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

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Abstract

This article analyzes the characteristics of the vermicomposting process and the reproduction of *Eisenia andrei* earthworms during the vermicomposting of cattle manure (CM) with increased proportions of corn silage residues (CSR) (10%, 30%, 50%, 70% and 90% volume/volume, v/v). Physical, chemical and biological parameters such as density, particle size, mass reduction, nitrogen, electrical conductivity, pH, number of earthworms and cocoons were monitored and evaluated using multivariate statistical analysis. The final densities after the vermicomposting increased 1, 25, 88, 142 and 178% in the treatments CM_{90}, CM_{70}, CM_{50}, CM_{30} and CM_{10}, respectively. The increasing proportions of CSR improved biodegradability, mass reduction 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 CM_{50} 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 CM_{90} and CM_{70} resulted in the highest increase in the quantity of earthworms, from 20 to 613 and 696, respectively. Thus, treatments with 50% of CM and 50% of CSR is 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 a key-factor to improve biowaste sustainability in milk-producing units.

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

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