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INFLUENCE OF GRANULOMETRY ON THE AEROBIC COMPOSTING PROCESS OF VEGETABLE SOLID WASTE

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Abstract: The efficiency of the composting process depends on the action and interactions of the microorganisms, which are dependent on favorable conditions, such as temperature, humidity, aeration, pH, types of organic residues used, carbon-nitrogen ratio and grain size of the residues to be used biodegraded. The granulometry is an important parameter to be considered, because the smaller the particles, the greater the area available to the microorganisms, creating mechanisms to accelerate the biodegradation process. Therefore, the objective of this research work was to evaluate the influence of granulometry on the aerobic treatment process of solid plant residues. The experimental work was performed in aerobic reactors of 48 liters of volumetric unit capacity, in two different treatments and three repetitions, totalizing 6 reactors. The solid wastes used were collected in the EMPASA, transported to the EXTRABES sanitation laboratory, and subjected to the unitary crushing, drying, and sieving operations in sieves of 5.5 and 7.0 mm. The physical and chemical parameters monitored were temperature, pH, moisture percentage, total volatile solids, and total organic carbon, taking into account APHA of basic recommendations (2012). The monitoring period was 45 days for treatment 1 and 55 days for treatment 2. It was found that there was no preponderant influence of particle size on the performance of the composting process or on the quality of the organic compounds produced.

Keywords: aerobic biodegradation; granulometry; organic compound; organic solid waste.

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INTRODUCTION

Second Silva et al., (2008), the solid waste arising from human activities when not collected and treated within a good standard in the field of Sanitary Engineering, presents significant impact potential, being the organic fraction of these residues responsible for most of the impacts, being able to attract animals of different sizes, contributing potentially to the proliferation of vector is responsible for the transmission of diseases to the human being.

Law 12.305/10 that guides Policy Solid Waste recommended in Art. 36, section V, which are implanted systems are composted for treating a putrescible organic fraction of municipal solid waste and other or portions types of solid waste and built mechanisms of articulation of actions with the economic and social agents, prioritizing the use of compost produced by the composting process (Brasil, 2010).

Conceptually composting is a bio-oxidation processes exothermic process of organic matter, potentially putrescible performed by a series of microorganisms in the presence of free molecular oxygen, generating primarily water vapor, carbon, and partially biostabilized organic matter dioxide, as shown in **Eq. (01)**, where putrid organic matter (POM) in the presence of free molecular oxygen and microorganisms produces partially biostabilized organic matter (PBOM), more water vapor, more carbon dioxide, more heat, and more nutrients.

$$POM + O_2 \rightarrow PBOM + H_2O + CO_2 + heat + Nutrients \quad (1)$$

According to Polprasert (1989), the composting process is divided into four phases, which are basically: the lag phase, the growth phase of the microorganism, the thermophilic phase, and maturation. In the lag phase, the microorganisms need a certain time to acclimate and process colonization in the new system. For Mancini et al. (2006), this phase may be called the adaptation of the microorganisms directly involved in the bio-oxidation process of organic matter.

In the growth phase and increased occurrence temperature, it is considered the growth and activity of microorganisms. The microorganisms already adapted, begin to metabolize and biodegrade constituents, obtaining energy that will be used for the realization of your metabolism and consequently continues the biodegradation and biotransformation process. In the thermophilic phase occurs intense biological activity, resulting in the degradation of volatile solids and increasing the temperature occurred reduction of the organic matter possible emission of odors, and the killing of photogenic microorganisms (Ogunwande et al., 2008; Neklyudov, et al., 2008; Saludes et al., 2008). At this stage, carbohydrates are degraded into monosaccharides, and complex proteins into amino acids (Miyatake et al., 2006). Meanwhile, the maturation phase occurs at low temperatures, low oxygen consumption, less heat emission, decreased evaporation of the mixture, and increased concentration of humic acids.

Granulometry is an important physical characteristic to be considered since it interferes with the composting process. The decomposition of organic matter is a microbiological phenomenon whose intensity is related to the specific surface of the material to be composted, the smaller the particle size, the larger the area that can be attacked and digested by the microorganisms, accelerating the decomposition process (Keener et al., 1996). The grinding and sifting materials, with fine granulometry and greater homogeneity, guarantee a better temperature distribution and less heat loss, improving the aeration process since the presence of small particles changes the specific mass of the material and consequently increases velocity kinetic degradability of biodegradation (Nogueira et al., 2011).

The available surface area is an important factor for aerobic microbial activity since most of the aerobic decomposition of compost occurs on the surface of the particles (Kiehl, 2004). The population of aerobic microorganisms accumulates in the liquid layer around the surface of the particles, using oxygen at the surface, leaving the inside of the residue essentially unchanged in an anaerobic state, as can be observed in **Fig. 1**. The microorganisms will biodegrade the particles of the residues from the outside in, and with the biodegradation of the particles, the reduction of the physical size occurs (Rynk, 1992).

Rodrigues et al. (2006) argue that materials with very fine granulation generate few porous spaces, making it difficult to diffuse oxygen inside the sheath, thus favoring the appearance of anaerobic conditions, which is provided by the presence of a greater amount of micropores, leading to compression and an increase in the specific mass of the waste in the process of biodegradation of the compost.

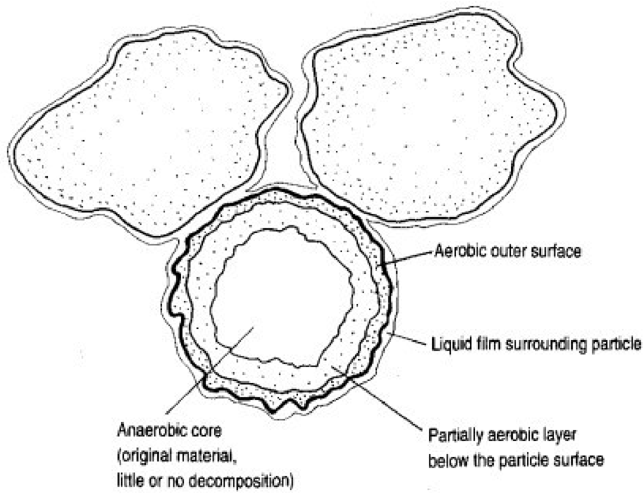

Fig. 1. Process of aerobic biodegradation of organic matter. Source. Rynk (1992).

and porosity between particles affects the balance between water content and air at each moisture level. Ahn et al. (2008) investigated the physical parameters of compounds obtained from large-scale composting and concluded that the porosity decreases according to the increase in the specific mass of the residue, the moisture content, and the absorption capacity of the composted material.

According to Handreck (1983), studying the size of the particles and their physical properties concluded that particles smaller than 0.5 mm and in particular between 0.1 and 0.25 mm, had a greater influence on porosity and water retention. Benito et al. (2006) studying composting waste and tree pruning finds that the best performance of the composting process was to waste solids with particle size between 0.25 and 2.5 mm, considering percentage allows better moisture and an aeration capacity.

Pereira Neto (2007) found that the optimal size of the fine particle was between 20 and 80 mm, reaching the conclusion that would be more convenient to perform the process of composting with particle sizes ranging from 10 to 50 mm. Richard et al. (2002) point out that particles with larger dimensions, such as wood chips, contribute to maintaining aeration of the litter, but provide less available carbon per mass of material, affecting the activity of microorganisms.

In general, it is not yet an easy task to define the ideal size particles of solid waste to be composted and is, therefore, advisable used to mix various kinds of organic waste aiming rigid color particle size, contributing to the homogenization of the mass to be composted waste, favoring the creation of a good porosity, which leads plow and therefore a lower compression higher aeration capacity. In addition, increased surface area for biodegradation, reducing composting time. According to Ruggieri et al. (2008), the physical characteristics of the initial mixture of organic solid waste are decisive for the good development of the composting process. Therefore, in this research, the objective was to evaluate the influence of granulometry in the aerobic treatment process of solid plant residues.

MATERIAL AND METHODS

The experimental part of this research was carried out at the Experimental Station of Biological Treatment of Sanitary Sewers (EXTRABES), located in the Catolé neighborhood of the city of Campina Grande Paraíba. The solid residue vegetables (SRV) used in the preparation of the substrate (mixture of more powdered solid vegetable waste wood saw) were collected from Paraiba Food Company of Agricultural Services (EMPASA) and consisted fraction of these residues were potentially disposed of in the marketing process and pH in the neutral range, which is not the case with most of the waste discarded in supply plants, mainly in relation to pH. The completed collection of the SRV was stored in plastic bags and transported to EXTRABES. In the EXTRABES the physical characterization of the RSV was performed, and then the quantification of each fraction was determined.

Once the chemical characterization of the SRV was completed, trituration was drilled with an organic waste shredder brand Trapp-TR 2000 and subjected to the drying pretreatment, aiming at the adjustment of the moisture percentage, which in this work was of 60% (percentage by weight). After adjusting the mass of SRV mass to 60% percentage, a second grinding was carried out, followed by the screening of the crushed waste mass. For treatment 1, the mass of SRV was sieved in 7 mm mesh and for treatment 2 in a mesh of 5.5 mm in diameter.

The sawdust powder was collected at a logging located in the city of Alagoa Grande Paraíba, which works with wood not chemically bound, considering the presence of chemical components that could interfere with microbial activity. The experimental system consisted of six aerobic reactors with a single layer of 48 liters and an experimental design of two treatments and three repetitions. The SRV/sawdust ratio was 80 and 20% (weight percent) respectively, and for the definition of this ratio, the specific weight of each type of residue was taken into account. In treatment 1 was fed to each reactor 14 kg of the substrate and treating the second pair mass fed to each reactor was 11 kg. The disposal of waste in the reactors was made in superinduce layers being interleaved SRV one layer to a layer of sawdust until it reached the respective weight of each type of waste treatment and in each reactor.

Fig. 2 shows a schematic drawing of an aerobic biological reactor used for conducting experimental d of the work. It should be emphasized that the physical and chemical characterization of the solid waste mass vegetables, quantifies the percentage of humidity and consequently the total solids, the solids total volatile solids, total fixed solids, and pH. The methods recommended by APHA (2012). Regarding the microbiological part, only eggs of helminths were quantified using the method of Meyer (1978).

The internal temperature of the reactors was quantified daily, and for this operation, a mercury rod thermometer was used, coupled with a wooden support. The quantification of the internal temperature of the reactors and the ambient temperature was always performed at 1 pm. The monitoring period of the reactors was 45 days for treatment 1 and 55 days for treatment 2. After the monitoring process, the reactors were discharged if the partially biostabilized residues coming from the two treatments and submitted the chemical characterization, for quantification of the percentage of moisture, total volatile solids, co Total Organic carbon, pH, macronutrients (N, P, K, Ca and Mg) and micronutrients (Cu, Zn, Fe, and Mn), and the quantification of helminth eggs.

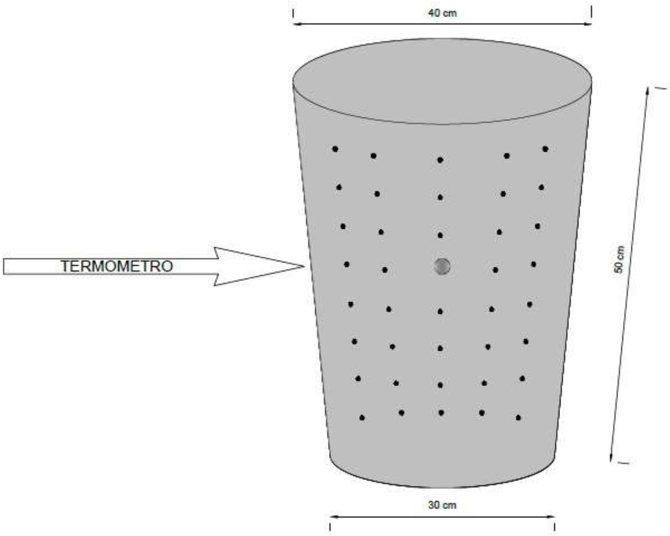

Fig. 2. Schematic drawing of one of the biological reactors.

It was also carried out the sieving of the partially biostabilized residues in sieves with 4.0 and 2.0 mm mesh, considering the need to classify these residues into three different types denominated coarse meal, bran, and powder, taking into account the Normative Instruction Ministry of Agriculture, Livestock and Supply 23 the month of August of 2005 (Brasil, 2005).

RESULTS AND DISCUSSION

Table 1 presents and discusses the results from the chemical and parasitological characterization of the solid plant residues used to feed the reactors in treatments 1 and 2. The solid plant residues used to perform this work had pH values recommended for biological treatment, presenting a range of 7.3 pH units and a significant percentage of organic matter expressed in terms of vapors solids. One of the parameters that showed a quite significant difference was the percentage of humidity from 46.3 to 68.1%, this variation is directly associated with the type of waste that was collected, the collection stage, and the time of year. It is noteworthy that in any sample of solid waste in both treatments was quantified the presence of helminth eggs, which is a good parasitological indicator, however, does not guarantee the absence of other types the pathogenic microorganisms.

Figure 3 shows the behavior of temporal variations of the ambient temperature (AT) quantified at the installation site of the reactor and the average temperature of the mass waste (WT) in the organic biostabilization process, the quantized average height of the treatment 1 reactor. In the monitoring period of reactor, it can be seen that the temperature ranged from 28 to 35 °C which is a temperature range considered

Table 1. Chemical and parasitological characterization of plant residues.

Parameters	pH	Total solids (%)	Volatile solids (%TS)	Humidity (%)	TOC (%TC)	Helminths (eggs/gTS)
T_1	7,3	31,9	83,7	68,1%	46,5	0
T_2	7,3	53,7	83,7	46,3%	46,5	0

T_1: Granulometry 7 mm; T_2: Granulometry de 5.5 mm.

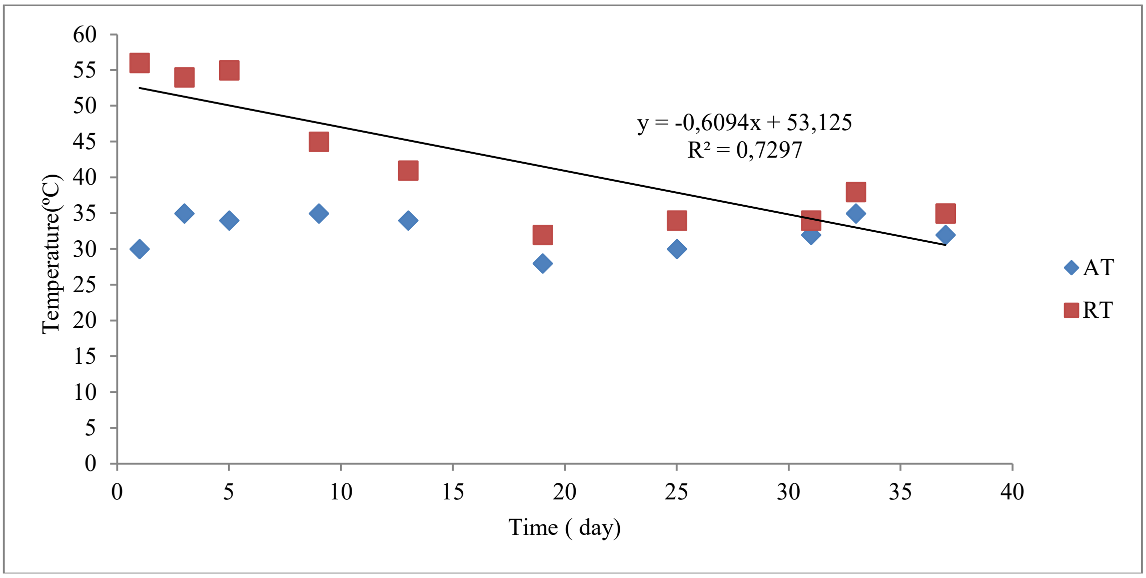

Fig. 3. Behavior of the temporal variations of the ambient temperature and the temperature of the mass of residues in process of biostabilization in the treatment 1.

good for microorganisms responsible for the aerobic biostabilization process of organic matter. In relation to the temperature of the mass of residues in biostabilization process, the variation was 34 to 56 ° C, reaching the peak temperature in the first two days of reactor monitoring. This phenomenon can be explained by the expressive amount of organic material from the solid plant residues, the humidity percentage always adjusted to 55%, the particle size, and the ambient temperature.

Regarding the granulometry, which in this treatment was 7.0 mm, considered relatively low, it is not possible to infer the effect of granulometry alone, even though it is known that the smaller the particle size, the greater the availability of specific area and consequently the greater the intensity of the biostabilization process. However, it should be taken into account that the reduction of particle size contributes positively to the specific weight increase of the mass of the waste, reducing the void space, which hinders the accumulation of the oxygen mass and consequently delays the process of biostabilization.

In the process of aerobic biostabilization of organic waste, initially, the microorganisms mesophiles use the more soluble and rapidly biodegradable components of the organic matter, propitiating the elevation of the temperature of the threshold of the ambient temperature, to levels around 45ºC, during the first three days of monitoring (Tang et al., 2004). In the case of this work, in the first five days, the temperature reached 55ºC, the activity of the mesophilic microorganisms was probably suppressed, and the community of thermophilic microorganisms emerged, a phenomenon already identified in studies performed by Tiquia (2005).

In the thermophilic phase, the rate of biodegradation of the organic compounds is considered to be the maximum, in which the starch, cellulose, and proteins are transformed into by-products that will be used by the successive microbiota (Pereira Neto, 2007). Therefore, the proportion that the organic material stock is being depleted, the tendency is to happen the temperature to decline until the temperature of the ambient temperature is reached (Vinneras, 2002). With the reduction of the carbon source in the thermophilic phase, then emerge micro communities the mesophilic organisms that will work in the humidification process residue already partially biostabilized, providing the biodegradation of organic compounds more recalcitrants, for example, hemicellulose and lignin, resulting in by-products with a pH ranging from 7.0 to 8.0 and the C/N level of the 10/1 (Tuomela et al., 2000).

In treatment 1, it was observed that the maximum temperature achieved during the first three days was 56°C, they did not observe significant loss of carbonaceous material in the 45 day monitoring period, which favored the production organic compound with good sanitary characteristics and agronomic conditions in a relatively short time when compared to other works. **Fig. 4** shows the behavior of the theoretical variation of the temperature at treatment 2.

In treatment 2, the ambient temperature ranged from 28 to 34ºC, and did not present significant difference in relation to treatment 1. In the mass of residues in the process of biostabilization with a grain size of 5.5 mm the temperature ranged from 32 to 60 ° C, and the maximum temperature peak was reached as early as the first days of monitoring, as can be observed in figure 4. In the first five days the temperature presented a level from 57 to 60ºC, decreasing abruptly shortly after the ninth day of monitoring.

By comparing the behavior of the temperatures in relation to the magnitudes of the particle sizes of the residues in the process of biostabilization, it can be verified that there was no significant difference between the two treatments. It is noteworthy that it is not easy to be notes of the influence of particle size in isolation, especially when the particle size difference is not as significant as in the case of this work. It is known that the grain size is linked directly to the specific weight of the mass of waste to be composted, directly influencing n the availability of oxygen, moisture, and the specified surface. This phenomenon of rising temperatures right at the of the monitoring process that took place in two different treatments is associated with a significant percentage of organic matter in crop residues, the particle size of the waste that ranged from 5.5 to 7.0 mm (low granulometry), the presence of dissolved oxygen in the mass of residues that were guaranteed by the efficiency of the aeration process and by the contribution of the structuring material in the distribution of the oxygen mass and other operational parameters. Therefore, it is guaranteed that the efficiency of the aerobic biostabilization process of organic waste, when taking into account the pairâmetros monitoring time and the agronomic and sanitary quality of the organic compound, the regular setting temperature is required.

Fig. 5 shows the behavior of the temporal variations of the pH of the masses of organic residues in the process of biostabilization during the monitoring period. The pH of the mass of plant solid residues in both treatments was 7.3 pH units, and in treatment 1 the pH of the mass of residues in the biostatization process ranged from 7.3 to 7.9, while in treatment 2 the pH ranged from 7.3 to 9.5 pH units.

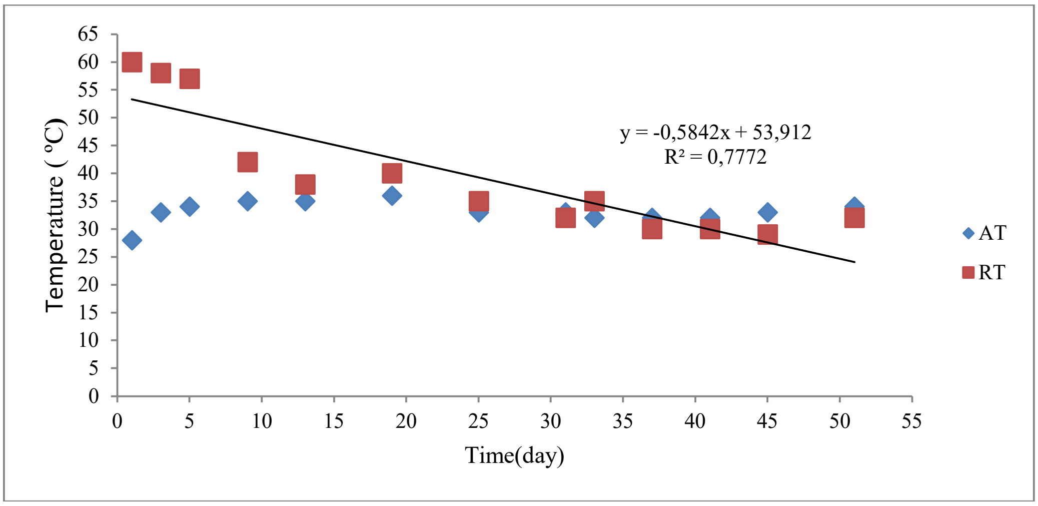

Fig. 4. Behavior of the temporal variations of the ambient temperature and the temperature of the mass of residues in process of biostabilization in the treatment 2.

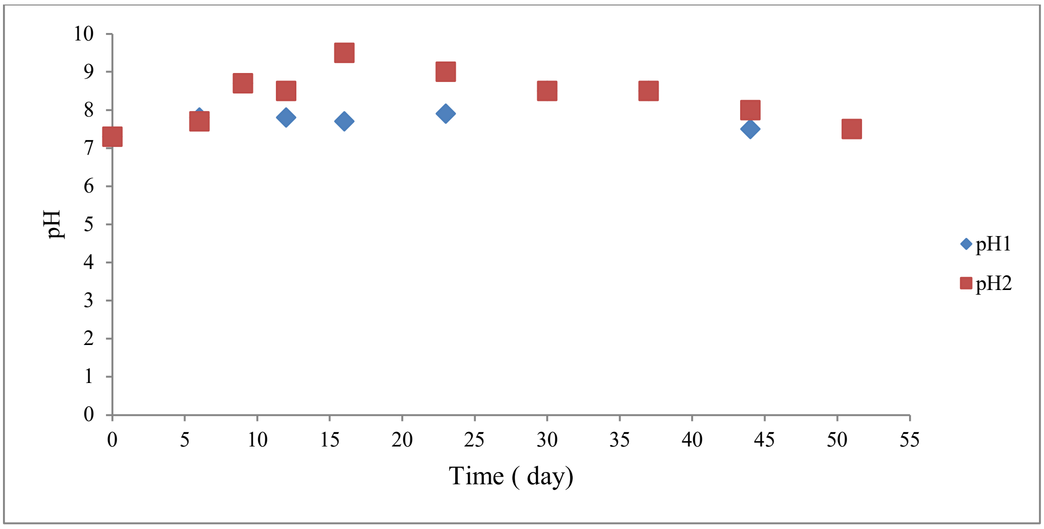

Fig. 5. Behavior of temporal variations of pH in treatments 1 and 2.

In the process vantage composed pH range optimal for the development of microorganisms is 5.5 to 8.5, since much of the enzymes produced by these microorganisms are found active in this pH range (Rodrigues et al., 2006). According to Pereira Neto (2007), composting can be accomplished ha in a pH range between 4.5 and 9.5, with the possibility of extreme values are automatically regulated by the microorganisms through the process of biodegradation of organic compounds produce acidic or basic byproducts as the medium requires. It could be observed that in treatment 2 of this work the pH peak was reached on the 15th day of monitoring and it was decreased until the final period.

In both treatments studied in this work, no significant difference was identified in the pH magnitudes, which may explain why a more significant intensity biodegradation process of the organic matter was found in treating 2 with a particle size of 5.5 mm. However, it is worth noting again that it is not prudent in the technical and scientific field to associate the efficiency of the biostabilization process only with particle size, especially when there is substantial influence of other physical, chemical and operational parameters.

Therefore, in this work, organic compounds produced in both treatments were the magnitudes pH 7.5, being the limits recommended by normative n ° 25, of July 07, 2009, in the MAPA (Brasil, 2009). The behavior of temporal variations of the percentage of total organic carbon (TOC) of the mass of organic waste are biostabilization process are shown in **Fig. 6.**

In the mass of *in natura* vegetable solids, used to feed reactors in both treatments the percentage of TOC was 46.5%, and this percentage was slowly reduced, reaching a percentage of 41% at 45 days of monitoring in treatment 1 and 40% of treatment 2 at 55 days of monitoring, providing efficiency reduction of 14 and 12% respectively in treatments 1 and 2.

When the monitoring time was standardized to 51 days in both treatments, there would be no difference from a mass reduction of TOC, which implies that the particle size did not affect the weight loss in the process of biostabilization of organic matter. It should also be noted that even in the case of organic waste of vegetable nature, the rate of mass loss of organic matter expressed in TOC samples was of the order of $2.9x10^{-3}$ day $^{-1}$, magnitude is relatively low which guarantees the good agronomic and sanitary quality of the compound produced.

Table 2 shows the magnitudes of the total nitrogen (TKN), total phosphorus (TP), potassium (K), calcium (Ca), and magnesium (Mg), expressed as grams of compound per kilogram of residues ($g.kg^{-1}$) present in the organic compounds produced in treatments 1 and 2 of this work. The organic compound is considered as the product obtained by the physical, chemical or biochemical process, natural or controlled, from raw materials of industrial, urban or rural origin, animal or vegetable, isolated or mixed, and can be enriched with mineral nutrients, active principle or agent capable of improving its physical, chemical or biological characteristics (Mapa, 2009). Taking this conceptual foundation into account, organic compounds of vegetable waste are classified as "Class A" (organic fertilizer which in its production uses the raw material of vegetable origin, animal or agribusiness processing, where they are not used in the process, heavy metals, potentially toxic synthetic elements or organic compounds, resulting in products for safe use in agricultural soils).

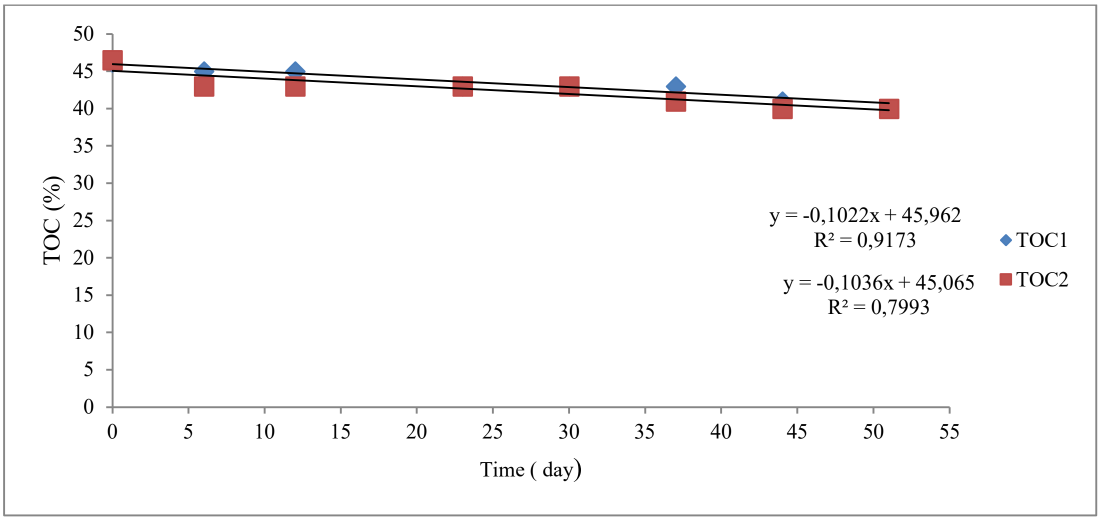

Fig. 6. Behaviors of temporal variations of TOC percentages in the two treatments.

Table 2. Mass concentrations of the macronutrients (N, P, K, Ca and Mg) present in the organic compounds produced in treatments 1 and 2, expressed in $mg.kg^{-1}$.

Nutrients	Organic Compost (T1)			Organic Compost (T2)			t-value	P	Reference Values [1]
TKN	1.50	±	0.10	1.40	±	0.10	2.90	<0.05	5.0
Pt	0.10	±	0.00	0.10	±	0.00	0.06	0.95	nd
K	26.20	±	0.60	41.20	±	1.90	10.60	<0.05	nd
Ca	67.60	±	5.30	36.50	±	1.70	7.80	<0.05	10
Mg	4.60	±	0.40	5.50	±	0.20	2.90	<0.05	10

[1]1 Reference values ($mg.kg^{-1}$) for organic fertilizers according to the Ministry of Agriculture, Livestock and Supply (MAPA, 2009).

According to Mapa (2009), the chemical elements are: nitrogen (N), phosphorus (P), and potassium (K) are classified as primary macronutrients, while the elements calcium (Ca) and Magnesium (Mg) are considered secondary macronutrients.

In this work the mass concentrations of TKN obtained in treatments 1 and 2 were, respectively, 1, 50, and 1.40 $kg.kg^{-1}$, denoting magnitudes lower than those recommended by Mapa (2009), which is at least 5.00 $g.kg^{-1}$ for organic fertilizers. Therefore, the low mass concentration of TKN in the organic compound produced is directly associated with the reduced percentage of TKN in the types of solid plant residues used in this work, which generally ranged from 0.1 to 0.24%.

In relation to the mass concentrations of total phosphorus, the magnitudes detected were 0.1 g. kg $^{-1}$ in treatment 1 and also 0.1 $g.kg^{-1}$ in treatment 2, which corresponds to 0.01% of the total phosphorus mass in relation to the total mass of the organic compound, which is a relatively low percentage. However, in work carried out by Leite et al., (2012), with different types of solid waste vegetable duos collected in EMPASA was found that the mass concentration of total phosphorus remained at the average level of 0.1$g.kg^{-1}$ and there was no reduction in the biostabilization process, remaining this same concentration in the organic compound produced.

Table 3. Mass concentrations of the micronutrients (Cu, Zn, Fe, and Mn) present in the organic compounds produced in treatments 1 and 2, expressed in mg.kg $^{-1.}$

Nutrients	Organic Compost (T1)			Organic Compost (T2)			t-value	P	Reference Values (1)
Cu	20.50	±	1.90	12.40	±	1.40	4.70	<0.05	500.00
Zn	77.80	±	1.10	79.10	±	6.50	0.20	0.70	1000.00
Fe	2161.90	±	80.00	2039.50	±	194.60	0.80	0.40	2000.00
Mn	113.20	±	5.8	102.30	±	3.5	2.20	0.08	500.00

[1] Reference values (mg.kg $^{-1}$) for organic fertilizers according to the Ministry of Agriculture, Livestock and Supply (MAPA, 2009).

The mass concentration of potassium detected in the organic compound of treatment 1 was 26.2 g.kg $^{-1}$ and in treatment 2 the concentration was 41.2 g.kg $^{-1}$. It should be emphasized that for macronutrients, for total phosphorus and potassium, there are no reference values established by Mapa (2009).

The significant difference in the potassium mass concentration in the organic compound produced in treatments 1 and 2 can be explained by the more significant presence of the banana (*Musaceous family*) vegetable residue used in the preparation of the substrate.

Regarding the mass concentrations of calcium, the magnitudes detected in treatment 1 were 67, 6 g.kg^{-1}, and in treatment 2 was 36 5 g.kg^{-1}, and these magnitudes are greater than those recommended by Mapa (2009) for an organic compound which is 10 g.kg$^{-1.}$

In the two treatments studied, the magnesium mass concentrations were 4.60 and 5.50 g.kg^{-1}, treatment 1 and 2 respectively, and these magnitudes are lower than those recommended by Mapa (2009), which is 10 g.kg^{-1} for organic compost. The micronutrient concentrations (Cu), zinc (Zn), iron (Fe), and manganese (Mn) quantified in the compounds produced in treatments 1 and 2 of this work are shown in **Table 3.**

In relation to the mass concentrations of micronutrients quantified in the organic compounds produced in this study, the concentration of Copper was 20.50 mg.kg^{-1} in treatment 1 and 12.40 mg.kg^{-1} in treatment 2, being much lower than the legal limit of reference. Regarding zinc, the mass concentrations of the organic compounds produced varied from 77.80 to 79.10 mg.kg^{-1} and are at the lower limit and the reference value set by Mapa (2009), which is 1 g.kg^{-1}. As for iron, the mass concentrations were 2.16 g.kg $^{-1}$ to Compound D The treatment 1 and 2.03 g.kg^{-1} for compound 2 treatment, these values are slightly above the values referents established by Mapa (2009).

The mass concentrations of manganese were respectively 113.20 and 102.30 mg.kg^{-1} in the organic compounds of treatments 1 and 2 are below the reference value established by Mapa (2009).

Therefore, it has been studied in the process of bioestablization aerobic vegetable waste solids with a particle size ranging from 5.50 to 7.00 mm, moisture percentage of around 55.0%, and average aeration process, the organic compounds produced met the reference standards established by Mapa (2009) in relation to macros and micronutrients, which compromises the agronomic quality of the organic compound. Regarding the sanitary quality, no type of problem was evidenced, since helminth eggs were not quantified in the mass of solid vegetal residues in their *in natura* state. In such a situation should be worked the process of co-composting, in which the junction of two or more types of organic waste power will provide the equilibrium of the macro and micronutrients in the mass of waste to be biostablized aerobically, contributing to the acceleration of the process and of the legal requirements of the production and application of organic compound in relation to agronomic and sanitary quality.

CONCLUSION

Analyzing the data of this work, it can be concluded that: There is a significant percentage of losses of solid plant residues in Supply Centers installed in medium-sized Brazilian cities. These solid vegetable waste arising from the process of putrefaction of diverse types of fruits and vegetables sold in Wholesale Markets are often used for human consumption in certain other situations, for cattle feed animals, horses and pigs, and even some fractions which are collected and destined for landfill, controlled landfill or even dumps.

Taking into account the guidelines of the process of integrated solid waste management, the main flag to be defended is the reduction of the amount generated from these wastes and then offering adequate allocation to the fraction generated, taking into account the social, economic, and environmental issues.

Aerobic composting emerges as a promising technological alternative for the rational use of this waste, due to the production of organic compost that can be used as a conditioning agent for agricultural soils, avoiding the production of greenhouse gas and landfill leachate. In this work, an organic compound was produced in a maximum period of 55 days of reactor monitoring.

In the technical and scientific fields, this is a great contribution, favoring the reduction of area and consequently of financial resources. In general, the organic compounds produced in treatments 1 and 2, did not meet the requirements that are legally established by the MAPA (2009), regarding to the quantitative some macronutrients and micronutrients.

In order to overcome these limitations, it is advisable to carry out the aerobic treatment in conjunction with organic waste originating from other sources, especially with ETE sludge treating domestic sewage and organic waste of agricultural, livestock, and agro-industrial origin. When the granulometry of the residual particles was studied, the plant solids of 5.5 and 7.0 mm, no significant influence was identified in relation to the aerobic biostabilization process nor the quality of the organic compound produced.

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