

SP-00-26

## STARTING A WORM FARM

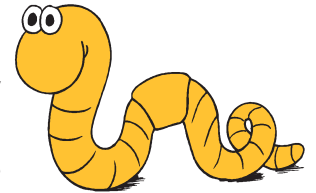
(Also known as vermicomposting or vermiculture)

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### What are Earthworms\*?

- mini-rototillers. They move through the soil, breaking up compacted soil so air and water can circulate more freely. Healthy organic soil may have enough earthworms to move forty tons of soil per acre every year.
- nature's recyclers. They voraciously consume decaying leaves, grass clippings, and kitchen scraps. As the material goes through their bodies, it changes from waste to fertilizer. A worm will eat the equivalent of its weight each day. As they produce 2,000 to 3,000 offspring each year, they can consume a great deal of waste product.
- producers of nature's fertilizer. As the food processes through their bodies, they expel what is called "castings" which are very rich in nutrients and minerals.
- truly a farmer or gardener's best friends.



### Where do they come from?

Worms are present in all soil that has sufficient organic matter. A healthy soil should have at least ten earthworms in every square foot. Earthworms play an important role in the soil ecosystem. They are an essential part of healthy fertile soil. They are able to take organic material such as vegetable food waste, leaves, grass clipping etc. and produce organic humus in the form of castings. These castings have five times the nitrogen, six times the phosphorus, and ten times the potassium of most potting soils you would buy at a garden center.

### WHY EARTHWORMS?

#### Earthworms increase the water absorption in soil:

Heavy silt and clay soils cause water to run off before it can be absorbed. The need to conserve water and help it reach into the root zone of the soil is very important. Increasing organic matter and the worm population in soil makes it more receptive to water infiltration. Through a research project, the USDA found that a silt loam soil without worms had an absorption rate of .2 inches of rainfall per minute. The same soil, after hosting earthworms for only a month, increased water infiltration by 350% to .9 inches per minute. Earthworms provide tunnels and openings to the surface and their castings help to keep the soil loose and able to accept and retain water.

*\*When this publication talks about earthworms it is referring to red worms or red wigglers, which are the best type of worms for composting. They have very big appetites and will consume large quantities of food waste.*

Cultivated soil with little organic matter and few or no earthworms will lose its water stability after a few rains or irrigations.

### **Starting your worm farm:**

Worm farms can be started in five to thirty gallon containers or in a layered compost pile in the yard. A bin can be easily made out of cinder blocks. Form a "U" or square shape, two or three feet high. Start with a small area. Make this your "worm compost" area. Pile up plant clippings, grass clippings (except Bermuda grass), and all kitchen waste that originated from a plant. When the debris reaches four or five inches, throw on a thin layer of soil. This is important because soil contains many small organisms that contribute to the acceleration of the decaying process.

The compost pile should be about two feet or higher to heat up properly. If there isn't a large quantity of debris, reduce the diameter. If the material is chopped or shredded, the decaying process will be accelerated. It is good to have a mixture of brown (carbohydrates) to green (nitrogen). A ratio such as 25:1 or 35:1 (brown to green).

### **Will earthworms sting or bite?**

They don't have stingers, stinging hair, or a hard outer protective skin. They can't jump or fly. If caught by a predator, earthworms will detach portions of their posterior, or wiggle violently, or give off fluids from their dorsal pores. Their main protection comes from spending much of their lives in the soil, only coming out in the dark or when flooded.

## **THINGS TO KNOW**

### **The life of the earthworm:**

Earthworms are sexually mature in 60 to 90 days and can produce egg capsules every seven to ten days. The eggs hatch in 21 to 28 days. Each capsule produces two to twenty baby worms. Worms are hermaphrodites so they all can produce eggs. They reproduce by slipping their heads under the band or collar of another worm. They like to breed and settle in the center of the container where the temperature and moisture are the most constant. Under ideal conditions, one thousand worms can produce one million in a single year.

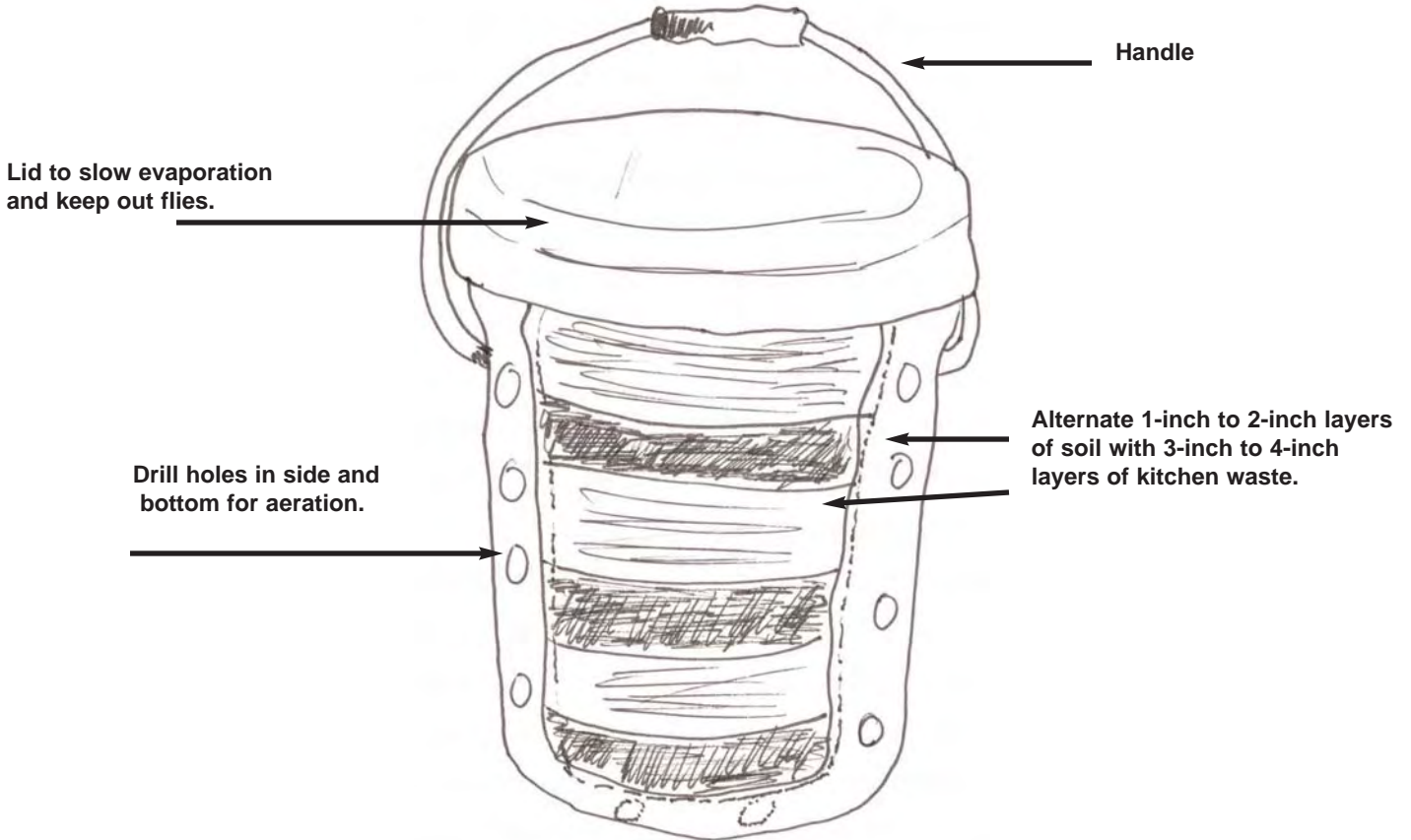
### **Harvesting worm compost:**

After three to six months, begin to harvest compost and add new bedding materials. There are two simple ways to accomplish this: the first is to place the bin under a bright light, (not direct sun light as it will heat the compost and the worms). Worms do not like the bright light. They will move further down into the container as compost is removed. Worms or eggs that are found can be placed back into the bin. The second way is to move all the compost to one side of the bin and add new bedding material and food waste to the empty side. In several days, the worms will move to the side with the new bedding and food, making the harvest of the compost very easy.

### **Using worm compost:**

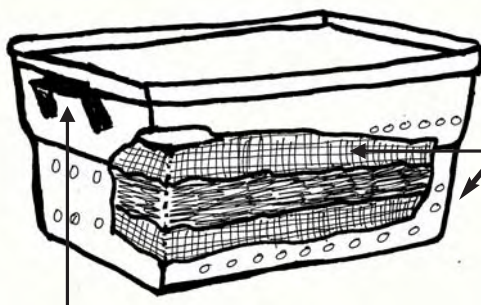
Worm compost is rich in nitrogen, phosphorus, and many other nutrients and minerals important to healthy plant growth. It can be added as a mulch layer over the potting soil of houseplants allowing the nutrients to leach into the root area of the pots with each watering. It can be used as or mixed with potting soil. This nutrient-rich amendment can also be used in the garden with no worry of burning roots or over fertilizing as with chemical fertilizers.

Drill holes in side and bottom for aeration.



**FIVE GALLON BUCKET**

Lid to slow evaporation and keep out flies.



Handle

**20 - 35 GALLON STORAGE CONTAINER**

Drill holes in side and bottom for aeration.

Alternate 1-inch to 2-inch layers of soil with 3-inch to 4-inch layers of kitchen waste.

Lid to slow evaporation and keep out flies.



**50 GALLON WHEELED GARBAGE CONTAINER**

## TROUBLESHOOTING

### **Symptoms**

Worms are dying

### **Problems**

Not enough food

Too dry

Too wet

Too hot

Bedding is eaten

Bin smells rotten and/or attracts flies

Not enough air circulation

Non- compostables present

Food exposed

Cat thinks bin is a litter box

No lid on bin

### **Solutions**

Bury feed into bedding.

Moisten until slightly damp.

Add bedding.

Put bin in shade.

Harvest worm compost, add fresh bedding.

Add dry bedding under and over worms, do not feed for two weeks.

Remove meat, pet feces, etc.

Secure lid, cover food scraps with bedding, cover worms and bedding with sheet of plastic.

Remove cat feces, keep lid on bin.

## NOTES

### What to do with the extra worm crop:

The worm population will need to be thinned from time to time so they will not over-produce for the size of container. Harvest as needed and put the extra worms in the garden or other compost bins, or give them to friends and neighbors. When planting extra worms in the garden, place about 200 worms in a 12-in. x 12-in. hole with worm bedding. Space the holes 10 feet apart. Keep the area moist, but not flooded. A good worm population can run from 300,000 (7/sq.ft.) to 2,000,000 (45/sq. ft.) per ac. Some soils produce yields as high as 6,000,000 (140/sq. ft.).

To speed the process, use steer manure or other organic fertilizer and water well. Do not forget to water often enough to keep the pile damp, but not wet or soggy. In cooler weather, covering the pile with plastic for a week or so will build heat and speed the decaying process.

1. Oxygen is an important part of the process. Turn the pile with a garden fork every week or two to provide oxygen and keep things stirred. If a compost pile doesn't have sufficient oxygen, it will begin to smell, so the more it's turned, the faster the organic matter will turn into compost.
2. When the material is well into the decaying process, there will be earthworms in the compost pile.

**IMPORTANT:** Once earthworms are in the compost, it is **IMPERATIVE** to keep the pile moist. Worms do not have lungs. They breathe through their "skin". If it dries out, the worm cannot breathe and will die. Too much moisture will drown the worm.

#### Gourmet Food for Earthworms:

Earthworms have food preferences. They prefer certain tree leaves to others, and certain plant material to others. Instead of putting foods down the garbage disposal, feed the earthworms, and later, your plants.

#### Earthworm Preferred Food

Banana peels	Cabbage	Tea leaves
Orange peels	Carrots	Coffee grounds
Apples	Celery	Leftover Jack 'o Lanterns*
Grapefruit rinds	Cucumbers	Watermelon rinds
Pears	Lettuce	Cantaloupe rinds
Tomatoes	Beans	Corn meal
Onion peels	Broccoli	
	Kale	

\*Pumpkin and other seeds in a compost pile may result in the seeds growing. Turn them under with a garden fork so the worms can enjoy the young tender growth while they are newly sprouted.

Many people put eggshells in the compost pile. Nevada soils have an abundance of calcium so eggshells are not recommended.

### CAUTION

#### RULE #1:

The most essential component in maintaining an earthworm farm is moisture. Worms must have moisture to survive. The next most important item is food.

#### RULE #2:

Use only household and yard waste that is organic plant byproduct, such as vegetable and fruit scraps, coffee grounds, tea leaves, shredded paper, etc. This does **NOT** include **MEAT, POULTRY, FISH PRODUCTS, BONES, OR PET WASTE.**

## Materials:

1. A container (wood, cement block, or plastic) with a lid will slow down evaporation and discourage flies.
2. Worms, 2,000 per 1 lb. of food waste a day. A worm farm may be started with one fertile worm or one fertile egg capsule but to speed things along, use the recommended amount according to the amount of waste food.
3. Bedding materials such as shredded paper, dry leaves, grass clippings, composted cow manure, sawdust, compost, or peat moss. Good worm bedding is absorbent. It should hold water like a sponge.
4. Food waste - fruit and vegetables

The easiest way to make a worm farm is to use a 5 or 10-gallon bucket or a 20 to 30 gallon storage container. A larger farm can be made of cement blocks stacked to form four walls. Or choose a 2 x 5 ft. container, a 3 x 3 ft. bin (cement block or wood), or two 2 x 3 ft. receptacles. One pound of waste per week requires a surface area of one square foot. 10 lbs. of food waste per week will require 10 square feet of space. No matter what size is chosen, it will need air holes on the sides and drainage holes in the bottom.

If the bins are outside, it is a good idea to place the containers on blocks or bricks. This helps provide good drainage and air circulation. Oxygen is important to the composting process as well as to the health of the worms. Remember worms like moist (not wet) dark environments. Place the container in an area that will not heat up too much and cook the worms. The smaller the container, the more apt this is to happen. In the desert, there is a need to conserve moisture in the worm compost bin. A cover will help. Place the bin so that it can take advantage of the irrigation system without being flooded with water. If water is heavily chlorinated, allow the chlorine to dissipate (about 24 hours) by setting it in an open container. Do not use softened water as it contains salts that are harmful to worms and plants. When adding water to the worm bedding, stir so the water does not simply run through without wetting the material.

## WHERE TO BEGIN

### Location of worm bin:

Because worms like moderate temperatures (between 55 and 75 degrees F), place the bin in a shady location where it will not freeze or overheat and is protected from the rain, such as a kitchen corner, garage, basement, patio, or laundry room.

### Finding worms?

In the spring, buy worms from mail order or a local nursery or bait shop. If soil is moist most of the time, and organic materials have been added over a long period to increase the organic component, collect worms from the yard.

### What are the best worms for composting?

The best worms for composting are "red worms", or "red wigglers." It is recommended that red worms be used rather than night crawlers as they require less work and can tolerate higher temperatures. And they can eat more than their own weight in food every day!

There are few animals in the world more defenseless than earthworms. Many people do not like earthworms but the fact is that they are non-aggressive creatures and cannot fight off attackers. Earthworms have none of the protective mechanisms found in other non-aggressive animals.

**For more information:    Master Gardener Help Line:    702-257-5556**  
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