

Harvesting a Worm Bin



OBJECTIVES:

Students will:

1. harvest a worm bin and learn about the application and benefits of worm castings.
2. describe how red worms make worm castings from food scraps in a worm bin.



STANDARDS: Science



SKILLS: Analysis, classification, description, problem solving



SETTING: Classroom and/or outdoors



TIME: 45 minutes



VOCABULARY:

Compost
Compost tea
Vermicompost
Worm bin
Worm castings
Worm leachate

Introduction

Overview:

In this lesson, students will learn about three different methods used to harvest an active worm bin. They will test these methods by working at different stations and brainstorm ways to use worm castings.

Teacher Background:

Harvesting a worm bin allows students to observe different stages of the decomposition cycle. The students will recall the type of food scraps and other materials they placed in the worm bin during the months leading up to harvesting. They will have an opportunity to observe the compost or castings that the worms have made. Worm castings are a high-quality organic fertilizer for plants.

There are several methods for harvesting a worm compost bin. After about six months, there may be an inch to several inches of vermicompost at the bottom of the worm bin. This can be harvested using one of the following methods:

Bucket method: all of the bin contents are placed into a bucket, filled with water, and the contents are strained so worms and any remaining food can be returned to the worm bin.

Light method: the compost is placed into small piles on a tarp which may be placed in indirect sun or under a source of light in the classroom. The worms will move to the center or bottom of the piles to avoid the light. The

castings on top of the piles can be removed and placed into a bucket.

Migration method: all of the bedding, worms, castings and food is pushed over to one side of the bin. Stop adding food to that side. Set up the empty side like a new worm bin with moist bedding, food and dry bedding. The worms will migrate to the new side and the vermicompost can be harvested from the old side.

Materials:

Student:

- Reused plastic bags, bottles or cups to fill with worm castings or compost liquid (one per student)

Teacher:

- Active worm bin
- Station supplies:*
- Two tarps
- Two five-gallon buckets
- Strainer
- Water
- Three to six handheld garden forks or trowels
- "Harvesting a Worm Bin" overhead
- Rubric overhead
- Rubrics (one per student)

Preparation:

You must have an "active" worm bin or have access to a bin that has been fed for at least three months in order to teach this lesson.

You can prepare your students for harvesting by teaching Lessons 21, "Wonderful Worms," and 23, "Setting Up a Worm Bin," prior to this lesson.

Be prepared to organize the students into groups of four to six.



ACTIVITY

Discussion

1. Ask students to reflect on having a worm bin in the classroom, describing some of the changes that have occurred in the bin over the last few months and how the students have maintained the bin.
2. Tell the students that they will be harvesting the contents of the worm bin and will use the castings as food for plants.
3. Describe the three methods of harvesting worm castings from a bin by using the overhead "Harvesting a Worm Bin":
 - a. **Bucket method:** Place all contents of the worm bin in a bucket. Gently pour cool water into the bucket (one part compost to ten parts water). Within a minute or two, pour the contents of the bucket into a second bucket through the strainer. Retrieve the worms and any uneaten food or bedding from the strainer. Return these to the bin. The remaining light brown liquid can be used to water and fertilize plants (if liquid is not light in color, it may be too concentrated to add to plants).
 - b. **Light method:** Place the compost in small piles on a tarp in indirect sunlight or under a light in the classroom for a few minutes. The worms will move to the center of the pile to avoid the light. The outer part of the pile, now without worms, can be removed and put in the five-gallon bucket. As the castings are removed, the newly exposed worms will move to the middle, out of the light. Repeat the process until only a ball of worms remain. The worms and any uneaten food scraps can be returned to the worm bin.
 - c. **Migration method:** Push all of the bedding, worms, castings, and food over to one side of the bin. Stop adding new food to that side. Make sure that one half of the worm bin is empty. Set up the empty side like a new worm bin with moist bedding and dry bedding. Put some food in the empty side, and keep feeding that side (about half the amount you usually give the entire bin). After the worms have eaten the food on the old side, they will begin to migrate. The process may require several months. The old side will then be without worms and ready to harvest.
4. Show an overhead of the lesson rubric, and review the expectations for this lesson.

Procedure

1. Set up three harvesting stations, or select only one of the following methods: (a) bucket method (requiring a tarp, bucket, water, and strainer); (b) light method (requiring a tarp, two buckets, and sunlight or bright light); (c) migration method (requiring a tarp).
2. Review the steps of worm composting with students. Note that red worms eat food that people would otherwise throw away. Worm castings that are left behind can be used as fertilizer.
3. Divide the students into groups of four to six, and assign them to a harvesting station (more than one group can participate at the light station).
4. Rotate the groups after five minutes.

Wrap-Up

1. Ask the students to compare the different methods for harvesting castings. Have them vote on the method they prefer by raising their hands. Ask them to give reasons for their vote.
2. Brainstorm different ways that the harvested castings can be used (putting it on plants in the school garden, around trees or on house plants).
3. Divide the harvested worm castings and give each student a bag or cup full to use at home. The castings will need to sit for two to three days before they are ready to apply.

Final Assessment Idea

Based on the three stations, have students describe their favorite method of harvesting a worm bin. Have them write an action plan for how they will use the harvested worm castings at home or school.



RESOURCES

Extensions:

Have students observe and record worms' reactions to light.

Teacher Materials:

California State Content Standards

The standards below represent broad academic concepts. This lesson provides connections to these academic concepts through hands-on activities and exploration. This lesson is not designed for a student to master the concepts presented in the standards. Additional lessons in the classroom that build on this lesson or the standard(s) ensure that students will have the opportunity to master these concepts.

SCIENCE	CONTENT STANDARDS
Grade 4	Life Science 2.a. Students know plants are the primary source of matter and energy entering most food chains. 2.b. Students know producers and consumers (herbivores, carnivores, omnivores and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem. 2.c. Students know decomposers, including many fungi, insects and micro-organisms, recycle matter from dead plants and animals. 3.a. Students know ecosystems can be characterized by their living and nonliving components.
Grade 5	Life Science 2.g. Students know plant and animals cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO ₂) and water (respiration).





Teacher

Harvesting a Worm Bin Rubric

A rubric is a scoring tool that defines the criteria by which a student's work will be evaluated. This rubric is provided to assist you in setting expectations for students and assessing their performance and engagement during the lesson based on specific tasks. Ideally, a rubric is developed with the cooperation of the students. Two blank rows have been provided for you and your class to develop and add your own assessment criteria.

CATEGORY	4	3	2	1
Harvests the bin	Student helps with harvesting the bin.	Student tries to help with harvesting bin.	Student does little to help with harvesting the bin.	Student does not help with harvesting bin.
Understands the uses and benefits of worm castings	Student can explain the use and benefits of worm castings.	Student tries to explain the use and benefits of worm castings.	Student poorly explains the use and benefits of worm castings.	Student does not understand the use and benefits of worm castings.





Harvesting a Worm Bin

Bucket method:

1. Place all contents of the worm bin in a bucket.
2. Gently pour cool water into the bucket (one part compost to ten parts water).
3. Within a minute or two, pour the contents of the bucket into a second bucket through the strainer.
4. Retrieve the worms and any uneaten food or bedding from the strainer.
5. Return any worms and uneaten food to the bin.

*The remaining light brown liquid can be used to water and fertilize plants (if liquid is not light in color, it may be too concentrated to add to plants).



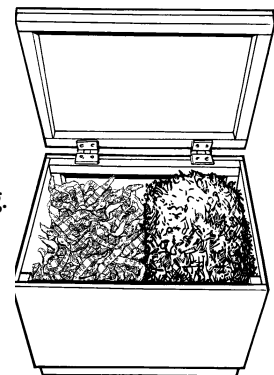
Light method:

1. Place the compost in small piles on a tarp in indirect sunlight or under a light in the classroom for a few minutes. The worms will move to the center of the pile to avoid the light.
2. The outer part of the pile, now without worms, can be removed and put in the five-gallon bucket. As the castings are removed, the newly exposed worms will move to the middle, out of the light.
3. Repeat the process until only a ball of worms remains.
4. The worms and any uneaten food scraps can be returned to the worm bin.



Migration method:

1. Push all the bedding, worms, castings, and food over to one side of the bin.
2. Stop adding new food to that side.
3. Make sure that one half of the worm bin is empty.
4. Set up the empty side like a new worm bin with moist bedding and dry bedding.
5. Put some food in the empty side, and keep feeding that side (about half the amount you usually give the entire bin).
6. After the worms have eaten the food on the old side, they will begin to migrate. The process may require several months.
7. The old side will then be without worms and ready to harvest.



DEFINITIONS

Vocabulary:

Compost: the process or the end result of living organisms digesting and reducing organic matter into a dark, rich, soil amendment.

Compost tea: an aerated liquid solution made from compost for use on plants.

Vermicompost: compost produced in a worm composting system. It is a mixture of partially decomposed organic waste, bedding and worm castings. When finished, it is a balanced, nutrient-rich compost for the garden.

Worm bin: a container used to hold worms, food scraps and bedding for composting.

Worm castings: worm manure or the final product of worm composting. It is a high-quality rich, soil amendment that is used to fertilize plants.

Worm leachate: liquid waste excreted by worms or excess moisture that leaches to the bottom of the worm bin. This can be applied to plants directly once diluted. Worm leachate can also be made by placing worm castings in water and straining any worms or remaining food scraps from the liquid.

