

SPECIMEN FORMAT FOR THESIS OF MONTH

Faculty	:	Bio Science
Department	:	Botany
Branch / Area	:	Organic Farming
Sub Subject Heading	:	Organic Farming
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Title of the thesis	:	Bioconversion of Paddy and Coffee husks as Organic Manure and its effect on plant Growth and Soil Fertility BIOCONVERSION OF PADDY AND COFFEE HUSKS AS ORGANIC MANURE AND ITS EFFECT ON PLANT GROWTH AND SOIL FERTILITY bioconversion of paddy and coffee husks as organic manure and its effect on plant growth and soil fertility
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Name f the Supervisor	:	Dr.A. Vijayalakshmi

Designation of Supervisor	: Professor & Head, Department of Botany Dean, Academics.
Centre/ Department/ School in which research was conducted	: Department of Botany, School of Biosciences
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Abstract within 300 words

Biocomposting is a sustainable strategy for managing agro-industrial wastes in organic farming by reducing soil hazards and enhancing fertility. This study investigates the bioconversion of paddy and coffee husks into organic manure using *Pleurotus eous*, *Pleurotus florida*, *Trichoderma asperelloides*, and *Eisenia fetida*. The experiment was conducted in four phases. In Phase I, microbial population analysis revealed a significant increase in bacteria, fungi, and actinomycetes, particularly in C6 (raw coffee husk + 6.5g *P. eous*, 6.5g *P. florida*, 7g *T. asperelloides* + *E. fetida* at 5t/ha), followed by C3 (raw paddy husk with the same inoculum) over 20, 40, 60, and 80 days. FT-IR and FESEM analyses confirmed the maturity and stability of the biocomposts. Physico-chemical assessments showed that C6 significantly reduced lignin, cellulose, EC, organic carbon, and C:N ratio, while increasing nitrogen, phosphorus, potassium, calcium, and magnesium content.

In Phase II, pot culture experiments were conducted on moth bean, black gram, fenugreek, and kalmegh with six treatments (T1–T6) and a control. Treatment 6 (T6) significantly enhanced biometric parameters, including root and shoot length, leaf and nodule number, and fresh and dry weight. Yield parameters, such as pod number, length, seeds per pod, and seed weight were maximum in T6 compared to the control and other treatments. In Phase III, biochemical analysis revealed that T6 plants had the highest levels of protein, carbohydrate, chlorophyll (a, b, and total), and leghaemoglobin. In Phase IV, phytochemical screening of T6 methanol extracts from fenugreek and kalmegh seeds and leaves revealed maximum antioxidant and antibacterial activity. Pre- and post-harvest soil analysis demonstrated that T6 led to the greatest improvement in pH, EC, and nutrient availability (N,

P, K). Thus, biocomposting paddy and coffee husks with *P. eous*, *P. florida*, *T. asperelloides*, and *E. fetida* effectively enhanced soil fertility, plant growth, and biochemical properties. The present research offers a sustainable solution for recycling agro-industrial wastes, boosting crop productivity and promoting environmentally friendly organic farming practices.

i) Major Objectives:

- Preparation of biocompost from paddy and coffee husk wastes.
- To determine the microbial dynamics and physico-chemical transformations during composting.
- To interpret the surface morphological characteristics of raw and biocompost using FESEM.
- To evaluate the functional group of the raw sample and compost by FT-IR spectroscopy.
- To evaluate the efficiency of biocompost on the growth and yield parameters of the selected plants.
- To study the biochemical parameters such as chlorophyll, protein, carbohydrates (leaves and seeds) and leghaemoglobin content in root nodules of selected plants.
- To analyze the antioxidant and antibacterial activity in the seed and leaf extracts of selected plants.
- To identify the phytochemicals present in the methanol extracts of leaves and seeds of the best treatment in medicinal plants.
- To assess the initial and post - harvest soil analysis.

ii) Hypothesis:

- ❖ There is significant difference between the paddy and coffee husk biocomposting.
- ❖ Biocomposting of paddy and coffee husk waste poses no drawbacks or negative impacts.

iii) Methodology:

Phase - I

- Collection of agro industrial wastes
- Collection of microorganisms
- Collection of earth worms
- Preparation of the compost pit

- Vermicompost experimental tray preparation
- Microbial population during 20th,40th,60th& 80th days of composting process
- Morphological study of the raw and compost samples by using Field Emission Scanning Electron Microscope (FESEM) and Fourier Transform Infrared (FTIR) spectroscopy.
- Physico - chemical parameters of raw and composted paddy and coffee husk

Phase II

- Pot culture experiment
- Biometric characters
- Yield parameters
- Authentication of test plants

Phase III

- Biochemical analysis
- Leghaemoglobin content analysis
- Phyto chemical analysis

Phase IV

- Antioxidant activity
- Antibacterial activity
- Pre and Post harvest soil analysis

iv) Findings:

This study highlights the potential of recycling paddy and coffee husk waste into biocompost using *Pleurotus eous*, *Pleurotus florida*, *Trichoderma asperelloides*, and *Eisenia fetida*. The resulting biocompost proved to be an efficient organic manure, significantly enhancing the biometric, yield and biochemical parameters of moth bean (*Vigna aconitifolia* Var. RMO-40), black gram (*Vigna mungo* Var. CO-6), fenugreek (*Trigonella foenum-graecum* Var. Lam Selection-1), and kalmegh (*Andrographis paniculata* Var. CIM-Megha). Crops grown with the biocompost showed improved root and shoot length, leaf and nodule number, fresh and dry weight, and overall yield. The biocompost also enhanced biochemical properties, including higher protein, carbohydrate and chlorophyll content, along with notable antioxidant and antibacterial activity.

Pre- and post-harvest soil analysis revealed increased pH, electrical conductivity, and nutrient availability (N, P, and K), indicating improved soil fertility. The present study demonstrates that biocomposting can reduce the need for chemical fertilizers promoting sustainable farming practices. By encouraging the use of organic manure, this approach supports healthier crops, enhances soil quality and contributes to a safer, more eco-friendly agricultural system.

Examiners

Internal Examiner	Dr.Anand Naraigh Singh : Professor, Department of Botany, Soil Ecosystem and Restoration Ecology Lab, Punjab University, Chandigarh-160014 India.
External Examiner	Dr.Muthu Thiruvengadam : Associate Professor Department of Applied Biosciences Konkuk University Seoul, South Korea.