



Effects of Heat on Plants

Annotation:

Students will identify heat as a potential stress factor influencing plant fitness and understand heat stress in an environmental context. They will assess heat tolerance in individual plants and perform selection of heat-tolerant individuals.

Problem: How does heat affect plants?

Primary Learning Outcomes

At the end of this exercise the student should be able to:

Identify heat as a possible stressor in a plant's environment.

Recognize that different plants have different temperature requirements

Identify members of a population that are more heat tolerant than others and hypothesize what effect this might have on the survivability of a species.

Explain how stressors in the environment can alter the gene pool of a population or species organisms.

Assessed GPS

Habits of Mind

SCSh2, SCSh3, ScSh4, SCSh5, SCSh6

Content

SB4

Duration

15 to 30 minutes on several days – less after the first day or two

Materials

2- liter soda bottles (one for each group of two students)

Potting soil/medium for fast grow plants and C Ferns

Several small growth chambers (this depends upon how many different temperatures you wish to test – one for each temperature).

Thermometers

Fast grow plants at least. 4 days old.

C Fern gametophytes and/or sporophytes

Water

Heating Apparatus – light with thermostat attached for each grow box

Background

Different plants require different temperatures in order to experience optimum growth.

In Agriculture and in landscaping and horticultural situations unseasonably cold or hot

weather can present problems to growers, homeowners and greenhouse operators. In

addition, the problem of global warming has shown that even small changes in ocean

water temperatures can have drastic effects on the world's weather patterns. What effects

do these changes have on the growth and ability of plants to survive?

Procedures

- Determine the optimum temperature range at which the plants you are using grow.
- Determine what temperature to which you want to expose the plants. Get approval from your instructor for this temperature.
- Place your plants in your grow box and set up the heating apparatus if needed. Using a thermometer position your light so as to maintain a constant temperature at your selected level.
- Check plants daily and water as needed. Make notes on any changes you see occurring on a daily basis.
- Continue experiment until all plants die or bear seed.

Assessment

How many of your plants survived?

If any survived what type of health were they in compared to the control?

Did one type of plant survive better than the other? Which one? Why do you think this was so?

Explain how heat can affect the two types of plants that we tested.

Were some individuals of each species we tested more heat tolerant than other individuals of the same species? How might this help survival of the species under stressful conditions?

How might heat tolerance by certain individuals of a species affect the future generations of that species?

Can environmental stressors affect the gene pool and survivability of a species? Explain how.

What effects might global warming or extended periods of unseasonable weather have on a population or species?

Extensions

Grow the seeds from any plants that survived and see if the offspring are heat tolerant as well.

Try to produce a heat tolerant strain of plants.

