

DO IT WITH WORMS!

OUTDOOR COMPOSTING WITH RED WORMS

A Project of CORE
CREATIVE ORGANIC RECYCLING ENTERPRISES
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Backyard composting. Too hard? Too smelly? Too dry in New Mexico? Just doesn't work? If one or more of these characterizes your experience with home composting, yet you understand the tremendous benefits to your garden and our environment that this simple activity can have, behold the amazing red worm. Compared with other methods, composting with red worms requires the least labor, the least water, and in most cases, the least time to complete. The best part, - so good it should be illegal - is that worm compost - "castings" - is simply the most fabulous compost in the known universe. We like to call it the "Organic Miracle Grow." A vermi-compost pile (worm-compost) benefits from the presence of both worms and bacteria. Worms possess a gizzard, like a bird, and thus are able to physically grind all the material they ingest producing nutrients and minerals ideally suited to plant uptake. Our test show major nutrient levels of 2x those found in standard compost. Furthermore, a worm's "castings" possess many beneficial enzymes and unique bacteria that promote seed germination and healthy plant growth. Don't be misled by information that suggests that composting with worms needs to happen indoors, I have been doing it successfully out-of-doors for over 20 years!

So can YOU!

To compost outdoors with red worms you will need the following: A *bin*, with four solid walls and, little to no vents. Only the top need be exposed to the air. Cutting back on the airflow through the walls dramatically reduces water loss. Unlike conventional composting methods using only bacteria, which will work quickly only when air flow through the compost material is high, using red worms allows for a bin which has a much lower level of air flow. With red worms the bin can be made with solid walls. In an arid climate, air-flow equals water loss. Maintaining a moist compost pile is crucial to successful composting. Bins made of straw bales arranged in a rectangle or square is ideal, a simple box made of un-treated lumber, or even a large plastic compost bin will also work well. For a number of reasons including maintaining a stable temperature, larger outdoor bins are better than smaller ones. My experience shows that a bin should be no smaller than 40 or 50 gallons. 150 to 200 gallons is better. To calculate total gallon capacity, multiply length x width x height, find the total number of cubic feet and multiply by 7.5 to arrive at total gallons. When it comes to outdoor bins, larger is better. Bins should be a minimum 18 inches, and generally no more than 48 inches deep, and minimum 18" length or width. Example bins: 3'x3'x3' equals 27 cu.ft. or 202 gallons.

3.5'x3.5'x2' equals 24.5 cu.ft. and 183 gallons. Many folks relate larger bins with more work. My experience is just the opposite. The hardest part about composting in a arid climate is keeping the material wet. Nothing decomposes unless moisture is present. A pile, or bin, loses water from the surface, any surface. Larger piles/bins have more volume per unit of surface area. As a pile grows in size its volume grows exponentially and the surface grows arithmetically. In other words, a larger pile has a better surface to volume ratio. For this reason, larger piles are easier to keep wet.

Wet bedding (Carbon) filling the bin for the worms to inhabit – examples include: loose straw(brown) –not hay(green), leaves, shredded paper and shredded cardboard, coconut coir, peat moss. The bin is easiest to set up using bedding that contains little or no nitrogen. Avoid manures and fresh green plant materials when preparing the bedding, as these contain nitrogen and will produce a hot pile initially. Later, add layers of manure or nitrogen rich materials to the top of the pile. The easiest and most water-efficient way to moisten the bedding is to soak it first *in* a container of water, rather than pour or sprinkle water over the top. The fastest way to moisten dry bedding is to mix it with your hands while sprinkling it with water. The bedding serves two major purposes. One is to provide the worms with carbohydrates -they eat the straw- and the other is to provide the worms with a moist loose home. Bedding is very important, and should be initially added to the empty bin a minimum of 12 inches deep. Straw will compress quickly when moistened, so keep adding it to the bin. Filling the bin completely with wet bedding is my recommendation. As it decomposes there will be plenty of room for more.

Food waste (Nitrogen) from your kitchen or friends', and/or other nitrogen rich materials. Green plant material from the garden contains nitrogen. Add it while it is still fresh and it will quickly decompose. To speed decomposition, water the layer of plant material, sprinkle it with soil, and bury it beneath straw, leaves or other bedding. Animal manures contain nitrogen. Add them in layers to the pile and moisten. Horse manure may contain bedding materials in quantity, if so, it may considered bedding for the worms as well.

Red Worms –not night crawlers- purchase them from Sam McCarthy (310-3971) or Robert Menegio (518-929-1160) or at the Farmers Market Saturdays. Worms are available where Sam works at Payne's Organic Soil Yard, 6037 Agua Fria (424-0336) Mon.-Fri. We can also set up the Worm bin for you. Email: SFCOMPOST@YAHOO.COM Red worms are smaller earthworm cousin to the night crawler most are familiar with. Red worms are “litter” dwellers or surface dwellers, meaning they naturally occur in the surface soils and layers of dead decaying plant matter on the surface of the environment. They prefer to live in what they eat, moist leaves, for instance. For this reason, a red worm will happily stay within a compost pile so long as it remains moist, has additions of carbon and nitrogen and remains within a moderately mild temperature range. While it is true that these worms will die if exposed to temperatures below 32 F or above 95-100 F, within a sufficiently large, moist and active compost pile, outside air temperatures far above and below these limits can be survived. The volume of the pile acts to insulate the worms, buffering the cold or hot outside air temperature. Bigger volumes do this better than smaller volumes.

How to set up your worm bin: Arrange the bales into a rectangle – five or six bales minimum for one average household, or build/buy a wooden or plastic bin. A block or stucco wall or fence can serve as one of the walls, thereby reducing the overall dimension of the bin. Overlap the ends of the bales so that there is a complete envelope around the bedding. Wet the bedding thoroughly and fill the bin *at least* 12 inches. It is helpful to sprinkle some soil from the garden on the bedding as you fill. If bedding is used containing nitrogen, such as manure or fresh green plant matter from the garden, or another compost pile, it will be necessary to wait for the pile to heat up and cool off before adding the worms. Red worms may not survive in a pile that is 95 degrees Fahrenheit or above. After two to three days, or when the pile cools sufficiently, introduce the worms. 1 pound is adequate to begin. Worms are very mobile, so tucking them in one corner is all one needs to do, though covering them with a layer of bedding can't hurt.

Feeding the worms: Begin feeding the worms kitchen waste, slowly at first: two or three day's waste per week for the first two to three months. Increase the additions of food wastes when you see the previous feeding has been consumed or is full of worms. Remember, worms will not stay in the light, and only eat moist things. If food waste is left on the surface, it will rapidly dry out, the worms won't be able to get to it, and it will attract pests. Cover all food waste with bedding, such as leaves or straw, 3-4 inches minimum. Feed the worms all the scraps from the kitchen. Meat and dairy will be eaten, but should be cut into small pieces and buried deeply in the bedding to lessen the chances that odor will escape. Milk should be diluted with water. Citrus is not a problem in an outdoor bin. Whatever you may add to the pile, even those foods (citrus) that are less desirable to the worms initially will decompose and then be eaten. In a large bin the worms can choose to avoid foods they don't like initially. Plant materials from the garden can be layered on top of the pile, covered with bedding, and will be much appreciated by the worms. Shredding or cutting-up this material will help hasten its decomposition, but it is not necessary.

Eventually, the worm population will increase sufficiently to accept all the waste you produce. Be patient during this process. The danger being that food waste added on top of food waste will lead to a smelly anaerobic mess. If you feel particularly impatient, buy more worms and use the book Worms Eat My Garbage by Mary Appelhoff to calculate just how many you will need. This "worm to garbage ratio" is particularly important with small indoor worm bins. One of the many beauties of the outdoor worm bin is that it allows less precision in this ratio.

All food wastes *must* be covered by bedding, either existing bedding or new bedding applied to the surface. When bedding is no longer distinguishable from compost, or there is not sufficient bedding to cover the added food scraps, more must be added to the surface, there is no such thing as too much bedding, only too little. A thick layer of bedding on the top of the pile is best. Roughly speaking, the pile requires a **minimum** of two parts bedding (carbon) to one part food wastes (nitrogen).

Watering the bin: Maintain moisture at a high level by light periodic applications. Once per week is a good place to start, checking corners, edges, and at depth frequently.

Water heavily from the top once per month. A dry pocket within the pile will become a perfect nesting spot for a family of mice. When squeezed, a handful of compost should hold together like a snowball. Remember, dry materials will not decompose. If the bedding dries out the worms have to leave it as well. If your worms aren't easily visible in the pile, it is probably too dry. Worms breathe through their skin; this exchange only happens if the skin is moist. Drying a worm is suffocating it. If your pile becomes infested with roly-polies or pill bugs, it is too dry. Re-wetting will solve the problem and the little critters will disappear. Ants as well, only inhabit dry piles. It is worth noting that it is easier to maintain a wet pile than to re-wet a dry one. Dry bedding materials are very resistant to water when they are dry. When this happens, mixing the bedding while watering is best to hasten the wetting process. Plant materials from the garden can be added in layers to the top of the pile. Plant stems and branches are often difficult to keep wet due to their coarse nature. Covering these materials with a ¼ to ½ inch layer of soil will allow these materials to stay wet and begin to decompose. Watering each layer as it goes onto the pile is best. Often, when nitrogen-rich materials are layered and watered, they will produce a hot layer. This is fine, as the worms will stay down in the cooler parts of the pile until this layer cools.

Turning the pile: Turning the pile, mixing it up with a fork to aerate it, is not usually necessary. The exception being if it has become very dry, mixing can greatly aid in the re-wetting process. Turning compost will invigorate bacteria to the degree that the pile may become hot enough to kill the worms. Worms, in my experience can survive even hot pile for a time, but turning is heavy work, so why bother. Let the worms do it! Yet another advantage of the worm pile versus traditional composting methods, no heavy lifting!

Other materials to add: Light layers of soil periodically. Manure in thin layers – 2 to 3 inches. Yard debris, including leaves, plants, etc...Shredded junk mail, paper, and cardboard. Avoid coated, colored and glossy paper due to the chemicals these contain.

Materials to avoid: Weed seeds or seeds of any plants you don't want to sprout in the garden. Oily, fatty, or greasy foods and residues. Dairy and meat items generally can be added if they are diluted, or cut into small pieces, as increasing the surface area of any material will speed its decomposition. The rule about burying wastes is especially true here, as these items will attract pests if left on or near the surface.

To cover or not to cover??? It may seem that covering the pile will help retain moisture, and it surely will. Covering will also provide a perfect place for all sorts of critters that you never knew existed in your yard to hang out. If you want to find out just what crawls and slithers around your yard when you aren't looking, then by all means, cover the pile. Personally, I do not like the daily surprise of something staring back at me each time I lift the lid. Therefore, I simply maintain a nice thick layer, 3-4 inches or **more** of bedding, such as leaves, straw or mulch, on top of the pile. Better yet, use the 2-3 inch "flakes" that a straw bale separates into when untied to cover the pile. These flakes hold moisture well and will slowly become part of the pile.

How long to feed a pile? A pile can be fed indefinitely. Either until you wish to harvest the compost or the bin begins to overflow. If using bales as a bin, you could simply add another layer of bales to the top of the first layer, deepening the bin. Alternatively, a new bin can be constructed and the process started again. Using new bales, construct a new bin and fill with wet bedding. The old bales surrounding the first pile are perfect bedding ready for the new bin. Once the new bin has been built and filled, transfer the top layers of the old pile over to the new one. These top layers, if adequately moist, will contain the majority of the worms and young, un-decomposed materials. Prepare for this move by thoroughly moistening the top layers of bedding a week before, and continue to water lightly each day until you move the worms. The idea is to move enough worms over to get the new pile going. The remaining worms can be taken to the garden with the compost. An alternative method involves building the new bin as an addition or extension off one side of the old bin. Worms will begin to move into the new bin as it begins to decompose. Yet another method, involves moving the top layers from one-half of the bin to the top of the other half. The exposed compost beneath can be removed. Refill the empty side with new moist bedding and proceed. Roots from surrounding bushes or trees may invade the pile. Consider this when choosing the spot for the pile. Invasive species such as elms are especially..... well, invasive. Another important aspect to locating the pile is to consider convenience. You don't want the pile to be so far away as to be a hassle to feed. As well, since water is critical to the functioning of the pile, locate it near a water source. A long run of hose will make watering in the winter a hassle. If it is a hassle, experience shows, it won't get done frequently! Remember, bedding is both a home **and** a part of the worms' diet. Bedding must be added to the pile in quantities approximately twice that of the food wastes. The most common thing that frustrated composters do, is allow the pile to dry out.

Keep the pile wet. A good rule of thumb is that if you squeeze a handful of the compost it will stay together, then it's probably wet enough. If water drips out, it's probably too wet. If it doesn't hold together it's probably too dry. A good indicator of a pile that is too dry is an explosion of roly-polies or pill bugs. These harmless creatures are also decomposers, so are helpful generally, but when in abundance indicate a pile that is too dry for the worms. Ants in the pile in large numbers also indicate dry conditions. A wet pile of anything will decompose. A wet pile of too-much nitrogen (greens and kitchen wastes) and too little carbon (browns) will decompose in a smelly, slimy, anaerobic way. Try to keep in mind this simple rule: **At least 2 parts Brown (carbon) such as leaves or straw to 1 part green (nitrogen) such as kitchen wastes.** Fortunately, adding more carbon or bedding to the pile than is necessary, has no ill effect. So add carbon in large quantities to ensure happy worms.

What will happen to my worms during the winter??? When working properly, a compost pile is a living organism, or at least a pile **full** of living organisms. Bacteria and worms generate body heat; it is this heat, combined with the heat liberated from decomposing materials, that makes compost piles warm or even HOT at times. During the winter, the warmth generated in the pile keeps the pile from freezing, and keeps the worms alive. If the pile is very small, say a plastic storage tote, the warmth is lost quickly and can freeze. A pile of more than 40 to 50 gallons will retain warmth sufficiently and work well even in cold weather. A larger pile insulates -holds heat- even better, so it is

best to make the pile larger than the minimum 40 gallon limit. Remember, the work of worms and bacteria requires water and food -carbon and nitrogen- to take place. It is essential in dry climates to water and feed the pile during the winter months. This keeps the pile active and warm. Watering when it's cold out will not freeze the pile. In moister climates, where the winter is severe, it is possible for a large pile to go through the winter with no additions of water or nitrogen, as long as the pile has abundant bedding and remains moist.

Above all have FUN and RECYCLE that food waste! ***Worm Facts and Fun:*** Red Worms live one to two years.

Worms are hermaphroditic, they have both male and female parts, but it still takes 2 worms to reproduce. They come together to trade sperm then each lays a cocoon or egg case about the size of a grain of rice and in about 3 weeks 2-3 baby worms emerge which are from 1/4 to 1/2 inch in length. These babies will mature in 8-10 weeks and start laying their own cocoons...Worms can eat a little over half their own body weight in garbage each day. A worm breathes through its skin and needs to be kept moist, if their skin dries out completely they will suffocate and die. How many worms in a pound? The number will vary depending on the size of the worms but somewhere around 1,000 is good estimate.

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