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Operating Manual

Model 5 - 6 Flow Through Vermicomposting Unit

Before you set up the unit, please read through the instructions completely and feel free to contact us with any questions.

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A. What is vermicomposting?

Vermicomposting is the process of using earthworms and associated organisms to break down green waste and organic materials into material containing nutrients for plant growth. Earthworms are excellent composters. They can compost green waste faster than any composting system. Earthworms will eat up to half their weight on a daily basis. Our goal is to provide an ideal living environment (your Model 5x6) for earthworms to live and reproduce.

B. What is vermicompost?

Vermicompost is a safe, dark, odorless mixture of worm castings, humus and organic material in varying stages of decomposition. This material contains millions of beneficial microorganisms that will enhance soils and potting soil mix, literally making the soil come alive. Vermicompost can be spread in garden areas, mixed with horticulture soil mixes and applied as compost tea to lawns, flowerbeds or crops.

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Vermicompost is close to neutral in pH and typically maintains much higher nutrient levels than the original green waste. It may also be a food source for other beneficial organisms. The composting process continues long after the earthworm is finished with it. Vermicompost contains a high level of humus, which soaks up and holds moisture. The earthworms secrete a mucus membrane that helps to hold nutrients. This allows nutrients to be slow released so they are available to the plants over a period of time, as the plants need it. The benefit here is that fewer and lighter applications of fertilizers are necessary as nutrient uptake becomes maximized.

C. Keys to maintaining a successful vermicomposting system

1. Location

As mentioned in the assembly instructions, the location you choose for your vermicomposting system is important. The unit should be assembled on a level concrete or other hard surfaced floor and in a protective shelter away from weather such as a barn, shed, pole structure or garage, if possible. Direct sunlight and rain can lead to failure of the system. The unit also needs to be within access to a 110v outlet for the blower motor.



A successful vermicomposting system will incorporate the composting process as closely into the normal waste disposal routine as possible.

Following are a few suggestions for easy incorporation:

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- ✓ Display a visual poster near collection areas that depict items that should and should not go into your unit to help ensure a well-balanced and correct feedstock.

- ✓ Use food scrap transfer containers and cutting boards of a different color, green for instance, from the rest of the kitchen equipment to assist in collecting the correct food waste.

- ✓ Set up an educational program explaining the benefits of composting to all employees. It is beneficial to connect and involve the employees in the system's success to give them a personal reason for it to succeed.

There should be easy access for a heavy container to be wheeled from the collection area to the vermicomposting equipment. A container that one or two people can easily lift and handle will make the work easier and keep the work area cleaner. The less additional work required of staff the better chance you will have of a successful vermicomposting program.

Some items are needed to operate a successful vermicomposting system:

- Access to water with a hose (50 foot) and mister attachment
- Storage containers for bedding
- Soil thermometer
- Push broom
- Squeegee
- Rake
- Square-nose shovel
- Pitch fork
- Gardeners 3 pronged hand fork
- Plastic 5-gallon buckets

2. Temperature

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Ideal Range: 55°- 80° Degrees F

Danger Zone: Below 40° F or Above 90° F

Worm beds generally stay cool in the summer months due to evaporative cooling and warm in the winter months due to the heat generated during the decomposition process. Two major factors that affect temperatures are moisture levels and food/bedding levels. Temperatures can be controlled by the amount of food waste added to the system. The best way to correct overheating problems is to stop feeding and use a garden fork and gently turn the top 6-8 inches of the bed allowing the heat to escape. If the bin is too cold, add more mass to the worm bed to increase the temperature.

The most critical time for overheating occurs within the first 3-4 months while building the bed depth to its proper height. It is best to feed lightly and maintain low temperatures as your team learns how to operate and manage the system and gradually increase the amount of food

stock added. Microbial activity can fluctuate, causing sporadic changes to occur. Should high temperatures occur, cease any additional feeding. This can create problems for an operation that has made commitments to receive or haul organic materials on a daily basis. With time and careful observation, you will soon learn to read the needs of your worm bin.

3. Oxygen- Aerobic vs. Anaerobic

Red wiggler earthworms (*Eisenia fetida*,) or "brandling worms," require an aerobic (with air) environment with plenty of oxygen flow. When the flow through unit is operating with aerobic conditions it will be odor free. When foul odors develop it is likely that anaerobic conditions (without air) have developed. Anaerobic decomposition creates methane, sulfurous gases and alcohol, which can be deadly to earthworms and easily detectable by the operator. If odors develop they can be corrected with

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steps such as slowing or stopping feeding and adding or changing bedding. For more information see the “Trouble shooting - Unwanted foul odors” section of this manual.

Your Model 5-6 flow through vermicomposters is an enclosed system. In a completely enclosed system, excess condensation will occur. The ventilation system on your Model 5-6 is designed to create an evaporative cooling process to remove excess moisture from the inside of the unit. With the top doors closed to seal the top of the worm bin, air will be drawn through the entire worm bed aiding in the overall cooling process of the system.

The ventilation system comes with a 24 hour timer to allow the system to draw air in 15 to 30 minute intervals on and off, designed to run all day everyday. The timer is located in the fan box, which is a recycled ammunition can. Plug the fan box into the GFI receptacle on the side of the unit.

4. Moisture

Worms breathe through their skin, which must remain moist in order to function normally. Maintaining the proper moisture level (75-90%) of the worm bed is imperative for the proper functioning of the unit. The proper amount of moisture exists when one handful of bedding squeezed will produce 1 teaspoon of liquid. Potable water may be added to dry bedding when necessary by spraying the top of the bed evenly with a simple garden hose and spray attachment. Too much moisture can reduce the amount of available oxygen causing decreased production and/or anaerobic conditions.

Moisture in the worm bed comes from several sources. Water is added to the bedding when it is initially set up. Food waste added is 75-90% water by weight. Moisture also comes from the process of decomposition as water and carbon dioxide are end products. Adding dry bedding to the bin can absorb much of the excess moisture. It is more common for the upper layers to be too dry than too moist

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5. Food

Red wiggler worms will consume almost any decaying organic matter. Worms will not eat waste until it has begun to decompose. When starting up the system, remember that microbial activity is generally low due to the type of feed stock used. If feed stock comes from a produce department in a grocery store these materials are trimmings from produce that we would normally eat. They are relatively clean and are usually tossed out because they are ripe and not necessarily rotten.

It is important to remain patient while gradually building the worm bed. From our own personal experience, and the experience of others, not accepting that this process takes time leads to overfeeding of the system. When overfed, the system will easily overheat which not only disrupts the daily routine of the entire operation but also can kill the earthworm population and lead to foul odors and the attraction of pests and rodents.

Feed stock to include:

- ✓ Food waste; fruit, vegetables, breads, pastas. Preferably foods that are raw, uncooked, unseasoned.
- ✓ Leaves and grass clippings
- ✓ Shredded paper and cardboard
- ✓ Manure of non- meat eating animals - domestic pet waste is not acceptable
- ✓ Chopped straw or hay
- ✓ Almost any biodegradable material such as coffee filters, paper towels, biodegradable kitchen ware

The SMALLER the particle size of your waste, the FASTER the worms can eat. Chopping or shredding your waste will increase productivity. Particle size for food

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waste should be 1/2" to 2". The best materials to add are a mixture of different types of materials.

Feed stock to avoid or limit:

CITRUS_____	Limit
MEAT AND BONES_____	Avoid
GARLIC_____	Limit
HEAVILY SPICED FOODS____	Limit
HAIR_____	Limit
DAIRY PRODUCTS_____	Avoid
EGGS_____	Limit
SALT_____	Avoid
OILS_____	Avoid

Although worms will consume meat and dairy waste, it is recommended that these items be added to a closely managed system by an experienced vermicomposter. If added in quantities too large for the system to handle, these materials can quickly create unwanted odors, which will attract flies, maggots and unwanted varmints.

6. Bedding

Bedding is a high carbon material that provides bulk to the waste to increase airflow. The carbon acts to increase the carbon to nitrogen ratio of green waste. This is required to provide the necessary ingredients for the microbial population to thrive. The ideal carbon to nitrogen ratio of waste for vermicomposting is 30:1.

Typical bedding materials used in vermicomposting are:

- ✓ Shredded paper and cardboard waste (LIMIT the amount of shredded paper as it tends to clump and reduce good oxygen flow)
- ✓ Leaves

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- ✓ Wood shavings
- ✓ Sawdust (avoid Cedar and Black Walnut)
- ✓ Finished compost
- ✓ Fully composted manure

7. PH

PH is a measure of the acidity or alkalinity of the compost. A pH of 7 is neutral. A pH above 7 is alkaline. A pH below 7 is acidic. **Red wiggler earthworms prefer pH levels from 5.5 to 8.0**, with a preference toward more acidic, lower levels. Decaying organic material will generally produce slightly acidic conditions in flow through vermicomposting systems. As the worms help to stabilize the waste into compost, the pH will approach 7. The important thing to remember is that too much unprocessed material in the unit can create highly acidic conditions that can harm your worms.

D. System Components- Worms

How many worms will you need?

Under ideal conditions the Model 5-6 will support an average worm population of 150 pounds. With this population the Model 5-6 will process approximately 75 pounds of total waste per day. This includes both the carbon and nitrogen stocks. We recommend starting this system with **45 pounds of worms**. You can start the system with fewer worms but will want to reduce the feed stock accordingly. The worms will control their own population based on available food, water and living space.

THE MOST COMMON MISTAKE MADE BY NEW VERMICOMPOSTERS IS TO OVER FEED THE SYSTEM. IT IS RARELY A PROBLEM TO HAVE TOO LITTLE TO FEED YOUR WORMS!

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E. System Start Up

The steps taken during start up are DIFFERENT from the regular feeding method. We will use this feeding method for the initial set-up only.

Step 1

Place 6 sheets of un-shredded newspaper over the cutter bars and wire grate and create a paper bowl on the bottom of the bin. These sheets should completely cover the grate with overlap on the sides to prevent the initial bedding materials from falling through. This covering on the grate will serve as a temporary false bottom to support the new worm bedding.

Step 2

Spread a 6-inch layer of bedding material evenly over the newspaper sheets. Finished horticultural compost can be substituted for this startup bedding. Add water with a garden hose and mister attachment or watering can until the bedding is lightly moistened throughout.

Step 3

Add your worms to the bedding, spreading them with their shipping material evenly over the bedding. Cover the worms with another 2-inch layer of moist bedding.

Step 4

Add food waste or other green waste in not more than a 1/2" to 1 " thick layer and spread evenly over the bedding material. Add another 1"- 2" thick layer of moist bedding material so it completely covers the food waste.

Step 5

Sprinkle a shovel full of moist garden soil and/or mature horticultural compost evenly over the moist bedding cover. The purpose of the soil or compost is to introduce microbes to the food waste to begin the composting process. The worms will also get grit from this soil for their stomachs.

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Place the thermostat bulb on the center of the worm bed. (Be sure not to insert it into the worm bed. The temperature to be monitored and controlled is the temperature on the top surface of the worm bed.

Step 6

Turn on a low wattage night-light for a least one-week while the worms settle into their new environment. Worms have a tendency to crawl immediately after they are relocated and the light will help to prevent them from leaving the bin.

It is recommended not to feed your system for a full 5 days after this initial set up to allow the worms to settle in and to allow the microbial activity to increase to proper levels. Should you want to feed your system, cut your feeding to 1/4 the recommended amount for the first 2 weeks.

F. Daily Operation/Regular Daily Feeding

The most effective feeding pattern is to feed lightly but more frequently on a daily basis or every other day rather than feeding heavily once per week. It is important to allow the worms to process most of the previous food waste before feeding again.

If the unit is managed for the worms' best interest, they will be able to work efficiently and maintain a trouble free system. Problems may easily arise when the worms become pressured to consume more food waste than the system and the microenvironment can handle. FEEDING TOO HEAVILY CAN RESULT IN UNWANTED ODORS AND PESTS!

It is important to keep a plentiful supply of shredded bedding material on hand at all times. Create a work pattern where shredded bedding is prepared in slack periods so

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it is always available when needed. New bedding is always placed on top of fresh feed added to the unit.

Step 1

Check the temperature of the worm bed. If the temperature is above 90° F, do not feed. Un-decomposed material is generating too much heat.

Allow the worms to process this material so that the material cools down below 80° F before feeding again. Check for foul odors. Do not feed again until foul odors have disappeared.

Step 2

Move the thermostat temperature bulb to one side before adding more food and bedding. The temperature bulb should remain on top of the material at all times.

Spread a layer of food waste no more than 1/2" to 1" thick over the old bedding. Try to break up any large compacted clumps of waste to create an even layer to allow for plenty of airflow. If large amounts of waste are added regularly, sprinkle 2 cups of dolomite lime over the waste. This helps control acidity and pests and will help the worms to process this material before it putrefies.

IF YOU DETECT ANY FOUL ODORS WHEN LIFTING THE LID FOR FEEDING, DO NOT ADD ANY MORE WASTE UNTIL THE ODOR DISAPPEARS. IF YOUR WASTE INCLUDES MEAT AND DAIRY, FEED 1/2 THE NORMAL AMOUNT.

Step 3

Spread a 1-2" layer of bedding material over the waste so that it is completely covered. This is very important to deter flies and unwanted pests from entering into the food waste.

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Moisten lightly with a garden hose and mister attachment until the bedding has uniform moisture content. At the proper moisture level, one handful of bedding squeezed in your fist should yield about 1 teaspoon of water.

IF YOU ARE ADDING MEAT AND DAIRY WASTE, A THIN COVER LAYER OF GARDEN SOIL OR FINISHED COMPOST IS RECOMMENDED OVER THE BEDDING LAYER TO ACT AS A FURTHER DETERRENT TO UNWANTED FLIES.

Step 4

This step is optional for every 2-3 feedings

Sprinkle a shovel full of moistened garden soil or mature horticultural compost over the fresh bedding. This will re-inoculate the system and provide grit for the worms to process the waste.

Clean the work area daily after feeding and harvesting. Maintain tools and keep them in a designated tool storage area.

G. Harvesting Finished Vermicompost

The unit should be filled to within 2 inches from the top before harvesting is attempted. This will allow enough time for the worms to migrate to the upper layers away from the layer of vermicompost that you will harvest from the bottom layers.

ATTEMPTS TO HARVEST BEFORE THE UNIT IS FULL MAY RESULT IN A LOSS OF WORMS THROUGH THE FLOOR OR THE HARVESTING OF INCOMPLETE COMPOST.

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Regular harvesting can be done daily or every other day. The decision to harvest daily or every other day can be determined by making note of any large volume of worms appearing in the finished compost. Should you notice excessive amounts of worms in the finished material, you will need to allow more time for the worms to move upward.

Step 1

Open the front harvest door and secure it in its open position with the attached door catch attached in the middle of the machine.

Step 2

The Model 5-6 has two manual cranks with one handle on each side of the machine.

Grip the handle firmly with both hands and turn it until you feel it stop. Approximately 1-2 inches of vermicompost should now be lying on the bottom collection area. You will also notice a drop in the level on top of the worm bed allowing room to add new waste.

DO NOT PLACE HANDS OR FEET NEAR THE WIRE GRATE WHEN THE HARVESTING MECHANISM IS BEING OPERATED

Note: Each harvesting mechanism has an oil fill hole on the bottom side and should be lubricated monthly with oil. A light oiling of the shaft that protrudes where the handle is bolted on should be included in this process.

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Step 3

You may wish to leave this vermicompost in the collection area until the next feeding time or remove it for immediate use. You will have some additional fall through of vermicompost until the pile settles. You will also find some juvenile worms or new hatchlings in this material. This is normal. These worms may be applied with the vermicompost for soil enrichment or can be separated and added back into the worm bin.

After harvesting you should have room to feed a fresh layer of food and bedding to the top of the worm bed. If not, harvest an additional 1-2 inches of compost.

Step 4

Using a floor squeegee you can scrape the finished compost to the front or to the back of the collection area for easy collection with a plastic grain shovel or plastic dustpan.

Step 5

Depending on your intended use, you may wish to let your vermicompost dry until it is moist and crumbles in your fingers. You can then screen it with a 1/4" to 1" screen to sift out any large particles. These particles can be added back into the system with fresh bedding.

H. Using Vermicompost

Vermicompost is a special type of compost with a high amount of nutrients and biological activity in a form easily used by plants. Because of its high nutrient content, vermicompost can be used sparingly. The nice thing about vermicompost is that it will not burn plants, so there is no risk of over application.

A 10 to 20 percent mix with your regular potting soil is the recommended application. If you are top dressing add a 1/4" layer to the top of potted or garden plants. Lawns

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can be top-dressed, lightly raking the vermicompost in. Your garden will thrive by putting a thin layer in the bottom of seed rows or in transplant holes or again as a top dressing.

I. Maintenance and Troubleshooting

Do not place bones, sticks, wood chips or any other hard material in the worm bin that is larger than 2"x2". THIS MAY FOUL THE HARVEST MECHANISM.

Do not place hands or feet near the wire grate when the harvest mechanism is being operated.

To avoid possible shock hazard - Disconnect all electrical connections before feeding or servicing the worm bin.

Remember to oil the harvest mechanisms monthly or as needed.

Troubleshooting

Temperature Too High - Above 80° F.

1. Remove from direct sunlight or provide a shaded cover.
2. Do not feed again until the temperature drops below 80° F.
3. If temperature is above 90° F, add water to increase the evaporative cooling process.
4. Feed in thinner layers or less often.
5. Add a greater amount of bedding material for more airflow and cooling.
6. Using a garden fork, lift material in a prying manner to allow for more aeration.

Unwanted Odors

1. Do not feed again until odors have dissipated.
2. Feed in thinner layers with less green material.

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3. Add more bedding with less water.
4. Do not mix the compost that is in the worm bed or turn old layers.
5. Using a garden fork, lift material in a prying manner to allow for more aeration.

Flies or Unwanted Pests

1. Eliminate or reduce putrefying feeds such as meat and dairy.
2. Add a thicker layer of bedding over layers of green waste.
3. Add a thin layer of garden soil or finished compost over the bedding layer to seal pest access to food waste and to eliminate odors that attract unwanted pests.
4. Keep the work area clean by washing up daily or after feeding and harvesting.
5. Clean the work area and around the system to remove excess materials

pH Below 5.5

1. Do not feed again until the pH rises.
2. Add eggshells or crushed oyster shells for calcium.
3. Add 1/2 lb. of dolomite lime for each point in pH below 5.5. Water this into the compost thoroughly.

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Thanks for your order!

Please feel free to contact the office with any questions.

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