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Using Worm Compost to Fertilize Soil Naturally and Economically

In Mexico, agriculture has serious problems because the government does not provide enough support, subsidies, and money for various areas that are relevant to farming, which include technology. Our farmers lose their crops because they do not know which are the best alternatives for exploiting the land, because they cannot afford them, or because of factors that are practically out of their control such as drought. Frequently, they have to use the money they have for urgent purposes other than their farms, or since they cannot maintain them, they and other family members take on other jobs to support their farms, but due to increasing difficulties, they end up abandoning their farm work. The problem that is specifically addressed in this essay is that, due to ignorance or lack of resources, farmers frequently make use of chemical substances that sooner or later cause erosion and contamination to the soil.

As we now know, soil is one of the environment's most important resources because in it we sow our food, which is one of the basic needs of human beings. Soil, along with sunlight and water, feeds plants, houses organisms responsible for nutrient cycling, affects primary productivity, and influences plant community diversity.

Soil contains living organisms, such as bacteria, fungi, algae, earthworms, nematodes, and arthropods. All contribute to the biological and microbiological activity which results in the breakdown of plant material, dead organisms, and other organic residues that accumulate in soils. As this organic material starts to decompose, soil organic matter is formed. Ten to fifteen percent of this organic material is readily decomposable, while the remainder takes much longer. (Office)

This essay proposes the use of worm compost in Mexico, specifically, as well as in all other countries with moderate climate because worms thrive in this weather, it is economical and natural, and the only thing you need to get started is a few worms and some organic matter. Once started, the digestion of these worms produces big quantities of organic credit, which is the basis of the fertility of soil.

Recycling the organic waste of a household into compost allows us to return badly needed organic matter to the soil. In this way, we participate in nature's cycle and cut down on garbage going into burgeoning landfills. It is a way of undoing all the organic matter without making trash, and we can obtain money from it because we can sell the worms internationally. (Elcock)

Agricultural soils and crops need this type of credits since it provides them organic matter that improves the structure of the soil. It returns life to the soil, by increasing the number of microorganisms. It is a product that does not alter the ecosystem; something that artificial manures cannot do. Using worm culturing, we obtain productive, strong and healthy plants. The fact that it is an organic product recommends it widely, because the crops of organic product have high value and demand, not only abroad but nowadays also in our country.

80 % of agricultural areas suffer some degree of erosion, from mild to very severe where practically it is not possible to carry out any agricultural activity. Degradation can be the effect of bad drainage, and the salinity of the areas may be due to bad management and the quality of the irrigation water.

We can use worm composts in crops of maize because these crops use a lot of minerals, and worm compost produces all these minerals in the soil. This can help us to accelerate the production of maize, which will help the country because maize is what we produce most. We must regenerate the

soil in a faster way, with worm compost, and this would be beneficial because maize is one of the most important foods in the world. (Ferrat)

We must keep on searching for alternatives that imply not only diminishing the environmental risks but also increasing the productivity of the soil. There is a world trend oriented to the substitution of chemical or synthetic fertilizers with the use of organic credits, especially within organic agriculture. (Ferrat)

In México, worm composts are used in Chilpancingo, Veracruz, and Xochimilco. The production in Guerrero is of coffee and chili pepper; in Veracruz, coffee, so we can use the worm compost in the same crops, but also in other countries that produce coffee, such as Brazil, Colombia, Indonesia, Costa de Marfil, Vietnam, and in all the countries with moderate climate. (Castellanos)

Worm compost is used in the crops of coffee, rice, papaya and melon. But not only in that kind of crops, other countries are using it also, such as Venezuela which produces apple, pear, plum and peach; Costa Rica produces banana, coffee, sugar, cocoa and pineapple; Nicaragua produces mango, banana, sapodilla, mandarin, orange, lemon, and pineapple; Honduras produces maize, beans, rice, pineapple, sugar and coffee; Colombia produces potato, rice, wheat, cocoa; Cuba produces sugar, banana and coffee; and the Dominican Republic produces sugarcane, coffee, cotton, cocoa, rice, beans, potatoes, and corn. (Castellanos)

Humus

Humus is a chemically complex substance of high molecular weight that can be used for organic soil, organic credit, microbial, and for germinating as well as growth of substratum. It was given the name of humus because we have organic mature matter and organic immature matter. (Dirección General de Normas de la Secretaría de Economía) Now, you can buy humus in Veracruz, although it is quite expensive; the price is 82.1132 USD for one ton without sieving; 97.0628 USD for one sieved ton. (lombricor)

Characteristics of good humus

Good humus presents a high microbial load that restores the biological activity of the soil; this intestinal flora is the one that recovers the functions linked to the absorption of nutrients by the roots of plants. It increases the retention of water and the aptitude to store and liberate the nutrients needed by the plants in a healthy and balanced way. Its pH is neutral and it is possible to apply in any amount without risk of burning the plants. The chemistry of the humus of worms is balanced, which allows us to place seeds in it without any risk. It does not contain chemical products that alter the ecosystem of the soil. And it provides the soils with permeability, both for air and for water. (Dirección General de Normas de la Secretaría de Economía)

Conditions for the subsistence of the worm

Worm compost is the intensive breeding of worms that are fed with organic residues in decomposition. The digestion of these residues produces big quantities of organic credit that are the basis of the fertility of soil.

The two types of earthworm that you can use are *Eisenia foetida* (commonly known as red wiggler, brandling, or manure worm) and *Lumbricus rubellus*. They are often found in aged manure and compost heaps. (Elcock)

Brief facts

2000 worms produce 1 kg of humus per day.

They reproduce once a week.

They are hermaphrodite, which means that all give offspring.

They live 16 years in captivity.
Temperature: Ideal 20 ° (Minimum 0° - Maximum 30°)
Dampness: 80 % (Wet but that does not trickle)
Acidity: Normal 7 (Minimum 4.2 - Maximum 8, alkaline)

Industrial worm composts

Worm composts can be produced industrially. Originally you begin with a small quantity of worms, organic matter and land. They need dampness. The worm has an extraordinary capacity of reproduction that allows the breeder to recover in short term the initial reversed capital. Implementation does not need big investments. The worm that is used (Red Californian) transforms the residues in very short time, and its constant reproduction yields surpluses of worms that also have a national and international market. In the country, there exist few companies dedicated to this, and the demand of organic credit fertilizer has grown in recent years in the whole country. (Sanzo)

The worm compost process

This is how the worms make compost. First the stomach acts like a crunching machine. The mouth of these animals does not possess teeth, for which the worm sucks everything that it eats, and once in the stomach, they are crushed. As the wastes advance through the intestinal tract, they begin to transform into humus. In the final part of the body of the worm, a microbial flora exists with a population of more than 50 billion microorganisms. As humus is forming in this part, from 10 to 20 billion of these microscopic beings join in for every gram of weight. This excrement has 5 times more nitrogen, 7 times more phosphate, 5 times more potassium, and twice more calcium than the organic material that they consumed. (conceptos generles de las lombriz)

Advantages of worm compost

- * Promotes faster growth of plants: increases crop production.
- * Produces crops with a better taste and lasting quality, without toxic residues.
- * Increases production of crops with less irrigation.
- * Improves groundwater recharge and reduces its depletion.
- * Reduces soil salinization and soil erosion.
- * Reduces pollution, since no chemicals are needed.
- * Lowers the risk of crop loss due to pest attacks.
- * The worms do not produce any toxin and do not transmit any disease.
- * The worms help to neutralize soil acidity.

Economic and social impact

The impact is different depending on the size of the farm and amount of worm compost as well as on the residues used. For example, if it is established by a group of rural producers, it could be considered an economic and ecologic alternative to produce a bio-fertilizer of low cost and high quality, which increases the production of crops at low cost and allows them to compete, not only in the general market of the products of the field, but in the market of organic products, which are always increasing in demand.

On the other hand, if one works with the residues of a market or of a community, its impact is observed in social well-being, in health, and it reflects a community that worries for its environment

Furthermore, worm culturing must be considered an important reducing agent of pollution that undoubtedly will lead to an improvement of the quality of life not only of the place where it is established but along the rivers and soils that are being contaminated.

One of the principal problems that the breeders of animals have is the accumulation of the manure of their animals. The evil smell and the generation of harmful fauna add to the problem. In this

case, worm culturing represents an economic alternative that can be adapted to turn all kinds of manure into organic fertilizer. It can be commercialized. For production of organic crops and crops in general, it is excellent, and not only for its physical characteristics, but also for its contribution of organic matter, microorganisms, and for its good composition of the principal elements, NPK, and minor elements. This translates into plants that are more productive, healthy and of increased quality.

How much does production grow?

These compost increases 75% of the production, the crops grow more and the worm generates two things: humus and Vermin compost. Humus is used in the base of the plant and vermin compost is mixed with water and irrigated on the crops. Not only does the production increase the size but weight increases too. Farmers can sell their products at a better price because they are bigger, and they can sell them more frequently because of shorter production cycles. It reduces the consumption of water by 50%, which frequently means more economical production and greater profit.

Why composts sometimes are not subsidized

Unfortunately, in Mexico it is difficult to obtain subsidies for composts because politically they lack importance to the municipal authority as compared to other problems that they consider more urgent, because of the so-called "lack of continuity of projects," which means that many projects are not followed up by government institutions which are constantly changing personnel, policies, and priorities. Corruption plays an important role also, as well as poor management, promotion, and marketing strategies for the compost, and sometimes there is greater production than demand and at other times greater demand than production, among other problems. (instituto nacional de ecologia)

Conclusion

During my investigation, I realized that nowadays almost everybody is concerned with the state of the world. The situation of our planet is critical, but we are now trying to take care of it, and are looking for alternatives to make the world more natural again as well as for options to produce more in less time, to feed the entire world, because we are too many (6,781,473,585).

I think that this proposal is feasible because it would benefit the environment and because it is extremely economical.

The most valuable things that we have are our natural resource, which means that we need to preserve the soil, the fertility of the soil fertility, thus preserving agricultural productivity and environmental quality, for us and for future generations.

And with worm compost not only would we help the soil but groundwater too because we would stop using chemical substances and we would stop polluting water. Moreover, we would help to refill the reserve of groundwater because we would give it back the minerals, since plants help to capture water, which goes down to become groundwater.

We are not only helping the environment, we are helping ourselves too. Soil gives us our food, and if we have healthy soil, we will have food security.

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