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Investigation of the Decomposition Rate of *Gliricidia Sp*, *Murraya Sp*, and *Cynodon Sp* under Different Abiotic Factors

Perera, G.C.A.*, Pieris, H.M.S., Muthukumarana, T.T., Madurangi, D.A.M., Jayalath, J.M.S.

Department of Zoology and Environment Sciences, University of Colombo, Colombo 3, Sri Lanka
**chashaliamaya166@gmail.com*

Abstract

The efficient decomposition of organic matter is fundamental to maintaining healthy and productive agricultural ecosystems and establishing a sustainable bioeconomy that maximizes resource utilization and minimizes waste. It directly influences nutrient cycling, soil health, and crop yields. Understanding the decomposition rates of organic matter is crucial for developing effective waste management strategies, as it directly influences the generation of greenhouse gases and the overall environmental impact of organic waste. This study aims to analyze the key factors governing decomposition rates in natural environments by investigating the decomposition rates of *Gliricidia sp*., curry leaves (*Murraya sp*.), and grass (*Cynodon sp*.) under varying abiotic factors. A total weight of 635.00 g 12 litter bags with holes for ventilation were prepared using 600.00 g of soil and 35.00 g of leaves. The selected leaves, *Cynodon sp.*, *Gliricidia sp*., and *Murraya sp*. were piled on the soil layer in the litter bags. Three setups containing *Gliricidia sp*. were monitored separately for water availability, pH, and light intensity. One control setup was kept without any changes. The same procedure was repeated to the other two types of leaves and 3 replicates from each setup were used to get measurements. Water availability was measured using the mass difference of every other day. Initial pH was maintained at 3.8 using Bilin extract, the initial set pH value was maintained, and the decomposition rate was compared with the control. The decomposition rate was measured using the heights of the mixtures and weight differences every other day. Based on our findings, *Glyricidia sp*. shows the highest decomposition rate in response to changes in each abiotic factor. It exhibits the highest rate of decomposition with variations in light intensity. Compared to the control conditions, all three plant species show the highest decomposition rates at an acidic pH of 3.8. A reduced rate of decomposition is shown among all species when water availability varies. Also, this suggests that acidic conditions significantly enhance decomposition, whereas fluctuations in water availability tend to impede the process. The findings of this study provide valuable insights into the factors that influence the decomposition of organic matter, which can be applied to improve composting practices and other waste management initiatives, ultimately contributing to pollution control and environmental sustainability.

Keywords: *Decomposition, Abiotic factors, Organic matter, Ecosystem, Nutrient cycling.*