

## 6<sup>th</sup> grade – Row Cover Lesson

45 min

**Objective** – Students will understand why extending the growing season in certain climates is beneficial and different ways this can be done. Students will then sow seeds and assemble 2 'hoop houses' in the garden over beds that were measured and plotted by 5<sup>th</sup> grade math classes.

15 min

### **Extending the growing season!**

(students gather beside raised bed near shed) What season is it? Fall – what's happening to the plants? dying/going dormant. Today we're going to talk about ways to keep plants alive in winter – or alive for longer in winter – by extending the growing season. Why would we want to do this? How do we do this? Students brainstorm...

- 1) **Heated greenhouse** – bring potted plants indoors – downside? You have to heat AND water – costs money!
- 2) **Unheated greenhouse** – plastic or glass covering – warmth from....? What's the downside? You have to go in to water....
- 3) **Cloches** – bell shaped mini coverings (glass jar or upside down plastic milk jug) French word for 'bell' – show kids an example!
- 4) **Cold frame** – mini unheated greenhouse (show them glass panes in shed)
- 5) **Row cover fabric** – floating or bows/hoops – hoop house! What are benefits of each? Floating less work, hoops allow more space.

We're going to finish constructing what Mrs. Grom's 5<sup>th</sup> grade students started – a row cover hoop house over 2 raised beds! Special fabric purchased lets water and sunlight through while insulating and warming by 7-8 degrees more than air temp. Also warms the soil.

30 min

### **Constructing a mini 'hoop house'!**

Students are shown supplies and given brief tutorial in how to construct hoop houses. Split class into 2 groups for 2 beds – give each class specs for their bed.

1. clear bed of plants – leave kale, perennials etc.
2. measure out and pound in rebar – slip over hoops
3. cut fabric to size
4. label and sow seeds, water in
5. stretch fabric over bed, use staples to attach firmly to ground

**Typar:** Typar row covers are reusable and made from durable spunbonded polypropylene fabric. **Polypropylene (PP)**, also known as **polypropene**, is a [thermoplastic polymer](#) used in a wide variety of applications including [packaging and labeling](#), [textiles](#) (e.g., [ropes](#), thermal underwear and carpets), [stationery](#), plastic parts and reusable containers of various types, laboratory equipment, loudspeakers, automotive components, and [polymer banknotes](#). A **polymer** ([/ˈpɒlɪmər/](#)<sup>[21][31]</sup>) (Greek *poly-*, "many" + *-mer*,

"parts") is a large **molecule**, or **macromolecule**, composed of many repeated subunits. Because of their broad range of properties,<sup>[4]</sup> both synthetic and natural polymers play an essential and ubiquitous role in everyday life.<sup>[5]</sup> Polymers range from familiar synthetic **plastics** such as **polystyrene** to natural **biopolymers** such as **DNA** and **proteins** that are fundamental to biological structure and function. Polymers, both natural and synthetic, are created via **polymerization** of many small molecules, known as **monomers**. Their consequently large **molecular mass** relative to **small molecule compounds** produces unique physical properties, including **toughness**, **viscoelasticity**, and a tendency to form **glasses** and **semicrystalline** structures rather than **crystals**.

Rebar-

Rebar (short for reinforcing bar), also known as reinforcing **steel**, reinforcement **steel** and colloquially in Australia as reo, is a **steel bar** or **mesh** of **steel wires** used as a tension device in reinforced **concrete** and reinforced **masonry structures** to strengthen and hold the **concrete** in tension.

PVC pipe –

**Polyvinyl chloride** (PVC) pipe is made from a plastic and **vinyl** combination material. The pipes are durable, hard to damage, and long lasting. They do not **rust**, rot, or wear over time. For that reason, PVC piping is most commonly used in **water systems**, underground wiring, and sewer lines.

## Sources:

<http://umaine.edu/publications/2752e/>

<http://cookingupastory.com/ways-extend-growing-season-garden> (video)

**cloche**: In **agriculture** and **gardening**, a **cloche** (from French, *cloche* or "bell") is a covering for protecting plants from cold temperatures. The original form of a cloche is a bell-shaped glass cover that is placed over an individual plant; modern cloches are usually made from plastic. The use of cloches is traced back to **market gardens** in 19th century **France**, where entire fields of plants would be protected with cloches. In commercial growing, cloches have largely been replaced by **row cover**, and nowadays are mainly found in smaller gardens.<sup>[1]</sup>

**Ways to Extend the Growing Season in Your Garden by Oregon State University's Community and Urban Horticulturist, Weston Miller** (<http://cookingupastory.com/ways-extend-growing-season-garden>)

Today we're going to talk about season extension, which is using various devices like the **row cover fabric** that you can see around me, **cloches** and **cold frames**, and **unheated greenhouses**, to extend the growing season. – We're able to add on about 3 or 4 weeks to the early season, 3 or 4 weeks late in the season, giving us a longer overall season where we get to harvest more food.

With row cover fabric, it's a spun polyester fabric and it's used in two ways. One is called **floating row cover**. The fabric is just laid down on the ground, bricks or other devices are used to weight it down. There's a little bit of slack, so as the plant grows, it will push the fabric up. Here we have peas that have germinated underneath the row cover fabric, and soon we will pull this material off and trellis the peas and they're going to grow as you normally grow peas up on a garden trellis.

The other way to use row cover fabric is to use **bows or hoops to support the fabric**. And under here we have chard that has been transplanted. And there are advantages to using the bows in that it keeps the fabric up off of the plant so that when the plants get a little bit bigger, nice big leafy chard or big heads of broccoli, that it's not going to be weighted down on the plants at all. We also use this system for peppers, tomatoes, zucchini, and cucumbers, all of which we transplant underneath row cover fabric and keep it covered for the first four to six weeks of growth. The plants will grow very quickly because it is four to seven degrees warmer underneath the fabric so it's an ideal situation for plants to grow readily. And then once the plant starts to flower, we remove the row cover fabric, and trellis them if they need to be trellised, and they will grow normally from there.

The other main advantage to using row cover fabric in this way is that when the fabric is weighted down all around, the plants growing underneath are protected. For example, leaf miner is a major pest of chard, and without using the row cover fabric, I couldn't grow high quality, marketable chard because the unprotected chard would contain major blemishes.

Another technique in season extension, is using an **unheated greenhouse**, called a **cold frame, or high tunnel**. The idea with these, it's not a traditional greenhouse, there's no mechanical heating or cooling, but two things can happen. One is, we use it to house our transplants for periods of time before they go into the field. And soon enough, we will pull all the flats out of here and expose the beds, so you can plant in the ground in cold frames, and high tunnels like this. And that again is going to provide you with a degree of frost protection and a whole lot warmer temperatures. With cold frames like this, you can also plant very late into the season. For example (in the USDA plant hardiness zone 8 region) you can seed arugula in November, and even December, and get it germinated and growing. And before too long, it will be too warm to grow arugula through the course of the warm season in a tunnel like this, but it really allows for some winter growing, that in Oregon, would not be possible otherwise.

Lastly with season extension, there are devices called **cloches**, which are used to help increase the temperature around individual plants. So for example, this is called a **wall-o-water**, and it's a plastic set of sleeves that's filled with water. It sits rigidly once it's filled with water, and that water is going to absorb the sun's energy. Water has a high thermal mass, it's going to radiate that energy out over time, and keep the temperature up inside so that the tomato that we transplanted is going to be able to get a really strong start. It's also going to cut the wind and create really an ideal situation for this individual tomato plant to grow. These are called "**hot caps**" and it similarly is a device that's used to cover an individual plant. It's a plastic one here, it's got a vent on the top, and you'll want to keep it vented. And basically, you're going to put it around an individual plant, and then cover the rim around with soil so that it doesn't blow away, and keep it ventilated. You can see that water is already starting to condensate inside because it's nice and warm.

With the dome that is covering your plants, you're going to want to keep that on until the plants start to fill it in, and touch the surface on the top of it. With the wall-o-water, you can leave that on for the whole time, or you can leave it on until the plants get well established—until they're starting to peek above the top of it. Then you can take those off, and the plants should resume normal growth.

With reference to all the season extension, there's **four things you want to keep in mind**. One is temperature inside. Vegetable plants like it warm, but they don't like it too warm. So you want to provide ventilation as much as possible. Air movement is going to be another really important factor. Vegetables, when the air is really still, they don't grow strong stems. So particularly in a greenhouse scenario, you're going to want to open the door so that the wind gets in there. Humidity is another thing. I would keep it as dry as possible because you want to minimize the potential for disease. Keeping it ventilated is going to be a great step towards doing that. And lastly, soil temperature is another thing that you're going to want to monitor. And here is the great advantage of growing in protected situations, the soil temperature is going to be just a little bit warmer. That's going to favor rapid growth of the vegetables, and it's also going to favor the rapid growth of weeds and slugs as well, so you're going to want to be very careful of those things.