Maximizing High Tunnel Production
with grafting, fertility, and more…

Steve Groff
Cedar Meadow Farm
Holtwood, Pennsylvania

Earliness
Quality
Yield
Be prepared and ready to go when there is little to no wind.
The job will be MUCH easier
(picture taken 5:30am)
Determinate

- 4 rows in 24ft wide bay
- 18” on the row
- 4800 plants per acre
Indeterminate

- 4 rows in 24ft wide bay
- 24” on the row
- 3600 plants per acre

Wind - the worst enemy

Bracing
Venting

- Doors
- Wind direction
- Wind speed
- Sun/Clouds
Venting

• “Baby-sitting” the tunnel
• Critical 6 week time period

Venting

• The summer position
Suckering

- Leave one sucker below flower set
- Take the rest off
- Heirlooms require a more aggressive approach
Bumble Bees

Insect management
- Spider mites
- Thrips
- Aphids
- Beneficials?
Irrigation
- Regular
- Often

Fertility
- Regular
- Often
- Adjust throughout season
1st Week of July

Disease management

- Early blight
- Leaf mold
- Powdery Mildew?
Scouting

Over 50 tons Per Acre
After 3.5" of rain
Pickin’ in the rain?

NO Problem!

Last picking November 8th
Picking in the rain

Raspberries

Picking in the rain
Pulling off the plastic
Expandable

**Cary Rivard** - Graduate Research Assistant
North Carolina State University - Technical advisor

*Where the grafting journey began...*
Grafting

Scion

Rootstock
High horsepower “Grafted” snow blower!

High horsepower “grafted” boat!
Grafted Determinate
4 rows in 24ft wide bay
24” on the row
3600 plants per acre

Grafted Indeterminate
4 rows in 24ft wide bay
36” on the row
2400 plants per acre
Grafted

Non-fumigated
Grafted

Non-fumigated
Non-grafted
Cedar Meadow Farm - Main Effects: Grafting

These values represent the averages of all of the non-grafted and maxifort throughout the whole experiment (regardless of plant spacing or fumigation).
The Bottom line...

Average 2008-2009

- 16.2 more tons per acre
- Or, 1,296 more boxes per acre
- @ $12.00 per box (#1’s and #2’s) = $15,552 increase
- Or, $4.86 per plant increase
How much does it cost to graft?

- Healing chamber
- Labor costs
- Grow 2 sets of plants

**Grafting costs $1.50-$2.00 per plant more than non-grafted plants**

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**Economics**

<table>
<thead>
<tr>
<th>Net returns of grafting ($/acre) : 2008</th>
<th>Non-grafted</th>
<th>Maxifort</th>
<th>(Max-Std*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot; Spacing</td>
<td>$44,525</td>
<td>$47,366</td>
<td>$2,841</td>
</tr>
<tr>
<td>24&quot; Spacing</td>
<td>$47,827</td>
<td>$45,533</td>
<td>$3,302</td>
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<tr>
<td>36&quot; Spacing</td>
<td></td>
<td>$1008</td>
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</tbody>
</table>

<table>
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<tr>
<th>Net returns of grafting ($/acre) : 2009</th>
<th>Non-grafted</th>
<th>Maxifort</th>
<th>(Max-Std(^1))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fumigated</td>
<td>$47,739</td>
<td>$60,699</td>
<td>$12,960</td>
</tr>
<tr>
<td>Non-fumigated</td>
<td>$57,677</td>
<td>$9,938</td>
<td></td>
</tr>
</tbody>
</table>

*Std = 18" plant spacing (2008), Std\(^1\) = fumigated at 24" spacing (2009)

Values in white text = Gross revenue – harvesting costs – transplant costs – fumigation costs
Grow Bags

• Need Disease free soil/compost
• Will require increased water management
• 2 years?
• What is the cost?
• Solution to long term tomato production in high tunnels?

Results

• Less disease
• Higher yields!
  - 32 tons per acre with 25 varieties of heirloom tomatoes
  - 27lbs of marketable fruit per plant

The Big Move!
Quality tomatoes

Earliness
Quality
Yield