**BACKGROUND**

Specialized tomato rootstock are used in greenhouses to confer resistance to soilborne disease and provide improved longevity and total marketable yield. Even when soilborne disease isn’t a problem, specialized rootstock can provide a yield advantage—especially for heirlooms (1). Growing grafted tomatoes in high tunnels when soilborne disease isn’t a problem, specialized improved longevity and total marketable yield. Even to confer resistance to soilborne disease and provide Specialized tomato rootstock are used in greenhouses in high tunnels in Ontario?

**METHODS**

**Grafting**

Grafting was done to compare the advantage for your farm.

**Results**

**Yield**

Total marketable yield of grafted and ungrafted tomatoes from each farm. Bars are means (± standard error). A yield advantage is above the graphed blue line. Est. = Estamino; Max. = Maxifort.

**TAKE HOME MESSAGE**

- Grafted tomatoes had greater total marketable yield regardless of scion variety.
- Grafted tomatoes had greater overall plant health.
- Grafted tomatoes had higher net returns on average but the degree of economic benefit varied by farm.
- Yield advantage for grafting likely depends on scion variety and scion and rootstock compatibility.

There was not enough data from Maxifort rootstock to draw conclusions but two comparisons suggest that it may also be a good choice for the region, which is also consistent with other studies (5).

**Caiman (Nith Valley Organics) had the highest yield for ungrafted plants. It also showed the lowest yield advantage on Maxifort and no yield advantage on Estamino. This may be because Caiman, as a greenhouse variety, already has a good disease package and good overall vigour.**

**Key Findings**

- Grafted tomatoes had greater total marketable yield regardless of scion variety.
- Grafted tomatoes had greater overall plant health.
- Grafted tomatoes had higher net returns on average but the degree of economic benefit varied by farm.
- Yield advantage for grafting likely depends on scion variety and scion and rootstock compatibility.

Because of a large yield advantage, it was economical for Eric and Sarah to graft tomatoes.

For example: Eric realized his extra cost to produce grafted seedlings is $4.47 /plant. His average yield advantage is 6.3 lb/plant, so the extra cost to produce the grafted seedlings is ($4.47/plant) / (6.3 lb/plant) = $0.71. Nathan was interested to see if Caiman, a greenhouse variety with good disease package and good overall vigour, would benefit enough from grafting to be economical. This data show that grafting Caiman on Maxifort was not economical at his retail price of $2.08/ lb but was economical at Eric’s retail price of $3.25/lb. Because Jenny’s yields were low in general (see note in Yield section), it was not economical for her to graft tomatoes.

**REFERENCES**


**Read online: efao.ca/research-library**
Do grafted tomatoes pay off in high tunnels in Ontario?

METHODS continued

Grafting

The healing chamber is critical to grafting success. A good chamber provides darkness, misting for humidity, and temperature control. To graft, Eric modified the method from reference 3. Briefly, he found rootstock-scion pairs of similar diameter, placed the seedlings in the dark for 1 hour to halt photosynthesis, performed the grafts on a bench next to the healing chamber and immediately placed them into the chamber that was prepared at ~26°C and high humidity. Grafts remained in complete darkness for 48-72 hours and then progressively experienced lower humidity and temperature and higher light for about 1 week. Survival was around 80%. Nathan modified his healing chamber and water timing based on reference 4. He also ran a propagation controller to provide mist during initial stages of healing. His grafting technique was similar to Eric’s, although the seedlings were not placed in the dark for an hour before grafting.

Eric grafted and grew grafted and control seedlings for himself and Jenny. He seeded rootstock and scion varieties on Feb 12, more scion on Feb 18, and control varieties on Feb 25; and he grafted on multiple sessions between March 4-16. Nathan grafted and grew grafted seedlings for himself and Sarah, and they grew control seedlings for themselves. Eric transplanted on April 29, Jenny on May 11, Sarah on June 4 and Nathan on May 15 in greenhouse 2 and May 29 in greenhouse 1.

Experimental Design continued

Each farmer compared replicate pairs of grafted and ungrafted tomatoes, following the design in Table 1, for a total of 13 replicate comparisons. The growers used two rootstocks and 7 scion varieties, such that we can not draw conclusions about individual scion varieties or one two rootstocks and 7 scion varieties, such that we can not change when data from the heated greenhouse was used.

Eric’s design: 5 rows randomly assigned a scion; each half row randomly assigned to grafted rootstock or ungrafted control (5 replicate pairs).

Jenny’s design: 1 row with 3 blocks of 2 sections each; each block randomly assigned a scion; each half section randomly assigned to grafted rootstock or ungrafted control (3 replicate pairs).

Sarah’s design: 2 rows; each half row randomly assigned to grafted rootstock or ungrafted control (2 replicate pairs).

Nathan’s design: 2 greenhouses; each greenhouse with grafted rootstock or ungrafted control (2 replicate pairs).

RESULTS continued

Yield continued

Table 2

Production statistics for grafted and ungrafted tomatoes at the four farms. G = grafted, U = ungrafted.

<table>
<thead>
<tr>
<th>Farmer, Farm</th>
<th>First Harvest</th>
<th>Last Harvest</th>
<th>Production weeks***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric, Eva Mae Farm</td>
<td>Jul 26</td>
<td>Oct 18</td>
<td>12</td>
</tr>
<tr>
<td>Jenny, Knuckle Down Farm</td>
<td>Jul 3</td>
<td>Sep 30</td>
<td>12.5</td>
</tr>
<tr>
<td>Sarah, Meadow Lynn Market</td>
<td>Aug 6</td>
<td>Oct 28</td>
<td>12</td>
</tr>
<tr>
<td>Nathan, Nith Valley Organics</td>
<td>Jul 15</td>
<td>Oct 14*</td>
<td>14</td>
</tr>
</tbody>
</table>

*Estimates based on estimated yields from the unheated greenhouse in Ontario and the heated greenhouse at Nith Valley Organics.

Plant Health

For plant health, the growers observed differences but no data was recorded. Compared to ungrafted plants, they consistently reported that the grafted plants had:

- Higher quality fruit (bigger, lower % culls)
- Even ripening, better colour (less yellow shoulders)
- Larger, more robust plants
- Less susceptibility to cracking
- More disease resistance against soil borne disease (Septoria leaf spot at Eric’s)
- More disease resistance against airborne disease, even though the rootstock only confers soilborne disease resistance (Botrytis on Tomimaru and Marbonne at Eric’s)

Acknowledgements

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