Extending the Season

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Early cabbage protected from frost and insect pests
Why use row covers?

• Retain heat to enhance plant growth and extend the growing season
  – Protect delicate crops from light frosts
• Reduce wind damage
• Exclude Pests
  – Protect crops from insect-borne diseases
Pest exclusion

- Cabbageworms
- Flea beetles
- Squash bugs
- Colorado potato beetles
- Root maggots
- Leaf miners
- Deer
- Rabbits
- Birds
- Cucumber beetles
- Army worms
- Grasshoppers
- Squash vine borers
Row cover weight

• Light
  – Excellent light and water transmission
  – Pest exclusion
  – Little frost protection
  – Tear easily (single season use)

• Medium
  – Good light transmission (75-85%)
  – Good frost protection
  – Durable (several seasons)

• Heavy
  – Poor light transmission (50%)
  – Excellent frost protection
  – Very durable (4+ years)
Heavier row covers protect cool-season crops well into winter
Row covers can be anchored with bricks, boards, rebar, soil...
Connie Lemley’s Farm, near Frankfort, KY
Can float, or support with hoops (low tunnels)

Connie Lemley’s Farm, near Frankfort, KY
Plastic Low Tunnels

- Can get too hot on sunny days
  - Small air volume
  - Need ventilation
High Tunnels

- Unheated greenhouses
- Frame of metal struts
- Plastic cover
- Tall enough to work inside
- Passive ventilation
- Soil-based production
- Simple
- Cheap (~$500 - $8,000)

Frame, hardware: $3,500
Plastic: $800
End walls, doors: $700
Cost: $5,000+/-
<table>
<thead>
<tr>
<th>Qty.</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Budget Plus Series</td>
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<tr>
<td></td>
<td>30 x 96</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>Posts:</td>
<td>2.197 12 Gauge Column Post</td>
</tr>
<tr>
<td>Bows:</td>
<td>1.900 14 Gauge</td>
</tr>
<tr>
<td>Purlins:</td>
<td>3 Runs 1.315 x 17 Gauge</td>
</tr>
<tr>
<td>Trusses:</td>
<td>1.315 Top Brace every other Bow</td>
</tr>
<tr>
<td>Side Wall Height:</td>
<td>4 Feet</td>
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<tr>
<td>Bow Spacing:</td>
<td>4 Feet</td>
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<tr>
<td>Hardware:</td>
<td>Complete Hardware Package for Frame Assembly</td>
</tr>
<tr>
<td>Gutter:</td>
<td>N/A</td>
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<tr>
<td>Price</td>
<td>$3,600.00</td>
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</tbody>
</table>

Atlas Greenhouse quote, 8/25/11
NRCS EQIP: Seasonal High Tunnel Initiative

- $2.57 per sq. ft. up to 2,178 sq. ft = $5,597
- High tunnel must be steel framed, from recognized vendor
- High tunnels may be fixed or portable
- Crops must be grown in soil

- 4 year contract
- Separate pool for organic growers
- Program ranking dates:
  - February 3rd,
  - March 30
  - June 1
- See http://www.ky.nrcs.usda.gov/programs/2012EQIP/
Why use two layers?
Spring

- Outside
- Inside

Summer

- Outside
- Inside

Fall

- Outside
- Inside

Winter

- Outside
- Inside
What about frost?
Irrigation

- Space T-tape 12” apart
- Use nozzles to space transplants (12” for lettuce; 24” for tomato)
- Don’t irrigate before cold snaps (water stress enhances frost tolerance)

Paul Wiediger, Smith’s Grove, KY
Ventilation

Joe O’Daniel, Smiths Grove, KY
**Sclerotinia sclerotiorum**

- Thrives in cool, moist conditions
- Persists in soil as sclerotia
- White mold of lettuce
- Broad host range
- Problem in high tunnels
Solarization

- White mold (*Sclerotinia sclerotiorum*) thrives in cool, moist conditions
- Attacks leaves, roots, stems
- Survives summer as heat-resistant sclerotia
- 4 weeks under clear plastic in August kills sclerotia
**Sample Cool Season Transplants**

<table>
<thead>
<tr>
<th>Seed transplants</th>
<th>Aug. 15</th>
<th>Monthly, Aug.-Apr.</th>
<th>Sep. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transplant into tunnel</td>
<td>Oct. 1</td>
<td>3-5 weeks after seed</td>
<td>Oct. 15</td>
</tr>
<tr>
<td>First Harvest</td>
<td>Nov. 1</td>
<td>4-6 weeks after trans.</td>
<td>Dec. 15</td>
</tr>
<tr>
<td>Remove</td>
<td>May 15</td>
<td>Jul. 1</td>
<td>Feb. 15</td>
</tr>
</tbody>
</table>
Direct-seeded cool season crops

• Arugula: every 3-4 weeks
• Carrots: seed in Oct., harvest in Jan.
• Mesclun:
  − Oct. – Nov. and mid Feb. – Apr: 3 weeks to harvest, re-cut weekly
  − Dec. – Feb.: 6 weeks to harvest, 3 weeks between cuttings
• Scallions: seed in Oct., harvest in Jan.
• Spinach:
  − Pre-germinate in Sept.
  − 5 weeks to harvest.
  − Cut and come again until Feb.
  − Seed in Dec., lasts to Apr.
# Sample Warm Season Crops

<table>
<thead>
<tr>
<th></th>
<th>Tomatoes</th>
<th></th>
<th>Bell peppers</th>
<th>Cucumbers</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed</td>
<td>Jan. 15</td>
<td>Jun. 1</td>
<td>Jan. 15</td>
<td>Feb. 15</td>
</tr>
<tr>
<td>Trans-plant</td>
<td>Mar. 15</td>
<td>Aug. 1</td>
<td>Apr. 1</td>
<td>Apr. 1</td>
</tr>
<tr>
<td>First Harvest</td>
<td>May 15</td>
<td>Nov. 1</td>
<td>Jun. 1</td>
<td>May 15</td>
</tr>
<tr>
<td>Remove</td>
<td>Jul. 15</td>
<td>Dec. 15</td>
<td>Aug. 1</td>
<td>Aug. 1</td>
</tr>
</tbody>
</table>
Tomato season
Fall/Winter crops

- Arugula
- Beets
- Bunching onions
- Carrots
- Chinese cabbage
- Endive
- Herbs (Chives, cilantro, dill, parsley, oregano, sage, marjoram, thyme)
- Kale
- Lettuce
- Mizuna (Japanese mustard green)
- Mustard
- Pak Choi
- Radish
- Raddichio
- Spinach
- Tat Soi
- Turnip
Spring Crops

- Bell peppers
- Cucumbers
- Cut flowers
- Summer squash
- Potatoes
- Tomatoes
Contact
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