3
M2	Soil	1

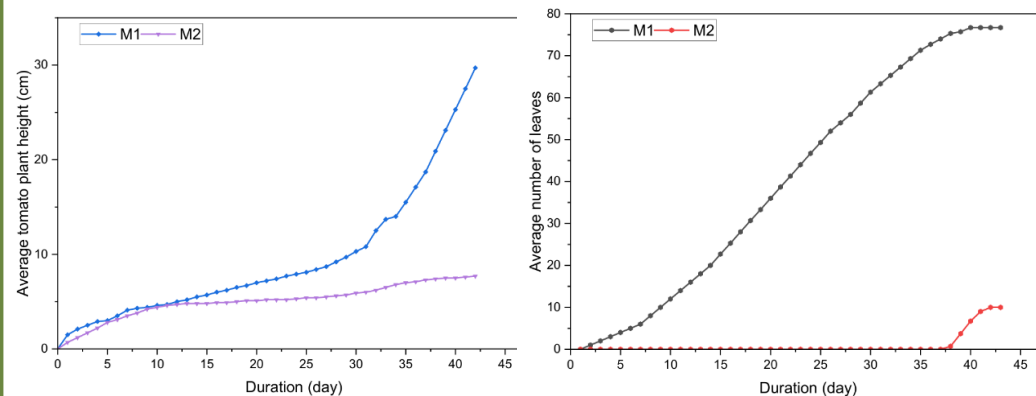
Two treatments (M1–M2), each replicated three times, resulting in a total of six pilots. The objective was to evaluate plant growth performance under different nutrient conditions through mixing ratios of quarry waste dump soil, municipal sewage sludge, and *Eudrilus Eugeniae* (earthworms). The growth rate of the plants was monitored for a duration of 43 days.

Results and discussion

Characteristics of municipal sewage sludge

No.	Parameters	Sewage sludge
1	pH	6.4 ± 0.1
2	Moisture content (%)	85 ± 2
3	Ash content (%)	22 ± 0.5
4	TOC (%)	24.7 ± 0.44
5	T-N (%)	1.42 ± 0.1
6	T-P (%)	0.11 ± 0.1

Although the phosphorus content is relatively low compared to nitrogen, the overall nutrient profile confirms that sewage sludge has potential as a raw material for organic fertilizer.



Figures clearly illustrate the superior growth performance of tomato plants in model M1 compared to model M2. In M1, where municipal sewage sludge and earthworms were incorporated, plants exhibited vigorous and continuous development, with average height increasing sharply after day 25 and reaching 29.7 cm by day 43, along with a steady rise in leaf number to approximately 76.7 leaves by day 40. In contrast, plants in M2 cultivated solely on degraded quarry waste soil—showed slow and limited growth, with height increasing only 2.5 cm over the same period and leaf formation significantly delayed, reaching merely 10 leaves by day 43. These results confirm that the M1 condition provided a more favorable environment for tomato plant growth and development.



Tomatoes plants in M1 and M2 on day 43