Soil Rehabilitation Potential of Co-Compost Pellets Made from Municipal Solid Waste and Dewatered Faecal Sludge as Feedstock

Sagara Pushpa Kumara[1], Jayantha Weerakkody[1], Bandula Ranaweera[2], Felix Thiel[3]

1 Wayamba University of Sri Lanka, Department of Plantation Management, Sri Lanka
2 Wayamba University of Sri Lanka, Department of Horticulture & Landscape Gardening , Sri Lanka
3 Ruhr University Bochum, Faculty of Geosciences, Department of Soil sciences, Germany

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INTRODUCTION

➢ The **depletion of soil fertility** has led to a loss of productivity of agricultural lands in the Sri Lanka. Inappropriate agricultural practices, excessive and extensive use of chemical fertilizers, herbicides and pesticides, erosion, inadequate use of organic matter and poor soil conservation measures are main issues and threats of fertility decline.

➢ **Solid waste management** challenges are felt most keenly in Sri Lanka as a developing country faces severe issues in managing the daily generated liquid and solid.

➢ **Co-composting** of dewatered faecal sludge (DFS) and the organic fractions of municipal solid waste (MSW) is considered as an appropriate low-cost technology that is capable of enhancing sanitation and waste management in low income countries.

➢ **Biochar** has long been used as a soil amendment. It is supposed to provide many benefits which contribute to soil fertility with long lasting effects.

➢ **Pelletization** is used to reduce the bulk density and simplify field application. This technology can be used to enhance the co-compost quality by adding biochar.

MAIN OBJECTIVE

The aim *of this research was to evaluate the effect of MSW and DFS co-compost pellets produced with the addition of mineral fertilizer and biochar on soil chemical and biological properties.*

METHODOLOGY

Co-composting

➢Trapezoidal windrow type co-compost piles were prepared with 18m^3 volume and **70% Municipal Solid Waste** and **30% Dewatered Faecal Sludge** .

Preperation of Biochar

➢ Oil palm empty fruit bunches **(EFB)** were used as a feedstock. Biochar was made using a pyrolyzer.

Pelletization

➢ Resulted co-compost was mechanically pelletized using biochar and mineral fertilizer as additives.

Field Test

➢ Co-compost pellets are used in maize (***Zea mays* L.**) cultivation.

➢ The experiment was arranged as Randomized Complete Block Design using 7 treatments.

Laboratory analysis

➢ Chemical properties - Total Nitrogen (%), Available Phosphorus, Organic Carbon (%), pH and EC

➢ Biological properties - Soil microbial biomass and activities

TREATMENT COMBINATION

➢ Seven types of fertilizer combinations were used for the experiment as given in the table.

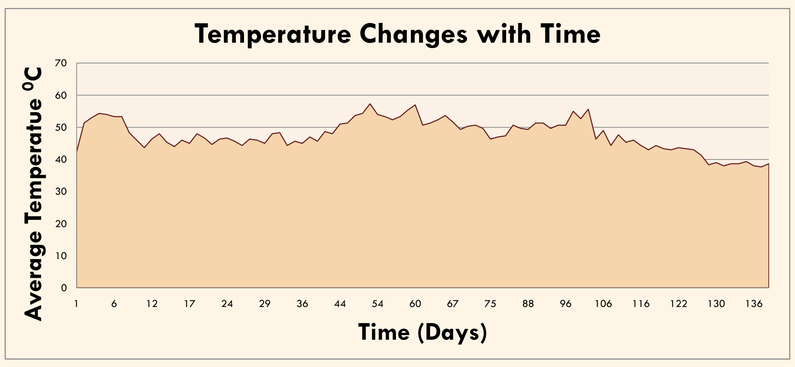
➢ 100% available Nitrogen in T_2 and T_4 signifies the assumption that all Nitrogen added is absorbed into the plant.

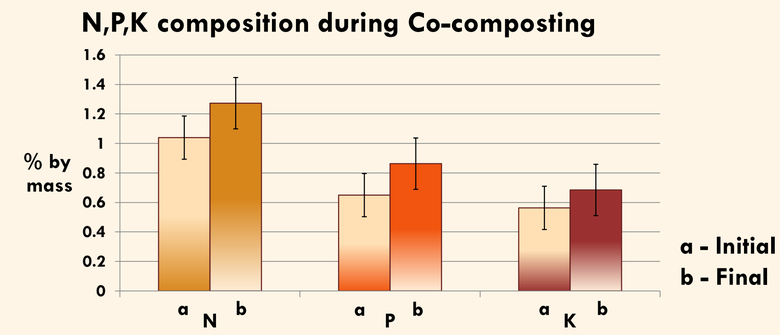
Code	Treatment
T_1	Mineral fertilizer
T_2	DFS-MSW-pellet 100% available N
T_3	DFS-MSW-pellet 30% available N
T_4	DFS-MSW-Biochar-pellet 100% available N
T_5	DFS-MSW-Biochar-pellet 30% available N
T_6	DFS-MSW-Mineral-Pellet
T_7	DFS-MSW-Biochar-Mineral-Pellet

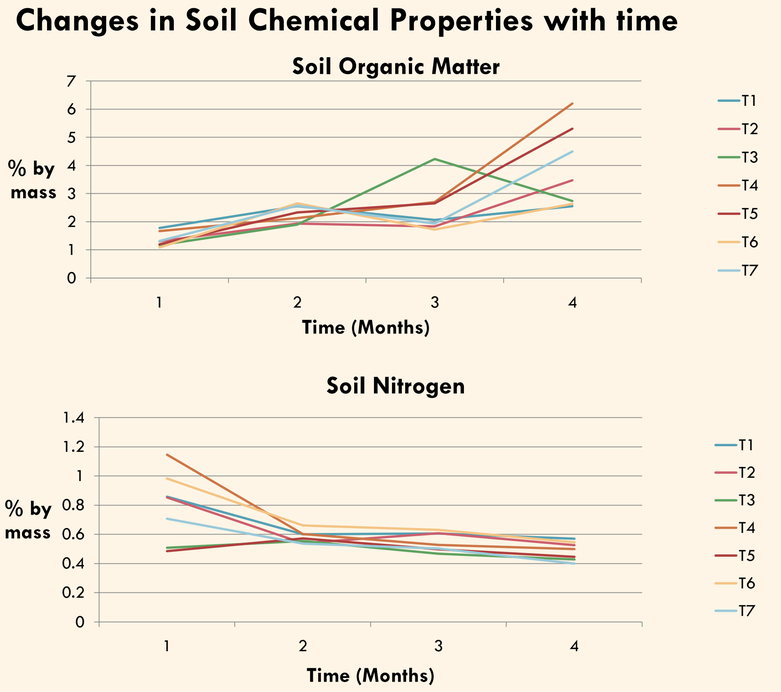
RESULTS

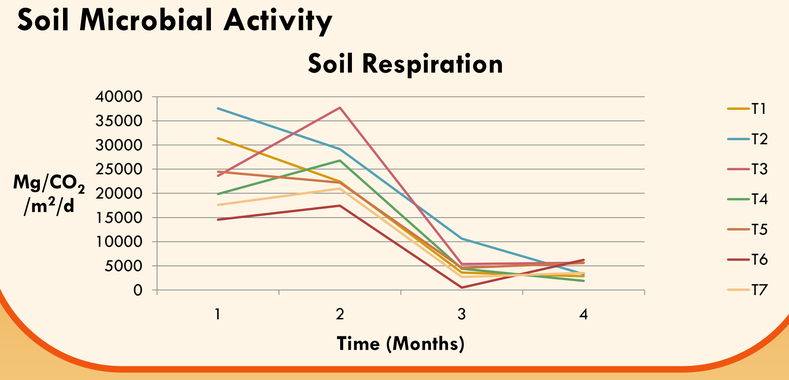
Co-compost Production

Temperature changes during the co-composting process, was different from normal composting process. Temperature change in co-compost piles is shown below.









KEY FINDINGS

- Co-compost helps to improve soil organic matter with compared to the mineral fertilizer application.
- Co-compost produced from MSW and DFS can potentially be used in soil rehabilitation.
- Co-compost enriched with biochar act as a soil amendment.
- Soil microbial activity was not significantly changed with the application of co-compost during the tested period.

FUTURE PERSPECTIVE

- Understanding the behavior of co-compost pellets and biochar can be obtained by conducting continuous crop rotation in the same trial under normal rain fed conditions.
- Further, analysis of plant available nutrients are needed.

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PROJECT PARTNERS

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awspk.diogit5@gmail.com