

Worms Turn Trash to Cash

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For almost two decades now, a species of earthworm from Africa has been revitalizing the soil of this Southeast Asian nation, giving it the nutrients it needs.

The African night crawlers are also expected to contribute much in the management of solid wastes in the years to come.

Scientifically known as *Eudrilus euginae*, these African earthworms are the main characters of vermicomposting in the Philippines .

Vermicomposting is a form of composting that utilizes earthworms to convert organic wastes like food waste, plant material and animal manure into vermicompost.

Earthworms feed on the decaying organic material and, with the aid of microorganisms in their digestive tract, the organic wastes are excreted as castings or worm manure, called vermicompost.

Those into vermicomposting like Pamela Henares say the African night crawlers, which were brought into the country in the 80s and have since adapted to the environment here, are the "most-effective species."

Together with her husband Jose, she put up a farm that is now one of the top models of organic farming and vermicomposting in the country.

She started vermicomposting to meet the demands of her farm. But today, Henares is not only growing the African night crawlers for her own use; she also sells the worms and promotes vermicomposting in the management of solid wastes.

African Worms in Waste Management

Food and yard wastes make up 44.5 percent of the typical municipal solid waste produced in the Philippines .

In the capital Metro Manila, according to the Presidential Task Force on Waste Management, household waste is composed of 41-57 percent kitchen wastes, 5-17 percent grass and wood wastes, 12-16 percent paper and the rest are non-biodegradable wastes.

But only a small percentage of this organic waste is composted or used as animal feed, while a large portion of this waste is disposed off to municipal dumpsites.

"Why not go into vermicomposting?" Henares asked local government officials gathered in Iloilo City for a seminar on ecological solid waste management sponsored by the Canadian government.

She describes the technology as "environment-friendly, doesn't require imported inputs, highly profitable when sold, more effective as an organic fertilizer than ordinary



African night crawlers are revitalizing the soil and playing a major role in solid waste management



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compost, humus, no burning of plants, has a naturally occurring growth hormone called auxin, no overdosage, and improves soil health.”

“It has been discovered through experiments and actual experiences that vermicomposting reduces organic waste to one-third of its original size. This would minimize the need for landfills and dumpsites,” Henares told 80 mayors and local government officials.

She added that the “recycling technology” could be employed to convert organic wastes into vermicompost, or high quality fertilizer. The fertilizers, which could be commercially sold, can contain up to 8 percent nitrogen, 0.7 percent phosphorus, 1 percent potash and trace elements.

“The vermicompost is also an excellent source of organic matter for potting mixes and nursery plants, and of nutrients badly needed by topsoil-depleted farmlands. It can also be used as an organic fertilizer for ornamental plants, vegetables and field crops.”

Henares said local governments should resort to this cheap, environment-friendly technology instead of buying expensive waste-management machineries and equipment. “It could also make your towns earn money. It turns trash to cash,” she pitched to them.

She added that world and local markets for vermicomposting are big. World consumption of organically grown foods is estimated at US\$ 100 billion per year.

In 1993, the potential use of organic fertilizer covered 2.5 million hectares in the Philippines. The demand for organic fertilizer in 1993 was 6.25 billion bags (50 kg/bag) compared to actual consumption of only 62,000 metric tons.

African Worms and Organic Farming

Pamela Henares along with husband Jose discovered vermicomposting through an article by Dr. Rafael Guerrero published in *Agriculture Magazine*.

In October 1998, the Henares couple started to turn their 18-hectare land into an organic farm, which is now one of the country’s top producers of African night crawlers.

The farm, located in Talisay City, Central Philippines, now produces plenty of organically grown vegetables and fruits. It also has mini forests and a variety of fruit trees. Part of it is also used for raising and keeping livestock and poultry.

The wastes generated in their farm became a resource for their vermicomposting facility. For the past four years, they have not purchased inorganic fertilizers but instead have utilized the vermicompost they produced for their farm.

Buyers of earthworms produced by Buro-Buro Vermi Farm, which are current and potential adopters of vermicomposting, come from different places across the country.

Vermicomposting

The vermicomposting process involves four general phases: collection and preparation of materials, anaerobic (without oxygen) decomposition, aerobic (with oxygen) decomposition and harvesting of vermicompost.

To start vermicomposting, Henares explains, there are four factors that need to be considered: site selection, earthworms to be used, materials for composting, and the vermicomposting process.

A suitable site for vermicomposting should have adequate water supply and good drainage. It should also be close to the source of materials and must be well shaded.

The earthworm preferred by Henares is the African night crawler. They can breed as often as once a week, producing an egg capsule that contains 1-3 young that mature in less than 30 days from hatching.

These worms are not harmful to man or domestic animals. They are cold-blooded, breathe through their skin and have a nocturnal habit (tend to shy away from light).

These worms can live up to two years and grow up to 30 centimeters (1 foot). They thrive best at temperatures of 24-28°C, with moisture content of 60-80 percent.

Materials used in vermicomposting are kitchen wastes (not including oil, meat and dairy products), garden wastes such as grass clippings and leaves and animal wastes.

These compostable materials can be degraded more quickly if they have small particle size to increase the surface area for microbial action. Thus, shredding and pulverizing bulky materials is helpful.

In preparing the materials or substrate, it is important to remember that the proper proportion of cellulosic (high carbon) and nitrogenous (high nitrogen) components must be maintained for rapid composting.

The desirable carbon-to-nitrogen range is 25-35:1. These materials are then mixed thoroughly. Water is added to obtain a moisture content of at least 80 percent.

For vermicomposting done inside a limited space, the substrate can be placed in containers such as wooden boxes, plastic bins and old drums. The height of the containers or bins should not exceed 30 centimeters (12 inches).

The length and width of the bin will depend on whether it is to be stationary or portable. It also depends on the amount of organic waste to be composted per week. It is advisable to provide 0.2 square meter of surface area per kilogram of waste in the bin.

For vermicomposting units located outdoors like on the farm or in the backyard, the substrate can be heaped in beds or windrows, which may be lined at the sides with bamboo walling or other forms of retaining devices such as screens and blocks. Beds can be stacked at a maximum height of 60 cm (2 feet) for aeration by earthworms.

The next step is the anaerobic stage wherein the bed is covered with a plastic sheet to step up the natural decomposition initiated by anaerobic bacteria. The temperature of the substrate in this stage can reach 50-70° Celsius. "The higher the temperature, the faster the decomposition would take place."

This phase may last for one to two weeks. When the temperature of the substrate goes down to ambient condition (24-28° Celsius), the plastic cover of the vermicomposting unit is removed.



Vermicomposting can be a very profitable business

Aerobic decomposition proceeds by stocking live earthworms into the substrate at the rate of one kilogram of worms per 20-30 kilograms of substrate (dry weight).

The vermicomposting units should be watered when necessary to maintain the optimum moisture content of 60-80 percent (when a fistful is squeezed, 3-5 drops of water should drip).

The worms need to be protected also from their predators such as birds, rats, toads and from flooding. The rate of vermicomposting depends on the density of earthworms, the substrate composition (carbon-to-nitrogen ratio) and environmental conditions (temperature and moisture content).

The more worms stocked, the faster the production of castings. When the substrate is fully composted in four to five weeks (28 to 35 days), the vermicompost can be harvested.

The earthworms are first removed from the pile by hand or through a mechanical sorter and then the compost is air-dried for two to three days to a moisture content of 30 percent.

Henares proudly said she was able to convince a number of people to go into vermicomposting and organic farming. "And they have told me vermicomposting didn't fail me."

Now, the former hospital administrator hopes local government leaders will listen to her and heed her advice to use the African night crawlers in turning the town's solid wastes into composts and organic fertilizers. "It would solve their garbage problem and would even make their towns and people earn money."