

*Johnny's
Educational
Webinar
Series*

Beat the Heat

Lettuce and Specialty Greens
for Southern Growers



July 15, 2021





Johnny's mission is helping families, friends, and communities to feed one another by providing superior seeds, tools, information, and service.

Meet Your Johnny's Rep



Blake Thaxton

Growing in the Southeast can be a big challenge, and it takes constant vigilance to stay ahead. Let me be another person to run ideas by, for your farm, greenhouse, or market garden.

- **Alabama**
- **Florida**
- **Georgia**
- **N. Carolina**
- **S. Carolina**
- **Certified Crop Advisor**
- **Variety Selection**
- **Protected Agriculture**
- **IPM**

Meet Your Johnny's Rep



Wesley Palmer

A farm is more than just land and crops, it's a family's heritage and future. I am honored to be able to help you cultivate your business and sow seeds of success for future generations to harvest.

- **Arkansas**
- **Iowa**
- **Kansas**
- **Louisiana**
- **Mississippi**
- **Missouri**
- **Nebraska**
- **North Dakota**
- **Northern California**
- **Oklahoma**
- **Southern Oregon**
- **South Dakota**
- **Wyoming**
- **Island Territories**
- **Tools Demos**
- **Variety Selection**
- **IPM**
- **Crop Planning**

Meet Your Johnny's Rep



Charlotte McGee

I'm here to provide region-specific, year-round support with the information, service and products you need.

- **Arizona**
- **Ohio**
- **Nevada**
- **New Mexico**
- **Tennessee**
- **Texas**
- **Utah**
- **Crop Planning**
- **Variety Selection**
- **Trend Awareness**
- **Regional Expertise**

Agenda

- The Johnny's Trial Farm
- Solutions for Heat-Related Issues
 - Common Problems
 - Production Systems
 - Tools and Supplies
- Variety Selection for the Heat
 - Environmental Preferences
 - Heat-Adapted Types
 - Proven Performers
 - Specialty Greens
- Trial Report: University of Georgia
- Acknowledgements and Resources

The Johnny's Trial Farm

We introduce new varieties every year to offer our customers. Everything we sell has been rigorously trialed at the Johnny's Research Farm — and in many cases at farms around the country or globe — before we make the decision to add it to our product line.

Meet Product Technician Daniel Yoder as he shows you around the Johnny's Trial Farm in Albion, Maine.



Solutions for Heat-Related Issues



Common Problems



Production Systems



Tools and Supplies

Common Heat-Related Problems



- Low Germination
- Bolting
- Tip Burn
- Cercospora Leaf Spot
- Fusarium Wilt
- Heat-loving Pests

Low Germination

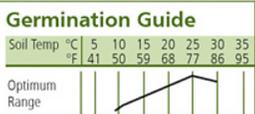


QUICK FACTS

Germination Guide

Soil Temp °C	5	10	15	20	25	30	35
°F	41	50	59	68	77	86	95

Optimum Range

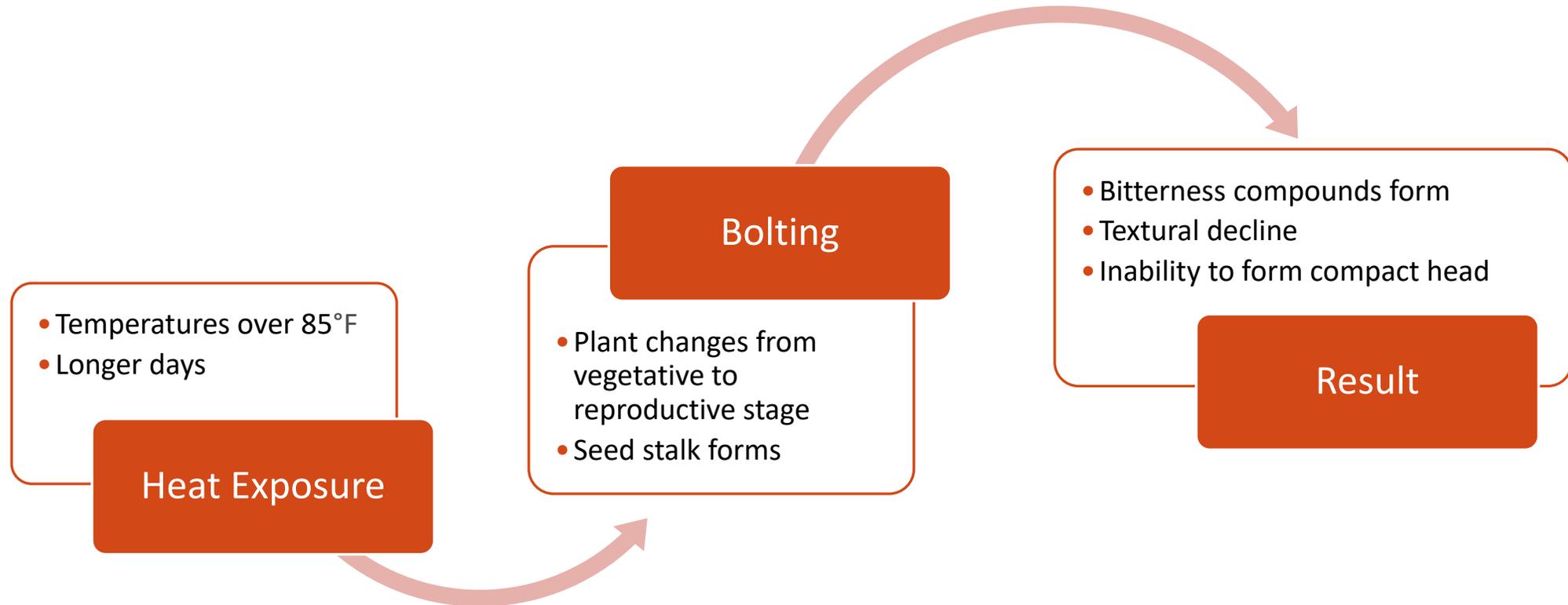


LATIN NAME
Brassica rapa var. chinensis

DAYS TO MATURITY
21 baby; 42 full size 

- Check the soil temperature range for optimum germination for each crop.
- For example, lettuce germinates best below 70°F, while Tokyo Bekana will germinate at temperatures up to 85°F.
- Keep soil cool prior to planting by using mulch, shade, or hydrocooling.
- Maintain consistently moist soil throughout germination period. Keep in mind soil will dry out faster under hotter, drier, and/or windier conditions.

Bolting



Reference: Hochmuth., R. et al. 2017. Yield, market quality, and bitterness of lettuce cultivars grown hydroponically in a north Florida greenhouse during the summer. *Proc. Fla. State Hort. Soc.*, 130, 44-99. <https://journals.flvc.org/fshs/article/view/114243/109556>

Bolting

Bolting Lettuce



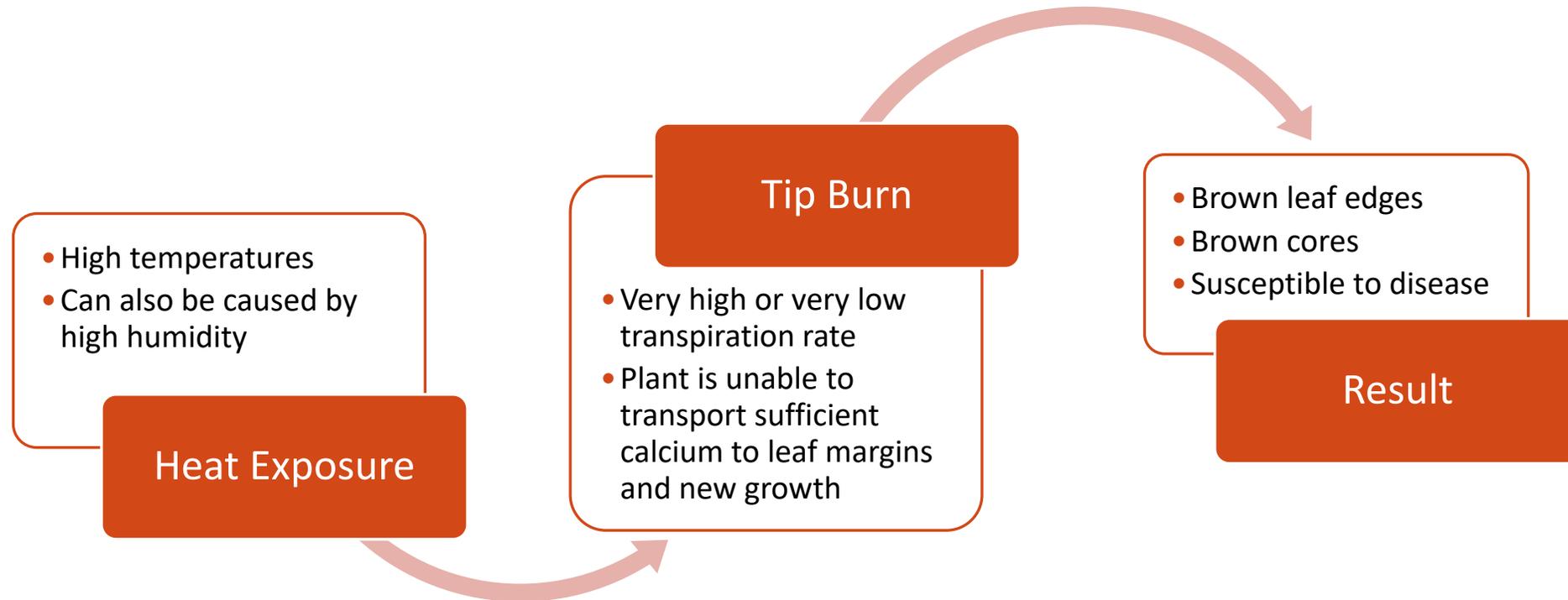
Photo Credit: [Tim Coolong](#), UGA Extension.

Solutions for Bolting



- Choose bolt-resistant varieties.
- Reduce air temp by planting under shade cloth or taller companion crop.
- Harvest at first sign of bolting.
- Post-harvest cooling may reduce bitterness of bolted lettuce.

Tip Burn



Reference: Hochmuth, R., *et al.* 2017. Yield, market quality, and bitterness of lettuce cultivars grown hydroponically in a north Florida greenhouse during the summer. *Proc. F. State Hort. Soc.*, 130, 94-99. <https://journals.flvc.org/fshs/article/view/114243/109556>

Tip Burn

Tip-Burned Lettuce



Photo Credit: Paul Gallione, Johnny's Selected Seeds

Solutions for Tip Burn



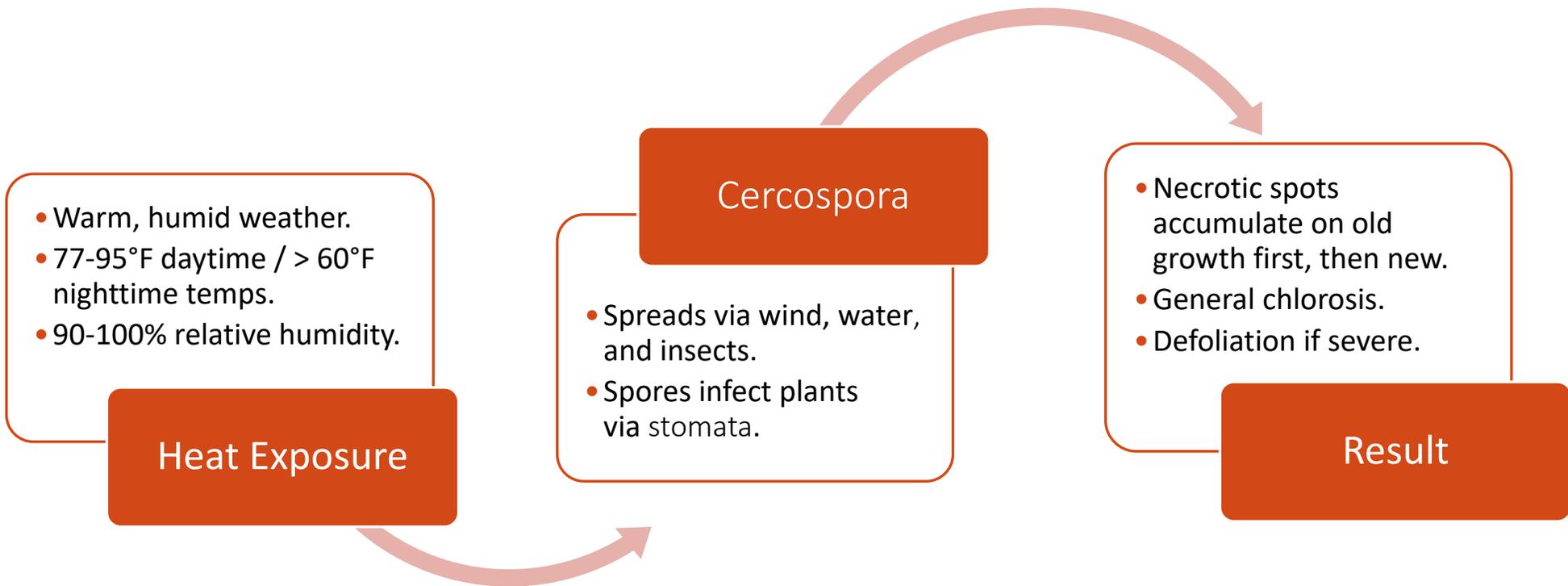
Solve for Calcium Availability:

- Check calcium availability and amend soil if necessary.
- Most North American soil is not calcium-deficient in general.
- Balance your soil's pH, cation exchange capacity (CEC), and sodium content to improve calcium availability. This may require gypsum or lime application.

Solve for Calcium Mobility:

- Maintain consistent soil moisture.
- Increase airflow in protected culture by using vents and fans.
- Choose tip burn-resistant varieties.

Cercospora Leaf Spot



Thomas, A. & Saravanakumar, D. 2019. Effect of host extract on growth and sporulation of *Cercospora lactucae-sativae*. *Australasian Plant Dis. Notes*, 14, 19. <https://link.springer.com/article/10.1007/s13314-019-0353-6>

Cercospora Leaf Spot

Cercospora Leaf Spot on Lettuce



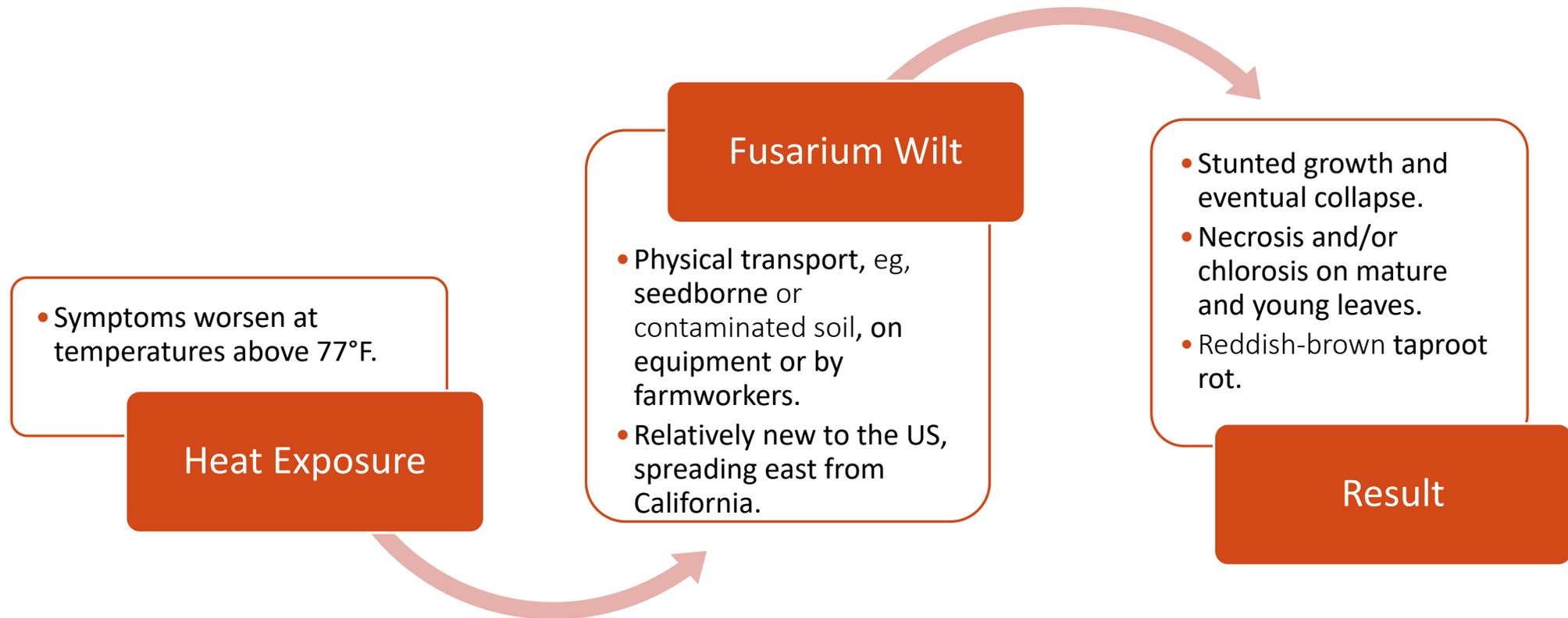
Photo Credit: Thomas, A. & Saravanakumar, D. 2019. Effect of host extract on growth and sporulation of *Cercospora lactucae-sativae*. *Australasian Plant Dis. Notes*, 14, 19. <https://link.springer.com/article/10.1007/s13314-019-0353-6>

Solutions for Cercospora Leaf Spot



- Avoid working in wet fields.
- Use drip instead of overhead irrigation.
- Practice crop rotation.
- Remove crop debris from infected fields.
- Use good cultivation practices to keep fields weed-free.
- Use vents and fans to maintain air circulation in protected culture.
- Landscape fabric can help prevent spread of spores.

Fusarium Wilt



Reference: Gordon, T., & Koike, S. 2015. Management of fusarium wilt of lettuce. *Crop Protection*, 73, 45-49. <https://doi.org/10.1016/j.cropro.2015.01.011>

Fusarium Wilt

Fusarium Wilt



Photo Credit: Scott, J., *et al.* 2012. Crop rotation and genetic resistance reduce risk of damage from Fusarium wilt in lettuce. *Calif Agr.* 66 (1), 20-24. <https://doi.org/10.3733/ca.v066n01p20>

Solutions for Fusarium Wilt



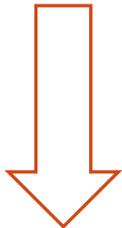
- Choose genetically-resistant varieties.
- Lolla Rossa and Romaine types are most resistant.
- Practice crop rotation.
- Sanitize equipment properly.

Reference: Gordon, T., & Koike, S. 2015. Management of fusarium wilt of lettuce. *Crop Protection*, 73, 45-49. <https://doi.org/10.1016/j.cropro.2015.01.011>

Heat-Loving Pests



Aphids



Row Cover



Thrips



Surround® WP

ProtekNet



Flea Beetles



Row Cover

Surround® WP



Spider Mites



PyGanic®

Grower Insights

Challenges & Solutions



Production Systems

- Growing Under Cover
- Shade Structures
- Irrigation Systems
- Landscape Fabric
- Companion Planting
- Post-Harvest Cooling





Growing Under Cover

- Better environmental control
- Easily covered with shade cloth
- Cooling systems can be installed – vents, fans, evaporative cooling

Green House

High Tunnel

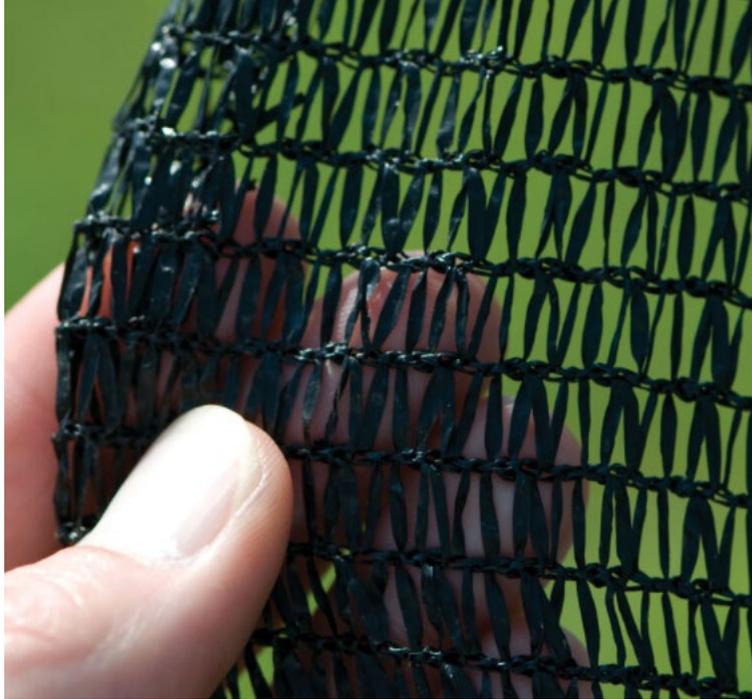
Hoop House

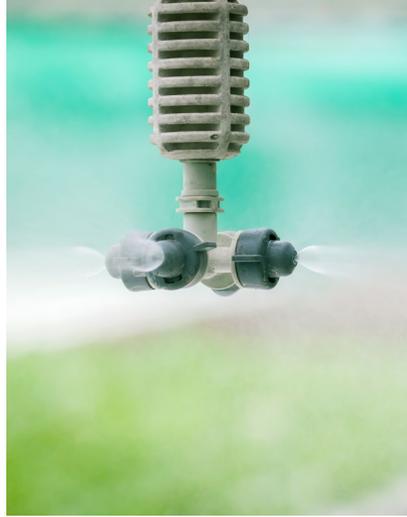
Caterpillar Tunnel/
Poly Tunnel

Low Tunnel

Shade Structures

- Knitted 30% and 50% shade cloth.
- Made from 100% UV-stabilized black polyethylene, naturally rot- and mildew-proof.
- Shade cloth can reduce ambient temperatures around crops up to 10° F.





Irrigation

- Drip
- Overhead
- Misting Sprinkler

*Pre-soak beds before transplanting



Ground Cover and Mulch

- Landscape Fabric
- Hay Mulch*

* Caution: Can introduce weed seed.



Companion Planting

- Saves space
 - Keeps soil covered, cool, and moist
 - Reduces weed pressure
 - Increases biodiversity and soil health
- * Brassicas are NOT a good companion to lettuce, but do work well with spinach, as pictured.

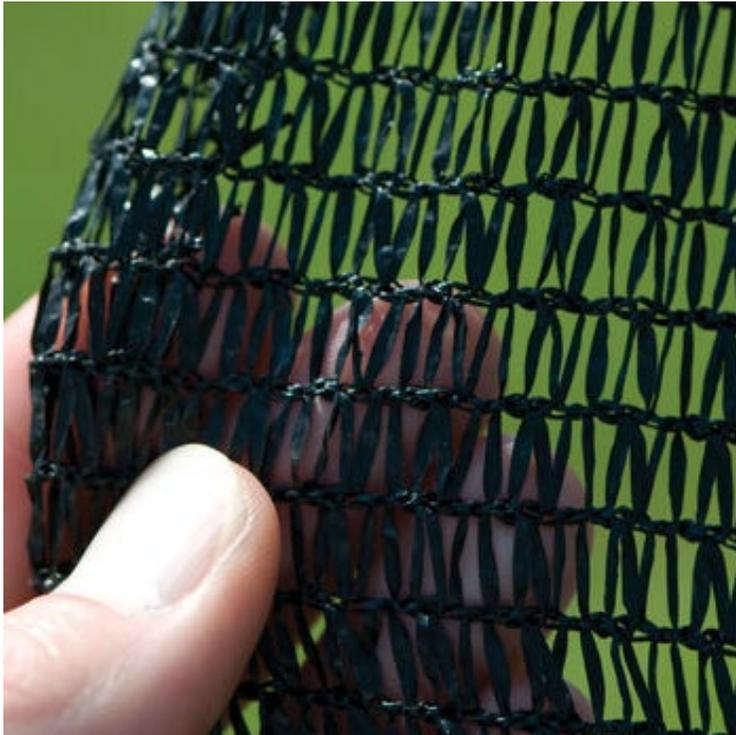


Post-Harvest Cooling

- Room cooling
- Forced-air cooling
- *Hydrocooling* — best option for greens
- Top or liquid icing



Johnny's Tools and Supplies



Shade Cloth



Drip Irrigation



High Tunnel Vents

Johnny's Tools and Supplies



CoolBot® Pro



SaniDate & OxiDate®



Ground Cover

Grower Insights

Tools & Techniques



Variety Selection



Environmental Preferences



Well-Adapted Types



Proven Performers



Specialty Greens

Environmental Preferences



- Lettuce prefers cool-season conditions.
- Optimal Germination Temperature: 70°–75°F
- Optimal Growing Temperature: 60°–70°F
- At temperatures above 70°F, lettuce can bolt (begin to flower and produce seed).
- Lettuce can withstand freezing temperatures if properly hardened off.
- Continuous exposure to freezing temperature can damage or kill lettuce.
- Specialty greens are more adaptive than lettuce to other environmental conditions.

Reference: North Carolina State Extension. <https://content.ces.ncsu.edu/lettuce>

Heat Adaptation by Type



Leaf and Butterhead



Romaine



Crisphead

Grower Insights

Varietal Favorites



Johnny's Heat-Tolerant Selections



Muir



Magenta



Cherokee

Johnny's Heat-Tolerant Selections



Monte Carlo



Coastal Star



Salvius

Johnny's Heat-Tolerant Selections



Salanova® – Green Batavia



Salanova® – Red Oakleaf



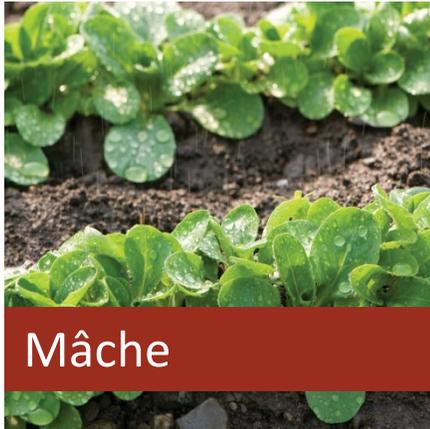
Salanova® – Green Butter

Specialty Greens



- Can be more heat- and cold-tolerant than lettuces.
- Types that form a bigger frame as full-size plants typically do better in the heat.
- Wide variety of flavors, colors, textures, and culinary applications.
- Many are known by farmers as a common weed.
- Diverse species and varieties can be marketed as Specialty, Alternative, or Asian Greens.

Specialty Greens



Mâche



Watercress



Purslane



Amaranth



Claytonia



Green Sorrel



Arugula



Red Orach

Specialty Greens and their Origins



Orach

- Spinach-like flavor.
- Native to Europe and Siberia.



Mâche

- Also known as vit, field lettuce or corn salad.
- Native to France



Sorrel

- Bright, lemon flavor.
- Native to Europe.



Purslane

- Crisp, mild flavor.
- Native to India and Persia.



Amaranth

- Also known as Callaloo.
- Native to South and Central America.

Asian Greens



Mustard



Tokyo Bekana



Mizuna



Tatsoi



Komatsuna



Pac Choi



Malabar Spinach



Noble Jade

Johnny's Salad Mixes



- **Premium Greens Mix** – Dynamic range of leaf shapes, colors and textures
- **Ovation Greens Mix** – Organic mix

Trial Report: University of Georgia



Spring/Summer Lettuce Trial

University of Georgia Trial Report



- Dr. Tim Coolong
- Spring/Summer 2019
- Heat-Tolerant Organic Lettuces
- High Tunnel and Field

University of Georgia Trial Report



- Seeds were sown in cell trays on April 21.
- Transplanted June 6 in a field plot and high tunnel plot.
- High tunnel treatment included 30% shade cloth (old and dirty plastic contributed to >50%).
- Harvested July 12-15.
- Field plot performed so poorly that data were not recorded. Bolting was less pronounced in the field, but that may have been due to the plants never growing to any size.

University of Georgia Trial Report



- “Day-time high air temperatures typically were above 90°F for the last 3 weeks of the study.”
- “ ‘Dragoon’, ‘Green Forest’, ‘Sparx’, and ‘Fusion’ seemed to perform well for mini-romaine and romaine types, respectively.”
- The Summer Crisps (Magenta, Cherokee, Nevada, and Muir) all yielded over 100 lbs/100 ft, with nearly no bolting.
- Green Sweet Crisps and Green Butter Salanova also yielded over 100 lbs/100 ft. Very little bolting was found in all the Salanova varieties outside of Red Incised, which had 25% bolting.

Q&A Session



Blake Thaxton
Territory Rep



Charlotte McGee
Territory Rep



Wes Palmer
Territory Rep



Rachel Katz
Product Tech



Daniel Yoder
Product Tech

Acknowledgments

Bad Goat Greens

badgoatgreens.com

Hearts of Harvest Farm

heartsofharvestfarm.com

Heifer Ranch USA

www.heifer.org/usa

Rose Creek Farms

rosecreekfarmstore.com

UGA Extension

extension.uga.edu

Heifer Ranch USA
Perry County, AR

Rose Creek Farms
Selmer, TN

Hearts of Harvest Farm
Arnoldsville, GA

Bad Goat Greens
Wetumpka, AL

Dr. Tim Coolong
University of Georgia

Resources

- **Variety Selection for the Heat**

Heat-Tolerant Lettuce Varieties

https://www.johnnyseeds.com/vegetables/lettuce/?prefn1=prod_feature_addtl&prefv1=40

Heat-Tolerant Specialty Greens

https://www.johnnyseeds.com/vegetables/greens/?prefn1=prod_feature_addtl&prefv1=40

Marketing Specialty Greens

<https://www.johnnyseeds.com/growers-library/vegetables/greens-for-all-growers-3-tiered-marketing-approach.html>

- **Solutions for Heat-Related Issues**

Reduce Tip Burn by Improving Calcium Availability

https://www.spectrumanalytic.com/support/library/ff/Ca_Basics.htm

Post-Harvest Handling to Mitigate Heat Damage

<https://www.johnnyseeds.com/growers-library/vegetables/post-harvest-handling-summer-fresh-market-vegetables.html>

Browse Shade Cloth

<https://www.johnnyseeds.com/tools-supplies/row-covers-and-accessories/shade-cloth/>

Browse High Tunnel Supplies

<https://www.johnnyseeds.com/tools-supplies/greenhouse-and-tunnel-supplies/>

NC State Extension

<https://content.ces.ncsu.edu/design-of-room-cooling-facilities-structural-energy-requirements>