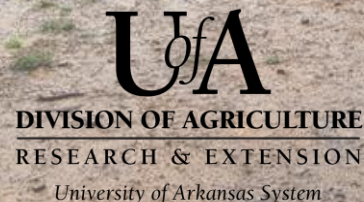


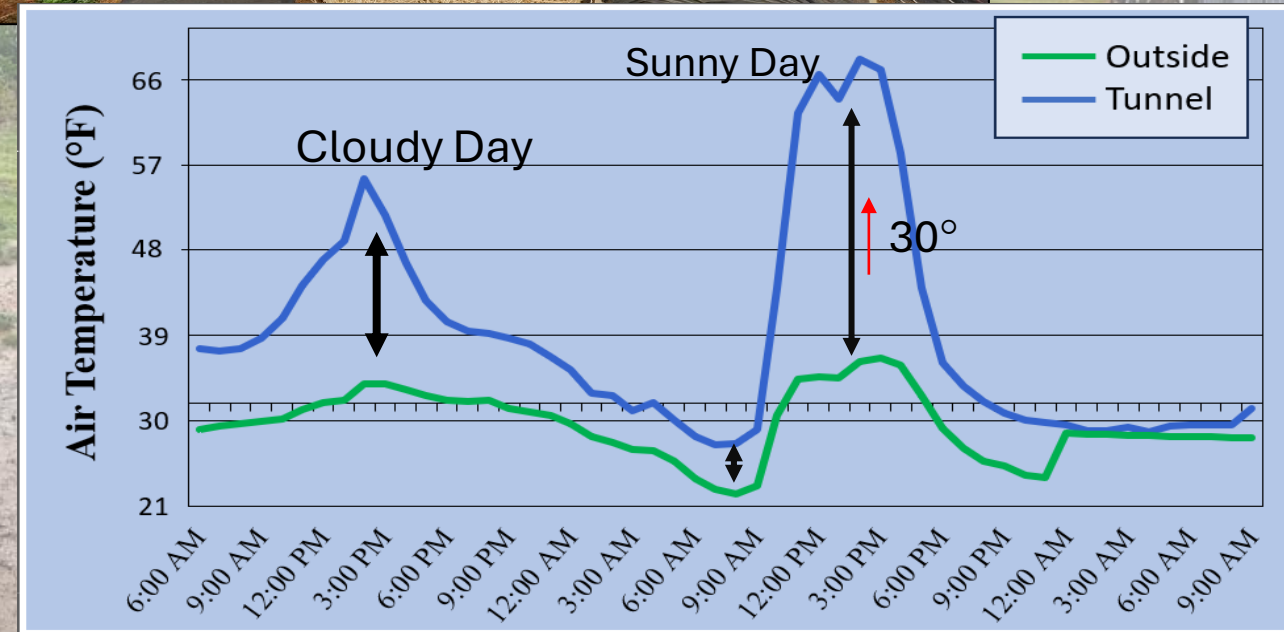
Introduction to High Tunnel Production

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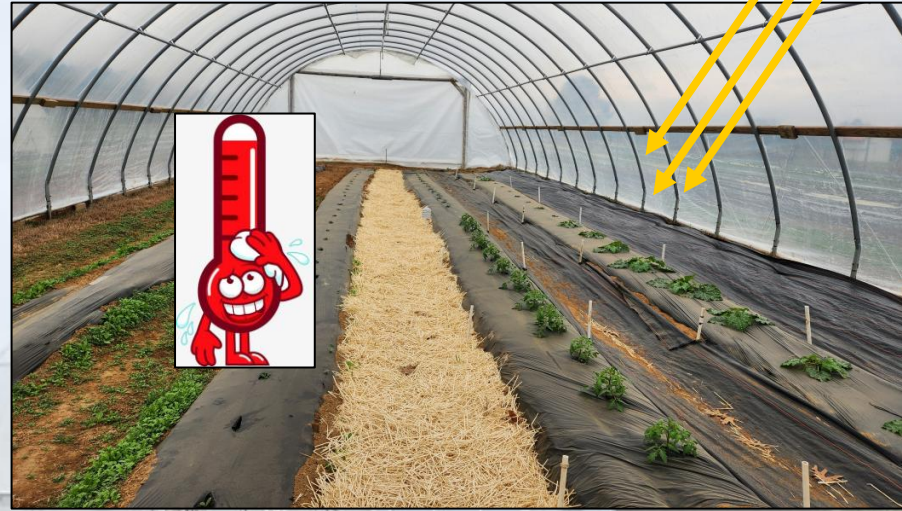
Quick Introduction to High Tunnels:

- Plastic covered structures that use solar radiation and wind to raise and lower their internal temperature.



Quick Introduction to High Tunnels:

- Plastic covered structures that use solar radiation and wind to raise and lower their internal temperature.
- No additional lighting
- Plants are grown directly in the existing soil



Benefits of High Tunnels:

- Protection from damaging weather events
 - High wind
 - Hail
 - Frost
 - Rain
- Reduce disease pressure
- Reduce the number of fungicide sprays



Benefits of High Tunnels: Disease Pressure

Splashing water:
rainfall or overhead irrigation



Anthracnose



Drip Irrigation



Benefits of High Tunnels: Disease Pressure

Splashing water:
rainfall or overhead irrigation

Extended periods of high humidity, leaf wetness and wind



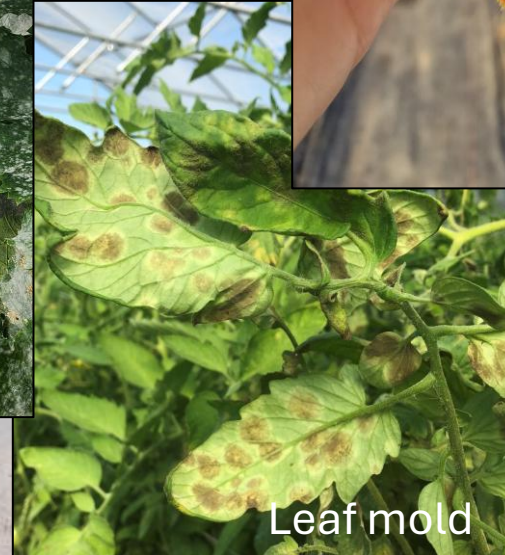
Anthraxnose



Powdery mildew



Botrytis grey mold



Leaf mold

Benefits of High Tunnels:

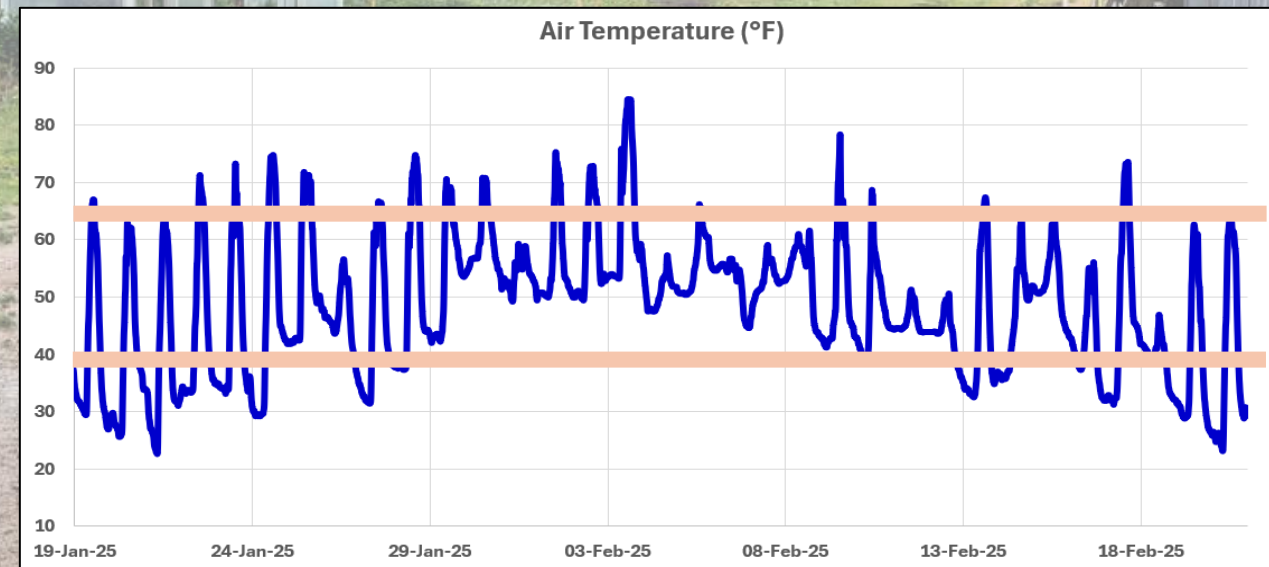
- Protection from damaging weather events
 - High wind
 - Hail
 - Frost
 - Rain
 - Reduce disease pressure
 - Reduce the number of fungicide sprays
 - Increased quality, yields, and shelf life
 - Season Extension!
 - Plant earlier in the spring
 - Earlier harvests
 - Get to the market first
 - Extend harvest into the fall and winter
 - Staying longer at markets
 - Extend farm revenue periods
 - Year-round production
 - Strengthens grower/customer relationship by maintaining contact year-round
- Good IPM Practices



Limitations to High Tunnel Production:

Cost

- Structure and season-specific “add-ons”
 - Structure: \$3 - \$10 per square foot
 - Secondary covers:
 - 1 oz row cover (10 ft by 500 ft): \$250 - \$350
 - Heaters – varies
 - Shade cloth - \$500 – \$1,000
- Labor - need for additional labor
 - Climate management – manual
 - Extended seasons = year-round labor
 - Pest and disease management



Limitations to High Tunnel Pro

Pest Pressure

- A high tunnel will not exclude pests
- Increase in pest pressure
- Populations can explode quickly



Site Selection and Preparation

“Location, Location, Location”

Begin Evaluating Sites Early

- Soil Conditions
- Drainage
- Sunlight
- Wind
- Know your neighbors
- Orientation
- Weed pressure
- Access to utilities
- Zoning Regulations

Herbicide Drift Damage



Flooding

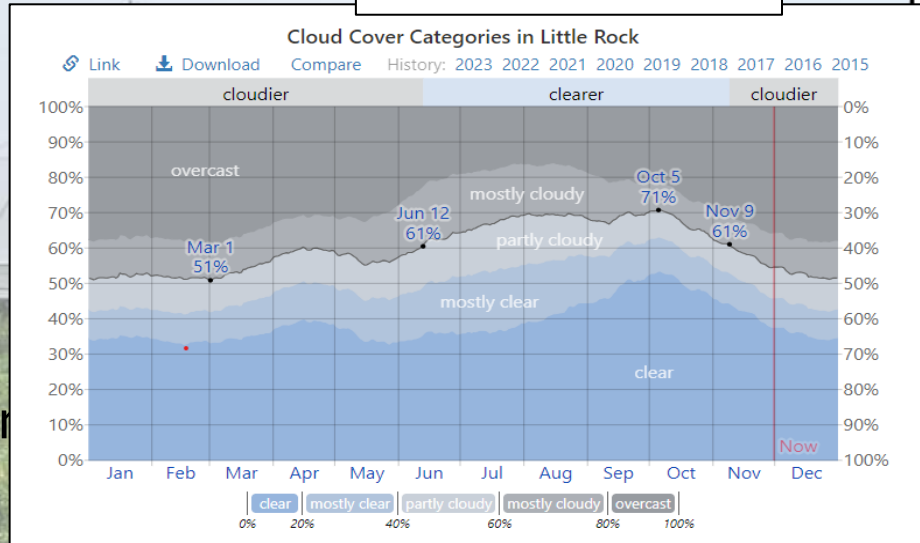


“Location, Location, Location”

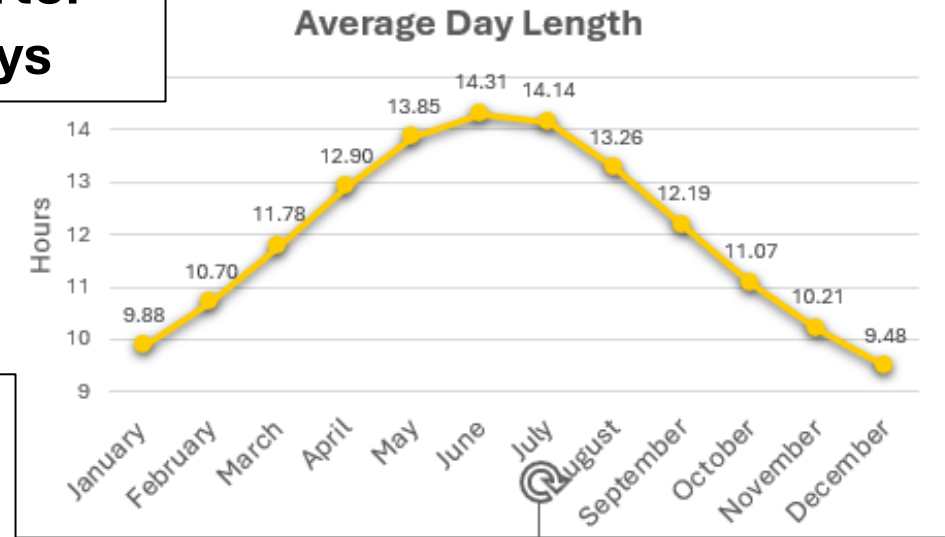
Begin Evaluating Sites Early

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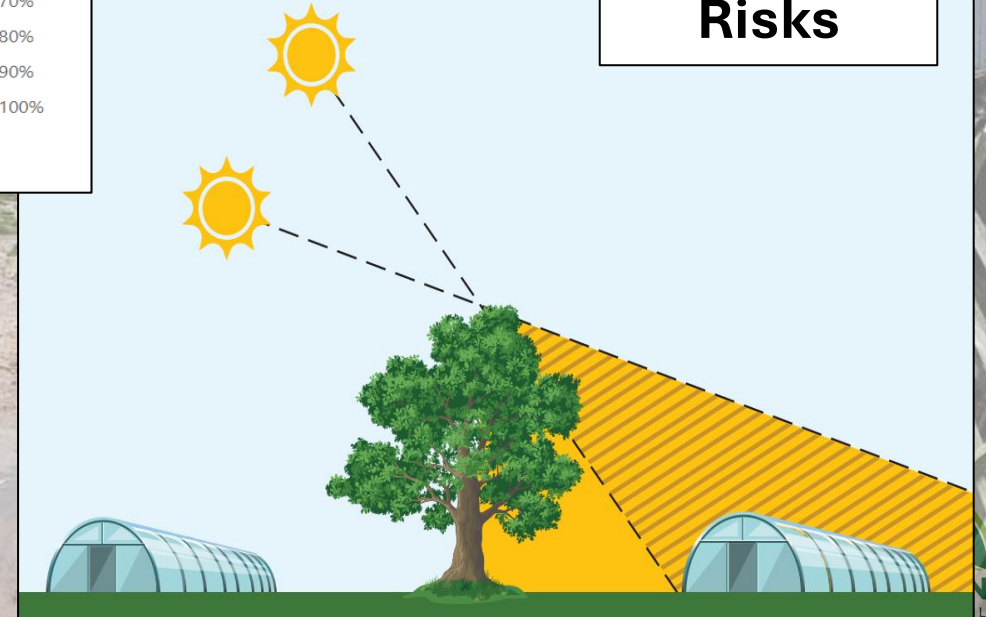
More
Overcast Days



Shorter
Days



Shading
Risks



Crop Selection and Planting Dates

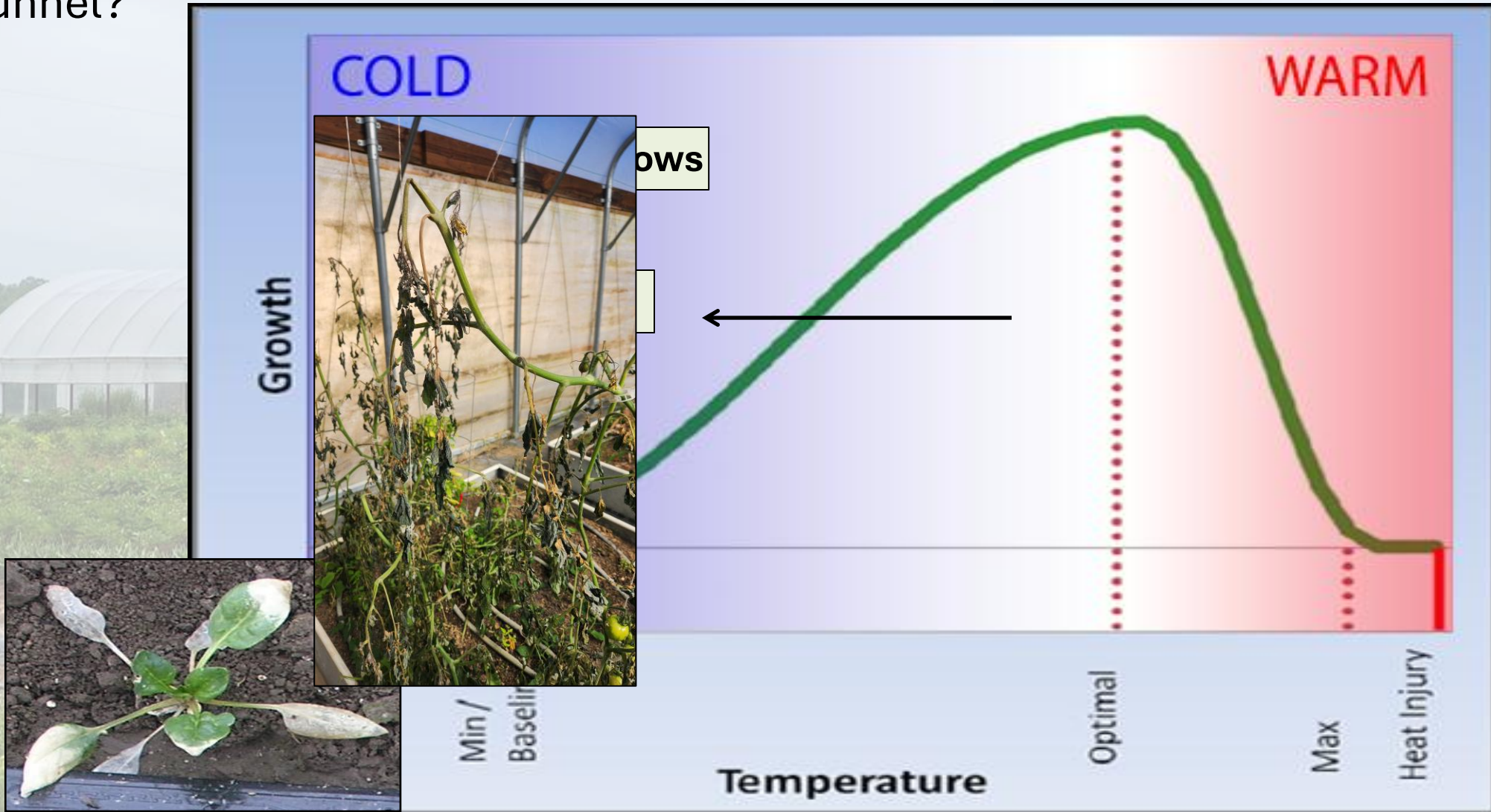
What to plant:

- Are you growing for a market?
 - No - any common fruit or vegetable can be grown in a tunnel
 - Market - vegetables are the most common and most profitable
 - Tomatoes \$\$\$
 - Lettuces and other winter-grown greens
Kale, arugula, Swiss chard, spinach, etc.
 - Peppers
 - Cucumbers
 - Eggplant
 - Cut flowers
- What crops will your tunnel accommodate?
- Production method?
 - Organic
 - Conventional
 - Pesticide-free



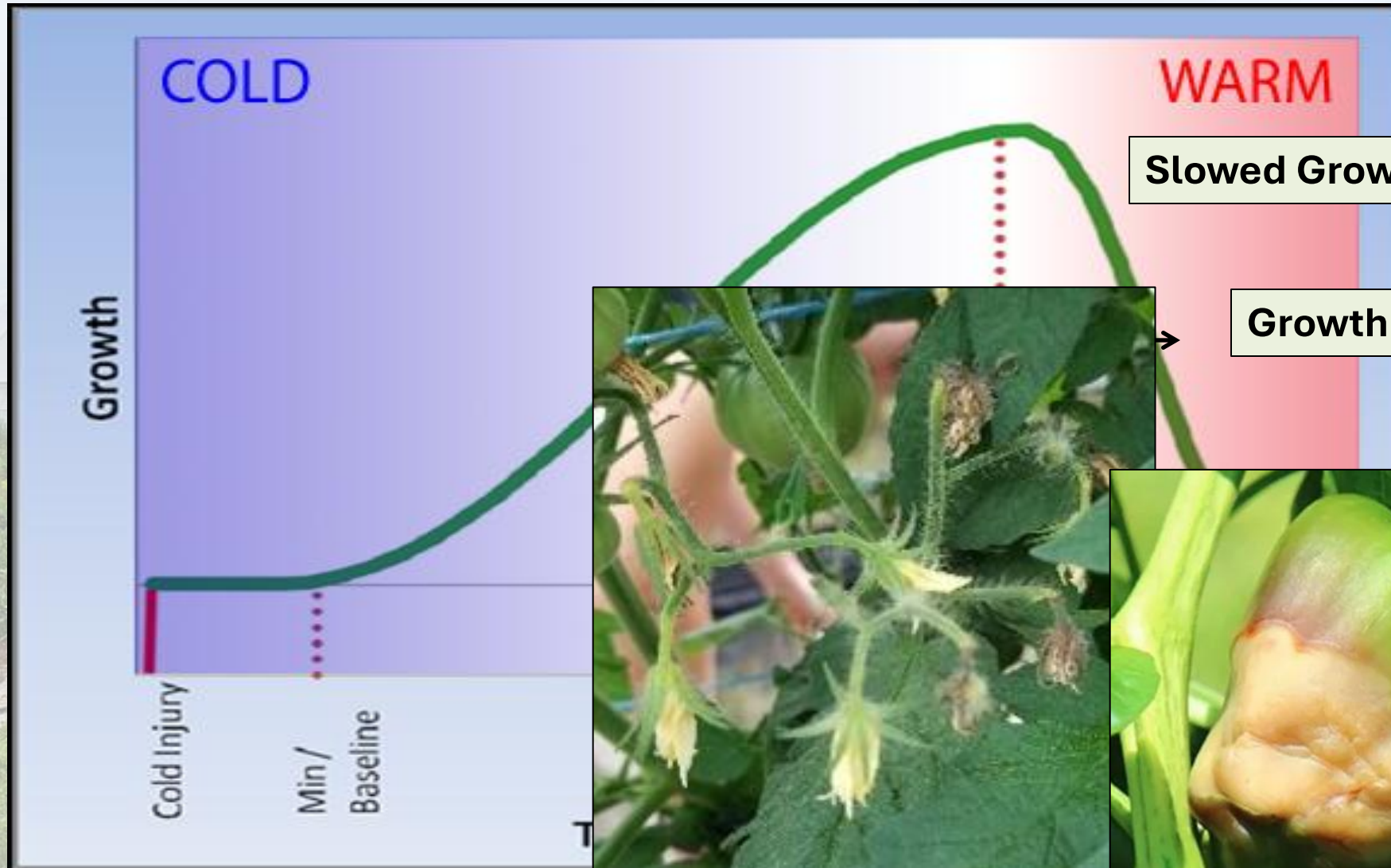
When to plant:

- What temperature can you maintain in your tunnel?



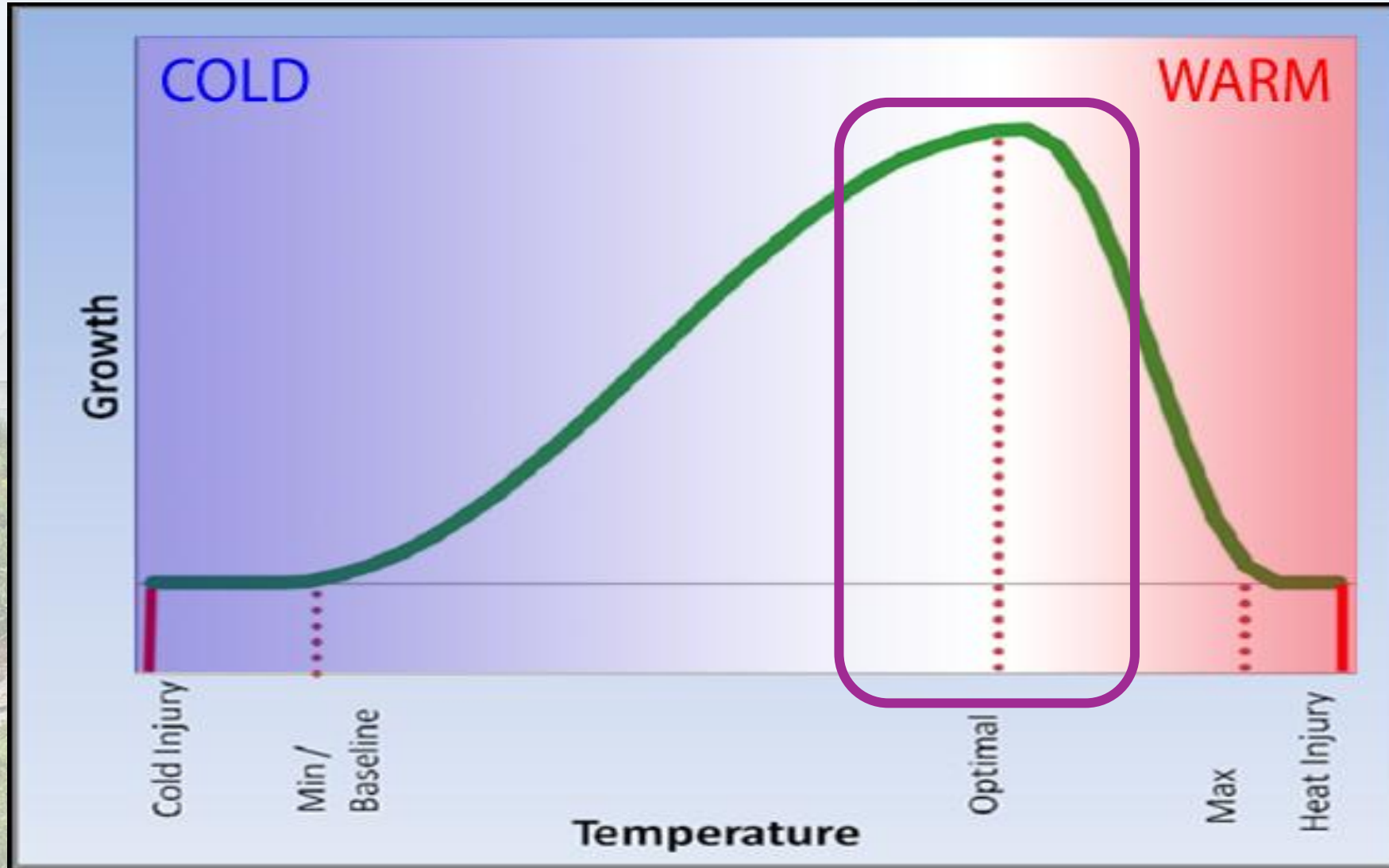
When to plant:

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When to plant:

- What temperature can you maintain in your tunnel?



When to plant:

- What temperature can you maintain in your tunnel?

Cool Season Crops			Warm Season Crops		
Base Temperature	Optimum Temperature	Maximum Temperature	Base Temperature	Optimum Temperature	Maximum Temperature
35-40°F	70-75°F	75-80°F	50°F	75-80°F	90°F

ACCLIMATION

When to plant:

- What temperature can you maintain in your tunnel?

SPRING: Jump-starting warm-season crops

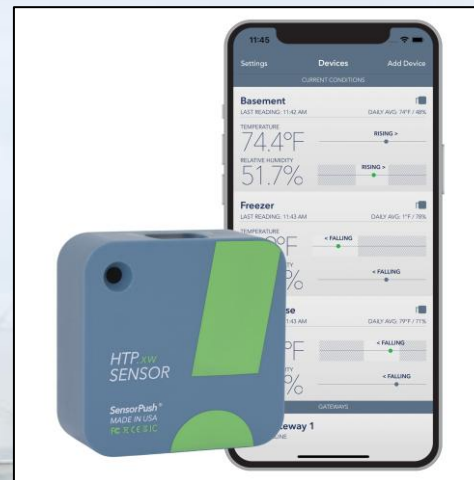
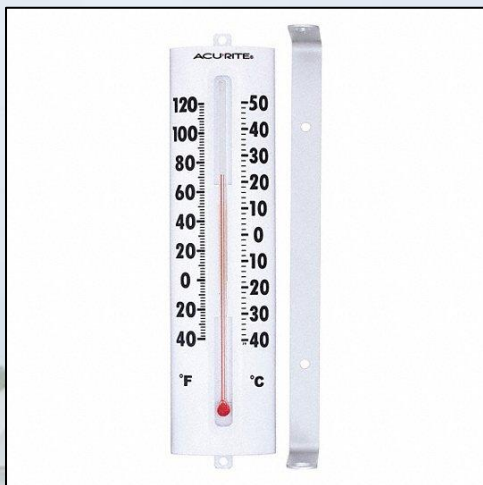
- Hardier warm-season crops (tomatoes, peppers)
 - transplant 4-6 weeks before the avg. frost-free day
 - Earlier plantings will require additional frost protection
- Tender warm-season crops (cucumber, summer squash)
 - transplant 2 -3 weeks later
 - additional frost protection will be needed

FALL: extend warm-season crops or transition to cool-season

- Cool-season crops:
 - Full heads/plants: Plant early to reach full maturity before light/temperatures drop.
 - Leaves/small plants: later plantings possible – stagger plantings for continuous harvest.
- When is your market?
- What is your neighbor growing?

City	Avg. last frost date
Benton	April 5
Bentonville	April 24
Cabot	April 15
Conway	April 13
El Dorado	April 5
Fayetteville	April 27
Fort Smith	April 8
Hot Springs	April 2
Jonesboro	April 12
Little Rock	April 3
Marianna	April 3
Paragould	April 5
Pine Bluff	March 29
Russellville	April 10
Searcy	April 7
Texarkana	March 29
West Memphis	March 29

Climate Management:



Standard Daily Climate Management Tools

Climate Management Practices

Winter:

1. Prevent or protect from damaging cold temperatures
2. Avoid excessively high temperatures (70-75°F)



Spring and Fall:

1. Limit high temperatures
2. Protect plants from excessively cold temperatures
 1. Warm crops: 45 – 50°F
 2. Cool crops: 35 – 40°F



Climate Management Practices: Winter, spring and fall

Extra Protection

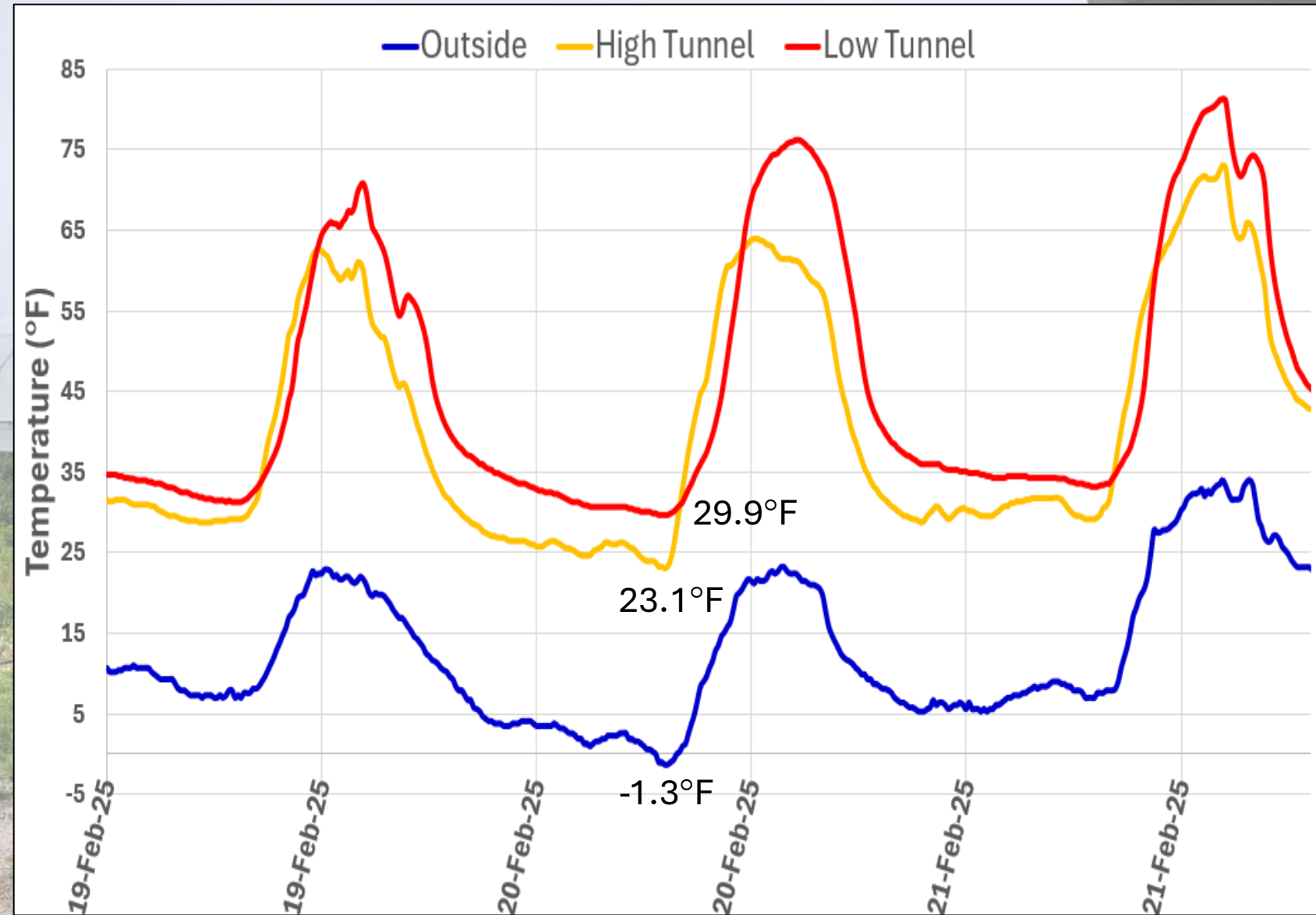
- Secondary covers
 - Night: additional 2 – 5° temperature protection
- Additional heating
 - Exhaust ventilation
 - Monitor humidity



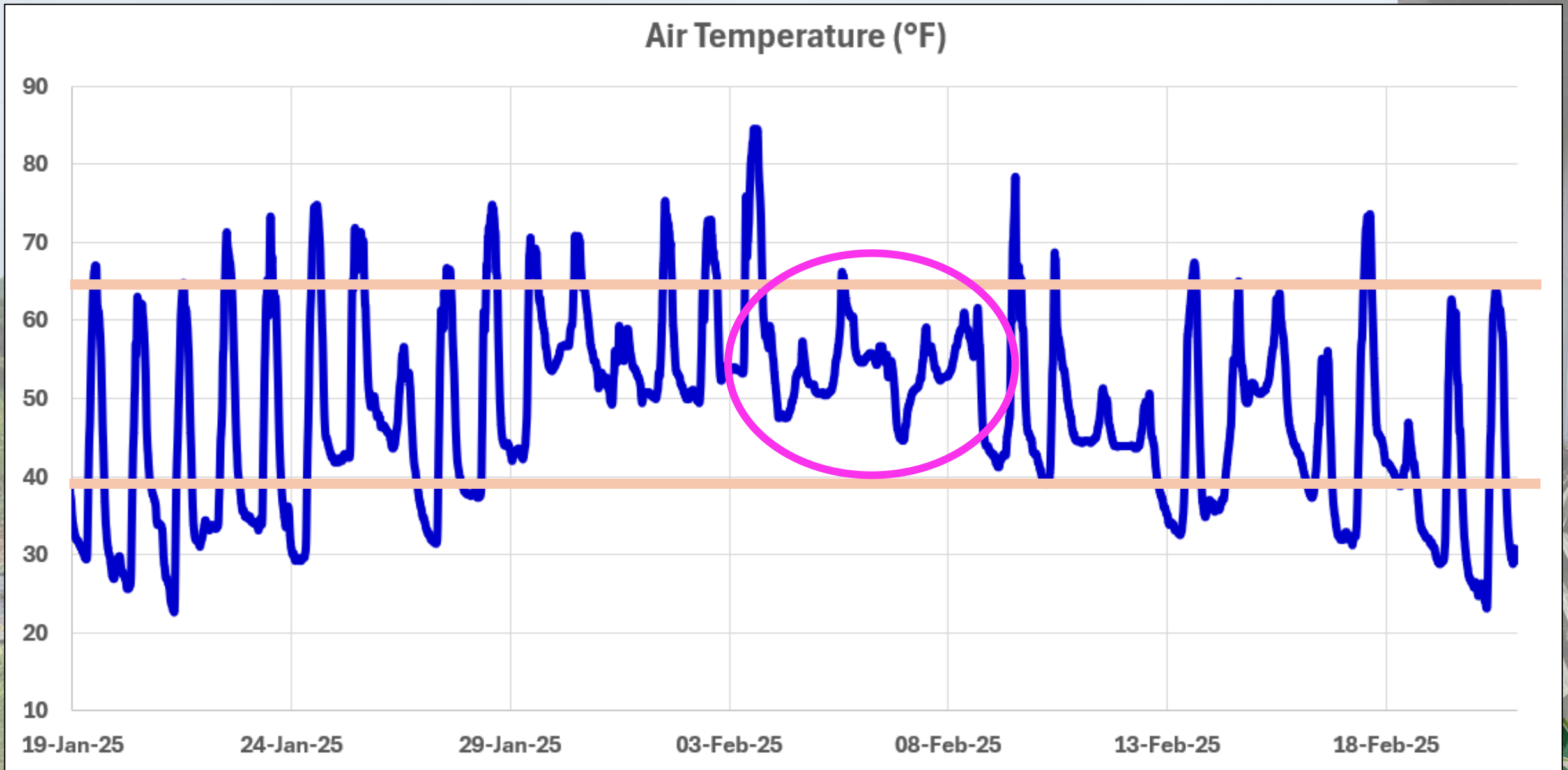
Climate Management Practices: Winter, spring and fall

Extra Protection

- Secondary covers
 - Night: additional 2 – 5° temperature protection
- Additional heating
 - Exhaust ventilation
 - Monitor humidity



Climate Management Practices: Winter, spring and fall



Climate Management Practices: Summer

Summer Climate Goals:

1. Prevent excessively high temperatures

- Shade cloth is essential!
 - Varying degrees of shade: 10-80%
 - Apply when day temperatures are consistently 80-85°F
 - Remove in the fall
- Adequate ventilation
- Gable vents and fans





HIGH TUNNEL PRODUCTION GUIDE

FOR ARKANSAS AND THE SOUTHEAST



uaex.uada.edu/publications/pdf/MP586.pdf

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U.S. DEPARTMENT OF AGRICULTURE

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workshops and
demonstrations**



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