



# **From Garbage to Gold**

**By  
Jeanette Stewart**

**Illustrations By  
Victor Zapata**

**A  
Step by Step Guide  
To  
Indoor Worm Bin  
Composting**

## **LANDS and WATERS**

LANDS and WATERS is a non-profit dedicated to watershed education and conservation. Indoor composting was the first educational program, we created. This little booklet provides all the information you need to have an indoor composting system working for you.

Humans are the only species that create garbage. Though we would like our trash to “go away,” it doesn’t. In nature, there is no away. Fruit and vegetable scraps thrown into garbage cans and disposals don’t really go away. They accumulate in our land fills, are incinerated, or burden our water treatment plants. Their nutrient value is lost. Nature’s cycle of life, death, decomposition and new life is broken. This is neither sustainable nor in alignment with nature.

Composting is a better choice. Indoor composting offers some advantages not found in outdoor systems. It is convenient. The bin can even be kept in your kitchen. It is less work (no turning of compost piles, no worrying about layering brown and green matter). It’s faster. Why? Worms, red wigglers, *Eisenia foetida*, work all year long consuming food scraps and producing waste (castings), a very fine fertilizer. The choice is sustainable and simple.

So, follow this fun guide. It takes you from buying the materials to harvesting the compost. Align yourself more closely with nature by creating a worm bin. For in truth, there is no away.

# Contents

Introduction 4

Materials 5

Construction 8

Feeding and Care 12

Questions and Answers 16

Harvesting 18

Using the Gold 21

Resources 23

About Us 24



## **Introduction**

### **Welcome to the World of Vermicomposting Or Composting with Worms**

Buy a container and make it into a worm bin. Add about 1,000 red wiggler worms and feed them your garbage (fruit and vegetable scraps only, please). End up with castings (worm waste), “Black Gold,” premium natural fertilizer. The bin doesn’t smell or attract pests. It’s easy, inexpensive, and convenient, even in a small apartment. Sounds great, doesn’t it?

**So, let’s get started!**



## Materials

### Container for mixing

Five gallon bucket or container about that size to mix the bedding materials.

### Container for Worm Bin

One plastic container with a lid. I like the Rubbermaid™ 14 gallon storage container. It's large enough to compost scraps from one or two people. But, a family of four would probably need two containers to handle all their scraps. The number of bins you will need depends on the amount of fruit and vegetable scraps you generate. Remember worms tend to feed near the surface, so your container should be about 12 inches deep.

### Tray

The tricky part is the tray beneath the container. You need the tray to catch the worm tea (the liquid that may drain from the bin). Now, don't get turned off! This tea is a fantastic liquid fertilizer. I dilute it half and half with water. Then, I water my plants with it.

To hold the tea, the tray needs to have sides and be slightly larger than the bottom of the bin. I've tried using many different things as trays, like shallow cooking pans or lids from other containers.

Finally, I just started buying two containers to get two lids, then using the second lid as the tray. The extra container, even without a lid, is useful for other things, such as the mixing container for the next project. If you find a better solution for the tray, please share it with me. Also, I prefer to use containers made from recycled plastic. Please let me know if you find any.

## **Newspapers**

You'll need lots of newspapers, a stack about 6 to 8 inches high should be plenty. Worms tolerate the black ink but the colored ink tends to make them sick. Use pages with mostly black ink, no heavily colored pages or slick inserts.

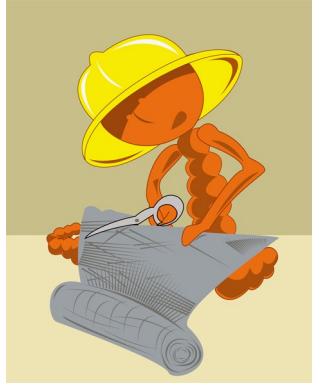


## **Water**

Plain tap water works well. I've never offered my worms bottles spring water, and they've never complained.

## **Dirt**

About 3 to 5 cups. I just collect the dirt from my yard. The dirt provides grit to help the worms digest the garbage - oops, I mean food. Naturally, I bring in lots of organisms that live in the dirt, too, but that hasn't presented a problem. In fact, it's a plus. Soil contains many things that assist in the decomposition process.



## **Fiberglass Screening**

This is the same screening used for windows and doors. Unlike metal screening, the fiberglass will not rust, so be sure to choose the fiberglass kind.

## **Caulking**

An ordinary tube of kitchen or bathroom caulking will do. It works best in the wet environment of a worm bin, just as it does in the tub or the shower.

My supplies (not including worms) come from my home supply store or from my yard. They cost less than \$20.



## **Construction**

### **The Drainage System**

Drill 36 one-eighth-inch holes in the bottom of the bin. Scatter your holes over the bottom, so the entire bin will drain. Now, you're ready to catch all that wonderful worm tea.

### **The Ventilation System**

Drill eight one-inch holes (two on each side) about one inch from the top of the bin. These provide air for our worm residents. Not only that, when scraps decompose without enough air, a bad odor is released. If this happens, your bin will begin to smell like "The Great Dismal Swamp." The only time this happened to me was in a bin that had no holes. What a mistake!

### **The Security System**

Cut eight two-inch squares from the fiberglass and cover the air holes, attaching the squares with caulking. Most people think this is to keep the worms from running away. To be honest with you, I have never met a worm that wanted to travel. If your bin satisfies all your worms' needs, stays moist and has plenty of food, they



have no need to travel. As far as I know, they are not curious about the “outside world.”

The real reason we put the screening over the holes is to keep the worms from falling out. It also discourages visitors from the “outside.” But, one of the nice things about this system is, it doesn’t attract interest from outsiders. Fruit flies are the exception. They like the same foods as the worms. But, don’t worry! We will deal with these little critters later.

The holes in the bottom need to be covered too. Cut a rectangle from the screen large enough to cover the bottom of the bin. Just lay the screen in the bottom. There is no need to attach it.

## **The Furnishings - Bedding**

Red worms seem very content living in newspaper bedding. Not only do they use it for cover and as a place to raise their young, but they actually eat it. They don’t care about the type of newspaper as long as the strips are the right size and the bedding is airy, loose, and moist. Worms crawl through the paper, occasionally stopping to nibble. I find it best to shred the paper by hand into strips about one-half to one-inch wide. Just open the paper as you would to read it and tear from top to bottom. It will tear easily and evenly if you go with the grain of the paper. I fill my mixing bucket with these strips.



## **The Irrigation System**

Add enough cool water to make the paper soggy. Keeping the bedding moist is extremely important. A moist environment facilitates mobility and reproduction. The most important reason to keep the bedding wet is to enable the worms to breathe. Worms don't have noses. They breathe through their skin and the skin must be moist in order for them to breathe. The best way to turn your bin into a worm cemetery is to let the paper dry out. On the other hand, don't get carried away. These worms can't swim, at least not for long. So, I advise no standing water. Bathing worms is not recommended.

## **Putting in the Dirt**

Just throw some of the dirt you collected right into your mixing bucket and mix with the wet newspaper. As you mix, keep the paper nice and loose. Don't pack it down. A compact mass of paper is a barrier to worms and is anything but appetizing.

## **Fill'er Up**

Unless you want your floor to look like your hands, be sure your tray is under your bin. Guess what – unless you used an enormous bucket – you don't have enough. Repeat the last 3 steps until you fill your bin three-quarters full.

## **Congratulations!**

You have just created a fine residence for your worms and goodness knows how many friendly tag-alongs, like springtails and sow bugs. Once again, these critters are harmless and remain in the bin. I have learned a lot about sharing my space from worms.

To be sincere with you, I hope to become a great deal more like my red worms. I give them an A+ when it comes to recycling and natural fertilizer production. They serve the Earth wherever they are, are not busybodies, and never complain. A real example to us all!

## **The Big Move**

Your worms don't need arranging. Simple put them gently into the bin. They'll work out their own accommodations.



## Feeding and Care

### The Continuous Feed

Red Wigglers eat almost constantly. In fact, they eat their weight in food each day. What do these hungry little rascals like to eat? Thank goodness, they're not picky. I recommend raw fruits and vegetable scraps. Egg shells (crushed, please) are good too, but avoid meat and dairy products.

This diet is anything but limited. It includes such garbage as vegetable peels, citrus rinds, apple cores, melon rinds, seeds and pits, corn cobs, coffee grounds, coffee filters tea leaves, bags, and strings, even the little paper tags that dangle from the strings.

Though I've never instructed my worms about the dangers of eating metal, they know to leave the tea bag staples alone. I'm always finding staples in the compost, along with those annoying oval shaped stickies that someone puts all over bananas.

Don't get me wrong, though toothless, worms don't shy away from challenges. They eat pretty hard items, like avocado pits. It just takes a while. Under no circumstances will worms eat glass, rubber bands, and such stuff. Recycle or reuse these. Even a worm has its limits!

## The Volume

Well, if you want to be scientific, a pound of worms (that's about 1,000 worms) will eat a pound of scraps a day, plus a little dirt and bedding. But, who's weighing? I avoid weighing myself, much less food scraps.

I prefer the "try and see" method. I bury a cup or two of scraps in a corner of the bin. In a couple of days, I add a cup or two in another corner, repeating until I have visited all the corners and the center. Then, I wait for two or three days and see. If the food in the first corner is still there, obviously, they don't need more. I put the scraps I wanted to add in my refrigerator. In fact, I keep a little bucket in my refrigerator to collect any "not currently needed" scraps. When the first scraps are mostly eaten, I add more, repeating my circle of food visits until I've replenished all sections of the bin.

**Observe your bin regularly.** A healthy bin is in constant change. The worm and tag along populations will explode. As their numbers increase, so will their food demands. Over time your bin will be able to handle more scraps.

## Feeding Techniques

You do not have to call your worms to dinner or fret about the dining location. Wherever the food is, there the worms will be. But, there is one thing you must do. **Cover the food with at least two inches of bedding.** Dig a hole in the bedding, dump all the scraps in, and cover. That's it, nothing fancy. I recommend cutting your food scraps into small pieces. The smaller the size of the scrap, the faster it will be eaten and turned into castings.

## Care

Worms are quiet, shy creatures who like to be left alone in the dark. They don't need a lot of attention, mostly food and wet paper. When you feed them, check and make sure their bedding is moist.

Even going on a vacation for a couple of weeks should not pose a problem. Just feed and water them well before you leave. As long as you don't make a big deal out of it, neither will they. If you are gone for more than a couple of weeks or if you turn off your heat while you're gone in the winter, engage a worm sitter or leave them with a friend. Worms prefer not to freeze!

## No End in Sight

Before we end this section, I want to share with you some observations I've made about the bin environment.

First, it is a contained system. The space is limited. Though you can add more and more food and your worm population will grow accordingly, you will eventually reach a point when the bin cannot support the numbers it houses. At this point, reproduction will slow down. You will see a decrease in the number of worms, as well as less variety in the sizes present. Time to share your little buddies with a person who wants a bin or make another bin for yourself. It is a custom among indoor composters to share their extra worms with others.

Second, a fully composted bin is an unhealthy environment for the worms. Castings should not be considered bedding. It does not have the airy, edible quality of the paper bedding. When your bin begins to look like rich, dark soil, you need to harvest it and

provide fresh bedding. If you don't, you will lose a large portion of your worms, eventually all of them.

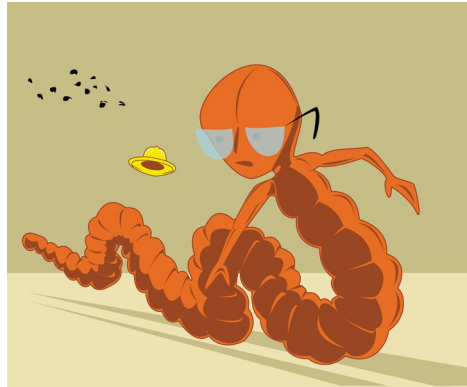
This tragedy must be avoided! There is no reason for the cycle of bin life to end. No doubt, my bins will be listed among my most valuable possessions in my will. My great-great-grandchildren will speak with pride and reverence of the bin begun generations before with "No End in Sight!"

## Questions and Answers

Children often ask me if I name my worms. I always say “yes,” but that they can rename them. Worms are not sensitive about such things. Adults never ask that question.

### Adult Type Questions with Answers

**What about roaches?** Bins do not attract roaches, or rats or mice for that matter.



**What about fruit flies?** Most people never have a problem. I’ve had fruit flies a couple of times. Once a little friend visited for a couple of weeks and fed the worms without covering the food. The second time was unrelated to my worm bin. If you develop a fruit fly problem, it’s not the end of the bin world. There’s a solution!

**Understanding fruit flies:** Before I begin, let me say that fruit flies are annoying, but not dangerous. They do not sneak up and attack. They are highly social beings, for it is impossible to find a lone fruit fly. They travel en masse. That’s the problem!

**The solution:** First, feed your worms and cover the food and the bedding very well. Next, make sure the bedding is very moist. Then cover the entire surface of your bin with about an inch of



sawdust. Do not disturb your bin for about a week. For some reason this discourages the fruit flies.

I get sawdust from my lumber store. They have lots where they cut the wood. Usually, they are willing to give it to me for free, especially when I explain the situation to them. There is something pathetic about a human with a fruit fly problem. Most people are sympathetic.

What happens with the sawdust? You guessed it, the worms eat it. As for the vanished fruit flies, that remains a mystery!

**Can I keep my bin outside?** Red wigglers work best in temperatures between 55 and 77 degrees Fahrenheit. They definitely should not freeze. I keep my bin in the kitchen, but lots of people like keeping theirs in the basement.

What about odor? Bins can develop an odor if they become too wet or don't have enough ventilation. Remember the Great Dismal Swamp? If this happens, you can place some bricks between the bin and the tray beneath it for better drainage and air circulation. Covering the food well also prevents odors. An odor could also develop if there is more food in the bin than the worms can handle. This is easy to solve, just feed them less.

If I have to get rid of my bin, can I just dump it outside? If you do, chances are your red wiggler worms will die. Even if the temperature is fine, they cannot live on the sparse diet of leaves and grass clippings. These little guys have ferocious appetites and require a large amount of organic matter. Give your worm bin away or call me. If you're in the area, I'll take it off your hands.

**What happens when the worms have eaten almost all of their paper?** Time to go for the Black Gold! Harvesting time!

## Harvesting

It will take from three to five months for your bin to fully compost. The length of time depends on lots of factors, such as the number of mouths working in the bin and the size of the food scraps.

### **My, how you've changed! Doesn't your bin look different?**

Now your bin looks very different from the wet paper mass your first prepared. Although you have added food regularly, the newspaper has gradually turned into castings and has decreased in volume. There are many more organisms moving about in the bin, such as springtails. In fact, these guys have probably moved in by the thousands and stand out like jumping white specks in the bin. What fun! Springtails, in spite of their jumpy dispositions, are among the most important soil organisms.

Many critters are happily living in your bin, in addition to the springtails. You can find enchytraeids (a very small white worm that reminds me of thread), pill bugs (famous for their roll-up act), and others. All of these guys are a natural part of the composting system.

Your bin looks like a container full of rich black soil. But don't let looks deceive you. You haven't got dirt. Honey, you've got "Black Gold!" You have your very own supply of fine fertilizer. Harvest time!

## Harvesting Techniques

### **Worm Migration/The Easy Method**

This requires very little work, just patience and time. Castings take up less space than bedding. Your bin is probably only one-half to one-third full at this point. Pile everything (worms, castings, and any remaining food scraps) from half the bin on the top of the other half. Prepare fresh bedding and fill the empty side of your bin. This bedding will be more appealing to your worms. Naturally, the worms will begin to move into these new accommodations. To encourage them further, start adding food scraps only to the fresh bedding.

A great migration will occur. Within a month or so, the worm community will have relocated itself. They've moved to fresher ground, so to speak. Now, you can harvest the castings. Then, fill the entire bin with the new bedding and resume feeding in all corners.

### **Hands-On Technique/The Faster Method**

If you have kids around, have an interest in getting to know your bin population more intimately, or have a sense of great adventure, this technique is for you. It takes me a couple of hours to sort through a 14 gallon bin. But, it goes faster if you make a social engagement out of it and invite neighborhood kids and friends. I emphasize to my guests the excitement of the hunt and the thrill of experiencing a casting harvest. If this doesn't work, offer pizza. That certainly brings in the kids!

Your adventure begins by spreading a large plastic sheet on the floor or ground in bright light. The light can be sunlight or from a lamp. Dump your bin out on the sheet. Immediately, chaos breaks out. Your quiet, shy worms' habitat has been utterly disrupted.

Their world has literally fallen apart, and they find themselves caught in the light.

As the director of this operation, you must swing into action and make about 9 or 10 piles out of the bin's contents. The worms will run for cover into the piles. Now, let the situation settle for about 5 to 10 minutes. No need to stress them out too much. Give them time to catch their breath. You can use this time to make fresh bedding and fill the now empty bin.

Next, carefully remove the outer layer of each pile and put the castings in a container. When you have finished the last pile, return to the first pile and repeat the removal process. Our little buddies will continue to retreat into the center of the piles until finally, all you have on the sheet are 9 or 10 piles of worms and a little compost. The harvesting is over. Put your worms and the leftover compost into their fresh bin. Add food scraps and start all over again.

## Using the Gold

You're rich all right! You now possess gallons of Black Gold, but what do you do with it? If you are into indoor bins just to reduce the garbage you add to land fills and disposals, just go outside and sprinkle the castings around on the ground. No matter where it falls, it will benefit the Earth. Placing it around trees and bushes or in a flower garden is nice. Before I got into planting native to help wildlife, I spread the castings under the branches of trees.

If you have a garden, lawn, or house plants, use your Black Gold on these. Castings do not have the problems associated with commercial fertilizers. They will not burn your plants no matter how much you apply. The castings contain nutrients in a form available to the plant or in storage until the plant needs them. I cannot think of one problem associated with worm bin compost. It feeds the plant, buffers the acidity of the soil, stimulates growth, and helps hold moisture in the soil. The list goes on and on. But, I think you have the idea.

### Application

Black Gold can be applied in several ways. No need for special equipment or fuss about gloves or masks. This stuff is safe! As for the other critters living in the compost, let them be. They are part of the dynamics of soil and should remain. They eat dead matter. I have not lost a single living plant to worm bin critters.

### Potting Plants

I always add castings to my potting soil. Don't get carried away, this stuff is rich. Twenty percent castings to 80 percent soil is a good mix.

## Seeding Your Garden

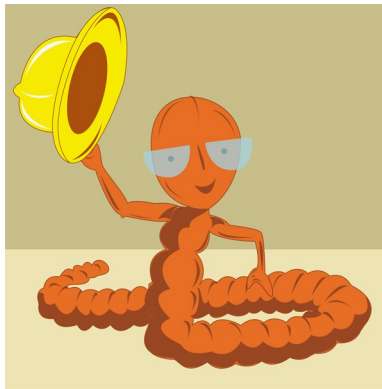
Sprinkle the castings along the bottom of the row, then spread the seed.

## Transplanting

I like adding castings to the bottom of the holes I prepare for the transplants. It seems to help them get over the move. This is particularly true if the plant is stressed. It's just a little extra push!

## Surface Feeding

Throughout the year, I add castings to my plants. For plants outside, simply scatter the castings around the base of the plant all the way out to the drip line. For my indoor plants, I sprinkle the castings around the surface of the soil. The inside of my house looks like a tropical jungle. When I leave the sliding glass doors open, the birds come in! What more do I need to say?



**There it is – from garbage to gold! Good luck and happy eating to you and your worms!**

## Resources

LANDS and WATERS  
2909 Charing Cross Rd. APT #9  
Falls Church, VA 22042  
<http://www.forlandsandwaters.org>

Jeanette Stewart  
[inti@mindspring.com](mailto:inti@mindspring.com)  
703-204-0841

Worms Eat My Garbage, Mary Appelhof (Flower Press 1982)  
10332 Shaver Rd., Kalamazoo, MI 4904 616-327-0108  
<http://www.wormwoman.com>

## About Us

**Jeanette Stewart** is the President and Founder of LANDS and WATERS a non-profit organization dedicated to watershed protection, conservation, and education. She has been composting for many years, has set up hundreds of worm bins in schools and private homes in the Washington D.C. area. She encourages everyone to keep an indoor composting system.

**Victor Zapata** was born in La Paz, Bolivia but has lived in the United States for over 20 years. He is a self-taught artist. His work ranges widely from cartoons to portraits using a variety of mediums. Victor illustrates for LANDS and WATERS including such presentations as “My Roommates Are a Bunch of Worms,” “Wetlands,” and “Happenings in our Habitats.”