

The Crucifer Cross: Studying Gravitropism in Plants



Problem

How do plant seedlings respond to gravity?

Hypothesis: _____

Primary Learning Outcomes

At the end of this activity students will:

- Have constructed their own low cost equipment for experimentation.
- Identify gravitropism in plants (both negative and positive)
- Explain the significance of this adaptation to a germinating seed.
- Collect, graph, interpret and summarize data.

Assessed GPS

Habits of Mind: SCSH2, SCSH3, SCSH4, SCSH5, SCSH6, SCSH7

Content: SB4e

Assessed QCC's:

Science, Technology and Society: 1, 3, 8

General Agriculture: 106, 114, 115

Horticulture: 106, 115, 121

Duration

25 min day one, 15 min /day on days 2&3, 1hour day4

Materials (per group)

1 clear/opaque film canisters (black canister can be used but germinate for two days only)

1 extra

8 fast plant seeds

Water bottle

Forceps (plastic)

2cm wide double stick tape or double stick foam tape*

Scissors

Small pipette

Hand lens

Paper toweling (soft and thick)

Background

How do plants know which way is up and down? The response, gravitropism, seems to be mediated by the root cap and the shoot tip. In roots, perception of down (direction of gravity) appears to be due to the settling of dense particles in specialized root cap cells. These particles called amyloplasts, sink toward the source of gravity and trigger growth towards the “down side” of things.

In plant shoots the process similar, but reversed. In plant stems cell growth is triggered on the side opposite ground or gravity causing the stem to grow up. We can demonstrate this in the lab with a simple experiment.

Procedure

1. Tape the extra film can lid to the side of the canister using the double stick tape. This will be the bottom of the apparatus.
2. Fold and cut a piece of paper towel into 4.5cm x 1cm strips.
3. Place the paper towel wicks inside of the film canister, 1 on each side and top and bottom. Be sure that the wicks are straight and parallel to each other.
4. Stick two seeds on each wick equal distance from each other and the two ends.
5. Add a couple of drops of water (that is 2) to the can CAREFULLY and make sure the wicks do not stick out of the can, then shut the lid.
6. Place the growth chamber in the light box and allow it to sit for two to three days.
7. Open your growth chamber carefully and record the results of your experiment in a data chart.

Assessment

1. For what was the film canister used?
2. What happened to the seeds?
3. In what direction did the stems of the new plants grow?
4. In what direction did the roots of the new plant grow?
5. What part of the plant exhibited positive gravitropism?
6. What part of the plant exhibited negative gravitropism?
7. Fill in your data on the histogram on the board. How does your data compare to the rest of the class? If your data is different why do think this is the case?