

ABSTRACT

Safe management of plant and animal waste is one of the most important environmental issues in the world. Disposable of groundnut shells and toddy palm shells are a threat to the environment. A significant amount of shell residuals dumping or burning process leads to the accumulation of waste causing environmental pollution. Hence, minimizing the waste by recycling promotes zero-waste production. Recycling of organic waste is most important for preserving natural resources. The current research was performed to investigate the growth and yield performance of bhendi, cluster bean, coriander and fenugreek by the influence of groundnut shell and toddy palm shell composts. The degradation of groundnut shell and toddy palm shell through the microbial consortium and *Trichoderma asperelloides* along with vermicomposting technology has been presented. The treatments includes T₁: Groundnut shell + *Trichoderma asperelloides* + *Eisenia fetida*, T₂: Groundnut shell + microbial consortium, T₃: Groundnut shell + microbial consortium + *Eisenia fetida*, T₄: Toddy palm shell + *Trichoderma asperelloides* + *Eisenia fetida*, T₅: Toddy palm shell + microbial consortium, T₆: Toddy palm shell + microbial consortium + *Eisenia fetida* respectively. During composting bacterial, fungal and actinomycetes counts were observed at the regular interval of 30, 60 and 90 days which achieved peak stage on 60th day of composting. The physical and chemical parameters of raw and composted samples were analyzed. The results observed range between pH (6.01–6.40), EC (1.39-2.59 dS m⁻¹), TN (0.91-1.39%), TP (1.98-2.51%), TK (2.36-3.85%), Ca (2.27-3.25%) and Mg (2.18-2.99%), were significantly increased while lignin (9.54-6.69%), cellulose (10.71-6.35%), OC (29.8–26.5%) and C:N ratio (29:1-19:1) were considerably reduced in C₆ and other treatments. In addition, FT-IR analysis showed high degradation in C₃ and C₆ and XRD confirms excellent compost maturity. SEM micrographs of final composts revealed the presence of many structural changes. The matured compost was used to evaluate the growth and yield characteristics of bhendi, cluster bean, coriander and fenugreek in field trial in 2019. The application of toddy palm shell + microbial consortium + *Eisenia fetida* (T₆) enhanced the growth, yield, biochemical and soil nutrients status of selected test crops compared to the control. Further, the best treatment (T₆) compared with coir pith and effective microorganisms in field studies during 2020.

The growth, yield, biochemical parameters and nutrients status of soil was observed maximum in either coir pith (T₁) or effective microorganisms (T₃). However, the application of bio-composted toddy palm shell by using microbial consortium and *Eisenia fetida* (T₆) showed near to maximum value. This may be due to the presence of consortium of microorganisms significantly increased the level of plant essential nutrients by producing plant growth regulators. The study revealed that composting could be a sustainable method for recycling organic waste into organic fertilizers, which can help in increasing productivity by enhancing nutrient supply.