

Comparing Layered Composting and Vermicomposting Methods

Nick Johnson

The act of composting has been present on the Earth in some form since life began. The decay, decomposition and consumption of organisms by other organisms is as natural a process as can be found. So, of course, humans have found a way to use these natural processes to aid humans. Luckily for the planet though, in this instance, our need to improve everything is actually helping the Earth. By speeding up the process that would happen naturally, we can then add to the size and production of the compost container. In nature things happen slowly and in place. Leaves fall under the tree they grew on for the most part, and slowly decompose and eventually will feed the tree. By actively composting the leaves, the nutrients contained in them become available to the tree sooner, and we can manage some of the pathogens and non-beneficial organisms out that would harm the tree if left on their own. Additionally, we can add to those nutrients and allow the beneficial organisms to multiply so there is enough for the tree that grew the leaves, and some left over for us to use in other areas that are lacking those things.

There are as many ways to actively compost, as there is any sort of farming. Considering composting as livestock management or animal husbandry of the organisms in the ecosystem, with compost being the by-product is a good mindset to begin composting. Be they visible such as worms and mites, or microscopic like nematodes and protozoa, it is the organisms in the compost that are the key to the composting process. There are three categories that these organisms fall into: Primary consumers, Secondary consumers and Tertiary consumers, and for the most part the later feeds on the previous category with the Primary consumers actually consuming most of the feedstock.

The populations of organisms in any compost depend on the feedstock and location of the pile, both geographically and rather the compost is inside or outside. For example, there will not likely be any ants or bees in an indoor vermicomposting bin; however, both can be an integral part of outdoor California style layered compost. Comparatively, if there are banana peels from the same hand in an outdoor compost pile and in an indoor vermicomposting bin, there will be similar organisms in both bins brought in on, and attracted to, the peel.

In order to keep all of these organisms as healthy and happy as possible it is necessary to carefully consider the location available for the "pile" and the style of composting that fits. For a small space in colder climates, indoor vermicomposting may be the right fit. If the space and feedstock are available, outdoor, multi-bin, layered compost may be better, especially in warm climates where composting can occur year round outside. For the purposes of this paper, layered composting and vermi (worm) composting will be examined in more detail.

Vermicomposting is a method of composting that utilizes the habits of specific worms, usually red wigglers (*Eisenia foetida* or *Eisenia andrei*) or European night crawlers (*Eisenia hortensis*), to consume the feedstock. This is not to say that worms are the only organisms in the compost, or even the most numerous. They are merely the most visibly present primary consumers. Worms, mites, fungi and actinomycetes are just some of the beneficial primary consumers possible in a vermicompost. Other visible consumers that may be in a vermicompost include beetles, mites and spiders. Each compost will contain its own unique ecosystem and therefore knowing what specific microscopic consumers are present, and their populations would require a laboratory sample being analyzed.

Temperature and moisture are two variables that can be problematic when composting with worms. The worms themselves need to be protected from elements outside like mice or rats that will eat them; therefore, the compost is more dependent on the feedstock added than other forms of composting. If the particle size of the feedstock is too large, or the bin is set in direct sunlight, the temperature may raise within the compost to a temperature that will harm or kill the organisms in the bin. If the feedstock is too wet, the organisms may not be able to do their job properly, and the holes that the worms create in the material do not stay open, so air is not allowed to penetrate in to the pile creating anaerobic conditions, which could harm or kill the organisms. The organisms produce liquids as well, so the moisture content management is paramount in vermicomposting methods. It should be stated that the opposite is also true. If the temperature is too low or the conditions are too dry, there will be negative feedback as well. The composting process slows considerably as the temperature lowers, and dry conditions allow for any fly eggs to mature, among other issues. Vermicomposting is a more controlled method of continuous composting than others and the balance needed for the ecosystem to thrive is maintained by the feedstock. If careful consideration is given before each addition of material, or feeding, conditions can be kept close to optimum.

Layered composting is considered a batch method of composting, and is a closer reflection of the natural processes. Material is laid on top of material until the bin is full. The container is then allowed to decay, decompose and be composted for some time, usually a few months. Eventually, depending on the method of layering, the pile becomes useable material. Turning the pile periodically at specific times to maintain the peak productivity of the organisms can accelerate this method.

This method of composting is primarily done outside; therefore, the variety of consumers, primary, secondary, and tertiary, in the pile is only limited to the local environment, climate and, to a lesser degree, the feedstock. Generally, these piles are left open to the environment and as the environment changes through out the year, so too does the compost pile. The temperature of layered composting is allowed to reach higher temperatures than vermicomposting and so there is room for bacteria, fungi and other organisms that live in cool, warm, and hot conditions.

As the temperature changes, these organisms move from the middle of the pile to the edges and back to find their respective optimum.

This method of composting is generally more tolerant to variations in conditions. For example, if the conditions become acidic or anaerobic, the pile may look or smell unattractive, but other organisms are invited from the surrounding environments to continue the composting process in their own way, and the process continues. However, there are some problems that could occur. The least of which is not wildlife. If the compost is not managed in a way that hides the smell of fresh food, it may attract larger animals. If the pile is not protected in some way from these larger animals, they will destroy the pile to gain access to the feedstock. Being conscious of what is being added, so that leaves or dried grass covers any eggshells or fruit peels and the cover layer is moist enough to conceal the smell of the under layer, then the animals that are passing by will leave the pile alone until such time that the feedstock is broken down enough to no longer be attractive to those animals.

Because of this, most residential layered composting is done in some form of container or hole. For the most optimum composting to happen it is advisable to have a two or three bin system. In doing this, the pile is turned and flipped into another bin for a secondary composting cycle while a new pile can be started in the original bin. This is better for pest control, but the more closed in the pile is the more management it requires from the owner to regulate other variables such as moisture content and oxygen flow.

Every method of composting, aerobic or anaerobic, inside or outside, batch or continuous, all require the organisms in the system to be healthy. A compost pile considered an ecosystem of animals that require food, water, and air in the correct proportions will be better managed than one considered a pile of inanimate rotting material, and therefore will be more successful. Temperature, nutrient balance, moisture and oxygen content can all be adjusted to maintain optimum conditions as time goes on, and will need to be as the feedstock breaks down. It is though for the benefit of the organisms that these variables are adjusted. Dependent on the method used, the optimums of any one variable will be different. Careful consideration should be taken before picking a method, as some require more attention than others. Any problems that arise can be remedied, and if the problems become too numerous for whatever reason, composting is a human improvement on a natural process, so it can be left unattended and eventually, Mother Earth will take back control and the process continues without us.