

Growing Organic Tomatoes in a High Tunnel using an Open-Trough System Filled with Composted Pine Bark

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NFREC- Suwannee Valley New Addition to Protected Ag area



History of UF Protected Ag Surveys

1991- 66 Acres

1996- 58 Acres

2001- 98 Acres

2013- 386 Acres

2018- 506 Acres

2021- ????? Acres

- Mostly tomato, cucumber and lettuce in 1991
- By 2001, increases in crop diversity including colored pepper, herbs, strawberry, etc.
- Production in perlite, rockwool, coconut fiber, composted pine bark, peat mixes and NFT
- 2013- Increase in vegetables, but also start of 100+ acres of blueberry

2021 Protected Ag

Fruits, Vegetables, and Herbs

- Current estimates (phone calls to experts) of edible vegetables and fruit grown under protected ag (greenhouses, high tunnels, shade structures, indoors, insect screens, etc.).

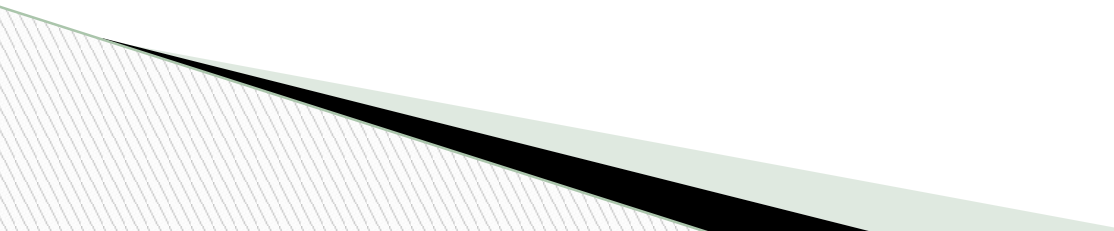
- **500 acres of fruit crops**

- **500 acres of vegetables**

Acreage is going to continue to increase!

Several benefits of a protected ag structure and culture

- Use of technology and materials to provide protection of a crop and/or extend the season

 - Protection from:
 - Temperature Extremes (High and Low)
 - Excessive Sunlight
 - Insects
 - Wildlife Pests
 - Diseases
 - Wind
 - Rainfall
 - Moisture, Dew, etc.
 - Now....Food Safety Advantages
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Definition of a High Tunnel

A high tunnel is generally a quonset-shaped structure covered with greenhouse grade 6-mil plastic and has no permanent heating or ventilation system but does have an irrigation system.

Production inside the high tunnel may be in the native soil or in soilless culture.

Also, likely the same as a hoop house or walk-in tunnel.

High Tunnels in FL Over 300 Acres



Greenhouses- Fan and Pad or Passive Ventilation Estimated 75 Acres



**Shade Covered or
Insect Screened Structures
200 acres +
(vegetables, citrus, fruit
crops)**



Typical Organic High Tunnel Production



Organic Leafy Greens in Tunnels



Organic Production of Leafy and Root Vegetables in High Tunnels



Research at NFREC-SV, Live Oak

- ❑ Organic leafy vegetables easier than fruiting crops
- ❑ Why use composted pine bark in troughs?
- ❑ Readily available renewable resource
- ❑ Good soilless media properties (water holding, aeration, etc.)
- ❑ High organic matter
- ❑ Resists nematodes and other soil-borne pests
- ❑ Simple to initiate



Modified Trough System



**UF/ IFAS Gulf Coast REC, Balm
Color peppers-in-ground troughs
filled with composted pine bark**



Research with Organic Production at NFREC-Suwannee Valley



Set-up. Solarization used in summers, grow organic transplants



**Troughs: 15-inches wide and 12-inches deep.
Lined with nursery cloth and back filled with
composted (aged) local pine bark. 2 rows of drip
tape**



Preplant incorporate soil amendments (ex. lime, sul-po-mag, organic fertilizer)



Crop management = modified Florida stake and weave system as needed



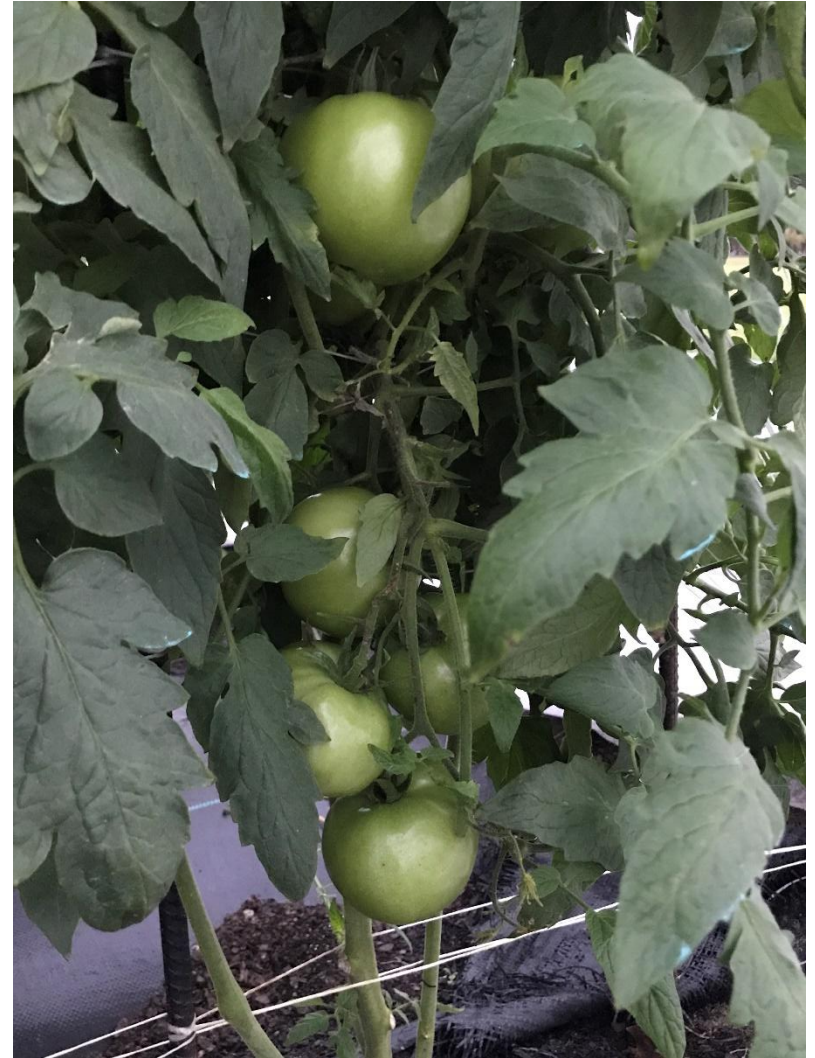
Greatest challenge was fertilizer source, application timing, and fertilizer management



Fertigated options included liquid sources (fish emulsions, solubilized sodium nitrate, etc.)



Mechanical pollination events 3 time weekly



Harvests conducted with any fruit at breaker stage or better



Several cultivars tested over two seasons (spring and fall of 2018)



First Trial Spring crop- 2018

Means are calculated per plot which included seven plants.

Culls largely due to color grades on shoulders. Graded rigidly. Related to late fertilization in early season

Tomatoes were rated and separated for size based on USDA standards: small, medium, large and extra-large. Small fruit was 2 and 4/32-2 and 9/32 inches, Medium fruit was 2 and 8/32-2 and 17/32 inches, Large fruit was 2 and 16/32-2 and 25/32 inches, and Extra-large fruit was greater than 2 and 24/32 inches.

Cultivar	Grade	Wt (lbs.)	Fruit No.
Bella Rosa	Small	0.00 A	0.00 B
BHN 589	Small	0.08 A	0.49 A
Primo Red	Small	0.00 A	0.00 B
Red Morning	Small	0.00 A	0.00 B
Bella Rosa	Medium	1.00 A	3.97 A
BHN 590	Medium	0.94 A	3.97 A
Primo Red	Medium	0.77 A	3.21 A
Red Morning	Medium	1.01 A	3.67 A
Bella Rosa	Large	5.51 A	16.87 AB
BHN 591	Large	6.43 A	20.33 A
Primo Red	Large	4.74 A	14.48 AB
Red Morning	Large	4.73 A	13.59 B
Bella Rosa	Extra Large	34.04 B	64.21 B
BHN 592	Extra Large	42.42 AB	75.58 AB
Primo Red	Extra Large	44.96 AB	80.89 AB
Red Morning	Extra Large	51.59 A	89.90 A
Bella Rosa	Cull	26.48 A	75.21 A
BHN 593	Cull	20.81 AB	58.99 A
Primo Red	Cull	16.49 B	42.45 B
Red Morning	Cull	16.13 B	38.82 B

Fall 2018 crop trial results

Fruit Count (number of fruit per plot)

Cultivar	Culls	Small	Medium	Large	Extra-Large	Total Marketable
BHN 589	19	17	17	38	34	106
Charger	5	15	15	24	59	113
Grand Marshall	11	23	16	35	50	124
Marnero	39	13	9	22	44	88
Rebelski	36	40	18	36	49	143

Fruit Weight (pounds per plot)

Culls	Small	Medium	Large	Extra-Large	Total Marketable
4.52	3.40	4.75	13.85	19.57	41.57
1.40	2.85	4.08	8.11	33.61	48.65
3.35	3.80	3.80	11.95	28.12	47.67
14.04	2.50	2.60	7.70	23.04	35.84
11.81	7.85	4.50	11.65	20.65	44.65

Means are calculated per plot which was comprised of six plants each.

Summary

▣ Total marketable fruit yields of 8-10 lbs per plant. Very respectable for high tunnel tomatoes grown using organic production practices.

▣ Key points- what we learned!

- The first Nature Safe application should be made at first sign of blooms.
- Plants responded during the early season to side-dressing of Nature Safe better than nitrate of soda or fish emulsion applications.
- Once the plants set fruit, it was difficult to “correct” nitrogen deficiencies.
- Nitrogen and potassium were most important to be supplied in timely manner, most other nutrients were supplied in adequate levels.
- Based on this research, we were very encouraged that this system will work well for organic tomato production, given proper management of the fertilizer program.
- Select determinate cultivars with strong vegetative plants for spring, “hot set” and virus-resistant preferred in fall.