



# Module 3: Developing a Locally-Based Food System

## Season Extenders

### Objectives

Students will be able to:

- list one plant and its growing season
- design and create a simple season extender

### Oregon Content

#### Standards:

1.2L.1 Describe the basic needs of living things.

2.2E.2 Record and summarize daily and seasonal temperature changes.

2.4D Engineering Design: Engineering design is a process used to design and build things to solve problems or address needs.

3.4D.1 Identify a problem that can be addressed through engineering design, propose a potential solution, and design a prototype.

4.2L.1 Describe the interactions of organisms and the environment where they live.

4.4D Engineering Design: Engineering design is a process of using science principles to solve problems generated by needs and aspirations.

5.4D.2 Design and build a prototype of a proposed engineering solution and identify factors such as cost, safety, appearance, environmental impact, and what will happen if the solution fails.

7.4D.1 Define a problem that addresses a need and identify constraints that may be related to possible solutions.

### Background

Season extenders are a great way to increase the amount of produce you can get from your garden. In the mild climate of the Willamette Valley, a few simple extenders can mean year-round food. You can use them to cover garden beds so you can keep things alive longer into the fall or so you can start things earlier in the spring. Here are examples of a few different types of season extenders.



<http://www.yourmarketgarden.org>

**Floating row covers** help protect young plants from late frosts. Made out of fabric, young plants push up the sheet as they grow.

**Cloches** are portable structures designed to protect plants from cold air. There are many types. The amount of heat trapped by the cloche depends on the materials used. They can be small enough to cover just one plant- like a plastic bottle covering a seedling, or big enough to cover an entire row of plants. Usually glass, remay fabric cloth or plastic are used. Most cloches have simple construction out of inexpensive materials. They are easy to set-up, deconstruct and move.



<http://greenbabyguide.com>



<http://pubs.ext.vt.edu/426/426-381/426-381.html>

### Oregon Content

#### Standards continued:

7.4D.2 Design, construct, and test a possible solution using appropriate tools and materials. Evaluate the proposed solutions to identify how design constraints are addressed.  
ET.3 Research and Information Fluency: Students select and apply digital tools to gather, evaluate, validate, and use information.

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.

#### Vocabulary

Season extender, cloche, cold-frame, greenhouse

#### Garden Tasks

- o Plant fall/winter/early spring crops
- o Clean up the garden after the fall harvest
- o Water plants under season extenders if needed

**Cold-Frames** use a passive solar design to heat up the air around plants. Using glass or hard plastic and a wooden frame, these are more or less permanent structures that are still moveable. They do require a bit more construction skills than cold-frames but they're also more airtight and will keep plants warmer. The glass/plastic lid is angled toward the south to maximize sun exposure. They're great for hardening off starts before planting them out in the garden or growing lettuce through the winter.



<http://www.dummies.com>



<http://www.caes.uga.edu>

There are many different types of **greenhouses**. These are permanent structures that you can usually walk into. The walls are plastic or glass. Basically, it's a building designed for growing things. Some have electricity with extra heating or light, some rely on the sun. Greenhouses allow you to grow plants throughout the winter without having to worry about outside conditions. They are also expensive to build or buy.

*Good sources for info about season extenders:*

<http://pubs.ext.vt.edu/426/426-381/426-381.html>

<http://www.frogchorusfarm.com/seasonextenderssummary.html>

## Project

### Building Season Extenders

**Length-** two-four 1 hour sessions, longer if using this as a basis for an experiment

**Materials-** internet and computer access, seed packets, thermometers, pencils, graph paper, hammer, nails, screws, plastic sheets/bottles, remay

cloth, various other building materials

**Preparation-** determine what sort of season extenders will work best for your garden and price out materials so you know what students will be able to do

1) Start by reviewing what plants need to grow. Beyond the basics, one very important need is heat/warmth. Have the students look at some seed packets. On the packets, they should be able to find the necessary temperature for the seeds to sprout and grow. Ask them how they can find out if this is a good time of year to plant these seeds?

One way is to take some temperature readings to see if the current temperature of the air and soil match the needs of the seeds. Use both regular and soil thermometers to check the temperature in various parts of the garden. See if there are warmer and cooler spots. Students will record their findings.

They can also check to see what the current day and night temperatures are in their area using on-line resources. In groups/pairs, have the students use their findings to determine if it would be ok to plant the seeds. Next, have them make a graph showing the average day and night temperatures throughout the year. They will mark on their graph which months they could plant their seeds in.

2) Knowing all of the above, their goal is to figure out some way that they could extend the growing season for their seeds. How can they make the temperature warmer in the garden during the colder months? Give them 10-15 minutes in small groups to brainstorm some ideas. After awhile, have them look at their ideas and figure out which ones are actually going to be feasible.

3) Have a local farmer or gardener come in to talk to the students about various season extenders. Using this expert advice, students will then design their own season extenders in groups. Their design needs to have materials listed, and the measurements of each of the materials.

For younger students, simplify this by having them all make the same thing. Cloches are an easy and simple option. Each group will get to decide what materials they want to make theirs out of- plastic, fabric, glass?

Older students could take on the building of a more permanent structure like a cold frame or a mini-greenhouse. You may want to only build one with the whole class depending the cost of materials and difficulty of the construction.

4) After they have their design they will build their season extender. They can put it over plants that are already growing or plant new seeds or starts. You can use the season extenders to make an experiment to determine the effectiveness of various types. (*Look at **Module 2- Plant Needs** for ideas on how to do an inquiry based experiment with students.*) If the students have already done the Plant Needs Experiments, challenge them to this time make a more detailed hypothesis and procedure.

ex. Instead of a hypothesis that states, 'plants in the cloche will grow better than plants not in the cloche', do something like this- 'plants in the cloche will grow 2" taller than plants not in the cloche.'

5) After building the season extenders and using them, have students blog about the findings and give directions for how others can make a similar season extender.

**STEM Professional Connection:** This would be a great time to have a local farmer or master gardener come give students some ideas about the usefulness of season extenders and/or how to build them.

## Activities

The activities below can be used to introduce or review the project concepts.

### Transplant Game- Season Extenders Version

**Length-** 10-20 minutes

**Materials-** red and blue cards

**Preparation-** lay out a playing field and decide which plants students will be for the game. This game is like red light/green light. It's a good way to discuss the pros of using season extenders. Give each student a card. Those with red cards are going to be planted under a cloche in the early spring. Those with a blue card are going to be planted without a cloche in the early spring. Have an adult be the signaler- when they turn so their back is to the group, the students run toward them. As soon as they turn to face toward the students again, the students have to freeze. The signaler should be pretty far across a field from the students. When a student gets to the signaler they have matured!

When you start it is early February. They are all going to be planted. Anyone with a blue card can start out jumping on one foot. Anyone with a red card is going to be walking. As the months go on during each round, slowly increase the pace of movement for both groups until they are both running:

- February: blue- hop on one foot, red- one foot moves every 5 seconds
- March: blue- hop on two feet, red- hop on one foot
- April: blue- skipping, red- hop on two feet
- May: blue- running, red- skipping
- June: blue- running, red- running

The game ends when everyone has gotten past the signaler. Use this activity to talk about the extra jumpstart season extenders can give seeds/plants in the early spring.

### Greenhouse Fieldtrip

**Length-** 30 min-2 hours (dependant on travel time)

**Materials-** none

**Preparation-** permission slips, set up a time with the owner of the greenhouse, figure out transportation  
If possible, a fieldtrip to a nearby greenhouse would be a great way to learn about more permanent season extenders.

**Where in the world do I come from?**

**Length-** 10 minutes

**Materials-** harvest trading cards, world map, season signs

**Preparation-** gather materials

Give each student a harvest trading card. Have them put their harvest card on a large world map where they think that plant originated from. Then flip the cards over one at a time and put them where they actually originated. Talk about how there are hot spots in the world where many plants originated from as formal agriculture got started.

You can do the same thing with the harvest trading cards only talking about the seasonality of different crops. Put out season signs: fall, winter, spring, summer. Have the students put their card under the sign they think their plant best grows in. They can put them in between two signs if they think the plant grows best in more than one season. Then flip the cards over to see which season they like best. This is often tied to the part of the world the plant originated in and the weather patterns of that place.