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Instructor Guide

Lesson Title/Topic: Season Extension

Length: 2 hours

Description:

This class will introduce strategies that farmers can use to extend the growing season. Specifically this class will introduce low tunnels and various coverings that can be used at different times of year for season extension. In this lesson, farmers will learn about transplant production, various options for plant coverings, and extreme weather adaptation techniques.

Participants will be able to...

- Explain 1 to 2 new season extension techniques.
- Explain the benefits of using season extension techniques.
- Identify crops and relevant season extension practices for early spring, mid summer, and late fall.

Materials/Resources:

Vocabulary:

Greenhouse: Covered and protected growing space with electricity; usually with tables, and additional ventilation and fans. These permanent installations require construction permits, electricity, and gas for heat.

High Tunnel: Covered and protected growing space, usually in ground, some with tables; usually without electricity. No available heaters. Cooling is by vents and fans.

Low Tunnel: A long row of consecutive **Hoops**. Easily built, for temporary installation over crops needing protection or season extension. Smallest and lightest option and easy to change by the season. No electricity.

Course Content

I. Warm-Up

Begin the lesson with a review of what farmers already know in order to gauge the knowledge base present in the audience. Adjust focus of presentation to accommodate less familiar areas of competence.

Ask: What months out of the year do you currently grow the most food?

What are challenges to trying to grow food in early spring and late fall?

What are challenges to trying to grow some crops in the hottest part of the summer?

II. Vocabulary Instruction

1. Show each vocabulary word with a picture, saying each word out loud. Give further explanations as needed.
2. Go through the words again and ask students to repeat the word after you.
3. Show students just the pictures of the vocab words and ask them to say the word.

III. Main Content

1. Slide 1/2: Why Season Extension?

- a. Explain the three primary benefits to farmers who do season extension include:
- b. The earlier you start growing, the more of a headstart on potential competitors. Same for growing later in the year, or growing cooler weather crops in the middle of summer: finding ways to fill customer demand as the supply coming from competitors dwindles.
- c. This means you can also set your prices.
- d. Customers come to know and appreciate the farmers who are able to provide food in parts of the year when other farmers are not able. It is that much more time to get to know customers, recruiting new ones and retaining old ones.
- e. The farmer can also get ahead of pest pressure by planting and harvesting certain crops strategically before a month when pest eggs hatch, or after they've all died off.

2. Slide 3: What is Season Extension?

- a. Season extension is when farmers are able to extend their growing for certain crops into seasons they wouldn't typically grow by utilizing special strategies and techniques,
- b. These include techniques that allow you to grow tomatoes and peppers in October, November or even December, like High Tunnels, Low Tunnels, and greenhouses.
- c. They also include things like irrigation and shade cloth which can help you grow cool weather crops like lettuce when it's very hot.

3. Slide 4: Review Objectives of the class.

- a. Review objectives on the slide.

4. Slide 5/6: Average Planting and Harvest Dates for Common Crops

- a. Review the K-State Average Expected Planting Calendar and Average Harvest Calendars. Explain the darker shades are weeks and months are usually expected to be planted or harvested. Explain the lighter shades represent weeks and months into which the crops can be planted or harvested with season extension techniques.
- b. Ask learners to identify a crop they are currently growing or have grown in the past, and figure out where it lands on the calendar.

- c. On Slide 6 review the concept of “Cold Hardy”, and the impact on tender crops, semi-hardy crops, and hardy crops.
 - d. Ask learners to name some crops for each category that aren’t listed on the slide.
- 5. Slide 7: Make a Plan**
- a. Explain to learners that the first step for successful season extension is to keep good records of planting and harvest dates, as well as months when certain pests seem to be present to identify their life cycle.
 - b. With this information the farmer will be able to identify what conditions will be needed to grow a crop longer in the season.
- 6. Slide 8/9: Hoops**
- a. Hoops can be used for many different purposes in season extension.
 - b. Many different hoops are available, but it depends on how wide your beds are, and how many beds you need the hoops to cover.
 - c. Farmers also need to know what they will be growing. For example, will your plants be tall and therefore need higher hoops?
 - d. Will secure row cover or shade cloth by using weights along the edges and paracord over the top of the hoops. Demonstration on Slide 9
- 7. Slide 10: What covering do I use?**
- a. Low tunnel hoops can be covered with:
 - i. Shade cloth
 - ii. Insect netting
 - iii. Row cover
 - iv. Clear plastic
 - v. More than 1 covering.
- 8. Slide 11: Irrigation**
- a. Using tunnels of any size or shape will require a plan for irrigation because:
 - i. Plants will need water as they grow.
 - ii. Irrigation is important for germination
 - iii. It keeps from a dry crust forming atop the soil, keeping the soil soft.
 - iv. Water can help moderate temperature and allow cool weather crops to cope with extreme heat.
- 9. Slides 12-13: Pest/Weed Management**
- a. Pest/ Weed Management can help with pest/ weed management, by allowing crops to grow at times of the year when these plants and insects are not as much of a problem.
 - b. It is still important to practice pest and weed management.
 - i. Review suggestions on these slides, and ask if there are other ways that the learners have managed pests and weeds in the past.
- 10. Slides 14-21: Common crops that can be grown in each month and suggestions for success.**
- a. Review each month’s slide and ask learners other ways they grow in these months that may not have been on the slide.
- 11. Slide 22: High Tunnel Example**
- a. Explain that a high tunnel is warmer than using row cover, but not as warm as a heated greenhouse.
 - b. Crops are grown in the ground, whereas in a greenhouse plants are grown in pots or on tables.

- c. This picture is from Redfearn Farm in Independence, MO. They use a high tunnel to extend kale harvest later in the year, and for new lettuce plantings later in the year.

12. Slide 23: Ventilation

- a. Review the importance of ventilation and different methods for venting high tunnels

13. Slide 24: Venting low tunnels.

- a. Talk about how high tunnels and low tunnels are ventilated differently, asking the learners what they see in the picture that is being used to vent the low tunnel.

14. Slide 25: Practice Scenario

- a. Ask learners to come up with solutions for each scenario listed on the slide.

IV. Wrap-up/Self-assessment

1. Ask three learners to name 1 benefit of season extension each
2. Ask three learners to name 1 common season extension technique, each.
3. Ask three learners to name 1 crop that could benefit from season extension strategies.

V. Additional Materials/Resources for Students

Assessment Rubric

	Not at all (0)	Basic (1) (demonstrates some knowledge)	Proficient (2) (successfully demonstrates the complete knowledge)
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Measurable skill			
Measurable skill			
Measurable skill			



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CULTIVATE KC

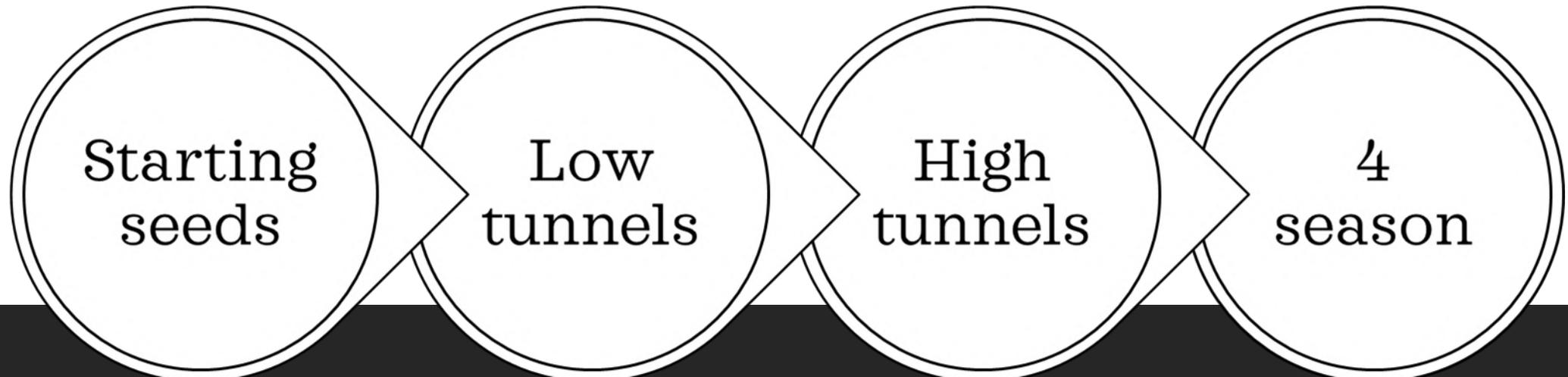


National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

Season Extension WHY?

Why do farmers want to learn season extension? How does Season Extension help farmers?

1. early to market, less competition with other farmers
2. 1st to sell crops can set a higher price
3. customer excitement, and retention



Season Extension



objectives

Farmers will be able to...

- 1. Describe how to store row cover when not in use.**
- 2. Describe 2 ways to prevent row cover blowing away in the wind.**
- 3. Name 3 different coverings that farmers use with tunnels.**
- 4. Name a reason why season extension is valuable.**



Grow More Food In More Months

No Season Extension:

- o 5 months
- o Less money \$\$\$

Season Extension

- o 9 months
- o More Money\$\$\$\$\$\$

Can extend both cool season and warm season



Make a PLAN
Remember your RECORDKEEPING

Starting seeds

Low tunnels

High tunnels

4 season

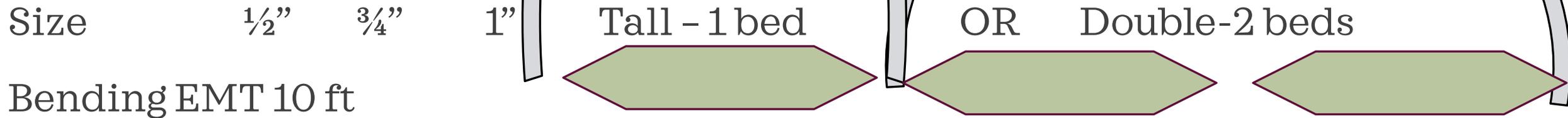


Hardiness- “Cold Hardy” plants grow in winter

Tender Crops	Semi-hardy Crops	Hardy Crops
Damaged by First Frost	Can Stand Light Frost	Can Stand Several Frosts, but Should Be Used Before Low 20°F Temperatures
Beans Cucumbers Summer squash	Beets Chinese cabbage Collards Irish potatoes Bibb lettuce Mustard Radishes Spinach Swiss chard Leaf lettuce	Cabbage Broccoli Cauliflower Brussels sprouts Carrots Turnips Kale



HOOPS



Accommodate full grown plants

BEND and/or SET UP HOOPS.

Need to know what covering you will use.

Need to use weights and paracord to hold in place.

INSTALL-



What covering do I use?

Low tunnel hoops can be covered with...

1. Shade cloth
2. Insect netting
3. Row cover
4. Clear plastic
5. more than 1 covering



Irrigation

Plants will need water as they grow .

Make plan to use drip irrigation or overhead.

Very important to help with germination.

Keeps soil soft

Mulch keeps soil wet

Water can be used to cool overall temp to assist with season extension (photo next slide)



January

4 season growing spinach and carrots. Seeds started in September, harvest anytime from undercover

Challenges: low light makes slow growth

ripping fabric, blowing in wind

Snow insulates!

Early start for spring Direct Seed Crops: earliest February and March plantings of bok choi, lettuce, radish, carrot, turnip,

BUCKETS? Cloches?

Outdoor early seed starting for cool tolerant transplants: specifically leeks and onion.



February- March

Early start for spring Direct Seed Crops:
earliest February and March plantings of
bok choi, lettuce, radish, carrot, turnip,

Outdoor early seed starting for cool
tolerant transplants: specifically leeks and
onion.



April

Early start for summer transplants

USE plastic for maximum heat saving,

Use row cover for protection on cold nights.

Cucumber

Tomato

Eggplant

Squash





Weed management

- Keeping your garden clean helps to prevent pests.
- Helps to be able to spot pests early.
- Prevent weeds from developing seeds.

Pest management

1. Anticipate the pests and have a plan before they arrive.
2. Remove old diseased/ pest materials when rotating crops
3. Plant varieties that resistant to diseases/pests
4. Use proper spacing, watering, and fertilizing
5. Weeding and pruning
6. If spraying , follow instructions on the label.

May- June- July

Early start for summer transplants

Use row cover to protect from late frosts.

Use row cover for protection from insects.

Use shade cloth to protect from sun damage.

Use insect netting.



July

1. Protect from bugs and birds using insect netting or thin row cover
2. Protect from heat using shade cloth
3. Use mulches to cool soil



Add
water
for more
cooling

August

Plant cool season transplants

Use irrigation for cooling.

Protect and extend warm season
using row covers

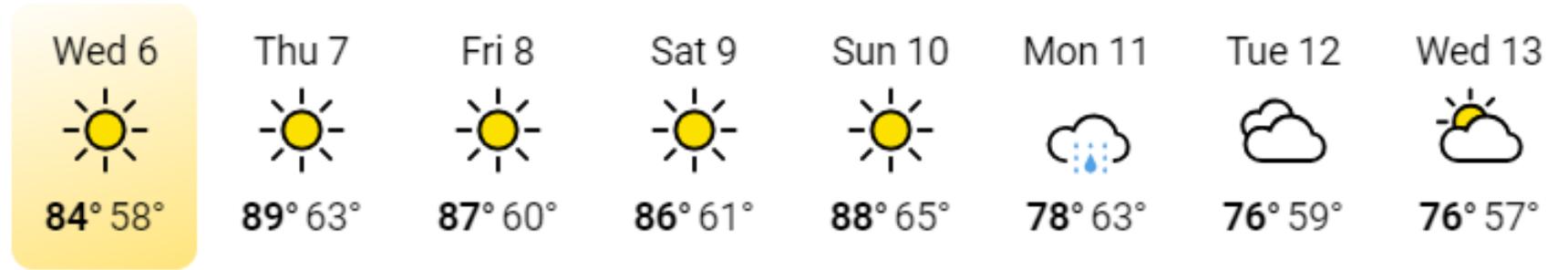
ADD fertilizer

Remove weeds

Manage pests



September



- Protect warm season plants from cool temperatures!
- Cold nights in 40s - 50s
 - Protect with row cover
 - Protect with greenhouse plastic for best heat saving
 - Weigh down with cloches/ buckets
 - Continue seeding for winter harvest



October/November

Extending cool season through Winter

Protect cool season plants from first frost!

Cold nights in 20s – 30s F

-- Use leaf mulch or straw

--Protect with row cover

--Protect with greenhouse plastic for best heat saving



High Tunnel

Example:

Redfearn Farms, Independence, MO

- New lettuce planting for late harvest.
- Kale extended harvest.

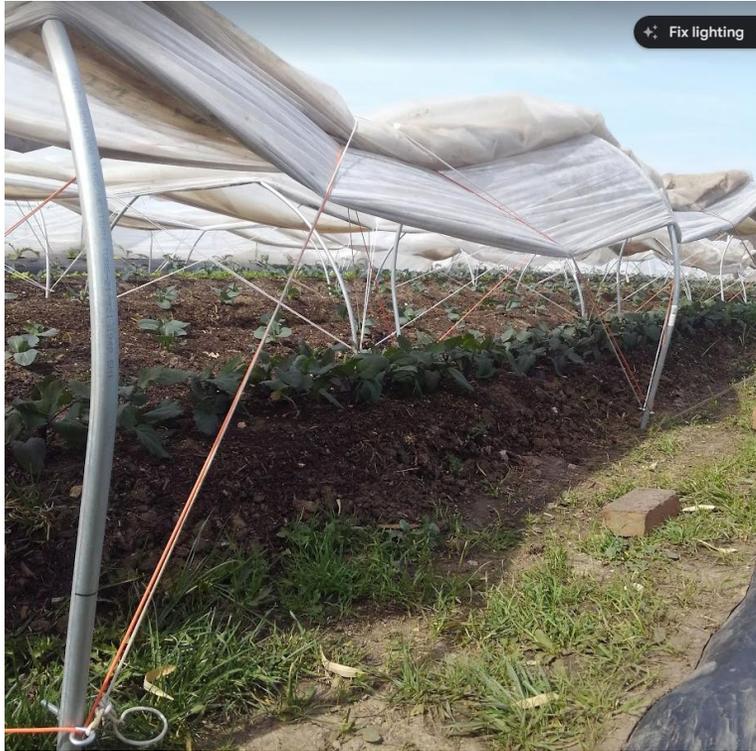


Ventilation

Plastic tunnel works too good in the sun. AND gets too hot !

FARMER must OPEN doors, sides, or vents and make more AIR FLOW





Open for warm weather



Closed for cold

LOW TUNNEL VENTILATION

Early and Late Season Challenges at Juniper Gardens Training Farm

- NO water before last frost.... DRY farming or use watering cans.
- Extreme weather
- Planning for season extension will make it easier.

