Activity 2

Habitat 2

Rationale: This activity looks at the data collected for the past six weeks. Careful analysis of the data will provide a foundation for most of the following activities.

Objectives

1) Design an experiment to determine the rate of decomposition.
2) Design an experiment to determine the rate of growth of the worms.

PDE Standards

Science and Technology
3.1.7 A,B,C
3.2.7 A,B,C,D,E,F
3.5.7. D
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,D,G
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
2.10.8. A,B
2.11.8. A,B

Materials

Bin
Scale (Bin)
Balance (worms)
25-mL graduated cylinders

Introduction

The Habitat will be a contained space of many metabolic activities. The worms' food "garbage" will begin to decay microbially and the worms will also break down the food by carrying on normal metabolic activities. These metabolic activities are easy to measure and analyze. In regards to burying the food many vermiculture experts suggest that a feeding grid should be established and strictly adhered to; others suggest the food should be mixed thoroughly in the entire top layer (2 to 3 cm thick). One

method should be selected and continued for the course of the experiment. This Activity needs to be started with breeder worms, not bedding worms.

Strategies

Before this activity is started have students determine what variables would be best suited to determine the quality of the Habitat. Discuss the activities the worms carry on each day and how best to measure these variables. As stated before, these activities are intended to be used with the inquiry approach to learning science. Students should discuss the biological and chemical activities taking place in the bin. Some teachers have a bin filled with bedding and make it into a hot-compost heap to compare with data collected from the worm bin. For the following experiments, the data collected will act as a "control," comparing the new data to the average of the previous data or the recorded trends. Many real science experiments do not have controls.

Procedure

The procedures will vary from class to class, but basically the students need to select a specified number of variables to study and decide how to best collect the data. If only one large worm bin is available, each group should pick/designate a different set of variables. The best method is to have a small bin for each group and each group will have one or more variables common to all groups and a few specific variables. The following are a list of possible variables that can be studied. This list is by no means complete.

1) Mass of food added
2) Mass of run off water
3) Mass of vermicompost
4) Mass of worms
5) Number of worms
6) Average mass of the worms
7) Temperature
8) Relative humidity
9) pH of vermicompost
10) pH of run-off water
11) Amount of $CO_2(g)$ above the vermicompost
12) Amount of $O_2(g)$ above the vermicompost
13) Length of individual worms
14) Density of the compost
15) Aversion to light

Actual lesson plans for most of the above will follow, as well as additional activities. It is imperative that students design as much of the experiment as possible, with guidance.

Typical students' ideas

1) Sort, weigh, and count the worms every week and chart their growth.
2) Weigh the vermicompost and determine the rate of decay.
3) Count the number of worms and chart the increase in the population.

4) Compare the mass of the food added to the change in mass of the worms and vermicompost.
5) Determine the amount of heat produced by the vermicompost and lost to the environment (a possible project though too complicated for MS).

Expectations

The students will be able to develop:

1) a sense of how real scientific experimentation occurs.
2) a sense of what are variables and constants.
3) a workable method for collecting data on selected variables.
4) several drafts of the experimental procedures.
5) several tables for recording data.
6) an understanding of dependent and independent variables.