

Season Extension with Low, High and Movable Tunnels

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Massaro Community Farm, Woodbridge, CT



SOLID GROUND FARMER TRAININGS

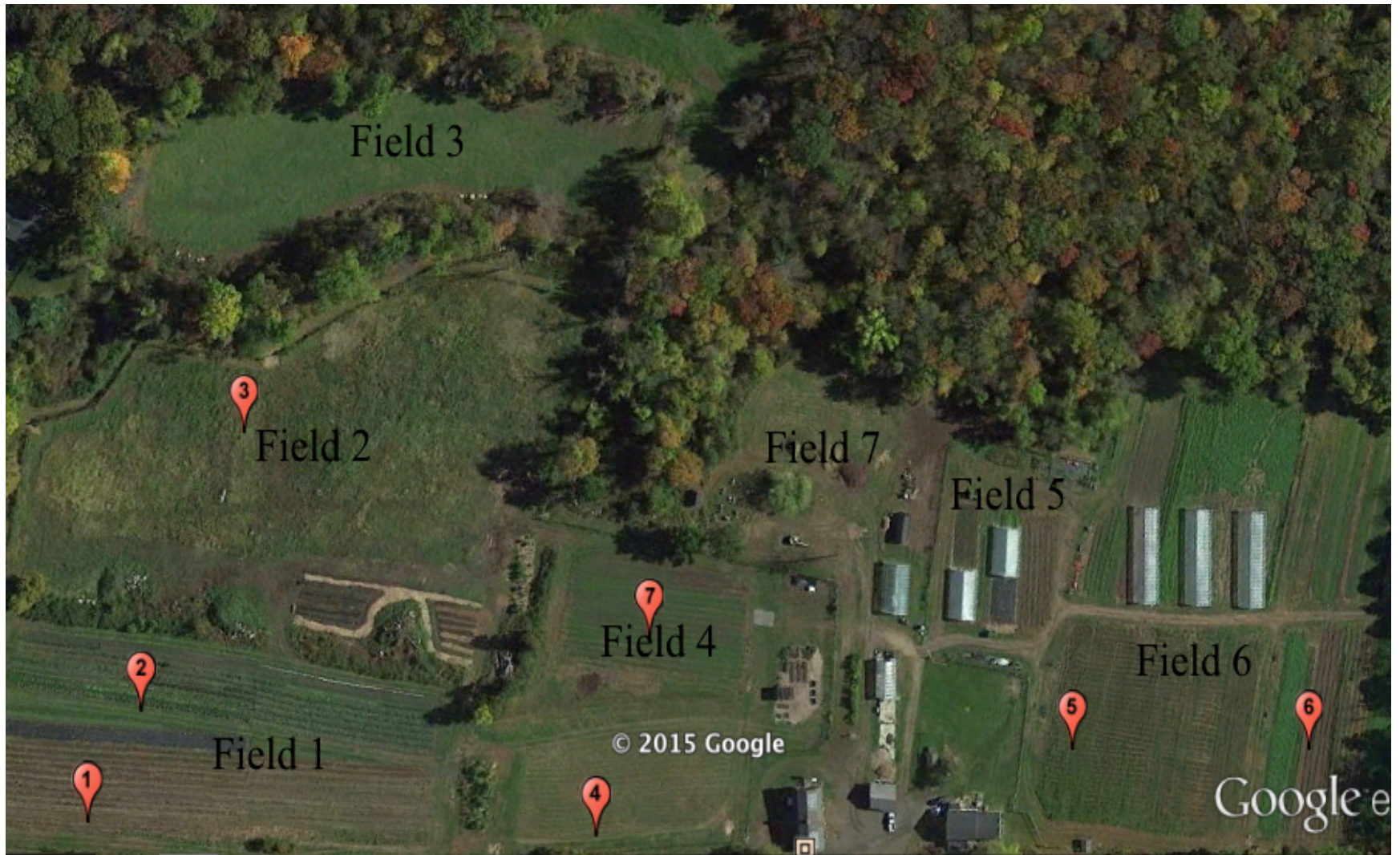
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- **Common Ground, New Haven**
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- **Killingly Agricultural Education Center, Killingly**
- **Knox- Urban Farming Incubator Program, Hartford**
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- **Mashantucket Pequot Tribal Nation, Ledyard**

Massaro Community Farm



Overview of Massaro Community Farm

- First year of production in 2010
 - Grew on 4 acres; 125 “Pioneer” CSA subscribers (16 weeks summer, 4 weeks fall)
 - Built heated greenhouse (22’ x 36’)
 - Built high tunnel (30’ x 48’)
- Added .5 acres in 2011; built two movable high tunnels on that space (each 30’ x 48’) in fall 2011 and spring 2012
 - Rebuilt in 2017 as one stationary 30’x96’ tunnel
- Added .5 acres in 2012
- Added 2.5 acres in 2013
- As of 2017, growing on ~ 10 acres; 200 CSA subscribers plus farmers’ markets and restaurant sales
- Built three 30’ x 96’ high tunnels in fall 2014, one in 2017

Tools for Extending the Season

- Hoops
- Row Cover
 - AG15 (insect protection only) to AG70 (heavyweight overwinter);
 - Plastic, perforated plastic
- I use AG19 at Massaro, two layers for overwintering
- Sandbags, stakes or other means to secure your cover so it won't blow off in the wind

Mini hoops at Massaro



4' Low Tunnels Somewhere



Mini hoops

- Pre-cut, pre-arched hoops
 - Heavy duty 3/16" wire
 - 64" or 76", 100/bundle, \$42 or \$48 from Nolt's
- Electrical conduit (EMT) available at hardware stores, shape using Johnny's hoop bender (\$60)
 - 10' lengths of 1/2" EMT, ~\$2.50 per piece
 - Hoop bender options: 6'W x 3'H or 4'W x 4'H

Mini hoops best uses

- Physical barrier for pest protection throughout the season
- Mini greenhouse over your beds in the field allowing for earlier and later plantings and harvesting
- Overwinter crop protection in the field or in a high tunnel
- Use row cover, plastic or combination

Mini Hoop Use at Massaro

- Inside tunnels over spring and winter greens
- Mini greenhouse for earliest cucurbits using perforated plastic/row cover combination
- Pest protection on spring brassicas, cucurbits, chenopods (spinach, chard, beets), onions
- Secure with sandbags, every other hoop if possible

High Tunnels



High Tunnel Fundamentals

- Location and orientation
 - Accessible year round
 - Quality soil
 - Level ground
 - Access to irrigation
 - Oriented east/west
- Cost-share opportunities with NRCS
 - Must have crop history; can't locate on new ground
 - Could cover ~75% of cost
- Massaro tunnels custom built by GroWell (Cheshire, CT)
 - Other potential vendors: Rimol, Four Season Tools, Harnois, Griffin, Farmtek

High Tunnel Advantages

- You can stand up and work easily inside
- Accommodates tall fruiting crops
 - Can trellis easily
- Potential to harvest in any month of the year
- Soil temperature warms earlier in the season, allows for earlier sowing or transplanting
- Disease prevention – large physical barrier to keep fungal spores off plant foliage

High Tunnels at Massaro

- 30'x48' tunnel used as a multipurpose house
 - In spring 1/3 seedlings, 2/3 carrots
 - Mid June planting of cucurbit or solanum
 - Fall/Winter greens
- Five 30'x96' tunnels
 - Two to three planted in tomatoes
 - One planted in cucurbits, one planted in early greens
 - All might be used for winter greens

Multi-use in Spring



Movable High Tunnel



Why Movable?

- Crop rotation
- Soil health
- Maximize use of covered space

Movable Tunnel Specs

- 30' x 48'; other sizes possible
- Roll up sides
- Roll up end walls
- Walk doors on end walls
- Sand bags every 4 feet to weigh down plastic on sides and ends
- Moving mechanism: skids, rail or v-track
- Irrigation: drip tape for fruiting crops, micro-sprinklers for greens and roots

Mini Hoops inside High Tunnel in Winter



Use space around the tunnels if you can



Moving each tunnel takes ~2 hours



Hoops in Movable Tunnel Secured to Ground posts



End-wall posts in movable tunnel



Wheels on each hoop for movable tunnel



What to grow in your tunnels?

- Anything is possible, so it depends on your operation
- What is your market?
- How to best take advantage of your tunnel investment?

Crops I have grown in high and movable high tunnels

- Tomatoes
- Peppers
- Eggplants
- Cucumbers
- Lettuce, Salad Mix (many varieties of greens)
- Beets, Radishes, Turnips
- Chard
- Spinach
- Onions
- Carrots
- Strawberries

Crops I won't grow again in tunnels

- Eggplant
- Onions
- Mache
- Claytonia

Bed layout, spacing

- Massaro: historically 6 beds, each ~42" wide
 - 7 paths, each 10" wide
 - More space dedicated to beds, less space occupied by paths
- Direct Sown Greens/Roots – 5-6 rows per bed
- Transplanted Greens/Roots – 4-5 rows per bed
- Fruiting Crops – 1 row per bed; *(target 8 beds)*
 - Might add a companion plant (basil with tomatoes, radishes with cucumbers)
 - Usually grown in plastic (landscape fabric), with 8 beds
 - Landscape fabric is 15' wide; two pieces cover width of tunnel
- Transitioning to Eliot Coleman style: 8 beds, each 30" wide
 - 9 paths, each 12" paths
 - Many tools are designed to fit this system

Lettuce outside movable tunnel, microsprinklers for irrigation



Carrots growing inside high tunnel



Tomatoes and basil in high tunnel



Tomatoes and Basil



Planting/Sowing Dates

- **Tomatoes:** late April planting for early harvest; mid/late June planting for late season harvest
- **Greens:** sow/transplant March for early harvest; late September/early October (by Oct 10) for fall/winter harvest. Can do later, but may not get multiple cuttings
- **Cucumbers:** sow late April for early harvest; sow early July for late harvest
- **Carrots:** sow March/April for late May/early June harvest; sow early August for fall/winter harvest; can sow late Dec-Feb for April/May harvest
- **Resource for planning:** [The Winter Harvest Handbook](#) by Eliot Coleman

Challenges and trouble shooting

- Complete moving process takes us ~2 hours
 - Building on level ground will help prevent problems
 - Can do with 2 people, best with 6
 - Wooden 2x4s to leverage wheels back on tracks
- Securing the endwalls
- Hurricanes, Blizzards, etc.
- New features I would add:
 - Polycarbonate end walls with removable panels or sliding doors for ventilation
 - Endwall vents above doors/panels

Hurricane Sandy, October 2012



Hurricane Sandy, October 2012



Hurricane Sandy, October 2012



Halloween snow 2012



Winter management, shoveling sides



Spring Rains



Long Lane Farm, Wesleyan University



Long Lane Farm, Wesleyan University



Long Lane Farm, Wesleyan University



Long Lane Farm, Wesleyan University



Long Lane Farm, Wesleyan University



Why extend the season?

Advantages

- Start earlier, end later, go year round?
- Continued customer contact
- Keep farm staff on
- Cash flow
- More food for you

Challenges

- Start earlier, end later... never stop?
- Habitat for pest and disease
- Weather conditions
- Infrastructure – washing, storing
- Cost analysis; is it profitable?