

**Growing Bell Peppers Under
Shade, Specialty Lettuce
Trials and More**

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Florida Hydroponics

- Overview
- Pepper Trials
- Shade Systems
- Lettuce Varieties





Crops for Hydroponics – Not Just Tomatoes Anymore!





Hydroponics- A Hands-on Approach to Learning for Farmers and Gardeners





Background- Florida Peppers

- Historically 20,000 acres field grown in Florida
- Available October – July
- July – September
 - High temperatures
 - High humidity
 - Frequent rainfall
 - Pest pressure high
- Colored pepper very difficult to grow outdoors in Florida
- Field **and** greenhouse production Jul-Sept very difficult





Summer Pepper Production??

- Large field acreage not
- competitive in mid summer
- However, small farmers and direct marketing...??
- Small farmers
 - Direct market
 - Demand for local products
 - Seek to extend season for
 - local markets





Florida Farmers Increasing Adoption of Season Extension Practices

- Transplants
- Row covers
- Plastic mulches
- Low tunnels
- High tunnels
- Greenhouses
- How about open shade structures??





Suwannee Valley AEC Pepper Trials- Materials & Methods

- 40 x 40 ft shade structure
- 10 ft high
- 50% polypropylene shade cloth
- 3 gallon plastic pots
- Composted pine bark media
- Heritage 'VR' pepper plants (TSWV resistant)
- Standard hydroponic nutrient solution
- Support system – fence posts and bamboo poles with string to standard trellis



Original Double Row System





Peppers Under Shade- Mid June





Complication of Trellis System





Single Row System, New Trellis, Two Leaders- 2013





Shade Pepper Crop in November (8 Months)





Harvest Results

- Harvests June 16 – November 9, 2006
- Total Marketable = 4,139 boxes/A
 - Fancy = 3,460 boxes/A
 - US No 1 = 477 boxes/A
 - US No 2 = 202 boxes/A





Fruit Size

Harvest Dates	Average Fruit Width (in)^z
16 Jun	3.67
23 Jun	3.63
10 Jul	3.54
27 Jul	3.47
18 Aug	3.00
12 Sep	3.13
13 Oct	3.35
9 Nov	3.30

^z Average fruit width was determined by measuring 15 randomly selected fruits from the US Fancy category. Measurements were taken across the base of the fruit near the stem end, the widest part of the fruit.



Conclusion

- **Open shade culture can serve to extend pepper production into the summer in Florida**
- **High quality fruit June-November**
- **Fruit size decreases in late summer, may not meet standards for wholesale markets**
- **Plasticulture techniques make it possible**
 - Shade cloth
 - Ground cover
 - Growing pots
 - Irrigation system
 - Polypropylene twine
 - Industry network



High Interest in Simple Hydroponics Under Shade





Measure light levels under shade materials





The Original Hydroponic Peppers in a Shade House- 2004





Collard Greens Under Shade



Specialty Leafy Greens





Some Interest in Open Field Shade Production





Mixed Crop, Direct Market, Under Shade





Mixed Crops Under Shade for Direct Markets and Restaurants





Vertical Culture (VertiGro) Under Shade





The “Terri Poppins” Shade Systems





Hydroponic Herbs for Direct Sale in Tunnels and Under Shade





Specialty eggplants in summer



**Balm, Hillsborough Co. (2009-11)
Color peppers-pine bark**



Balm, Hillsborough Co. (2009-11) Tomato-pine bark

Production system	Marketable yield
	t/ha
Tunnels	100
Open field	40







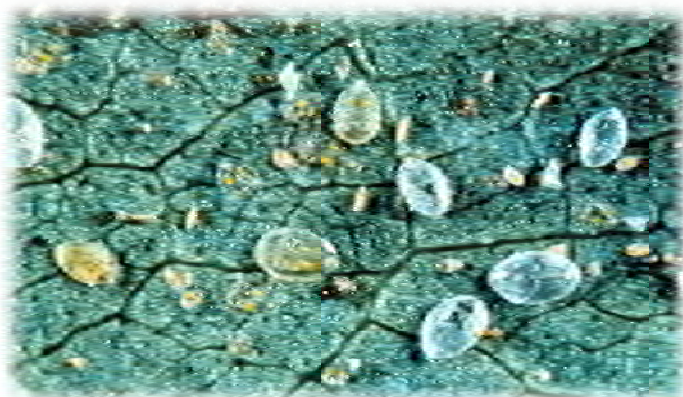
Not So Fast- Tomatoes a Different Story- Hot Set, YLCV



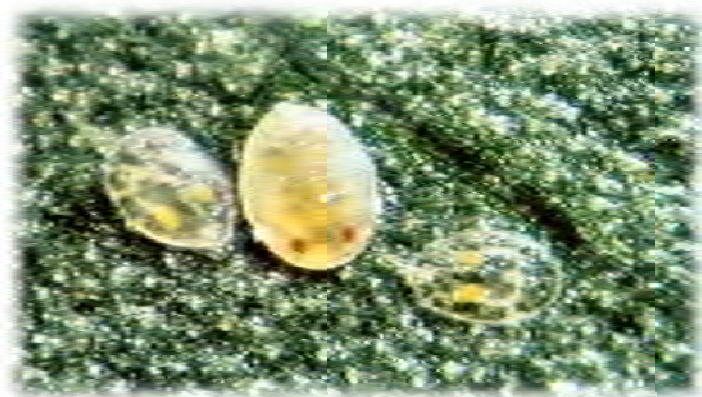


Silverleaf Whitefly (SLWF)

- Virus Transmission
- Tomato Chlorosis Virus (1990s)
- Tomato Yellow Leaf Curl Virus (2000)
- Tomato Irregular Ripening



Silverleaf whitefly life stages



Red "eye spots" to identify silverleaf whitefly



Yellow Leaf Curl Virus- SLWF





Nutrient Film Technique Hydroponic Lettuce Trials





Background

- **Increased interest in locally produced vegetables for direct marketing**
- **Lettuce is a very popular vegetable at local Farmer's Markets**
- **Increased interest in protected culture**
- **Many lettuce cultivars available to growers**
- **Little research information on lettuce cultivar performance in Florida greenhouses**
- **Trial conducted in cooperation with industry partners, Crop King (Lodi, Ohio) and Johnny's Selected Seed (Winslow, Maine)**





Tipburn Rating (0-5)

<u>Lettuce Cultivar</u>	<u>Harvest 1</u>	<u>Harvest 2</u>	<u>Harvest 3</u>
Bambi	0	5.0 a	4.00 a
Focea	0	4.67 a	2.00 b
Flashy Troutback	0	4.67 a	4.33 a
Australe	0	4.17 ab	1.67 b
Red Cash	0	4.00 ab	1.67 b
Adriana	0	4.00 ab	0.00 b
Rhazes	0	3.67 abc	0.00 b
Amaze	0	3.00 bcd	2.00 b
Breen	0	3.00 bcd	0.00 b
Ridgeline	0	2.50 cd	0.67 b
Coastal Star	0	1.67 d	0.00 b
Skyphos	0	0.33 e	0.00 b
Rex	0	0.00 e	0.00 b
Livigna	0	0.00 e	0.33 b
Antago	0	0.00 e	0.00 b
	NS	***	***



Best Overall Performers

-
- **Antago** (Red Lollo)
 - **Livigna** (Green Lollo)
 - **Rex** (Green Butterhead)

 - **Skyphos** (Red Butterhead)
 - **Coastal Star** (Green Romaine)

 - **Ridgeline** (Green Romaine)

 - Note: No Red Romaine cultivars evaluated were acceptable due to tip burn



Salanova Lettuce Trial









Small Farms Academy Hands-On Hydroponics

**December 15-16, 2013
Hobe Sound**

**March 17 & 18, 2014
or
March 21 & 22, 2014
Live Oak**



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<http://smallfarms.ifas.ufl.edu>

Thank You

- For more information visit the Small Farms web at <http://smallfarms.ifas.ufl.edu>
- Take a virtual field day tour by visiting the Virtual Field Day web at <http://vfd.ifas.ufl.edu>

