

Ohio Science Concept

- 7th Grade: Conservation of mass and energy: properties of matter
 - Cycles of matter and flow of energy: biomes and their processes
- 8th Grade: Forces and motion: measurement of forces
 - Species and reproduction: fossil record and the diversity of species

Next Generation Science Standards

- MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Science Inquiry and Application

- Communicate observations and ask questions about the natural environment
- Employ simple equipment and tools to gather data and extend the senses.
- Use appropriate mathematics with data to construct reasonable explanations.

Objectives

Students will...

- Observe adaptations of various plants that allow them to survive the winter season and in arctic biomes.
- Learn about the history and meaning behind plants associated with holiday traditions.
- Apply carpentry skills to add a low tunnel on a garden bed as a means of season extending.

Materials

- Transition signal (bell, chime, etc.)
- Introduction: Pictures of plants with various characteristics and adaptations
- *Observe Station*: “Holiday Plants” handouts, access to computers with internet, encyclopedias or other botany resource books, pencils
- *Explore Station*: Materials: “Adaptations A-Z handout”, pencils, clipboards, timer
- *Garden Station*: 5 PVC poles 7' 4" in length, 16 pipe straps, 36 wood screws & matching drill bit (included in package), 12 feet of Agribon 19 row cover, 10 bricks, PVC cutter, 8' tape measure, permanent marker, high powered drill, seeds for cool season crops, directions from Civic Garden Center’s “Adding a Low Tunnel” blog.

Overview

This lesson guides students in understanding that while the garden may appear dull and lifeless in the winter, there are still possibilities for making observations about biological processes, exploring the natural environment and building practical life skills. At the observe station students investigate the history and meaning behind plants associated with holiday traditions. At the explore station students identify adaptations allowing plants to survive the winter season. At the gardening station students are guided in adding a low tunnel to a garden bed to extend the growing seasons of fall and spring.

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Garden Lesson: The Garden in Winter

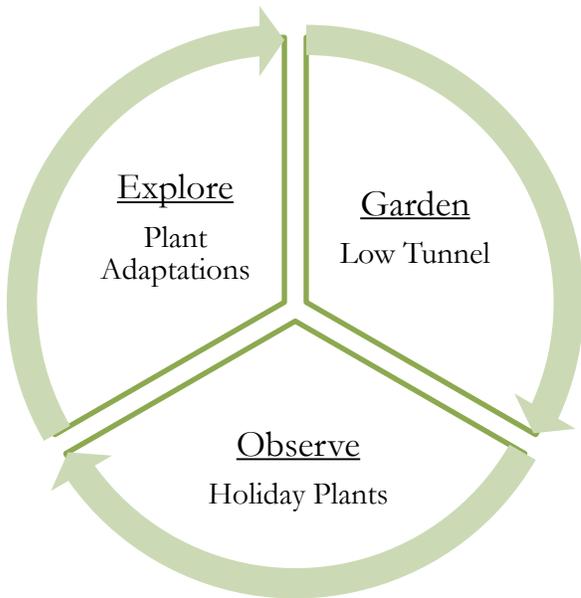
Season: Fall/Winter

Grades: 7 & 8

5 minutes Introduction

- Welcome & review expectations
- Why do plants have different characteristics? How do plants survive in different seasons and biomes?
- Break into three groups for station time

20 minutes Station Rotation (5 minutes per station + 1 minute for transition)



Observe: Holiday Plants

Materials: “Holiday Plants” handouts, access to computers with internet, encyclopedias or other botany resource books, pencils

- Ask students to share holiday traditions they partake in or have heard of that involve plants. Discuss the history of the tradition, based on what the students know.
- Hand out “Holiday Plants” sheets and have students complete research questions about a holiday plant listed.
- Allow students to work independently or in groups. Share information found. Have students continue research in class.

Explore: Plant Adaptations

Materials: “Adaptations A-Z handout”, pencils, clipboards, timer

- Pass out clipboards and “Adaptations A-Z” handout.
- Have a conversation about what an adaptation is and share examples.
- Explain that students will have about 3 minutes to come up with as many words that can be applied to the adaptation topic beginning, one per letter of the alphabet. They may walk around garden for inspiration.
- Bring group back together and share answers

Garden: Low Tunnel

Materials: 5 PVC poles 7' 4" in length, 16 pipe straps, 36 wood screws & matching drill bit (included in package), 12 feet of Agribon 19 row cover, 10 bricks, PVC cutter, 8' tape measure, permanent marker, high powered drill, seeds for cool season crops, directions from Civic Garden Center’s “Adding a Low Tunnel” blog.

- Discuss advantages of adding low tunnel.
- Collect and prepare materials
- Follow directions from blog to build the low tunnel on a 4x8 garden bed.
- Involve students in measuring, marking the bed, dividing materials and anything else you feel is appropriate.

5 minutes Conclusion: What Can You Do?

- While you collect the materials, ask the students to give ideas on how they can help the garden as the seasons change
- Ask if the students have any questions

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Observe Station Handout

Holiday Plants

Directions: Please choose a plant that relates to a holiday tradition. You may choose from the list below or check with your teacher if you have another idea. Use reliable resources to research the plant and record your answers.

Holiday plant ideas: Ivy, Holly, Poinsettia, Fir/Pine/Spruce, Radish, Olive Branch

1. **Physical description of the plant.**
2. **Where it is found naturally?**
3. **Explain the history of why the plant is used for holiday traditions.**
4. **List 3-5 additional facts you find interesting about this plant (example: how tall is it?; how long does it live?: what lives in it?:**

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Garden Lesson: The Garden in Winter

Season: Fall/Winter

Grades: 7 & 8

Explore Station: Adaptations A-Z

A _____	N _____
B _____	O _____
C _____	P _____
D _____	Q _____
E _____	R _____
F _____	S _____
G _____	T _____
H _____	U _____
I _____	V _____
J _____	W _____
K _____	X _____
L _____	Y _____
M _____	Z _____

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Garden Station: Adding a Low Tunnel

Guess what? We are going to try winter gardening! This will be a new adventure for us and we are excited to embark on this experiment with you. We have installed several low tunnels on raised beds to extend the growing season and try for year round gardening. With this low tunnel design, our garden beds will be 3-4°F warmer than the outside temperature. We are adding tunnels to beds growing fall crops planted in September and in beds that have been cleared and will be planted with seeds throughout the winter from our [fall seed package](#). If you are interested in adding a tunnel to garden beds at your school please don't hesitate to contact us!



Step 1: Gather your materials. After a few test trials, we decided upon the following list of necessary materials (this list is enough for one 4'x8'x1' garden bed). Click on the links for vendors:

- 5 [PVC](#) poles 7' 4" in length (purchase 10' and cut 32" off one end-there are lots of projects you can complete with the extra pieces; [click here](#) for ideas)
- 16 [pipe straps](#)
- 36 [wood screws](#) & matching drill bit (included in package)
- 12 feet of [Agribon 19 row cover](#)
- 10 [bricks](#)
- [PVC cutter](#)
- 8' tape measure
- Permanent marker
- High powered drill
- Seeds for cool season crops

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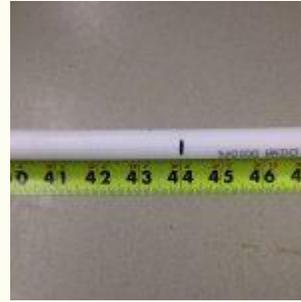
Step 2: Mark the raised bed. Using a tape measure mark the bed at the following intervals: 4", 32", 62" and 92". Do this on both sides of the raised bed. Measuring and marking is one of the jobs students can work together to complete.



Step 3: Screw in the pipe straps. At each mark on the raised bed two pipe straps will be screwed in. Screw one in an inch from the top of the bed and another directly below the top pipe strap and six inches from the top of the bed. Screw in all pipe straps on both sides of the bed (16 total). The two pipe straps must line up or the PVC poles will not slide into them.



Step 4: Mark the PVC poles. Using the permanent marker, mark 8" in from one end of the PVC pole (this mark will line up with the top of the raised bed), another at 44" (this will be the highest part of the hoop), and a final at 80" (this mark will line up with the top of the raised bed). If you purchased 10' poles you can cut it at 88" so the pole is 7' 4" in length.



Step 5: Attach the PVC poles to the bed. Slide the PVC pole into both pipe straps on one side of the bed, then bend the pole to the other side of the bed and insert it into the pipe straps on the opposite side. Slide the pole down so the 8" and 80" marks line up with the top of the bed. The 44" inch mark should be the highest point of the bend in the PVC pole.



Step 6: Add the stabilizing PVC pole (optional). Place your final PVC pole along with length of the bed. Mark the pole at each point where it touches the PVC hoops that are secured on the bed. This should be every 29". At each mark drill a screw through the first layer of PVC-don't go all the way through the pipe. After all four screws are secured cut the PVC at each end so there is as little as possible sticking out. This will reduce the possibility of having the row cover (attached in next step) get snagged and tear. Have students hold the trimmed PVC pole with the screws facing up so an adult can complete the drilling of the screws into the center of the hoops from the underside (at the 44" mark made in step three).

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Step 7: Anchor the row cover. The row cover we suggest in step one above reaches the ground on both sides of the width of the bed when centered. It's very important to be able to be able to anchor the row cover on all sides of the bed, so before cutting make sure to test you have the right length! Anchor with bricks so it is secured on all sides.



Wahoo! You've just installed a low tunnel on your raised bed! Check on your garden at least once a week, continue succession planting and harvesting greens. You may need to water the bed more often since it will be warm under the cover. On warm clear days you can remove the cover but be sure to put it back before the cold nights.

There are many options for extending the garden season. No matter what method you choose, we'd love to hear from you and offer our support and encouragement! Please contact us at youtheducation@civicgardencenter.org with questions, comments and ideas!

