



"Gheorghe Asachi" Technical University of Iasi, Romania



---

## CENTRALIZED TREATMENT OF WASTE THROUGH COMPOSTING: INFLUENCE OF THE C/N RATIO AND BULKING AGENT

Felippe Martins Damaceno<sup>1\*</sup>, Camila Marta de Abreu<sup>2</sup>, Igor de Souza Batista<sup>2</sup>, Luis Felipe do Nascimento Pinheiro<sup>2</sup>, Renata Mendes Serralheiro<sup>2</sup> and Thiago Edwiges<sup>2</sup>

<sup>1</sup>Research Group on Water Resources and Environmental Sanitation, Western Parana State University, Cascavel/Brazil. Rua Universitária, 2069 Jd. Universitário, 85819-110 -Cascavel/Brazil

<sup>2</sup>Department of Biological and Environmental Sciences, Federal Technological University of Paraná, Medianeira/Brazil

---

### Abstract

The objective of this study was to evaluate the feasibility of composting municipal solid waste and agro-waste and the effects of initial C/N ratios of 35/1, 28/1 and 25/1 using 0%, 18% and 28% recalcitrant bulking agent during the composting process and in the final compost. Parameters such as thermal and exothermic profile, losses of organic matter and nitrogen, pH, electrical conductivity and C/N ratio were evaluated during the composting process. The quality of the organic compost was evaluated through the germination test and Brazilian normative instructions. The losses of organic matter were adjusted to a first order kinetic equation and the cluster analysis was applied to assess the similarity between the piles. Temperatures necessary for the elimination of pathogens were reached in all piles. The duration of the thermophilic phase doubled (49 days) in a pile with the initial C/N ratio of 35/1 without recalcitrant bulking agent. In the piles with initial C/N ratios of 28/1 and 25/1 and the addition of 18% and 28% recalcitrant bulking agent, thermal peaks (68 to 72 °C) were achieved more quickly (4 to 5 days) and the degradation of organic matter was more intense (0.071 to 0.173 d<sup>-1</sup>). The organic composts obtained did not present phytotoxicity (germination index > 90%). Composting proved to be viable for the treatment of solid waste in a centralized way and the C/N ratio of 25/1 combined with 28% recalcitrant bulking agent ensured more significant degradation and better quality of the compost.

**Keywords:** animal manure, biodegradability, food waste, germination index, waste management

*Received: September, 2020; Revised final: November, 2020; Accepted: December, 2020*

---

\* Authors to whom all correspondence should be addressed: e-mail: [felippemartins.utfpr@gmail.com](mailto:felippemartins.utfpr@gmail.com)