Grafting Tomatoes

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Basic Grafting

- Rootstock
- Scion
- Graft Union
Function of the Plant Roots

- Support
- Water and nutrient uptake
- Nutrient transport
- Storage
- Contact between plant and soil
- Soil born disease resistant
Grafting History

The Chinese were thought to be grafting the detached shoots and twigs containing buds as early as 2000 B.C.
Grafting History

In Romans 11:16-21, the apostle Paul talks about grafting "good" olives onto "wild" olives
Reasons for Grafting

• Maintain consistency
• Improve vigor
• Disease resistant's
• Dwarfing
• Repair
• Other
Disease Resistant

- Natural
- Plant breeding
- Genetic engineering
- Grafting
Vegetable Grafting

- 1920’s: watermelons
- 1950’s: eggplants and cucumbers
- 1960’s: tomatoes and peppers
- In many Asian Countries tomatoes are grafted onto eggplant for bacteria wilt resistant
Root Stock

• Commercial Rootstock

• Cultivar Rootstock
# Rootstock

## Commercial Rootstock Selection

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>TMV Root</th>
<th>Corky Race 1</th>
<th>Corky Race 2</th>
<th>Fusarium Wilt Race 1</th>
<th>Fusarium Wilt Race 2</th>
<th>Verticillium Wilt</th>
<th>Bacterial Wilt</th>
<th>Nematodes</th>
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</tr>
</tbody>
</table>

HR = Highly Resistant, MR = Moderately Resistant, S = Susceptible

* = De `Ruiter Seed Co.  ** = Takii Seed Co.  *** = Dai Honmei
**** = D Palmer Seed Co.  ***** = Riik Zwaan  ****** = Bruinsma Seed Co.
Grafting Heirloom Tomatoes

- Asian Vegetable Research Development Center
- North Carolina State University
- Ohio Agricultural Research & Development Center
- Others
Types of Grafts

• 45 Degree Cut Graft/Double Splice (primarily for small plants)
• Cleft Graft
• Tongue Approach Grafts
Grafting Systems

- Tube Graft
- Clip Graft
- Glue (new)
Tube Grafting

Isabel Francis
©2008
45 Degree Angle Cut (Double Splice)

Tube Grafting (Source: Rivard and Louws, 2006)
Cleft Grafting

1. Razor blade
2. 15 cm
3. 15 cm
4. Remove clips 7-10 days after grafting
Tongue Approach Grafting

1. Grafts tongued into each other
2. Potting
3. Cutting of scion hypocotyl
Stem Specialized Tissues

It is very important that the vascular bundles of the scion come into contact with the respective vascular tissues of the rootstock.
Time Line

- Humidity: 85-95% RH
- Full Sunlight

- Rootstock seed is planted
- Scion seed is planted
- Both rootstock and scion emerge within a 2-day window
- 7-10 days
- 7 days
- 7 days
- Grafts are made, and plants are moved into healing chamber
- Grafted transplants are moved into full light
- Transplants are moved to field
Healing Chamber

• Place grafted plant into healing chamber as soon as possible
• 2-5 days in total darkness
• Followed by 5-7 days for filtered sunlight
• Maintain temperature at 75-80 degree F
• Strive for 90% relative humidity
Basic Healing Chamber
Reason for Failures

• Rootstock and scion varieties are genetically incompatible
• Poor grafting technique
• Improper management of the healing chamber environment
• Insufficient healing period.
• Mechanical disruption
• Insufficient sanitation
Management in the Field

- Keep graft union above ground
- Stake and tie plants
- Remove lower prunes
- Remove ground suckers
Principles for Success

- Planning
- Uniform Seedling Production
- Grafting
- Healing Chamber Management
- Re-acclimation
Tube-Grafting

- Seedlings are grafted at 2-4 leaf stage
- High throughput
  - One person can make \( \sim 300-500 \) grafts/hour
  - Grafting robots 600-1200 grafts/hr.
Bradley County Grafting Project
Bradley County Grafting Project

- Local favorite heirloom tomato “Bradley”
- No Fusarium Wilt resistance
- Utilized “Crista” as rootstock
  - Commercially available variety
  - Resistant to Fusarium wilt 1,2 & 3
- Grafted older plants to ensure high graft union
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References

• Asian Vegetable Research Development Center
• North Carolina State University
• Ohio Agricultural Research & Development Center
• University of Connecticut
Questions
Starting Seeds

• Get Soil Test!
• Get Seeds
• Start 6 to 8 weeks before transplanting
• Seed takes 5 to 8 days to germinate
• 6 oz styrofoam cup is a good container
• Use a peat based starter mix in cup
• Keep cups in a warm place about 72 deg
Good Seed is Valuable
Planting Seeds

- Plant seeds $\frac{1}{4}$ inch deep
Young Tomato Seedlings
Early Transplant Growth Cup at 3 Week of Age
Tomato Seedlings
Choose One Strong Shoot
Below First Flower Cluster