



PUTTING WORMS TO WORK AND KEEPING THEM HAPPY

FOR MORE INFORMATION

WEB sonomamg.ucanr.edu
PHONE **Master Gardener Information Desk**
(707) 565-2608
EMAIL mgsonoma@ucdavis.edu

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133 AVIATION BLVD, #109 SANTA ROSA, CA 95403

Written by Rosemary McCreary
Updated by Jennifer Roberts

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ABOUT WORMS

Worms you buy from a worm farm or supplier are generally either Red Wiggler Worms, *Eisenia fetida*, or European Night Crawlers, *Eisenia hortensis*. But many worms are called Composting Worms. The Red Wiggler, *Eisenia fetida*, is best as is lives in the top 18" of the soil and eats 1/2 its body weight each day in optimal conditions. These worms live just under the surface, ingesting soil along with decaying organic matter and leaving tunnels that carry oxygen to plant roots and improve drainage. This activity breaks up heavy dirt clods, and the resulting castings keep the soil loose and provide nutrients to plants. Worms multiply rapidly in 55 to 75 degree temperatures, but they will also survive in somewhat lower and higher ranges. Eight worms can produce as many as 1,500 offspring in 6 months if conditions are ideal. Worms are hermaphrodites, possessing both male and female sexual organs. Mature worms reproduce by rubbing together and exchanging sperm. Several times a week, they deposit 2-4 eggs inside a band of mucous around their upper bodies. As the worms slip out of the band, it encloses the eggs and hardens into a protective cocoon about 1/8 inch in diameter. After 3 weeks, the eggs hatch. Young worms reach maturity in another 8-10 weeks and begin reproducing.

SETTING UP A BIN

- **Use any wood or plastic containers** for housing your worms. The best bin has at least 2 square feet of surface area and is about 1 foot deep. Wood boxes generally allow a constant supply of air, and plastic bins are adequate as long as you provide air holes on the sides of the bin.
- **Build a worm bin or purchase an inexpensive plastic storage box with a solid lid** for under twenty dollars. Or, you can spend up to one hundred dollars for special commercial designs with tiers, removable trays and drip pans.
- **Keep your worm bin in a protected site** away from hot summer sun and winter rains or freeze. A heavy sheet of black plastic makes a good insulator against winter weather, but a garage or carport offers even more protection.



WARNING: Your worm box must be well ventilated. Aerobic bacteria, or those that need oxygen, slowly decompose the organic material, making it more palatable to the worms. If the environment becomes anaerobic—that is, lacking air—the bin will develop a foul odor and the worms will eventually die.



MAKING THE BED



- **Worms need bedding both under and over them.**

Newspaper, office paper, and corrugated cardboard shredded into ¼ to 1-inch wide strips are commonly used materials. Immerse shredded strips in water, squeeze out excess water, then fluff them inside the bin. It is helpful to include browned leaves or decomposing wood chips. Sawdust, straw, or coconut fiber (coir) are great too. Any of these materials can be mixed together to keep the bedding fresh and airy.

Add a handful of moist soil or a sprinkle of crushed eggshells to the bedding. It provides worms with grit necessary for digesting their food.

WARNING: Drain or wring out the bedding well before putting it in your worm box. It must be able to absorb moisture from the food scraps you add. The bedding is perfectly moist if it clumps together when you squeeze it in your hand and no water drips out, like a wrung out sponge. Usually, it is unnecessary to add water to keep the bedding moist, but if it dries out, add a small amount of water at a time.

ADDING WORMS

Before you buy worms, estimate the amount of food scraps you will be adding to your worm box using this formula:

- **1 lb. of worms requires 2-4 sq. ft. of surface area** to consume 3.5-4 lbs. of food waste in 1 week.
- **If you generate more food scraps**, increase the surface area and the number of worms accordingly.

Worms are sensitive to light. When you add them to the bin, put them on a 4-6 inch layer of moist bedding material in the bottom, then cover them with another 6-inch layer of bedding.

WARNING: Until the worms adjust to their new environment, it is a good idea to feed sparingly and include plenty of bedding. After a week, they will be well-fed and acclimated to their new surroundings.

FEEDING

Begin feeding your worms soft foods for the first week or two. Soft fruits and vegetables, cereal, and bread are easiest to ingest. Later on, add crushed egg shells and tougher vegetables and trimmings along with coffee grounds, filters, and similar organic wastes.



Worms will also eat chopped leaves, grass clippings, weeds, and flower stalks. Decomposition from bacterial action is on-going in the worm bin and occurs fastest when food particles are small, but leave a few larger scraps since worms like to cluster together inside a melon or avocado shell or under a soft tomato.

WARNING: Bury all food scraps several inches under the castings and bedding to avoid odors and pests. Be careful not to overwhelm your worms with too much food. Some foods such as carrots, potato peelings, onions, and beets are eaten faster cooked than raw. Be careful about including foods cooked in oil. Worms breathe through their skin and oil clogs their pores. Also avoid feeding worms citrus, hot chili peppers, onions, meat, or dairy. Notice the worms' habits and make adjustments accordingly. Don't worry about feeding on any schedule. Worms are extremely adaptable and will eat bedding and castings in the absence of scraps.

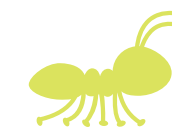
MAINTAINING THE BIN

As the bedding disappears, replace it. Try to keep some moist leaves in the bin along with shredded paper. Don't hesitate to add bits of paper towels, tissues, junk mail, torn up paper cups and

plates (only those unlined and uncoated with plastic), and whatever other organic materials that would otherwise be wasted. The worms will readily eat paper and cardboard along with the bedding. Continue to add a handful of soil or crushed egg shells every month or two for grit.

WARNING: Keep the bedding moist but never soggy. Remember that most food is 80% water. If excess moisture develops, pour it out onto your plants and add dry bedding. Weight from excess food scraps blocks out air. Stir to aerate and cut back on adding scraps if the worms eat slowly during cool or hot weather. Don't ignore the corners of the bin. Worms will place things that they can't eat such as seeds that are too hard. Stir in castings that accumulate there to keep all materials well-aerated and remove rejected objects.

Pests are sometimes a nuisance. If ants enter the box, a barrier will keep them out. Be creative. Elevate the bin on supports set in water or contrive a sticky trap. Ants are attracted to dry conditions, so be sure the bedding is moist enough. Cut back on feeding until the ants leave, but provide ample shredded paper for the worms. Don't be surprised to find harmless sow bugs or other creatures living in the worm bin. Tiny white nematode worms usually appear, often under acidic conditions. These worms are normal, but excess acidity, common with fruit debris, also attracts fruit flies. They will certainly appear if you fail to bury food scraps adequately or if top bedding is too thin. Keep dry bedding to the top of your bin's lid to keep fruit flies at bay. They will certainly appear if you fail to bury food scraps adequately or if top bedding is too thin. Keep dry bedding to the top of your bin's lid to keep fruit flies at bay. Soldier flies, pollinators as opposed to pests, are scavengers that breed in decaying organic matter. The gray, flattened, armadillo-like larvae may invade outdoor worm boxes and compost piles, but seldom bother bins in an inside, protected area. Screen the top of your bin to exclude flies since the larvae can feed on worm eggs. However, they are also helpful decomposers.



USING WORM CASTINGS

After 6-12 months, you will have enough castings to harvest in one of the following methods.

- **Feed the worms in one end of the bin for several weeks**, attracting all of the population to one area, then scoop out castings from the other end.
- **Stop adding scraps until all are eaten and only bedding remains.** Remove paper bedding and empty the bin onto a plastic-covered table outdoors or under a bright light. Make a long, low mound and slowly brush the castings off the top of the mound. The worms will quickly bury themselves at the bottom. Continue removing castings until the worms are left with a thin covering, then put them back into their bin with fresh bedding. If the population has exploded, begin another bin with half of the worms and new bedding.
- **Include a handful of nutrient-rich castings in potting soil** for your houseplants around your ornamental plants and underneath fruit trees. Use generously in vegetable beds. Mix the castings into the top few inches of soil and water well. There will be worm eggs and a few young worms in the castings. They can survive and enrich the soil under a mulch but it's best to keep them. Learn to identify worm eggs and preserve them for your bin.



WARNING: Because worm castings are rich in nutrients, use no more than 5% in seed germinating mixes. You can use up to 20% castings, however, in potting soil for seedlings and mature plants.

