



Grade Level:
10th Grade

Subject:
Biology

Exhibit:
#13 Demand
Management
(*Earthworm and
Moisture*)

**Approximate
Time Frame:**
2 hours (*more than one
class period*)

Materials:

- paper
- pencil
- soil
- organic matter
- worms
- dissecting tray
- cardboard

Lesson Plan - "Worms Gone Wild!"

Science TEKS:

1. A Demonstrate safe practices during field and laboratory investigations.
1. B Make wise choices in the use and conservation of resources and the disposal or recycling of materials.
2. A Plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology.
2. B Collect data and make measurements with precision.
2. C Organize, analyze, evaluate, make inferences, and predict trends from data.
2. D Communicate valid conclusions.
3. A Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.
3. C Evaluate the impact of research on scientific thought, society, and the environment.
3. D Describe connections between biology and future careers.
3. E Evaluate models according to their adequacy in representing biological objects or events.
9. D Analyze the flow of matter and energy through different trophic levels and between organisms and the physical environment.
10. C Analyze and identify characteristics of plant systems and subsystems.
12. A Analyze the flow of energy through various cycles including the carbon, oxygen, nitrogen, and water cycles.
12. D Identify and illustrate that long-term survival of species is dependent on a resource base that may be limited.
12. E Investigate and explain the interactions in an ecosystem including food chains, food webs, and food pyramids.
13. A Evaluate the significance of structural and physiological adaptations of plants to their environments.

Related TEKS: Physics and Chemistry

Vocabulary of Instruction:

soil moisture	fungi
bacteria	decomposer
organic matter	

Advanced Preparation: Organize students' into groups

Instructional Procedure (5 E)

Engage: The students will prioritize water use by importance at the level of human demands and the demands of ecosystems. Incorporate alternatives to water use. Understand the role of plants in water use and their role in ecosystems. Design and complete a variety of lab exercises to help understand the effects of water scarcity on plants and other organisms and adaptations that organisms have developed to handle dry climates.

Explore: This lab will take several set ups so the teacher may decide to assign each group a set of soil types and moisture levels and then share the results of each group with the whole class to develop a consensus. The soil types will be sand, clay, or organic mulch and then some pre-determined mixture of the three. The moisture levels will be dry, moderate and saturated.

Each set up will include a small tray or dissecting tray, two types of soil or soil moisture, and a cardboard cover for the tray and four healthy, fresh Wal-Mart earth worms.

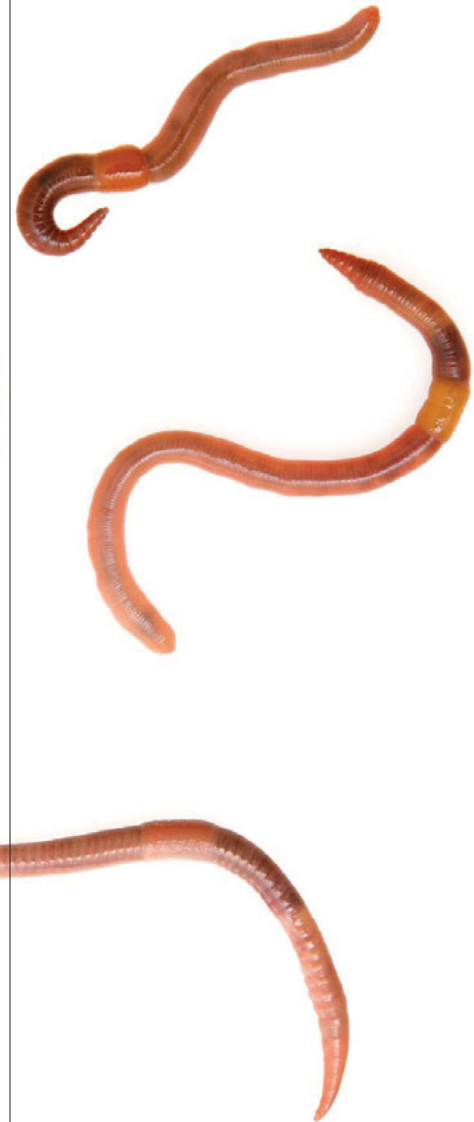
Put about an inch of one type of soil in one half of the tray and a different type of soil on the other half of the tray. Try as many different combinations of soil type and moisture content as you can with your class size.

Place four worms in the tray with their body stretched out over the line that separates the two soil types. Make sure that two of the worms have their heads pointing in one direction and the other two have their heads pointing in the other direction. Cover the trays and do not disturb them for the rest of the period.

You can usually get results within a half hour. Uncover the tray and record your observations. Which side of the tray did the worms move to? Include the soil description and condition in your observations. Share your results with the class.

From this point the class may decide to take the best of the conditions that tied in worm favorability and perform more detailed test in soil composition and soil moisture to find the best type of soil for the worms.

Explain: Soil moisture is a very important factor in organisms that live in the soil. Plants rely on soil moisture to absorb through their roots and have adapted different strategies and structures to take advantage of any available water. Some very important organisms in the soil include animals, fungi, and bacteria that act as decomposers to return nutrients to the soil from dead organic matter. These organisms play a key role in the availability of nutrients for plants and rely heavily on soil moisture and soil composition. Worms respire through their skin so their skin must remain moist at all times. Too little moisture in the soil will cause their skin to dry out. Too much moisture will not allow air to reach their skin so that they can breathe. The objective of this lab is to let a group of worms decide the soil moisture level and soil composition they prefer the most.



How
is soil moisture
important to
organisms
that live in
the soil?

Elaborate/Extend:

Questions:

How is soil moisture important to organisms that live in the soil?
How important is decomposition of organic matter to organisms?
Desert soil is usually high in mineral content but low in organic content?
Why could that be?
How could different soil mixtures affect soil moisture capacity?

Evaluate: Closure of class will consist of student groups developing and presenting a statement about what they learned today and how it may change their ideas toward their water use and other water usage in the city.