

Toxicology Study with Lima Beans

Some material borrowed from the following website:

Grade: 7/8

Time: 1 class period preparation, two weeks of observation

Lesson Plan: Toxicology Study with Lima Beans

Materials:

- Plastic cups
- Cotton balls or paper towels
- Ruler
- Plastic wrap
- Water
- Graph paper
- Stickers or labels
- Wax pencil or permanent marker
- Lima beans
- Salt
- Smartboard or projector
- Powerpoint Presentation
- Worksheets/Handouts (see attached)

Goals/Objectives:

- Students will observe the effects of a toxic environment
- Students will get hands on experience in *in vitro* toxicology
- Students will measure growth
- Students will analyze and compare data

NJCCCS Addressed

Standards 5.1A, 5.1B, 5.1C, 5.3D, 5.4B, 5.5A, 5.5B, 5.6A, 5.10A, 5.10B in 7th and 8th grade Science
Standards 4.1B, 4.2D, 4.4A, 4.4B, 4.5A, 4.5B, 4.5C, and 4.5D in 7th grade Mathematics

Activities and Procedures:

Part 1.

Give students a powerpoint presentation about *in vitro* toxicology and how it is used by scientists in place of animal testing. Encourage students to ask questions and participate in classroom discussion about how cells can be used to indicate toxicity in materials.

Part 2.

Break the class up into teams and explain the nature of this experiment to students. The instructor may want to talk about how salt runoff occurs when people salt the roads and sidewalks during winter. Salt concentration changes in soil may be discussed as well as how plants and animals are affected by excess salt.

Part 3.

Give each student two cups, 8 cotton balls, 10 lima bean seeds, a permanent marker (or wax pencil), labels (or stickers), 2 squares of plastic wrap, and 2 sheets of graph paper (which will be used later on to make bar graphs to monitor growth).

Part 4.

Observe students as they set up the experiment. Offer help if necessary.

Part 5.

Once the experiment is set up, collect all cups and place them in an area where they will not be disturbed. Allow students a few minutes at the beginning of each period in the next few days to measure lima bean growth. At the end of this time, students will analyze collected data and form conclusions about salt and its potential toxic effects.

Accommodations:

SLD/ELL

Students will work in teams

Check up on students as they work

Offer help to students as they work

Students will be allowed to work with bilingual students

Offer translations if possible

Visuals will be used

Assessment:

Students' work will be collected and reviewed

This is an on-going project

Follow-up:

This lesson will be part of a series of lessons pertaining to cell culture research

Name _____

Date _____

Lima Bean Toxicology

As we have learned, *in vitro* toxicology employs cell cultures instead of animal or human test subjects. The use of cells in *in vitro* toxicology allows science to test new (and potentially dangerous) chemicals, cosmetics, and medicines without harming organisms. In today's laboratory we will use some *in vitro* toxicology methods to test the effects of a form of salt pollution. SALT POLLUTION?!?!? Yes, you heard right. Every winter, people salt roads and sidewalks, assuming that the salt they put down gets used up completely or somehow disappears. Well, the truth is, the salt does disappear. Unfortunately, however, it ends up in the soil of environments surrounding roads and sidewalks. The salt concentrations can increase over time and affect surrounding ecosystems. Today, we will start an experiment that should tell us how salt can affect plant life surrounding sidewalks and roads.

Procedure

1. Obtain 2 cups, 8 cotton balls, labels, and 10 lima beans from your instructor.
2. Place 4 cotton balls into each cup.
3. Label one cup "SALT" and label the other cup "CONTROL" using a permanent marker and label. You may use a wax pencil in place of the marker and label.
4. In the "SALT" cup, add 2 tablespoons of salt.
5. Carefully pour just enough water into each cup to ensure that the cotton balls are completely soaked. You don't want to completely submerge the cotton balls underwater, so don't add too much water.
6. Use permanent marker to label each of the beans using the numbers in the table below.

Control Cup Bean Labels	Salt Cup Bean Labels
1	6
2	7
3	8
4	9
5	10

7. Place 5 beans on top of the cotton balls on each cup. Make sure that they aren't submerged under water. If this is the case, remove some water.
8. Cover each cup with plastic wrap and place the cups in a well-lit location.
9. Over the course of the next two weeks, monitor the growth of the beans in each of the cups.
10. Make sure that the cotton balls in each cup remain moist. This may require some watering over the course of the next 2 weeks.

Before any growth begins, can you predict which cup will exhibit the most lima bean seed growth? Explain your reasoning in the box below.

What can the results of this experiment tell us about how salt may affect humans?

Compare and contrast today's experiment with cell culture. You may discuss the scientific method, data collection, and materials used.

