



### Why Compost With Worms?

Worm composting is advantageous because it is a complement to regular composting. Even though you can compost food waste through regular yard debris bins, they are harder to keep free of pests than worm bins. Worm bins are built differently and keep unwanted pests (if cared for properly) out of the system. This is a great way to dispose of most food waste and, in addition to yard debris composting, will keep unwanted organic material out of the waste stream where it can create methane, a known green house gas.

Vermicomposting, better known as “worms who eat my garbage”, is an exciting way to demonstrate nature’s way of dealing with waste. It can also introduce students to many scientific concepts that they will need to understand in order to graduate. Whether you make this a classroom project or take on a school-wide worm program, this hands-on look at Glencoe Elementary’s worm bin program will help you understand the basics.

You can visit Glencoe’s web page about their project at: <http://www.glencoe.pps.k12.or.us/recycling.html> or call 503-916-6207. Find out more about local support for starting your program at: <http://www.oregongreenschools.org>. For an all inclusive reference source, you’ll want to obtain a copy of Mary Apelhof’s *Worms Eat My Garbage* available from Flower Press visit: [www.wormwoman.com](http://www.wormwoman.com)

### What Do I Need To Get Started?

#### **A. CONTAINER**

In *Worms Eat My Garbage*, Mary Appelhof suggests weighing your food waste for one week (in pounds), and then provide one square foot of surface area per pound. The container depth should be between eight and twelve inches. Options to one large (and heavy) box are a number of smaller containers for easier lifting and moving and more choice of location. The book illustrates a variety of containers.

Containers can be made of scrap materials such as untreated wood or an old dresser, or you can modify a store bought rubbermaid storage container or buy a bin that is specially manufactured for worm bins. Keep in mind, however, where you will keep the worms because they cannot get too hot (over 150 degrees) or too cold (below 40 degrees). Wood tends to insulate better than metal or plastic, but you may also add a foam core insulation layer around the inside edges of the box, or loosely cover the bin with a tarp.

Worms in a 16" x 19" x 12" bin can process 2-3 pounds of garbage a week. Capacity of a 20" x 24" x 12" bin is up to 5 pounds of garbage a week. Depending on the size of the container, drill 8 to 12 holes (1/4 - 1/2 inches) in the bottom for aeration and drainage. A plastic bin may need more drainage - if contents get too wet, drill more holes. Raise the bin on bricks or wooden blocks, and place a tray underneath to capture the excess liquid (worm tea) which can be used as liquid plant fertilizer.



The bin needs a cover to conserve moisture and provide darkness for the worms. If the bin is indoors, a sheet of dark plastic or burlap sacking placed loosely on top of the bedding is sufficient as a cover. For outdoor bins, a solid lid is preferable, to keep out unwanted scavengers and rain. Like us, worms need air to live, so be sure to have your bin sufficiently ventilated.

Glencoe's worm bin named "Yellow Submarine" for its yellow exterior paint, is made of wood and is located outside year round. The bin is cared for by Emma Pletz, school librarian, and her 2nd and 3rd grade helpers. The bin is insulated on the inside to help keep it warm and a plastic sheet is placed on top of the worms to keep in heat and moisture.

## B. BEDDING

It is necessary to provide a damp bedding for the worms to live in, and to bury food waste in. Suitable bedding materials are shredded newspaper and cardboard, shredded fall leaves, chopped up straw and other dead plants, seaweed, sawdust, peat moss, compost and aged manure. Try to vary the bedding in the bin as much as possible, to provide more nutrients for the worms, and to create a richer compost as shown in this picture of Glencoe's worm bin.

Add a couple of handfuls of sand or soil to provide necessary grit for the worm's digestion of food. It is very important to moisten the dry bedding materials before putting them in the bin, so that the overall moisture level is like a wrung-out sponge. The bin should be about three-quarters full of moistened bedding. Lift the bedding gently to create air spaces which help to control odors, and give freer movement to the worms.

## C. WORMS

The two types of earthworm best suited to worm composting are the redworms: *Eisenia foetida* (commonly known as red wiggler, brandling, or manure worm) and *Lumbricus rubellus*. They are often found in aged manure and compost heaps. Please do not use dew-worms (large size worms found in soil and compost) as they are not likely to survive.

Here is a picture of Glencoe's Red Wiggler bins and the worm tea being harvested each week. The helpers carefully record the volume of the tea, then it is mixed with water in a 3 parts water to 1 part tea ratio and applied to the school's plants.

## Where To Get Your Worms?

If you feel adventurous, find a horse stable or farmer with a manure pile and collect a bagful of manure with worms. Check your own or a friend's compost bin for worms. You can also purchase worms. Check with your local plant and garden store to find out about ordering worms and use the resource list at the end of this extension.



Yellow Submarine -  
Glencoe's worm bin gets fed.



Examining the health of the worms  
and their bedding.



Harvesting the "worm tea."

## How Many Worms Do I Need?

Mary Appelhof suggests that the correct ratio of worms to food waste should be: for one pound per day of food waste, use two pounds of worms (roughly 2,000). If you are unable to get this many worms to start with, reduce the amount of food waste accordingly while the population steadily increases.



The collection bucket in Glencoe's cafeteria



Chopping the food scraps for easy worm digestion.

## How Do I Keep my Worms Thriving?

### **A. FOOD**

You can compost food scraps such as fruit and vegetable peels, pulverized egg shells, tea bags and coffee grounds. It is advisable not to compost meats, dairy products, oily foods, and grains because worms will not readily break down these materials and it will cause problems with smells, flies, and rodents. To avoid fly and smell problems, always bury the food waste by pulling aside some of the bedding, dumping the waste, and then cover it up with the bedding again. Bury successive loads in different locations in the bin.

Glencoe collects food scraps from the students in a specially marked bucket in the cafeteria on every Friday. After lunch is over, Mrs. Pletzs and her helpers weigh the food and record the types of foods included in the mix. The food is then chopped with a flathead shovel to make it break down faster with the worms. A special marker is used to keep track of where the food was placed inside the bin the week before. The new food is added to the opposite side and the marker is moved to indicate accordingly.

### **B. LOCATION**

Worm bins can be used indoors all year round, and outdoors during the milder months. The advantage of mobile bins is that they can be moved when weather conditions change. Indoors, basements are excellent locations (warm, dark and dry), but any spare space can be utilized, so long as temperatures are between 40-80 degrees F. We know dedicated worm composters who have convenient kitchen counter worm bins. Outdoors, bins can be kept in sheds and garages, on patios and balconies, or in the yard. They should be kept out of hot sun and heavy rain.

### **C. MAINTENANCE**

If you have the correct ratio of surface area to worms to food scraps, there is little to do, other than adding food, until about two and a half months have passed. By then, there should be little or no original bedding visible in the bin, and the contents will be brown and earthy looking worm castings. The contents will have substantially decreased in bulk too.

It is important to separate the worms from the finished compost, otherwise the worms will begin to die. There are several ways to do this, and you can discover which is best for you. The quickest is to simply

**REDUCE**  
**REUSE**  
**RECYCLE**

move the finished compost over to one side of the bin, place new bedding in the space created, and put food waste in the new bedding. The worms will gradually move over and the finished compost can be skimmed off as needed.

If you have the time or want to use all the compost, you can dump the entire contents of the bin onto a large plastic sheet and separate the worms manually. Most children love to help with this process and you can turn it into a fun lesson about worms for them. Try creating small separated piles on the tarp. Shining a bright light on the area helps because worms will migrate to the bottom of each pile then you can scoop off the top compost. Watch out for the tiny, lemon-shaped worm cocoons which contain between two and twenty baby worms! By separating the worms from the compost, you save more worms for your next bin. Mix a little of the finished compost in with the new bedding of the next bin, and store the rest in plastic bags or in a covered bucket for use as required.

#### **D. WHERE DO I USE MY COMPOST?**

The compost can be mixed with potting soil and used for houseplants and patio containers. It is an excellent mulch (spread in a layer on top of the soil) for potted plants. If it is screened, it can be added for potting mixes for seedlings, and finely sprinkled on a lawn as a conditioner. It can be used directly in the garden, either dug into the soil or used as a mulch.

#### **E. COMMON PROBLEMS AND SOLUTIONS**

The most common problem is unpleasant, strong odors which are caused by lack of oxygen in the compost due to overloading with food waste so that the food sits around too long, and the bin contents become too wet. The solution is to stop adding food waste until the worms and microorganisms have broken down what food is in there, and to gently stir up the entire contents to allow more air in. Check the drainage holes to make sure they are not blocked. Drill more holes if necessary. Worms will drown if their surroundings become too wet.

Worms have been known to crawl out of the bedding and onto the sides and lid if conditions are wrong for them. If the moisture level seems all right, the bedding may be too acidic. This can happen if you add a lot of citrus peels and other acidic foods. Adjust by adding a little garden lime and cutting down on acidic wastes.

Fruit flies can be an occasional nuisance. Discourage them by always burying the food waste and not overloading. Keep a plastic sheet or piece of old carpet or sacking on the surface of the compost in the bin. If flies are still persistent, move the bin to a location where flies will not be bothersome. A few friendly spiders nearby will help control fly problems!

## **The Final Word**

Taking worms out of their natural environment and placing them in containers creates a human responsibility. They are living creatures with their own unique needs, so it is important to create and maintain a healthy habitat for them to do their work. The first attempt to vermicompost at Glencoe was not successful, however, they did some more research and started again. If you supply the right ingredients and care, your worms will thrive and make compost for you. Happy and successful composting!

## **Worm Resources\***

### ***Worm & Bins for sale:***

Earth Angel Worm & Garden  
503-234-WORM (Portland)  
888-BUY-WORM  
[www.buyworms.com](http://www.buyworms.com)

March Biological Control  
503-554-1077 (Sherwood)

Three Trees Farm  
541-942-9033 (Cottage Grove)  
[www.redwiggler.com](http://www.redwiggler.com)

Vermico  
541-476-4555 (Merlin)  
[www.vermico.com](http://www.vermico.com)

Yelm Earthworm & Castings Farm  
877-339-6767 (Washington)

### ***Just Worms for sale:***

Try your local nurseries or garden stores

### ***Just Bins for sale:***

Recycled Plastics Marketing, Inc.  
800-867-3201 (Redmond, WA)  
sells worm bins made of recycled plastic  
[www.rrpm.com](http://www.rrpm.com)

### ***Oregon Educational Worm Resource***

Edible Resource Center  
Worm Digest  
541-485-0456  
[www.wormdigest.org](http://www.wormdigest.org)



# Worm Data Sheet

## To Do Check List:

- |                               |                          |
|-------------------------------|--------------------------|
| _____ Open the Bin            | _____ Feed the Worms     |
| _____ Remove Cover            | _____ Cover Back On      |
| _____ Check for Food Remnants | _____ Close Bin          |
| _____ Check for Worms         | _____ Check Worm Tea     |
| _____ Prepare Food            | _____ Secure Bin Tightly |
| _____ Weigh Food              | _____ Clean up           |

## Observations

Are Worms Present?      Yes    No  
 Comments \_\_\_\_\_

Are Bugs Present?      Yes    No  
 Springtails    Whiteworms    Pill Bugs      Millipedes  
 Other \_\_\_\_\_

Any Food Left Over?      Yes    No      \_\_\_\_\_

Odor?      Yes    No      \_\_\_\_\_

Compost Falling Below?      Yes    No      \_\_\_\_\_

Worm Tea?      Yes    No      \_\_\_\_\_

Need to Harvest?      Yes    No      \_\_\_\_\_

## Feeding

Food Volume: \_\_\_\_\_

Food Type:    Apples      Bananas      Broccoli      Carrots  
 Cauliflower    Celery      Coffee grounds      Eggshells      Salad

Other: \_\_\_\_\_

No Meat and No Dairy Please!

Worm Tea Volume: \_\_\_\_\_

Anything Else? \_\_\_\_\_

Data Recorded  
 by: \_\_\_\_\_

Today's  
 Date: \_\_\_\_\_

What's the Weather Like?  
 \_\_\_\_\_



Students at Glencoe record the worm data in their journal.



Examining the worm pile for worms and other bugs present.