New Jersey Agriculture in the Classroom

The Greenhouse Effect

A lesson in the NJAITC Climate Change Series

OVERVIEW: This easy experiment shows students how heat becomes trapped by gases in the atmosphere causing temperatures to warm on Earth.

GRADES: 3-5

OBJECTIVE: Students will be able to:

- Describe the greenhouse effect.
- Explain how human activity can increase the greenhouse effect.
- List things children and their families can do to combat climate change.

MATERIALS:

Two thermometers
A glass jar big enough for one thermometer to stand in
Plastic wrap
Rubber band

Note: The experiment can be done as a whole class demonstration or by small groups of students.

BACKGROUND

The Earth is surrounded by an atmosphere about 60 miles thick of gases, including nitrogen, oxygen and carbon dioxide. The greenhouse effect occurs when these gases in the atmosphere trap the sun's heat, warming the Earth. That's exactly what a greenhouse does for plants. When it's too cold for plants to grow outside, the glass of the greenhouse traps heat, enabling the plants to survive and grow. Without this greenhouse effect, the Earth would be too cold for human life. Think of the atmosphere as blanket that protects life on Earth.

But in the last 100 years, scientists have observed that human activities have released more and more greenhouse gases, such as carbon and methane, into the atmosphere, causing average temperatures on Earth to increase at a rapid pace. In the last century, average temperatures on Earth have increased about 2°F.

Humans are increasing the greenhouse effect by burning fossil fuels like coal, oil, and natural gas to power our cars, run our factories, and fuel our electric power plants. The carbon dioxide released by burning all this fossil fuel is being released into the atmosphere,

where it is trapping more and more heat. Earth's blanket atmosphere is becoming thicker and thicker, causing temperatures around the globe to increase.

PROCEDURE:

Optional: Read Chapter 1, The Dangers of Climate Change in *Understanding Climate Change, Facing a Warming World,* by Melissa McDaniel.

Begin a discussion on the greenhouse effect. Ask students what they know about Earth's atmosphere and what it does for life on the planet. Using information in the background section, compare Earth's atmosphere to a greenhouse, and ask students to consider what happens when the atmosphere thickens.

Tell students we will do a very simple experiment today to demonstrate how the greenhouse effect works.

Place one of the two thermometers inside a glass container that is large enough that the thermometer can easily be read from inside. Cover the top of the glass container with plastic wrap and secure it tightly with a rubber band.

Place the other thermometer and the glass container with the thermometer inside in a very sunny spot. This experiment must be done in the sun, the sunnier the spot, the better the results will be. Ask students to check both thermometers at about 20-minute intervals to see what is happening with the temperature. You can also ask students to graph the results of each temperature check.

Discussion: Ask students to describe what some effects of warming temperatures on Earth have on people in different areas.

Optional: Read Chapter 3 Climate Change and You in *Understanding Climate Change, Facing a Warming World* by Melissa McDaniel. Discuss steps children and families can do to combat climate change.

EVALUATION:

Ask students to write a paragraph or essay about their observations of the experiment. Ask them to list possible problems warmer temperatures on Earth might cause for people in different areas on Earth.

New Jersey Learning Standards

Science: K-PS3-1, 3-LS4-4, 3-ESS3-1

Social Studies: 6.1.2.GeoHE.1, 6.1.5.GeoHE.3