Vegetable Production in High Tunnels

Michael Bomford, PhD
Kentucky State University
High Tunnels

- Unheated greenhouses
- Metal quonset frame
- Plastic cover
- Passive ventilation
- Soil-based production
- Simple
- Cheap
High tunnels vs. greenhouses

- Big (1-50 ac.)
- Energy intensive
- Hydroponic
- Same crop all year

- Small (30 x 96’)
- Energy efficient
- Soil-based
- Seasonal year-round production
Western Lettuce Now Inc., Langley BC

6 acres

8 acres

Wiediger high tunnel
Greenhouse: 2129 MJ/m²/yr

High tunnel: 95 MJ/m²/yr

- natural gas: 1750
- electricity: 341
- plastic: 23
- steel: 7.6
- aluminum: 56
- glass
- wood
- concrete
Where should I put my high tunnel?

- Close to house
- Good, well-drained soil
- Full sun
- Relatively level
- Wind for ventilation
- Long side facing south
- Water for irrigation
- Electricity?
Why use two layers?

Outside temp. (ºC) vs. Outside temp. (ºC)
Double Layer Systems
What about frost?
Ventilation
Sliding tunnels
Attaching plastic
Soil Amendment
Management
(8-10 hours per week)

• Daily
  – Opening and closing tunnel… especially on sunny days
  – Scouting

• Weekly
  – Weeding
  – Watering (Drip system)
  – Seeding and Transplanting
  – Harvesting
Transplant production
Transplant production: Solar heat & electric pads
Transplant production: Wood heat
Transplant production: Propane heat & electric pads
## Sample Cool Season Transplants

<table>
<thead>
<tr>
<th>Event</th>
<th>Kale</th>
<th>Head lettuce</th>
<th>Cole crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed transplants</td>
<td>Aug. 15</td>
<td>Monthly, Aug.-Apr.</td>
<td>Sep. 1</td>
</tr>
<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>Bell peppers</th>
<th>Cucumbers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>Seed</td>
<td>Jan. 15</td>
<td>Jun. 1</td>
<td>Jan. 15</td>
</tr>
<tr>
<td>Trans-plant</td>
<td>Mar. 15</td>
<td>Aug. 1</td>
<td>Apr. 1</td>
</tr>
<tr>
<td>First Harvest</td>
<td>May 15</td>
<td>Nov. 1</td>
<td>Jun. 1</td>
</tr>
<tr>
<td>Remove</td>
<td>Jul. 15</td>
<td>Dec. 15</td>
<td>Aug. 1</td>
</tr>
</tbody>
</table>
Mixtures
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)
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
Questions?

Michael Bomford
502-597-5752
Michael.Bomford@KYSU.edu
http://Organic.KYSU.edu