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CONSIDERATIONS CONCERNING THE COMPOSTING OF ORGANIC WASTE

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ABSTRACT

Compost means a product obtained by an aerobic, thermophilic, decomposition process and microbial synthesis of the organic substances in the residual products, which contains over 25% relatively stable humus predominantly composed of microbial biomass and which is subsequently subjected to a slight decomposition. stable enough not to reheat or cause problems with smell or breeding of insects and has the ratio C: N = 10-15 Regardless of its origin and nature, organic matter, depending on the conditions of aeration and humidity, evolves towards a new qualitative state, relatively stable to biodegradation, characterized by a humus-likeC:Nratio.

INTRODUCTION

Composting can therefore be defined as a method of managing the biological oxidation process that converts heterogeneous organic materials into more homogeneous ones, with fine particles-like humus. By composting is understood all the microbial, biochemical, chemical and physical transformations that organic, vegetable and animal waste undergoes, from their initial state until they reach different stages of humidification, a qualitatively different state from the initial one, characteristic of the newly formed product, called compound. For farmers who do not have sufficient surface area for distribution of waste products, composting is one of the methods of treating and clearing manure under the conditions of environmental protection. pile.

Three main phases of the composting process have been identified: • phase 1, the mesophilic fermentation stage, which is characterized by the growth of bacteria and temperatures between 25 and 400C; • phase 2, the thermophilic stage in which bacteria, fungi and actinomycetes (first consumer level) are present at a temperature of 50-600C, decomposing cellulose, lignin and other resistant materials; the upper limit of the thermophilic stage may be at 700C and it is necessary to maintain the high temperature for at least one day to ensure the destruction of pathogens and contaminants; • phase 3, constitutes the maturation stage, where the temperatures stabilize and some fermentation is continued, converting the degraded material into humus through condensation and polymerization reactions; the last objective is to produce a material that is stable and can be judged on the C: N ratio; well composted materials have a low C: N ratio; for example. the ratio C: N can decrease from 30 at the beginning of the composting process to 15 in the mature compost.

During active composting, aerobic decomposition generates carbon dioxide and water vapor. The active anaerobic decomposition generates carbon dioxide, methane and other fermentation products that create unpleasant smells, low pH in the compost pile and inhibit plant growth. Numerous factors affect the generation of the smells: the amount of oxygen in the

pile, the characteristics of the materials subjected to composting, the initial pH of the mixture and the materials used as additives. Even if there is a good supply of oxygen (obtained by diffusion, reshuffling or forced aeration) in the compost pile, there are still some smaller or larger bags in which the process is carried out under anaerobic conditions. The products from these anaerobic bags will break down when they reach the compost pile in aerobic conditions. At pH conditions around 4.5 or lower, aerobic microorganisms die, work equipment is corroded and smell appear. The low pH and the appearance of smells are the best indicators of the need for oxygen. A compost pile is predominantly aerobic if the oxygen concentration in the compost pile is evenly distributed and has values over 5-6%. At oxygen values below 3% the smell appear and the anaerobic process begins. Anaerobic processes may occur if the airflow in the pile is interrupted even for only 2 minutes when the microbial activity is high in the pile. Under anaerobic conditions, smells generated by rapidly formed volatile organic acids and acids lower the pH of the pile. Restoring aerobic conditions through proper aeration and porosity can take from 2 to 6 days.

MATERIAL AND METHOD

In the USA at least 5 composting methods are practiced: passive composting in open pit; composting on the platform, in rows or in piles using a loader for turning, mixing and handling; composting on the platform using special stacking equipment; Aerated static pile systems using perforated pipes; composting system in container. The first three methods are usually practiced outdoors, and the last two indoors to have better control of humidity, treatment and smell capture.

Passive composting In the open pile it is suitable for small or moderate farms with lower management. The method involves forming the pile of organic materials and leaving them undisturbed until the materials are broken down into stabilized products. These small piles have the advantage of natural air movement. Due to the active fermentation, the pile is heated indoors, the warm air rises and is lost on the top surface of the pile, being replaced by the cold air entering the base of the pile. Depending on the size of the pile, air currents can refresh the slower air faster or slower by activating the fermentation process. For an efficient exchange of air especially during the summer period and if composting materials that give off more heat such as trash from horses, the height of the pile will be only 0.9 - 1.2 m. The cost of labor and equipment required to form and mix the pile is the largest operational expense. Farm loaders and garbage spreaders are usually the ones used on the farm. Passive or undisturbed composting is usually used to compost carcasses of farm animals. The disadvantage of this method is that the pile becomes unmanageable, being too wet, too dry, too compacted, and can quickly become anaerobic and very odorous. Platform composting in rows and piles is the most common form of composting. For an active management of the process the rows and piles are rearranged with the help of a special machine which avoids compaction of the pile, improves the exchange of air, brings to the surface of the pile the material from the inside and introduces in the pile the material from the surface of the pile Returning and mixing again with the changes, the materials subjected to composting are fragmented into smaller particles and increase their biological active contact surface. Excess reshuffling can lead to reduced pile porosity if the particle size becomes too small. The size

of the pile (of the row) is given by the characteristics of the equipment that performs the reshuffling of the pile. Only some mushroom growers have had such tools in our country. It is time to import such equipment if we want to advance in this area. The collected liquid can be used to moisten the pile for resurfacing if necessary or can be applied on agricultural land as a liquid fertilizer. In the case of small and medium-sized enterprises, composting from a few hundred to several thousand cubic meters, in the absence of the specific equipment for reorganizing the pile, a tractor with loading bucket (fadroma type) and conveyor belts can be used to make it mixture.

Platform composting using specialized remodeling equipment is practiced in large compost producing units. It is identical as a way of organizing with method B - composting on a platform in rows and piles, but it is obligatory to attend the special reorganization equipment.

Aerated static pile system with perforated pipes – it can develop in open or closed spaces. In the pile are perforated pipes for aeration. The hot gases inside the pile rise up and the cold air enters through the pipes inside the pile. Forced aeration can also be practiced by using an air blower in the pipes at the base of the pile, which makes the air circulation faster. The aeration force system allows the pile to be increased and a better control of the composting process. Negative pressure arrangements (inside perforated pipes) allow direct air to be exhausted through biological filters if odors become a problem. Aerated static piles are based on wood chips, chopped straw or other porous materials. The porous material at the base also incorporates perforated pipes for aeration. The selection and initial mixing of the raw materials subjected to composting is essential, as it must have a good structure to maintain its porosity throughout the composting period. This general requirement is ensured by the use of a density preserving agent, such as straws or wood chips. The initial height of the aerated static pile is 1.5-2.5 m. In winter, larger piles help maintain heat. A layer of finished compost covers the compost pile. The length of the static aerated pile is limited by the distribution of air through the aeration pipes. For aerated static piles the mixing of the materials deposited in the pile is essential because the pile is formed only once. The mixing of the pile is done by means of a front loader of the fadroma type by mixing several times in another pile and then depositing in the final pile of the mixed materials. It is recommended that the mixing and formation of the pile be done on a concrete surface.

Composting system in (vessel) container involves closing active composting materials in a container, building, etc. The container system has the most aggressive management and in general the one with the largest capital investment, but it offers the best control of the composting process. Most methods in the container involve a variety of forced aeration systems and mechanical turning techniques leading to the intensification of the composting process. Some composting systems in containers (a huge bag) include composting materials without return. The composting system in small containers that are installed for use for about a year are accessible for composting on a variety of farms that generate organic materials including dead birds and manure.

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RESULTS AND DISCUSSIONS

Compost is considered good if it has the following characteristics: • It presents as a homogeneous product of dark brown or black color. • The smell is

earthy, without any other unpleasant smells. • The particle size is less than 1.2 cm. • It is a stable product (capable of being stored for a reasonable period of time without losing its efficiency as a soil amendment). • Contains no viable weed seeds. • Does not contain phytotoxins or visible contaminants, and • has a pH between 6.0 - 7.8. In order to deliver the compost, it must be accompanied by a certificate which must include at least the following: • humidity (below 50%); • total nitrogen content (over 1.5% per year); • the ratio C: N (10-18); • pH (6.0 -7.8). The label will include the name and address of the manufacturer, the materials that were the basis of the compost preparation and recommendations for use. In recent years, interest in composting as an alternative to organic waste management has grown significantly in Canada. As a result, through the national committee, the Canadian Council of Environment Ministries has begun developing national guidelines for the production and use of compost for all provinces and territories. The specific objectives of these guides are: • to protect the environment and public health in the country; • encouraging the separation of sources from municipal solid residues in order to produce a quality compost; • harmonized development at national level of compost standards that will harmonize different groups and different interests; • ensuring consumer confidence by establishing national quality criteria for compost; and • the assurance that the composting method is allowed to develop as a waste / resource management solution and as an environmentally conscious industry that deviates organic waste from landfill and incineration. The standardization office issues a certificate of conformity attesting that the product manufactured by a specific plant complies with all the requirements of the applicable norms. In addition, the certificate ultimately recognizes the ability of the manufacturer to permanently and consistently produce such a product in accordance with the standards. The certificate of conformity is valid for 2 years. The process of recognizing conformity involves the following steps: the request for recognition of the conformity submitted by the company, which leads to the opening of the file by the standardization bureau; the preparation by the company of its inspection plan and the collection of evidence for its quality control required for the report on compliance with the norms and transmission to the standardization office of the "Quality Checklist"; the first visit of the inspector from the standardization office to the factory, to verify the place, the system and the quality control register and to proceed to the sampling of the products for certification; the collection of samples through a properly accredited laboratory, and the samples collected by the Bureau of Standardization, at the end of the analyzes, will characterize the product against the requirements of the norms;studying the first evaluation report and, if necessary, requesting corrective measures; issuing the certificate of compliance, if all the requirements of the certification program have been met;

periodic verification (every 2 years) of the company by the standardization office, to ensure that all the conditions presented at the time of certification remained constant over time (raw materials, the process adopted, the frequency of quality control, etc.). When setting acceptable quality limits, they were taken into consideration.

Although there are no current standards for assessing the quality of compost, many conventional parameters have been used, including the following: pH 5.5 - 7.5; content in organic matter; soluble salts (below 5 mmhos / cm); humidity (35 - 55%); the content in nutrients; particle size (1 - 3 cm);water storage capacity;apparent density (below 600kg/m3); The main advantages of composting zootechnical waste products are: ensures the protection of the environment near the zootechnical complexes and throughout the area where it is applied; constitutes an efficient recycling method for crop residues,

residues and mortality in zootechnical complexes;it replaces a bulky product, with high humidity, difficult to transport and on a small radius around the complex with a concentrated product, easily transportable at any distance, without odor, free of pathogens, able to control the development of diseases and pests in the soil , easy to store, does not cause problems with flies or weeds, and can be applied on the field at the most convenient time;preserves the nutrients in the garbage; the compost contains a more stable organic form of nitrogen, which is less washed in groundwater;the final product yields more difficult the nutrients accessible to the plants and can be applied on the field for a longer period;a valuable fertilizer is obtained for agriculture, especially for the vegetable and floricultural sectors, which can substitute large quantities of chemical fertilizers: obtain a product capable of reducing the deficit of organic matter and microelements in agricultural soils, to improve the physical, chemical and biological characteristics of the soils and to increase the indices of valorization of the nutrients from the applied mineral fertilizers; can replace the sheet; it combines the release of the residues with the improvement of the soil in a "natural" way, which does not require very high energy consumption, but requires at least as much attention as milking operations, egg handling, disease control, etc. : composting does not just mean putting up some waste products and then waiting to compost for a few weeks; constitutes a method of removing excess nutrients from the farm and reducing the surface • occupied with the deposition of residues;the compost is spread evenly on the agricultural land with the existing machines in equipping the units;compost is an excellent soil conditioner, improves soil structure, has an important contribution of organic matter and reduces the potential for soil erosion; is the ideal fertilizer for the garden and is especially recommended for seedlings; compost has antifungal potential;the existence of a market for compost makes it a very attractive product; the main buyers are gardeners, vegetable growers, those who deal with landscape agriculture, cultivators of ornamental plants, those who maintain golf courses, etc; the price varies considerably because it is sometimes regarded as a residual product, but it is obtained with 5-10 $ per m3 and it is sold with 50 $ being highly dependent on the local market, the quality of the compost and the raw materials used; can make a profit;compost can be used as biofilter material; • composting offers the possibility of reusing nutrients and organic fraction from farm residues and leads to obtaining a new, marketable product requested on the market, capable of increasing the quantity and quality of agricultural production.Disadvantages can exist as with any other activity. These consist of: it requires time and money; composting requires equipment, labor and management; using only farm equipment would increase labor consumption; It is therefore necessary for medium and large farms to purchase special composting equipment whose cost ranges from a minimum of $ 10,000 to over $ 100,000 in order to start composting operations;requires land for the activity; the areas required for the storage of raw materials, finished compost and for the composting process can be very large; odors may occur, at least in the first phase of the process; composted products often emit unpleasant smells, especially if stored for a while before the process starts, some places may require odor reduction measures; odors can also be generated by improper management; weather may affect or prolong composting; cold and humid weather can prolong the composting process by reducing the temperature in the compost pile and increasing humidity; Snow in large quantities and long term can even block the composting process; a study of marketing and its application is needed; this involves an inventory of potential

buyers, advertising, packing, transport to points of sale, equipment management and maintaining product quality;

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