Prelab Information

**Purpose** Explore the interdependence of organisms by performing an experiment with lima bean plants and earthworms.

**Time** Approximately 45 minutes

**Question** How can the presence of one species benefit another in the same ecosystem?

**Hypothesis** If plants grow in soil containing worms, then the plant growth will be greater, because worms help decompose organic matter and distribute it through the soil in a form that plants can use.

**Summary** You will grow two groups of plants. The experimental group will grow in soil with worms.

The control group will grow in soil without worms. After the plants grow, you will measure the plant growth for both groups and compare them.

**Variables** *Independent Variable*: presence of worms

*Dependent Variable:* plant growth

Safety

 Always wear safety goggles and a lab gown while performing an experiment.

 Behavior in the lab needs to be purposeful. Do not play with the soil or plants or eat the lima beans.

 Review soil contents and follow any guidance and warnings provided on the packaging.

 Wash hands after handling all lab materials.

 Treat living organisms, such as the lima bean plants and worms, with respect and provide proper care.

 Report all accidents – no matter how big or small – to your teacher.

Lab Procedure

1. Gather Materials

 Two trays, 10 cm (4") deep

 potting soil

 lima bean seeds, soaked overnight

 location with sunlight or growth lights

 worms

 graduated cylinder

 water

 black marker

 ruler (with metric markings)

1. Prepare Two Trays of Lima Bean Plants

**a)** Label the trays *Control Group* and *Experimental Group*. (If the trays are disposable, you can use a marker to write directly on the tray. Otherwise, use tape.)

**b)** Add approximately 6–7 cm of soil to each tray. Make sure that the quality and amount of soil in each tray is the same.

**c)** Plant six lima bean seeds in each tray, about 2 cm deep into the soil. Label the plants with the numbers 1 to 6.

1. Give the Plants Water and Light during Sprouting Time

**IMPORTANT:** The environment must be identical for both groups of plants. To ensure consistency:

• Water all the plants following the watering schedule recommended on the seed packaging.

• Use the graduated cylinder to ensure that the same quantity of water is delivered to each pot.

• Make sure that all plants get the same amount of light.

1. Measure the Heights of the Plants at the End of Week 1

**a)** Measure the height of all twelve plants to the nearest centimeter. If any plant dies, mark an X

in the data table for that plant and write a note about it in your lab notebook.

**b)** Use a calculator to compute the average heights of the (living) plants in each group.

**c)** Compute the difference in those averages by subtracting the average height of the plants in the experimental group minus the average height of the plants in the control group. Use this pretreatment difference as a basis for comparison.

**d)** Record qualitative observations in your lab notebook as well, such as the health of the plants, leaf color and size, wilting, unusual growth, brown spots, and other marks.

1. Add Six Worms to the Soil of the Experimental Group of Plants

Be sure to write qualitative notes about the condition of the worms in your lab notebook.

1. Measure the Heights of the Plants at the End of Week 3

(Repeat Step 4)

1. Measure the Heights of the Plants at the End of Week 5

(Repeat Step 4)

1. Check the Health of the Worms at the End of the Study

Are all the worms still alive? Do they all seem healthy? Have they changed in any way? Are there any new worms? Write qualitative notes about their condition in your lab notebook.

1. Dispose of all material according to the direction of your teacher.

Data

Record your data in the table below. Be sure to record any qualitative observations in your lab notebook.

**Heights (cm)**

**Plant 1**

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| --- | --- | --- |
| **Week 1 (before adding worms)** | **Week 3** | **Week 5** |
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**Plant 2**

**Control Group**

**Plant 3**

**Plant 4**

**Plant 5**

**Plant 6**

**Control Group Average**

**Plant 1**

**Plant 2**

**Experimental Group**

**Plant 3**

**Plant 4**

**Plant 5**

**Plant 6**

**Experimental Group Average**

**Difference in Average Heights**

*(Experimental – Control)*

**Graph:** Your teacher may ask you to create a graph that summarizes the results. Choose an appropriate graph type, label the graph properly, and interpret the graph.