

OUTDOORS ❁ GRADES 5-6 ❁ FALL, WINTER, SPRING ❁ PROJECT



A Warm Place to Grow

DESCRIPTION

Students design and test ways to protect plants from frost damage. This activity should be used during cool weather.

OBJECTIVE

To understand how mulch can protect plants from frost.

TEACHER BACKGROUND

Throughout agricultural history, farmers have attempted to control their local climates through technology. Examples include irrigation systems, wind generators to circulate air to prevent frost damage, and greenhouses to extend growing seasons. An early fall frost or late spring frost can easily destroy a crop. There are several common ways to protect plants from frost. Covering the plants with plastic heats up the soil during the day and traps some of the heat at night. Wind generators circulate the air and keep the cold air from falling onto the plants. Mulch (organic material applied loosely over the soil and around plants) insulates the soil and keeps it warm.

Mulch is also used to reduce evaporation of moisture from soil and reduce weed growth. Some of the more common mulches are: straw, leaves, aged animal manure, and ground tree bark. A mulch layer should be 3 to 6 inches (7.5 to 15 cm) deep.



MATERIALS

- ❁ A Warm Place to Grow Lab Sheet, 1 per student, page 421
- ❁ 2 experimental garden beds planted with the same crops
- ❁ 2 minimum-maximum thermometers or 1 soil thermometer
- ❁ organic materials for mulch: straw, leaves

PREPARATION

Prepare two garden beds for the experiment by planting both with the same number of the same crop, such as kale or broccoli.

CLASS
DISCUSSION

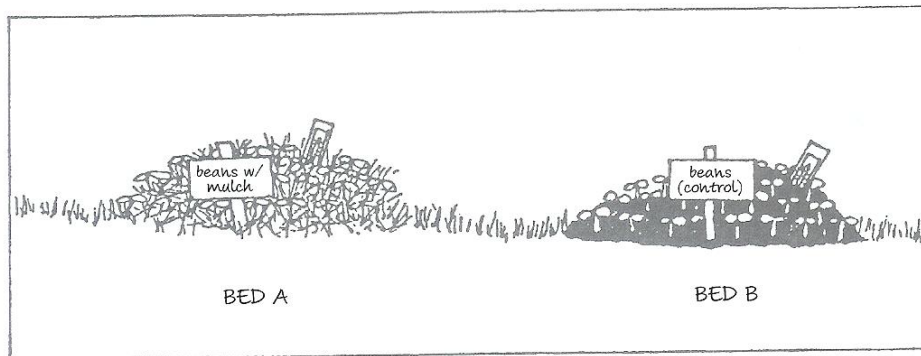
What impact does the weather in our area have on local farmers? Are there times of the year when they cannot grow crops? Is there always enough rain to water the crops? Can wind be a problem? How do farmers try to solve these problems? (*greenhouses, not growing crops all year, irrigation, tree windbreaks*)

A common problem for farmers is an early frost in the fall or a late frost in the spring. Frost can kill some crops. Farmers must work with the weather and often must simply accept what weather may do to a crop, even though widespread frost damage to food crops may result in higher food prices that affect all of us.

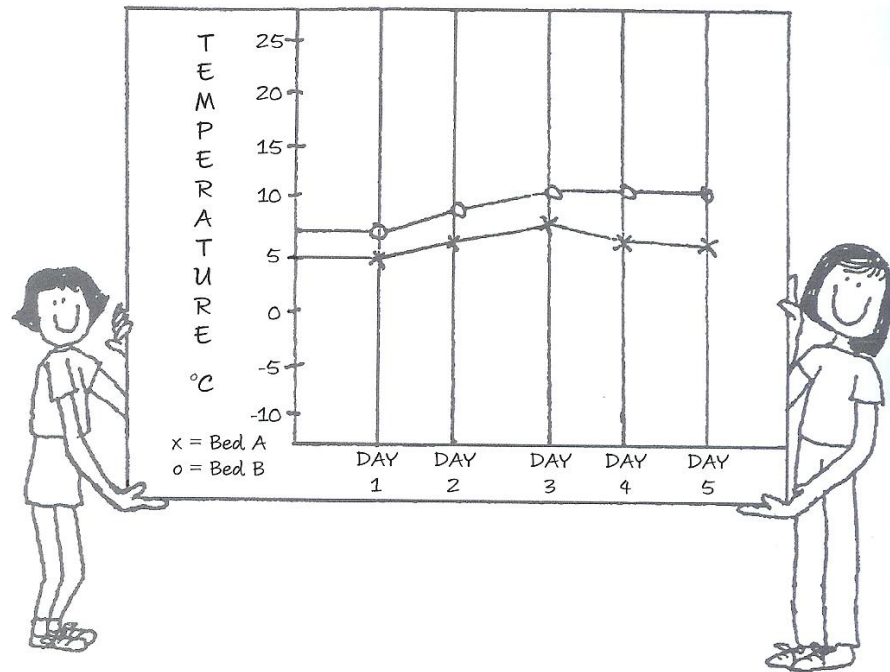
As we prepare for cool temperatures, let's design some ways to protect plants from the cold. (*Discuss ideas.*)

ACTION

1. Have students design an experiment to test the effect of mulch on plant health in cool temperatures. Ask, *What is our hypothesis? How will we test it? What data (information) will we want from the experiment? How will we collect it? How will this data help us draw a conclusion?*
2. Have the class plant two beds (or two halves of a bed) with identical types of plants (we recommend planting a few different types, but make sure they are the same in each of the two beds). Have students carefully mulch around all the plants in one bed, Bed A, creating a 3- to 6-inch (7.6 to 15.2 cm) layer. As in the illustration below, the soil should not be visible after mulching.



3. Leave the other bed (Bed B) without mulch. Label the beds.
4. Demonstrate the maximum-minimum thermometers to the class. Place one in each garden bed (the thermometer in Bed A should be placed under the mulch layer). The thermometers will record the coldest and hottest temperatures since the last time they were read. If these thermometers are not available, a simple soil thermometer can be used to read the soil temperature as early in the morning as possible.
5. Establish a time each day for the recording of temperatures and observations.
6. Record data on a class chart for two weeks (see illustration, page 110).
7. Have students compare results from each bed. Based on their observations of plant health and growth, do they conclude that the protection actually helps the plants?



WRAP UP

Did temperatures differ between the experimental and control beds? Why or why not? Was there a difference in plant growth between the two beds? Would a farmer be able to use this method of plant protection? What methods do farmers use in our area to protect their plants from frost? Did you observe any other ways mulch affected the plant growth and the soil?

DIGGING DEEPER

Have students test mulch for its ability to prevent evaporation from the soil and to slow weed growth.

A Warm Place to Grow

(From: A Warm Place to Grow, page 108)

Crop: _____

Soil Temperatures	Bed A (with mulch)		Bed B (without mulch)	
	Min:	Max:	Min:	Max:
Day 1				
Observations				
Day 2				
Observations				
Day 3				
Observations				
Day 4				
Observations				
Day 5				
Observations				
Day 6				
Observations				
Day 7				
Observations				
Day 8				
Observations				
Day 9				
Observations				
Day 10				
Observations				

Wrap Up: Did temperatures differ between the experimental and control beds? Why or why not? Was there a difference in plant growth between the two beds? Would a farmer be able to use this method of plant protection? What methods do farmers use in our area to protect their plants from frost? Did you observe any other ways mulch affected the plant growth and the soil? *what other ways could we protect our plants from frost?*