Waste Reuse in a food establishment for the production of organic fertilizer in Manaus - Amazonas

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Abstract

Organic waste has been a threat to society and the environment, both by the amount generated and the inadequate treatment. Seeking solutions to these wastes, composting becomes an efficient process through accelerated biodegradation. The present study aimed to analyze the reuse of organic waste generated in a food establishment in Manaus-AM. The quantitative methodology presented two steps, weighing for three (3) weeks daily, (i) the waste generated in the kitchen and (ii) discarded by consumers, in addition to the total compost generated by the compost, as a basis for treatment of this material, as way of minimizing the amount of these wastes, analyzing the productive activities of this establishment. Given the results obtained it was observed a disposal of almost 30 kg / week, which if estimated, can reach a value of 0.5 tons / year, for each type of disposal evaluated, totaling a value that can reach 1 ton of organic waste disposed of by this small food establishment. Analyzing the composting process, the data show that there is a reduction in the amount of materials generated, due to their transformation into organic fertilizer, obtaining 50% of the total value produced from the waste, thus indicating a solution to the problems arising from the incorrect disposal of waste. organic matter, which is close to 54% of this waste generated in Brazil. In addition, currently about 1.3 billion tons of food is wasted and there are on average about 815 million hungry people in the world, proving to be an alternative of economic, social and ecological viability.

Keywords: Organic waste, Composting, Organic fertilizer;

1. Introduction

In today's society it is observed that consumption goes beyond the search for comfort and well-being, inciting people to consumerism, a society that values personal recognition and the degree of success, since the population is increasingly using products. and services, given by the acquisition of goods. The problem is that the more we consume the more garbage is generated and thus the more natural resources are used to satisfy these boundless processes. Even knowing that this excess waste produced causes serious damage to the environment, there is still no control and no proper model to follow.

Changes in consumption habits combined with individual responsibility result in sustainable development, which aims to find molds that meet current needs without compromising future generations. Making use of natural resources without depleting it, knowing that the quality of life of the future generation depends on environmental awareness, has become a premise for the maintenance of quality of life and resources, presenting measures such as recycling, reuse of waste, new technologies. from renewable resources, among other steps necessary for sustainability.

In the city of Manaus - AM, the waste has been a great challenge, from the aesthetic and environmental side. They are usually found in public areas, especially in fairgrounds, serving as a source of food for rats and insects, or causing harm to human health. These materials are collected by municipal waste collection and disposed of in the municipal mixed landfill, causing even more environmental problems, since many of these wastes could be reused because they are sources of raw material in the production of organic compounds [1].

Solid wastes are materials, substances, objects or goods disposed of as a result of human activities in society, whose final destination is mandatory and should seek technical or economically viable solutions, given the best technology.

In the case of organic waste, we can characterize it as food waste: vegetables, fruits, eggshells; and other products: paper, wood, seeds, among others, which are usually generated at fairs, homes and restaurants. These residues can be reused in some ways, such as composting, making nutrients available to plants in higher concentrations and assisting in microbiological composition, along with energy production, in which the decomposing biogas generates the gas. methane, renewable source [2].

Waste has therefore been a major problem in today's society with population growth, contributing significantly to increased waste generation under different conditions. Even with all the legislation that tries to combat environmental pollution, there are still few actions linked to this theme and application of awareness and awareness through environmental education, aiming to be an attenuating in this process.

Thus, this study aims to analyze the reuse of organic waste generated in a food establishment in Manaus-AM, making the quantification of waste generated, dividing into kitchen materials and waste consumed by customers, thus comparing the amount of waste. material produced by the establishment through the production of compost purchased through the composting process.

2. Material and Method

2.1 Type of Study

The types of methods used in the research were descriptive and exploratory. Descriptive research studies,

analyzes the facts and exploratory research aims at discovery, the confirmation of phenomena [3]. This work is characterized by qualitative methods, relating the objective to the results, and the descriptive as well as quantitative collected data promoting reliable results through data collection [4].

2.1 Area of Study

The study was conducted in a food establishment located in the city of Manaus / AM, which initially did not apply any type of solid waste destination, and most of these generated wastes is organic. The property serves its customers five days a week, from Tuesday to Saturday, lunch only.

2.3 Data Collection

Organic waste samples were counted for three weeks from April 2 to 20, 2019, divided into kitchen materials and customer waste. The method used for the waste reuse process was composting, a practical, agile and effective method used today, with many benefits, such as the reduction of material disposed in landfills.

2.4 Collection Instruments

The composting process took place by means of a compost made from 15 kg plastic buckets, stacked one under the other, one at the base to receive the slurry liquid generated during the process. The base bucket was drilled only the lid, to allow the liquid to enter, the others above, the sides were drilled in the upper part as well as the lids and bottoms, thus allowing the air to enter the inside of the buckets, in we used a one millimeter drill to drill these holes.

2.5 Segregation of Organic Waste

For the segregation of waste, some measures were adopted: a) identification of waste types; b) Weighing the waste.

a) Description of waste types

According to [5] one of the types of waste is organic, those that have animal or vegetable origin, being the type that was analyzed in this study.

In this context, the organic waste was divided into: a) cooking materials characterized by potato peels, carrots, onions, garlic, bananas, pineapples, coffee grounds, kale, lettuce, cabbage, tomatoes, eggshells, seeds and b) leftovers consumed by customers leftover meat, chicken, pepperoni, boiled rice, pasta, beans, seasoned salads, crumbs, paper napkins (not used for paper recycling).

b) Waste weighing

During the waste weighing process, the PPE were used: gloves, goggles and apron; and the 40kg Premier Digital Scale, then minced and introduced daily into the compost. From this initial process was interspersed with dried leaves, for verification and evaluation of composting, this evaluation lasted three (3) weeks.

Each weighing, performed every day of the restaurant activity, being five days a week, totaled 15 measurements, making the data and subsequent tabulation via Microsoft Excel.

During the activity, after the introduction of the residues in the compost, and during these three weeks, the monitoring began that did not present a bad smell, and every once a week the need for overturning was

observed and if there was the presence of insects and other vectors that might cause some alteration of the result.

3. Results and Discussion

Population growth in just 25 years has grown by two billion, and with it the increase in the amount of natural resources for both production and consumption, resulting in large amounts of discarded waste, directly related to environmental degradation.

Thus, most of the time, organic waste is incorrectly disposed of in landfills, representing a threat to both society and the environment, which can cause imbalance to the population's health. Thus, it was observed a disposal of almost 30 kg / week, which is estimated, reaches a value of 0.5 tons / year for each of the measured materials, totaling about one (1) ton of organic waste disposed through this small food establishment (Figure 1).

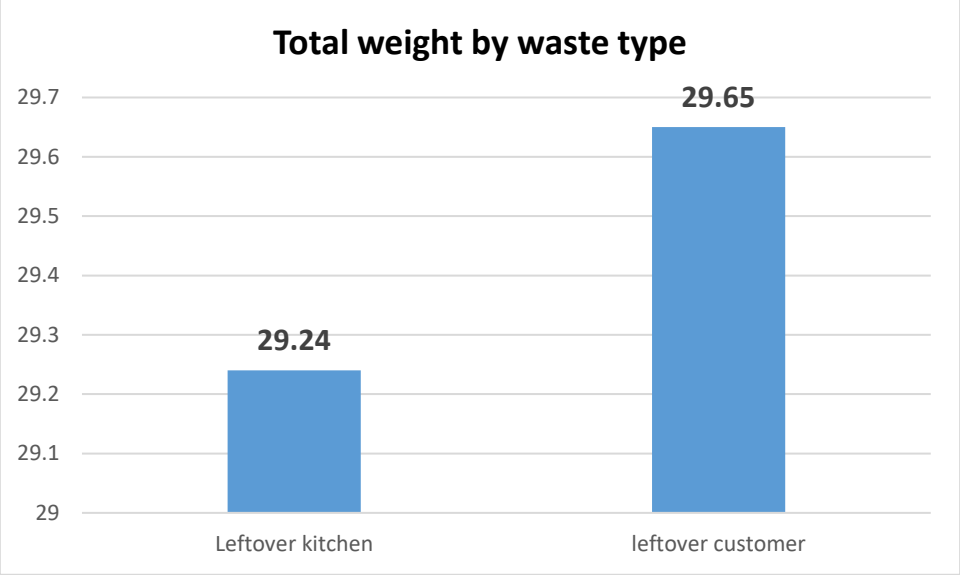

Figure 1. Total weight by type of waste in the three weeks of collection.

A family of approximately four people generates, on average / day, 2 (two) to 7 (seven) kg of organic waste, a value slightly higher than that found in this study. Thus, it is important to understand the proper treatment and disposal process, as they are often mixed with other waste and disposed of without any treatment [6]. In Brazil the amount of food thrown in the trash daily could feed an average of 10 million people, showing that urgent measures need to be taken [7].

Table 1 shows the average values of the 15 days of collection (3 weeks), separated from each type of waste generated in the establishment, both kitchen waste and customer waste.

Table 1. Quantity of waste measured in the restaurant for composting, along with their respective statistical measures.

Measures	Kitchen Leftovers (kg)	Customer remains (kg)
Average / day	1,949	1,977
Standard Deviation (s)	0,396	0,902

CI (95%)	0,200	0,456
LI	1,140	0,530
LS	2,600	4,080
AMP	1,460	3,550

Caption: CI (95%): 95% confidence interval; LI: Lower Limit; LS: Upper Limit; AMP: Amplitude.

[8] states that restaurant waste can negatively impact the environment, both due to the amount generated and the inadequate treatment, with a higher organic percentage.

Currently there are several measures linked to environmental education that is supported by the Ministry of Environment, among them the proposal of 3R's: reduction, reuse and recycling that are important actions for the environment.

Reducing the source as well as reducing energy use, and the amount of raw materials become more rigorous in choosing the material applied for manufacturing, where reusing or reusing waste becomes an idea of product valorization and gain. In addition, the recycling process, where new products will be produced from the material purchased on the market, demonstrates environmental responsibility [9].

Citizens play a key role in solving environmental problems. As much as public policy creates incentives and mitigating measures, society needs to be engaged as a whole, being aware of reuse or reuse where disposal should be the last option as long as efficient recycling is available [10].

Figure 2 shows the values from the percentage of residues generated in the food establishment, after being transformed into compost produced compost for each evaluation week.

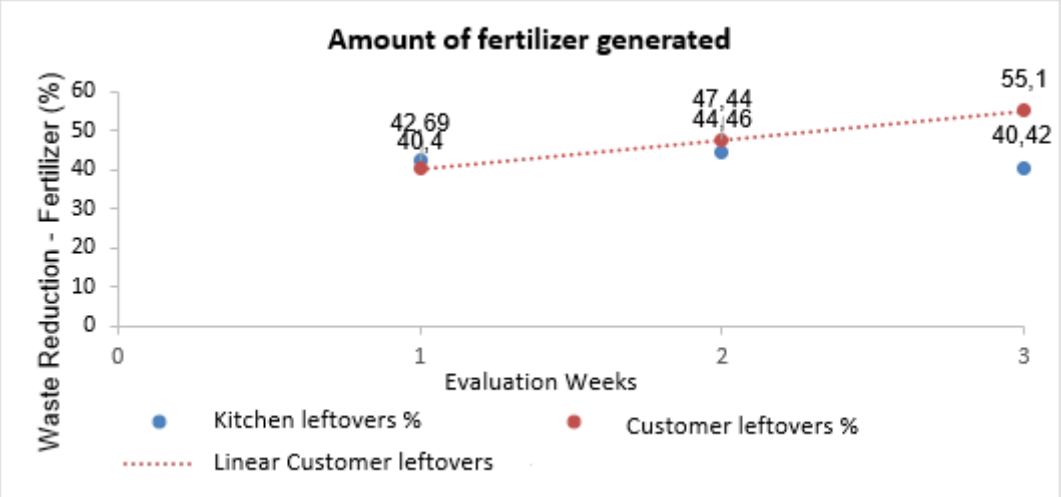

Figure 2. Amount of fertilizer generated (%) from material deposited on compost.

Through the obtained data it is observed that there is reduction of the quantity of materials. However, the organic fertilizer reaches 50% of the total value produced from the waste.

In search of more favorable solutions for the use of natural resources, accelerated biodegradation technology has been a waste management model, aiming at reducing environmental impacts [10].

The composting process occurs with the decomposition and biological stabilization of organic substrates through the action of different microorganisms. It can be a fundamental element in solving this problem, thus bringing benefits by reducing the release of waste into landfills, as well as promoting the treatment of

the organic fraction with the final production of a fertilizer compound [11].

Currently about 1.3 billion tons of food is no longer consumed per year, due to waste, and is worrying when data show that there are some 815 million hungry people in the world, showing that hunger is far from being deleted [12].

4. Conclusion

Waste is still one of the main environmental problems today, especially when it comes to generation (increased consumption), disposal (incorrect) and treatment (few actions).

The total waste generated in the 3 (three) weeks of evaluation in a small food company was 58.89 kg, with little difference (less than 1%) with what is generated in the production of food and its disposal, presenting an average of 2 (two) kg of organic waste / material.

Alternatively, there is compost generation via compost ranging from 40 - 50% of the total material deposited per week. Extrapolating this value to 1 (one) year, can reach 1 ton if we consider kitchen waste and leftovers.

Thus, finding alternative ways, it is mandatory to reduce the amount of waste disposed and optimize use, given the number of people at risk of hunger, caused by the lack of food in the world.

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