

# Ecosphere



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This experiment tested the Earth and how the bio-geochemical cycles within it rely on each other. The worms relied on the ground for shelter and the plant for oxygen. The Ecosphere also evaluated limiting factors within an ecosystem because the bottle used was a small, contained environment. For example, one of the three worms had died because it got stuck between the plant and the side of the bottle. This is a limiting factor in terms of space: if there was more space for the worm this would not have happened.

Question: If one producer and one consumer are to maintain a viable ecosystem in a bottle, how long will they survive?

Hypothesis: I believe the outcome of the experiment will be that all of the worms will survive and the plant will not. The worms will survive because I will be feeding them sawdust, their desired food, and they will have plenty of dirt to wiggle around in. The plant, however, will not survive because the plant's resources are limited. The soil put into the ecosphere is not going to be changed out, therefore the nutrients in it will diminish.

Background Information: The EcoSphere is a display of a working ecological system. While it is beautiful to view, it also demonstrates the delicate balance of a closed ecosystem like the Earth. Contained within the completely sealed glass is a small variety of biota living in a filtered environment.

The EcoSphere contains some of the same essential elements that are found on our planet. The Earth is represented by the soil at the bottom. Fire is the light, which streams in each day. Finally, life: the worms, plant and microbes that live in the EcoSphere.

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The EcoSphere's biological cycle represents a simple version of Earth's' own ecosystem. Light together with carbon dioxide in the water enables the plant to produce oxygen by photosynthesis. The worms breathe the oxygen in the air while nibbling on the sawdust which is fed to them and bacteria. The bacteria break down the animal waste into nutrients, which the plant utilizes.

The worms and bacteria also give off carbon dioxide, which the plant again use to produce oxygen. And so the cycle renews itself.

Materials: - one 1 liter coke bottle with cap - one plant (bought from pet store) - 3 Super Worms - 2 cups of soil - water - sunlight - sawdust (food) - scissors - duct tape - notebook to record data

Procedure: All the materials were collected. Then, a scissor was used to cut a half moon shaped opening in the top of the bottle, approximately 1 inch below the cap. Next, half the soil was pored into the opening. Then the plant was placed into the soil, while poring the other half over the bottom of the plant to ensure proper growth. After, 3 super worms were put into the EcoSphere with some sawdust. The EcoSphere was taped shut and placed on a windowsill with good sunlight exposure. Data was recorded at that moment and everyday, for 20 days, following.

Analysis: My hypothesis was very incorrect. Two superworms ended up surviving, while the plant was wilting and struggling. One superworm died due to it getting stuck. Unable to get out, I assume it died of starvation or hypothermia because the worms spent all of their time under the soil. I believe the plant wilted because it did not have enough space and oxygen inside of the EcoSphere.

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During the experiment, I believe the EcoSphere was knocked off the window. This could have hindered the plant's growth also. The plant could have been up-rooted during the fall causing its deterioration.

Conclusion: In conclusion, the EcoSphere project is important to our curriculum because it evaluates the bio-geochemical cycles, as well as tests limiting factors. An error made with this experiment was it being knocked over. This was very detrimental to the worms and could have been fatal for the plant.