



“Gheorghe Asachi” Technical University of Iasi, Romania



SUSTAINABILITY OF DAIRY FARMS THROUGH VERMICOMPOSTING OF CATTLE MANURE AND CORN SILAGE RESIDUES

Thiago Edwiges^{1*}, Felipe Martins Damaceno², Higor Eisten Francisconi Lorin²,
Alexssander Juliano Tavares¹, Alessandro Minikowski¹

¹Federal Technological University of Paraná, Department of Biological and Environmental Sciences, Medianeira/Brazil

²Western Parana State University, Research Group on Water Resources and Environmental Sanitation, Cascavel/Brazil. Rua
Universitária, 2069 Jd. Universitário, 85819-110 - Cascavel/Brazil

Abstract

This article analyzes the characteristics of the vermicomposting process and the reproduction of *Eisenia andrei* earthworms during the vermicomposting of corn silage residues (CSR) with increased proportions of cattle manure (CM) by 10%, 30%, 50%, 70%, and 90% (volume/volume, v/v) resulting in the treatments CM₁₀, CM₃₀, CM₅₀, CM₇₀, and CM₉₀. Physical, chemical, and biological parameters such as density, particle size, mass reduction, nitrogen, electrical conductivity, pH, number of earthworms, and cocoons were evaluated by using multivariate statistical analysis. The final densities after the vermicomposting increased 1, 25, 88, 142, and 178% in the treatments CM₉₀, CM₇₀, CM₅₀, CM₃₀, and CM₁₀, respectively. The increasing proportions of CSR improved biodegradability, mass reduction, n and carbon/nitrogen ratio (C/N). The dry mass reduction in the vermicompost ranged from 50.6 – 67.6% and it was higher than 62% in the treatments with more than 50% of CSR. The treatment CM₅₀ also resulted in the maximum increase in the nitrogen content. Higher proportions of CM increased pH, reduced electric conductivity (EC), and improved the reproduction of earthworms. Treatments CM₉₀ and CM₇₀ resulted in the highest increase in the number of earthworms, from 20 to 613 and 696, respectively. Thus, treatments with 50% of CM and 50% of CSR are recommended for the production of vermicompost and earthworms as by-products. The combination of favorable agronomic characteristics to the vermicompost and an attractive reproduction rate of earthworms is key-factor to improving biowaste sustainability in milk-producing units.

Key words: agricultural waste, earthworm reproduction, multivariate analysis, vermicompost quality

Received: March, 2021; Revised final: December, 2021; Accepted: December, 2021; Published in final edited form: March, 2022

* Author to whom all correspondence should be addressed: e-mail: thiagoe@utfpr.edu.br