

Grafting Fruit Trees

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Grafting

- “...the natural or deliberate fusion of plant parts so that vascular continuity is established between them (Pina and Errea 2005) and the resulting genetically composite organism functions as a single plant.”

A History of Grafting
(Mudge, Janick, Scofield, Goldschmidt)

History of Grafting

- Dates to 400 BC as established practice
- Numerous mentions in the Bible, the Hebrew Bible, and the Book of Mormon
- Alexander the Great sent “Spring Apples”, a dwarf tree, to the Lyceum in Athens, Greece
- In early 1900s, efforts began in Europe to categorize and propagate rootstocks of the name, “Paradise”
- East Malling Research Station

Rootstock Research

- M - East Malling Research Station
- MM – Cross between Malling series and “Northern Spy” in Merton, England in 1920s
- EMLA – Virus-free rootstocks developed in 1960s

Plant Propagation

Sexual

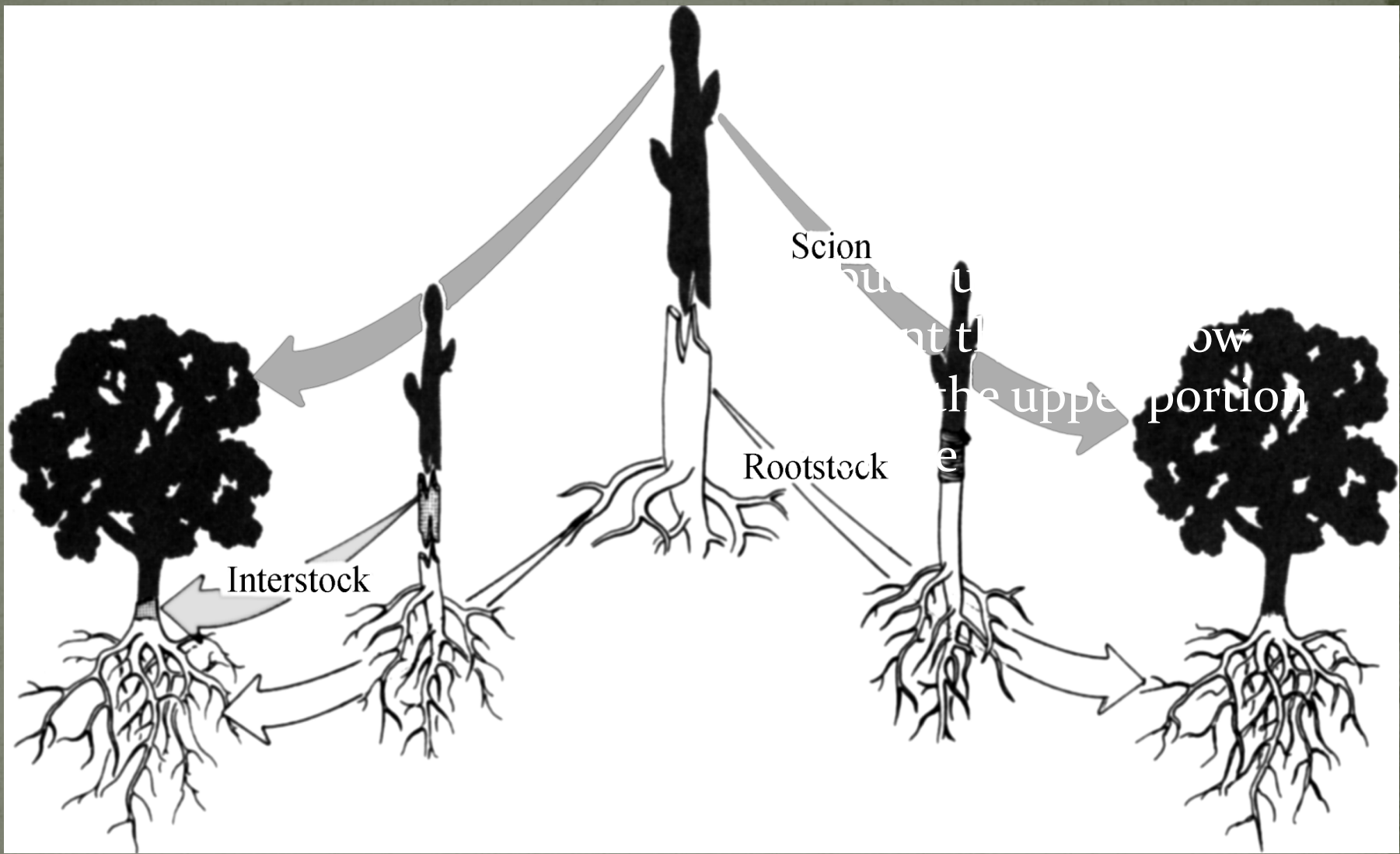
- Combination of genetic material from 2 parents
- Method to create genetic diversity
- Allows a species to evolve & adapt to an environment

Vegetative

- Clonal reproduction from 1 plant (rooting cuttings, grafting)
- Consistency in propagation, growing, flowering & fruiting

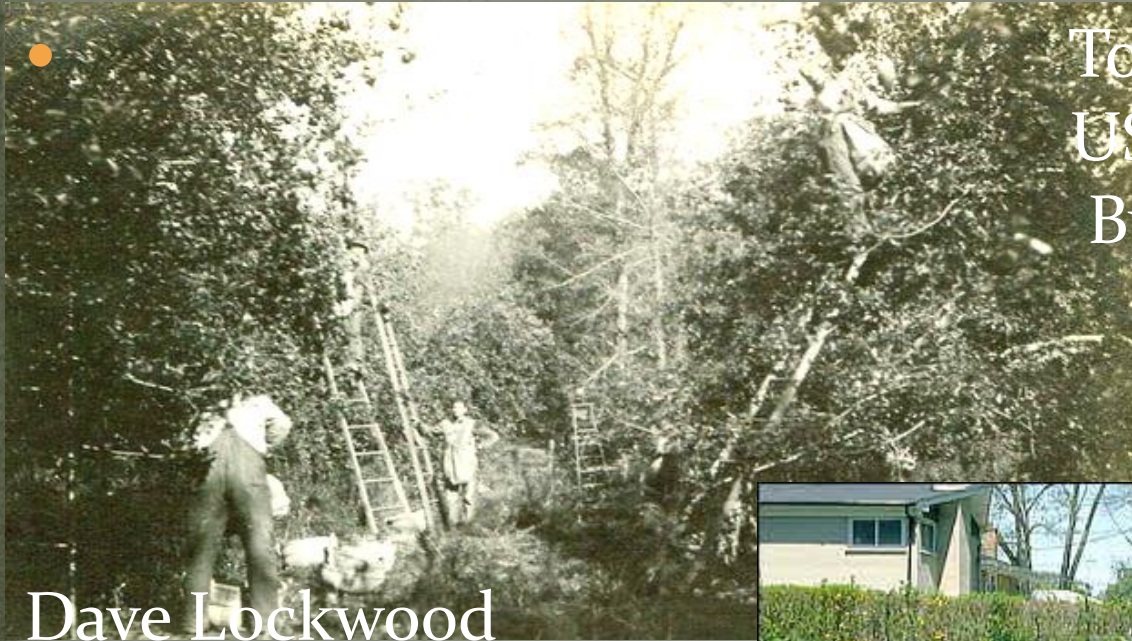
Reasons for Grafting

- Vegetative propagation
- Avoidance of juvenility
- Cultivar change
- Unusual growth forms
- Repair
- Size control
- Control of diseases, insects, and nematodes



Rootstock Influence on Tree Performance

Tom Beckman
USDA-ARS
Byron, GA



Dave Lockwood
UT/UGA

SE. Fruit & Veg. Conf. 2014



Rootstock

- Species
 - Same as scion
- Store away from fruit
- Caliper
- Amount of dwarfing
 - Mature Size
 - Root system
 - Support



Photo by Willamette Nurseries

Rootstock – how does it grow?



Photo by Willamette Nurseries

May – 14 Months After Planting



Photo by Willamette Nurseries

One Year Later.....



- One year later
- Cut off growth
 - Sweep sawdust away

Photo by Willamette Nurseries

Bed with crown visible



- Fertilizer applied



Photo by Willamette Nurseries

Photo by Willamette Nurseries

Mounding



Photo by Willamette Nurseries

- promotes rooting
- Some varieties mounded first time by hand

Mounding

- 3 inches added – 2 to 3 times



Photo by Willamette Nurseries

Stool beds in August



Harvest begins after leaf drop

Photo by Willamette Nurseries

Grading and Quality Control



Photo by Willamette Nurseries

Ready for shipping



Photo by Willamette Nurseries

Build relationships with growers



Scion Wood Collection and Storage

- Collect wood while is dormant – February
 - Before buds swell
- Identify varieties
- Refrigerate but don't freeze
- Keep moist



- Don't store with fruit or vegetables that produce ethylene gas during ripening

Scion wood

- Water sprouts
 - Last year's growth
 - Grows from the tops of limbs
 - Avoid sprouts with Fire Blight
 - Don't use tips of sprouts
- Should be pruned out anyway
- Neglected trees don't have many watersprouts

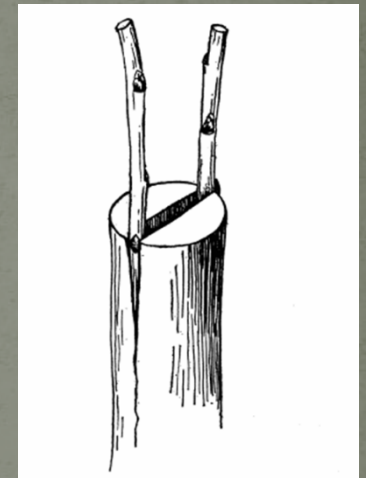


Types of Grafting

- Bud Grafting
 - T bud
 - Chip bud
- Dormant Grafting
 - Whip and tongue
 - Cleft
 - Side
 - Omega Cut – Grafting Pliers
 - “V” cut – Grafting Tool
 - Bark graft
 - Others – included in grafting handout



Side Graft



Cleft Graft

Supplies Needed

- Types of knives
 - Grafting vs. budding
 - Utility knife
 - Must be sharp
- Seal graft
 - Parafilm
 - String and wax
 - Cloth-backed masking tape
 - Electrical tape
- Seal top
 - Parafilm
 - Wound dressing
 - Wax
 - Fingernail polish
- Knife alternatives
 - Grafting pliers
 - Bench-mounted grafting tool



Now, Let's Graft A Tree

- Match rootstock and scion
 - Cambium layers should match
 - Make sure scion is oriented with buds pointing up
 - Need 2 or 3 buds on scion
 - Keep best one after graft takes
 - Seal top of scion
 - ID the new tree



Whip and Tongue

- Make the cuts (length depends on diameter)
- Straight and as flat as possible
- Don't touch the cut surface
- Cut the “tongue” on scion and root
 - Make sure they overlap



Grafting Tools

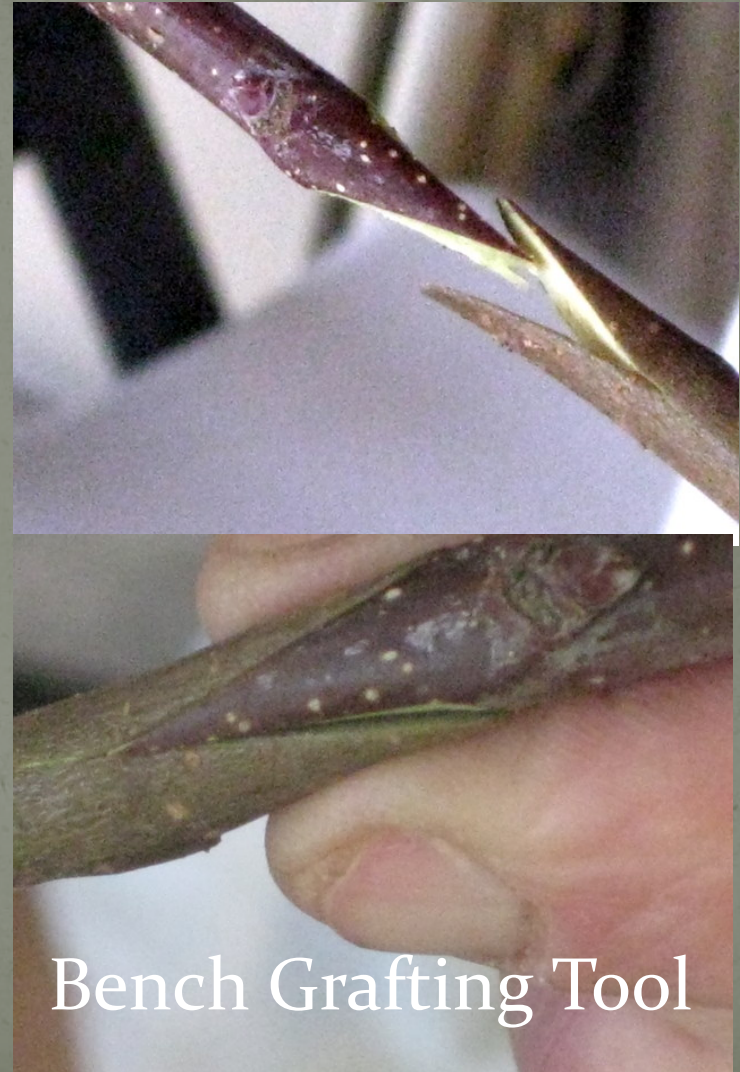


Grafting pliers best for larger diameter – at least $\frac{1}{4}$ inch
\$50.00 to 74.49



Will graft slightly smaller material than pliers – still difficult
Very expensive \$\$\$\$\$

Grafting Pliers and Bench Grafting Tool



Care of and Planting Graft

Plant in good loose soil

- Avoid soil with high clay content
- Good potting soil best
- Graft above ground level

Plant in 2 gallon nursery container

Plant in “nurse” bed – transplant later

Cut tape if you use non-biodegradable type

- Don't pull on tape

Water

Remove growing buds below graft

Sources of Information and Supplies

Grafting Supplies

- Great Western Bag Company – 800-762-9749
- A.M. Leonard – 800-543-8955

Rootstock

- Lawyer Nursery – 800-551-9875
- Adams County Nursery - (717) 677-8105
- Willamette Nurseries – 800-852-2018

Parafilm M

- SPI Supplies
- <http://www.2spi.com/catalog/supp/parafilm.php>

Handouts

- Grafting and Budding Fruit and Nut Trees – Dr. David Lockwood
- Pruning and Training Fruit Trees – Dr. David Lockwood

Pollination

- <http://extension.missouri.edu/explorepdf/agguides/hort/go6001.pdf>
- http://www.acnursery.com/apple_pollinizer.pdf

Fire Blight - <http://www.canr.msu.edu/vanburen/fb1991.htm>

Information Sources

- Devin Cooper – Willamette Nurseries
- Dr. David Lockwood – UT Extension Fruit Specialist
- Dr. M.L. Parker, NCSU Extension Horticulturalist

Questions?