

# Technological Innovations in Organic Fertilization

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**Abstract**— *This work is based on the reuse of the disposal of organic matter from fish found in street markets, supermarkets and restaurants. The discarded organic matter becomes an excellent product for organic fertilization, supplementing the soil in various types of applications. It acts on the soil providing better conditions for plant development, avoiding impacts resulting from water erosion. During the composting process, the compost will go through the monitoring and control of its production. This development process lasts until the compost acquires the ideal characteristics so that its beneficial action for the installed culture can be enhanced. The objective of this research was to demonstrate that organic fertilization helps sustainability with local resources. The research method is deductive from research already carried out.*

**Keywords**— *Organic fertilization, Fertilization, Technological innovation, sustainability.*

## I. INTRODUCTION

The organic fertilizer from fish waste is intended to increase crop productivity, preserving the principle of environmental sustainability, since its use reduces the consumption of mineral fertilizers, as well as decreases the unrestrained consumption of natural resources, helping to preserve the sustainable cycle for future generations [1].

According to Dias; Fernandes (2006), organic fertilizer is a product of fundamentally organic nature, obtained by physical, chemical, physical-chemical or biochemical process, natural or controlled, based on raw materials of industrial, urban or rural, vegetable or animal origin, enriched or not with mineral nutrients [2].

The Northern region of Brazil, known for its peninsular geographical position, offers immense hydrographic resources and these resources are demonstrated by the amount of fish taken daily from the waters of the Negro River, the Solimões River and, consequently, the Amazon River.

The Negro River, whose coloring results from the acids released in the decomposition processes of organic sediments released by the forest itself, is an example of natural organic fertilization, without human interference.

Over its 1,700 km, the Negro River naturally receives a large amount of organic matter from the rest of the leaves, shrubs and trunks that, in the riverbed, are dissolved and decomposed, releasing acids that make the color dark water [3].

The waters of the Solimões River are called clear waters because they have large amounts of calcium and magnesium, in addition to suspended solids. Its colors vary from yellow to ochre and have a muddy appearance. The meeting of these two rivers, with different waters, forms the largest river in the world in length and depth: the Amazon River [4].

The Amazon River is the largest river in the world, its waters are shared in the context of the Amazon Basin, and cross borders of sovereign states, from the Andes to the mouth of the Atlantic Ocean. Amazonian waters nourish the life of a diversity of ecosystems, which have vast animal and plant species, which depend on the integrity of the Amazon River to exist [5].

Tons of fish are taken from these large rivers every day, taken to distribution centers and then to consumers.

Fish are the main source of food for the population living in the northern region of Brazil [6], serving all social classes.

In this sense, it is worth asking what is made of the remains of fish that are not used in human food? Where are they discarded and what are the consequences of this discard? How to use fish waste efficiently in the production of fertilizers? What are the advantages that the use of tailings can bring to society?

After fishing and distribution, the fish pass through the sales centers. In these places, they are cleaned, cut and separated according to the demands of the consumer market. The remains of this procedure are discarded, taken to open-air dumps, where they rot, causing the proliferation of disease vectors, bad odor, leachate, among others. [7].

The disposal of organic matter is a waste of reusable material, since it can be transformed into organic fertilizer and serve to improve many types of crops. In this perspective, possibilities are opened to contribute to a healthier and more sustainable reality, since the redirection of the organic mass, considered waste, becomes a resource for the production of organic fertilizers.

The contribution would cover some branches of services that include from the opening of companies for the collection, storage and processing of organic matter, to the sale and distribution of the final product.

In this way, applying already known and developed methods, it is possible to create new sources of work, using a type of local material, found in abundance that, when used, reduces the environmental impacts caused by consumption and disposal. In addition, the material that is discarded can also serve as a basis for the production of bioenergy.

This article aims to demonstrate the importance of technological innovations in organic fertilization, via organic compounds derived from the disposal of fish waste in natura, in which such compounds can be used in various types of soil, improving their conditions, making them suitable for the cultivation of more productive plantations.

## II. METHODOLOGY

The research was conducted on the basis of deduction through scientific articles and works that encompass the initial process of analysis of sustainable technologies and the types of fertilization currently applied in societies, from the initial process of collecting organic matter and soil to its process end of production [8].

This research is justified by the need to characterize the need to create new technologies in organic fertilization from fish waste, an abundant material found in the city of

Manaus, located in the State of Amazonas, which belongs to the borders of Brazil [9].

## III. RESULTS AND DISCUSSION

Fish waste, when used, can serve as organic matter for the production of organic fertilizers and also for the production of electricity. The simple fact that the tailings are not thrown into dumps or open places, inhibits the creation of bacteria and mosquitoes that can cause damage to human health, as well as avoid putrefaction that causes a bad smell.

The use of organic fertilizers dates back to antiquity. Where the first one, derived from nature itself is humus. Humus is the organic matter resulting from the decomposition of dead animals and plants, deposited in the soil [10].

This process develops other by-products produced by earthworms. It was from this wealth offered by nature that humanity was able to feed itself more and better.

Humification is the process of humus formation, in which it is considered a natural process when it is spontaneously produced by bacteria and fungi, when there is human interference it induces the production of humus, adding chemicals and water to a soil, it is called artificial humification [11].

Both in the natural and artificial formation of the humus, there is a release of various agents. Naturally decomposing organic agents, which will serve as a basis for demonstrating this research.

The banks of the River Nile bear witness to the importance of humus. It was because of it that many foods were obtained, this because it provides nutrients for plants, regulates populations of microorganisms that make soil fertile and suitable for plantations [12].

This site is also a source of various chemical elements such as carbon, nitrogen, iron, phosphorus, manganese, among others. These substances are essential for the healthy growth of plants in general.

The creation of domestic animals such as cattle, horses and chickens made it feasible to human eyes that the manure produced by them was fertilizer, since plants were born and grew more quickly and more vigorously than those that had no contact with animal waste. And so, for a long time, man managed to improve his productivity, using organic fertilizers from the feces of domestic animals.

History shows us, the intimate relationship of the soil with the emergence of civilizations and peoples throughout our journey on Earth. Let us start with Egypt, one of the

first human groupings, the origin of the word of its nation, meaning people of the black earth, in allusion to the color of the soil, after the floods of the Nile River, which fertilized the land. At that same time, the peoples of Mesopotamia emerged, occupying a plateau, between the Tigris and Euphrates rivers, also known as the Fertile Crescent, for having the shape of a crescent moon and having a fertile soil. Millennia later, it relates to the origin of the USA to knowledge of the soil, as it was crucial in the British defeat at the Battle of Cowpen in 1781 [13].

Based on the knowledge about the soil, information about reverse logistics is complemented, which consists of the reuse, reuse and recycling of materials from the main activities to produce other materials [14], as an alternative condition for land use, including. Thus, it is necessary to apply the necessary condition to make the logistics reverse, as a condition for the correct process of the material to be transformed for fertilization, being still relevant a brief analysis on the step by step of how to treat waste, while the chain through which it goes through until it completes the process. In this sense, the storage and accommodation process are important items to be followed so that the collected material can be processed and transformed into organic matter, following the following steps:

### 1. Storage of Tailings

For an adequate storage of tailings, it is necessary, first, to create a project that is viable, obeying the criteria and laws that promote sustainability and receive approval from the City Hall, since it is the government agency that must take care of the tailings.

In Brazil, the National Solid Waste Policy (PNRS) was instituted by Law No. 12,305, of August 2, 2010, regulated by Decree No. 7,404 of December 23, 2010, with the objective of imposing on companies the need for use of reverse logistics processes, where it defines: "manufacturers, importers, distributors, traders, consumers and owners of public urban cleaning and solid waste management services are responsible for the life cycle of products", published in the Brundtland Report (Our Common Future, in 1987 [15].

The North Region, being very hot and humid, makes it difficult to store fish waste. Therefore, it is necessary to find adequate storage for this type of material. Since the remains of fish are moist, the tendency of loss of raw material is very great. It can rot in a short time and is no longer suitable for reuse. Therefore, the storage location must be appropriate to the needs of the type of organic matter you are going to store. However, it seems that, to date, there are no containers or drums suitable for the

conservation of this type of product, which raises new research, investments and solutions for this specific type of storage.

### 2. Collection of tailings

Waste collection consists of an operation that involves several types of resources. In addition to human investment in the preparation of adequate labor, vehicles, collection and storage equipment, as well as the destination location, generate great costs not yet measured, not to mention that the E.P.I. used for the entire operation must be in accordance with the current standard [16].

Considering all the needs mentioned above, it appears that the investments required for collection represent high investments because they require a vehicle for transportation, trained people, a place prepared with machines and products necessary for the continuity of the process. Once again it is confirmed that only the union between society and the Public Power will be possible to collect the tailings.

The scientific literature shows us that there are collections of oil [17], foods and others that can indicate the paths that can help and support the execution of the use of the remains of fish.

### 3. Processing

The processing of the collected organic matter, another fundamental step in the reuse process, consists in the immediate forwarding of what was collected to the place where it will receive the necessary and appropriate treatment. In this location, organic waste will receive biodegradable enzymes that assist in the decomposition process.

Thus, the location that receives the organic matter also requires investments, since it must have the equipment and products suitable for the treatment and processing of waste. And again, at this stage, the question of significant investments is essential.

### 4. Destination

The main destination for organic fertilizers is farmers. The purpose of organic fertilizers results in improving the quality of the land, which generously responds by giving more nutrients to the plants they produce, more and better.

In addition, the use of waste need not be restricted to the production of fertilizers. There is a possibility that these residues can be used for energy generation, as in the case of biomass, that is, organic matter from animal or vegetable origin is used to produce fuels, electricity and heat [18].

## 5. Distribution

The distribution of products resulting from the reuse of fish tailings can be done in the same way as other products are commercialized, and can be done in small, medium and large scale, depending on the investments you receive from the collection of tailings to the final consumer.

## IV. CONCLUSION

With the concentration of people in the cities, consumption has become increasingly higher, with regard to the increased use of raw materials, which requires new technologies for their better use, especially with regard to tailings, as well as in the generation of fertilizers, that help increase food productivity without harming the environment or the health of consumers.

However, sustainable activities require investments greater than those inserted in the current market. In addition, nature has a time that does not meet the urgency of today's world. It comprises its own time and manner, different from what humanity requires. Searching for ways to integrate these times and needs of men of nature is the biggest challenge. Faced with so many possibilities, the use of fish tailings can be a viable alternative if the various social agents, commit themselves to viability.

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