

## Activity 19

# Castings

**Rationale:** The amount of castings (excreta) is an important measure of the overall health of the Habitat. The mass of the castings is also related to the mass and age of the worms present.

### Objectives

- 1) Determine if there are any relationships established between the mass of the castings and the other variables.
- 2) Collect castings in a specific portion of the Habitat.
- 3) Estimate the total mass of castings in the vermicompost.

### PDE Standards

#### Science and Technology

3.1.7. A,B,C

3.2.7. A,B,C,D,E,F

3.6.7. A,B

3.7.7. A,B,C,D

#### Environment and Ecology

4.1.7. A,B,C

4.2.7. A,C

4.6.7. A,B,C

#### Math

2.1.8. A,B

2.2.8. A,B,F

2.3.8. A,B,D

2.4.8. A,B,D,F

2.5.8. A,B,C,D

2.6.8. A,B,C,E,F

2.7.8. B,C,D

2.8.8. F,G,H,I,J

2.11.8. A,B

### Materials

TI 83/84

Plastic cups

Tweezers

### Introduction

The mass of the castings can be measured in several small samples removed from the vermicompost. After the worms are removed, castings and cocoons are visible within the vermicompost. These castings will be a valuable source of enrichment for plants (Wisconsin Fast Plants®) used in later activities. The castings are a result of the worms' digestive processes and the castings are nutrient rich.

## **Strategies**

This is an activity designed for students to collect castings in several small samples of the compost, weigh the castings, and then estimate the total mass of the castings in the Habitat. The students must look at 10 or more 100 mL samples of the vermicompost. These samples must be representative of the whole system. The worms are separated from the vermicompost. The worms and cocoons can also be counted/weighed and these data can be used in future activities. For this immediate activity, only the mass of the castings will be used to predict the total mass of the castings. Students should collect and weigh the castings from the selected samples and determine if they believe the samples are representative of the whole. The castings will be found mostly in the upper strata of the bin, but not exclusively. This depends on the methods of maintenance and bin size. By taking several samples from several specific areas, these representative samples can then be used to predict the total mass of castings. The sections that are used for alternating feedings can be used as well as several layers. The usual method is to have six feeding areas and 3 strata. That will give a total of 18, 3 dimensional sections, similar to rooms in an apartment house. If a 100 mL sample is carefully collected from half of these sections good results will be obtained. Nine or ten 100 mL samples (ca. liter) will be a small, but representative of the entire vermicompost. After the students have weighed the castings in the samples and averaged the values, the total mass of the castings can be predicted mathematically. The number, age, mass of the worms, and the number and mass of the cocoons can also be recorded for future activities and used to predict the total mass and numbers of worms compared to the actual hand-collected values.

## **Procedure**

- 1) Decide on the sections to be sampled.
- 2) Carefully obtain about a 100 mL sample. Record the actual volume in the journal and Data Table 1.
- 3) Count the worms and return them to the vermicompost.
- 4) Count the cocoons and leave them in the sample.
- 5) Remove the castings, weigh, and record the mass.
- 6) Repeat with 8 or 9 more samples.
- 7) Return all the samples to the vermicompost and mix them carefully into the top stratum.
- 8) Complete Data Table 1.
- 9) Draw conclusions from the results.

## **Expectations**

The students should be able to:

- 1) determine a reasonable set of sample locations.
- 2) collect and weigh the castings from the selected samples.
- 3) collect and record data for the worms and cocoons.
- 4) use the TI 83/84 to predict the total mass of the castings.

**Data Table 1**

<b>Sample</b>	<b>Volume</b>	<b>Castings</b>
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
<b>Average</b>		

**Data Table 2**

<b>Volume Bin</b>	<b>Volume Average</b>	<b>Castings Average</b>	<b>Total castings*</b>

\* The total is the result of the average volume of samples *divided* into the total volume of vermicompost *times* the average mass of the castings.

**Data Table 3 (optional)**

<b>Sample</b>	<b>Volume</b>	<b>cocoons #</b>	<b>Worm #*</b>			<b>Worms mass</b>		
			<b>Ha</b>	<b>Ju</b>	<b>Ma</b>	<b>Ha</b>	<b>Ju</b>	<b>Ma</b>
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
<b>Average</b>								
<b>Total</b>								

\*Ha = hatchlings, Ju = juvenile, Ma = mature