

## **Vermiculture Facility**

### General Info:

Vermiculture (From Latin: vermi, worm + culture, to nurture / grow) is the process of raising worms, which are used to compost waste from the farm.

Worms are an essential part of any farm ecosystem - whether they are earthworms tunneling through soil, or red wigglers living and working in a vermicompost system. Worms can break down about 20% of their body weight every day, so they are highly effective composters, and their feces (or "castings") are high in nutrients and beneficial microorganisms. By using a worm bin to compost food scraps on the UW Farm, we close the loop on a portion of our waste by redirecting it from industrial King County facilities. We will also increase soil nutrition, and hopefully reduce costs by limiting the amount of compost we purchase.

On the UW Farm, we have one industrial size vermicompost facility housed in the vermiculture shed on the North side of the farm. The facility is equipped with a harvest system powered by two winches. The facility has the capability to house up to 100 lbs of worms, and produce 100 lbs of compost output weekly. We use red wiggler worms, which are smaller than ground-dwelling earthworms, to compost our waste. They prefer to stay in the upper 6-12 inches of the soil, which is ideal for vermicompost as they continually cycle the upper layers of fresh waste, and largely stay out of the bottom layers so they are not accidentally harvested along with their castings.

### **Temperature:**

**60-80 degrees F** is the ideal temperature for the bin (use thermometer to measure temp when adding compost to the bin, record in spreadsheet). Hot temperatures can indicate anaerobic, or oxygen-free, decomposition which is detrimental to worm health (as aerobic respirators, they need oxygen to survive). If temps are getting too high, aerate the worm bin by turning over the bedding and compost, and add more "browns" (see "How to Feed" section). During periods of extreme cold (rare for this area) add more newspaper or burlap if available to cover and insulate the bin. Adding more "greens" can also increase the temperature.

### **Worm density:**

Ideal worm density for composting is between **0.5 and 1.5 lb worms/ cubic foot** (a pound of worms is about 1000 red wigglers). Lower density reduces the compost production due to lower worm reproduction rate, and a density over 1.5 or 2 lb/sq. ft becomes too crowded and worms don't grow to optimal size. Check that worms are growing to full size, and seem to have enough room to move about.

### **Moisture level:**

Compost should be moist (to keep worms happy and hydrated) but not wet enough to drown worms. A good test is to dig down a few inches into the compost, and water with a watering can if a handful does not clump together when squeezed. The ideal moisture level is

about **70%** (feels like a damp sponge) Worms should look healthy and pink, not dried or stressed.

## Inputs and Feeding Methods:

### **What can be fed to the worms?**

YES: leafy greens, non-acidic food waste, tea bags, coffee grounds, eggshells, grass clippings, dried leaves, cardboard/ paper (non bleached paper only, limit dyes), limited amounts of sand (aids in digestion), finished compost

NO: Acidic fruits or peels, dairy products, meat or bones, cooked foods/oils/fats, diseased or poisonous plants (like blighted tomato leaves), weeds, plastics or other non-biodegradable materials (even if they are “compostable”!)

For more information, see <https://urbanwormcompany.com/what-do-worms-eat/>

### **How often and how much can the worms be fed?**

Feed the worms when all the previous food from last feeding is gone: generally feed the weight of worms each week (if about 20 lb worms, 20 lb food/ week). Eventually the goal is to reach 100 lbs worms in the facility, processing 100 lb waste per week. If once a week is too frequent and the waste is not processed, adjust the schedule to once every two weeks. It is difficult to underfeed worms, but easy to overfeed!

### **How to feed:**

1. After weighing and recording the temperature and amount of waste, double check that the produce is safe for worms.
  - For some large turnips or other hard produce (stalks, etc), cutting or chopping into smaller pieces can help the worms more easily process the food
2. Remove the top layer of burlap insulation and thermometers from the bin.
3. Using a shovel and/or rake, move the top few inches of bedding and compost to one side of the bin.
4. Add fresh food waste, then rake or shovel the bedding you moved earlier back to cover the new food.
  - If there are rotting/ uneaten leaves, bad smells, or the temperature is higher than desired, it may mean that there are too many “greens” in the bin, so also add more “browns” along with the food (browns are carbon rich, dry material like newspaper, leaf mulch, or straw. Even if there are no red flags, adding extra browns every few weeks is important to maintain a balanced chemical composition of the output fertilizer).
  - The worms will not consume food if it is on the surface (because the light and open air deter them), so all food must be at least lightly covered with bedding and old compost.
  - If the compost feels dry, or the weather has been dry / warm, and depending on how much water is contained in the food for that week, use a watering can to

moisten the soil. **WARNING: be careful not to over water! Worms can drown, and water can increase the rate of anaerobic decomposition, resulting in a stinky, wet mess.**

5. After ensuring proper moisture levels and that no food remains uncovered at the surface, replace burlap sacks and thermometers. The worms are happy and fed for another week or two!

## Outputs:

### - **When to collect:**

When the bin becomes full, regular compost collection can begin. A schedule should be set up with harvesting at regular intervals (like once every two weeks). Harvest a few days after a recent feeding, as the worms will be drawn to the surface for the fresh food. Harvesting too frequently can result in under-processed vermicompost, or loss of worm life.

### - **How to collect**

The vermicompost facility is equipped with two winches that drag a claw-like mechanism through the bottom layer of the compost, loosening it and allowing it to fall through the grated floor onto the platform below. The winches and harvest system should always be operated by two people who have been trained on the system.

1. Remove the top layer of burlap to keep an eye on the compost as it is shifted.
2. Determine the location of the claw mechanism relative to the sides of the bin, and decide which direction to begin pulling it.
3. Turn the handle on the winch on the *pulling* side to “gears engaged” and the handle on the other side to “free wheel”. This will allow the winch to pull without tension.
4. The control on the *pulling* side will be switched to “in”, and the other side to “out”. Both controllers will switch their controls to “on”.
5. Run the winch until the claw mechanism is within no more than 6 inches of the side of the bin, or until the blue painters tape is seen on the wire. Watch for sticks or other large debris that can disrupt the flow.
6. Run the winches back and forth (alternating which side is free-wheeling and which is pulling) until a sufficient amount of compost has fallen through the grates onto the collection floor.
7. Collect the compost in a bucket or wheelbarrow
8. Sift the compost through a screen, and put any large chunks, worms, or woodchips back into the worm bin.
9. Use the compost as a general fertilizer on the farm!

### - **Nutrients (soil test results go here)**

### - **Where to use (see: Fertilizer section?)**

The first soil test (see google folder) indicated high levels of phosphorus, so we decided to use the vermicompost for mainly perennials like fruit trees, to avoid increasing the levels of P in the farm plots.

- **Record in spreadsheet**

Resources and further reading:

- Links to videos
- link to handbook from Griffen's drive
- Contact info for the manufacturer
- Links to troubleshooting