

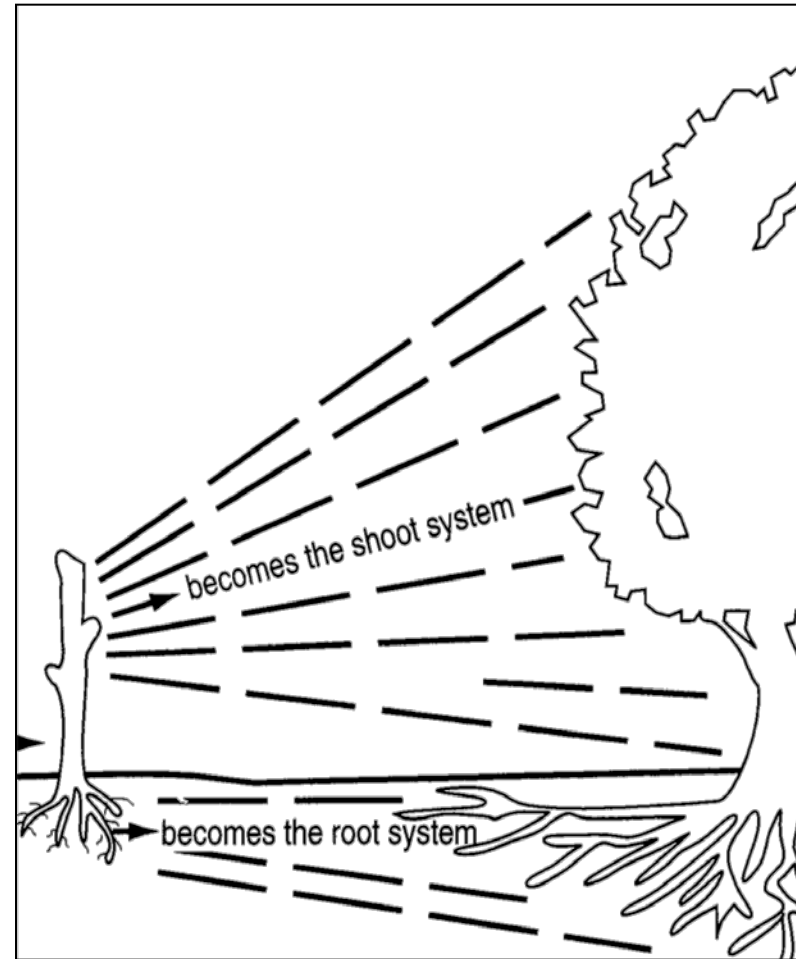
Propagation of Fruit & Nut Trees



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Why Graft?

- Propagation
 - Seeds- every tree will be different!
 - Clonal Propagation by cuttings, layering, grafting or budding.

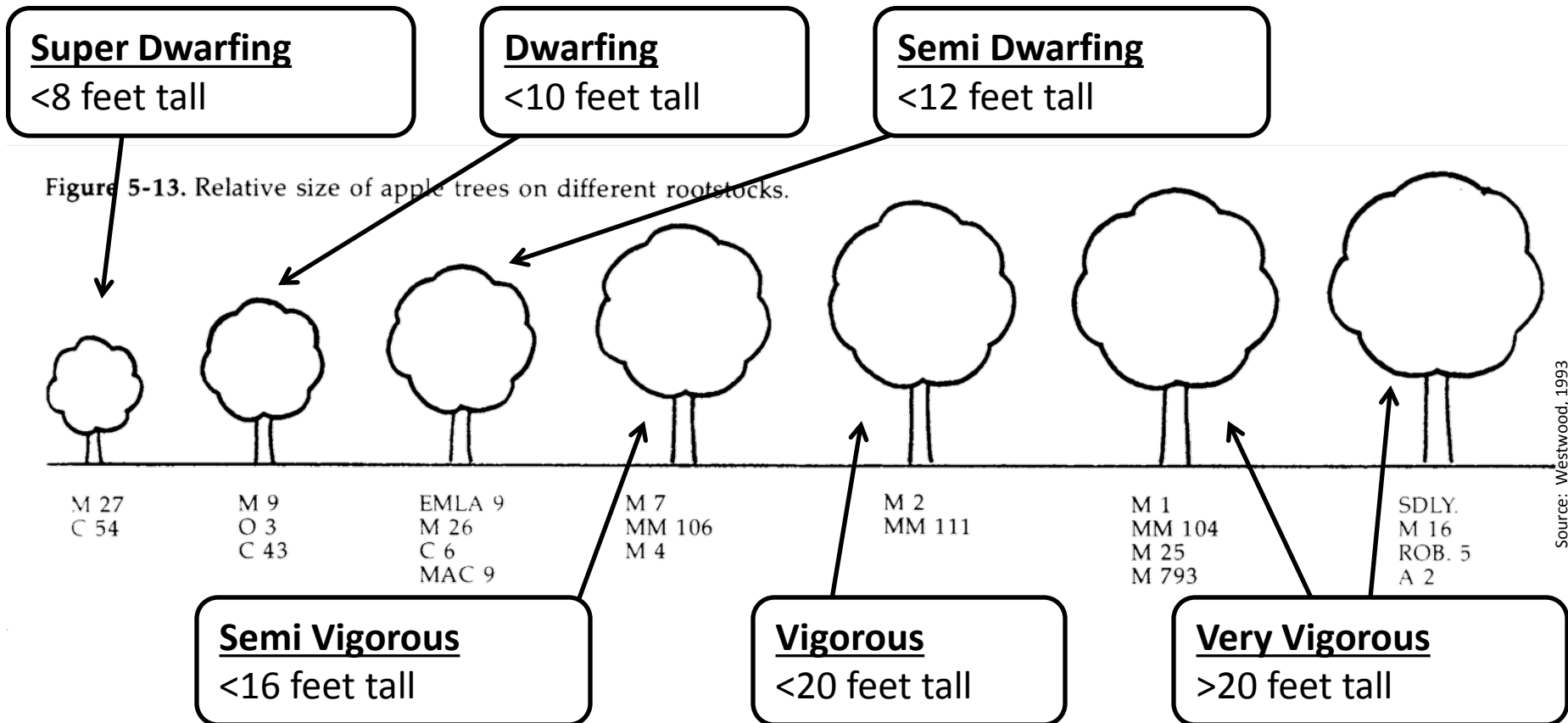


Why Graft?

- Rootstocks can confer their own benefits:
 - Size control/vigor
 - Disease resistance
 - Nematode resistance
 - Insect pest resistance
 - Salinity tolerance
 - Poor drainage tolerance
 - Freeze tolerance
 - Fruit quality

Why Graft?

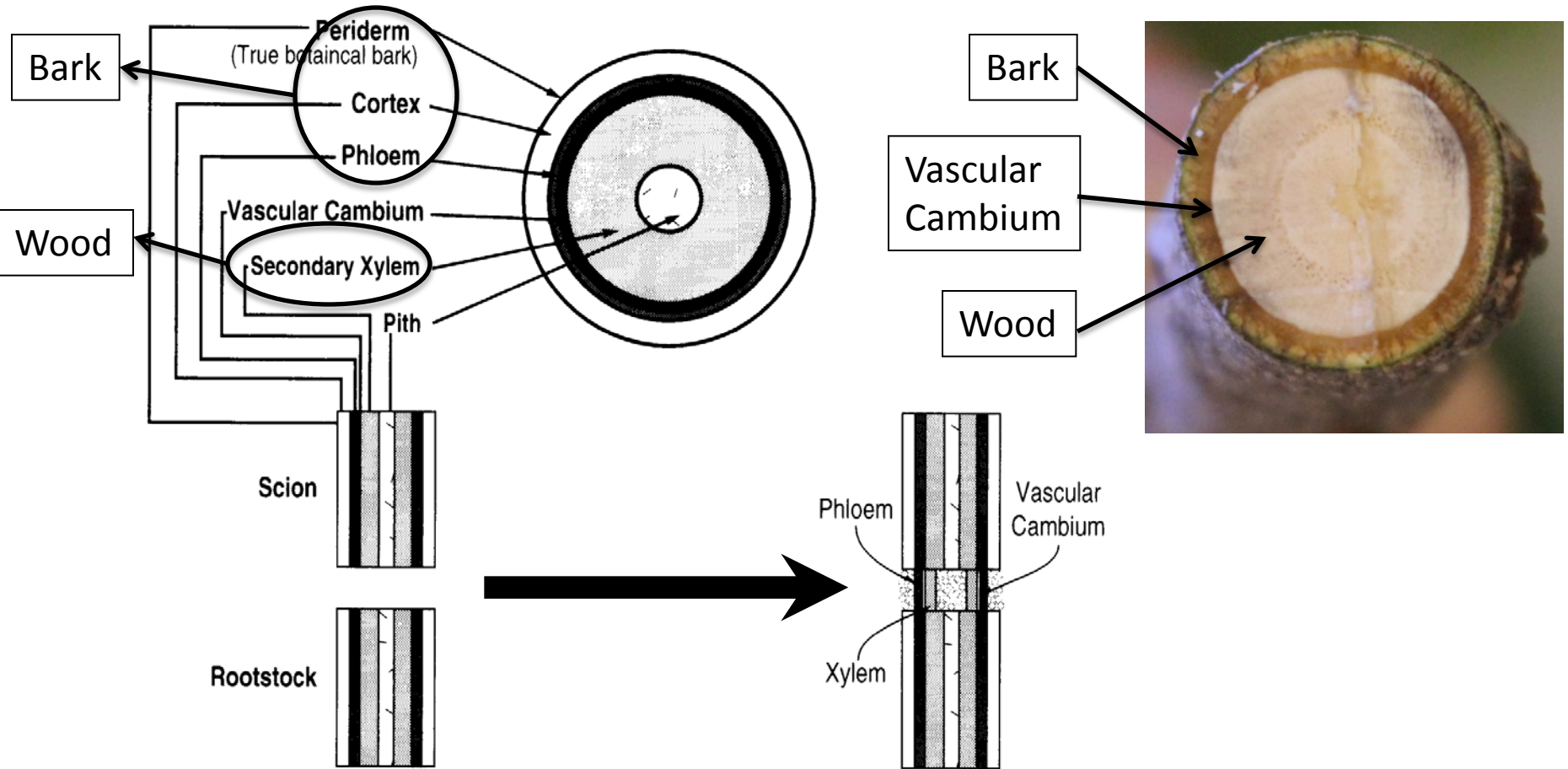
- Size control of apple rootstocks



Why Graft?

- Other reasons:
 - To repair an injured tree
 - To change the cultivar in an existing orchard
 - To create multi-cultivar trees:
 - Pollination
 - Space conservation
 - To create interesting aesthetic effects
 - Usually not fruit/nut trees

Grafting Biology: The Cambium



Graft Compatibility

- Only related plants can be grafted together.
 - Different clones within a species can *usually* be grafted together.
 - Sometimes different species in the same genus can be grafted successfully.
 - Examples: *Prunus*, *Citrus*, *Juglans*
 - Different genera in the same family occasionally may be grafted together.
 - Examples: *Pyrus* on *Cydonia*, *Citrus* on *Poncirus*

Some Basic Grafting Supplies



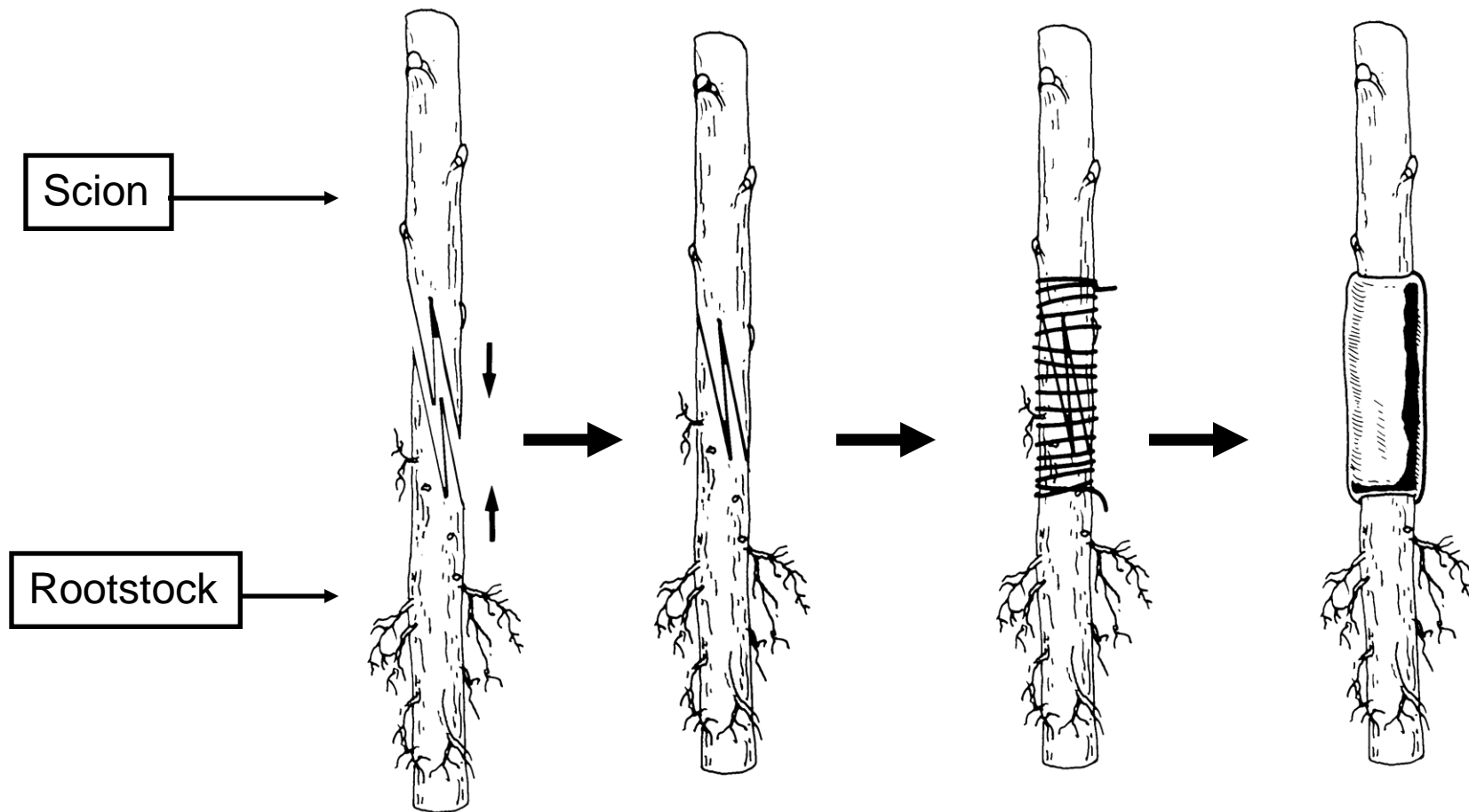
Whip Graft

- Used for small diameter material (1/4-1/2”).
- Scion wood:
 - Should have similar diameter to rootstock.
 - Should be previous-season wood collected during dormancy.
 - Should have 2-3 buds.
- Grafting is usually done in late winter/early spring prior to rootstock’s second growing season.

Whip Graft

- Vascular cambium should match on 1 or 2 sides.
- Advantages:
 - Does not require bark to be slipping.
 - Heals quickly.
 - Forms strong union.
 - Does not require holding scion while tying/sealing.
 - May be used for most tree species.

Whip Graft



Whip Graft

- Several buds may grow– thin to only one shoot.
- Nursery trees are often dug when rootstock is two years old and scion is one year old.

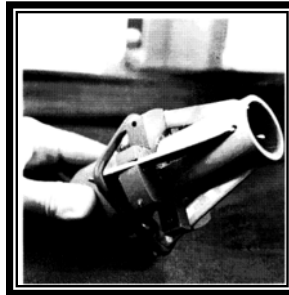
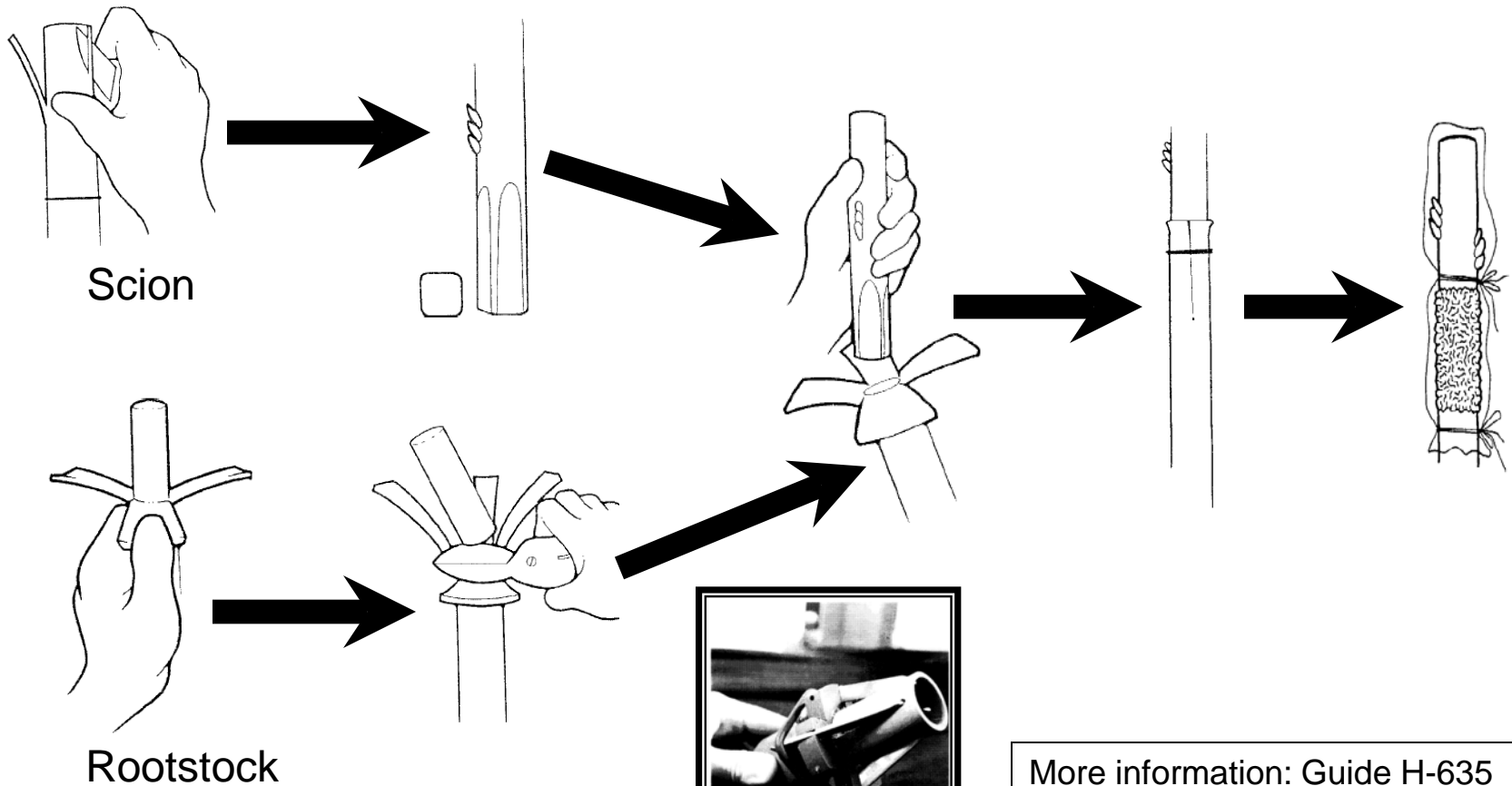
Four-Flap (“Banana”) Graft

- Good for topworking trees or on younger rootstocks.
- Rootstock and scion should be ≤ 1 ” diameter and must be about the same caliper.
- Scion wood is collected during dormancy and stored. Scion should have ~ 3 buds.

Four-Flap Graft

- Grafting is done in early season when rootstock bark begins to slip.
- Simple, easy graft for beginners.
- Most popularly used for pecans.

Four-Flap Graft



More information: Guide H-635
(www.cahe.nmsu.edu)

Four-Flap Graft



4 year old 'Pawnee' tree grafted onto 'VC1-68' rootstock

'Kanza' branch was four-flap grafted onto 'Pawnee' branch back in April.

'Pawnee' branch



Date of photos: 11-11-13

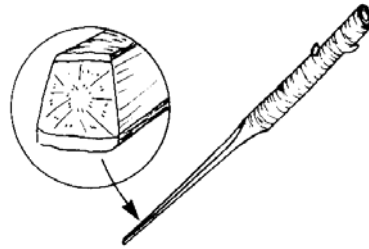
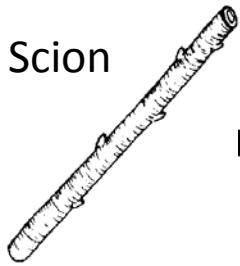
Cleft Graft

- Used to topwork trees
 - Either in trunk of a small tree or scaffold branches of larger trees.
- Rootstock branch stubs should be 1"-4" diameter.

Cleft Graft

- Scion wood:
 - Wood from previous season's growth.
 - Should be collected when fully dormant and stored.
 - Should be 3/8"-1/2" diameter.
 - Should have 2-3 buds.
- Grafting should *ideally* be done in early spring when rootstock buds are just beginning to swell.

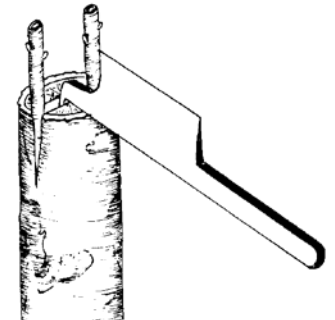
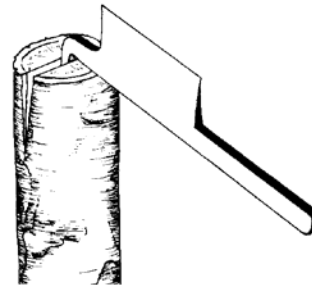
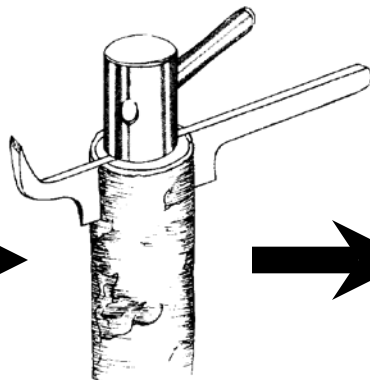
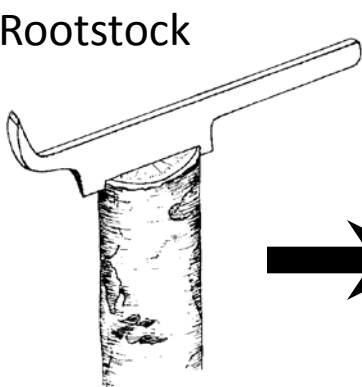
Scion



Cleft Graft



Rootstock

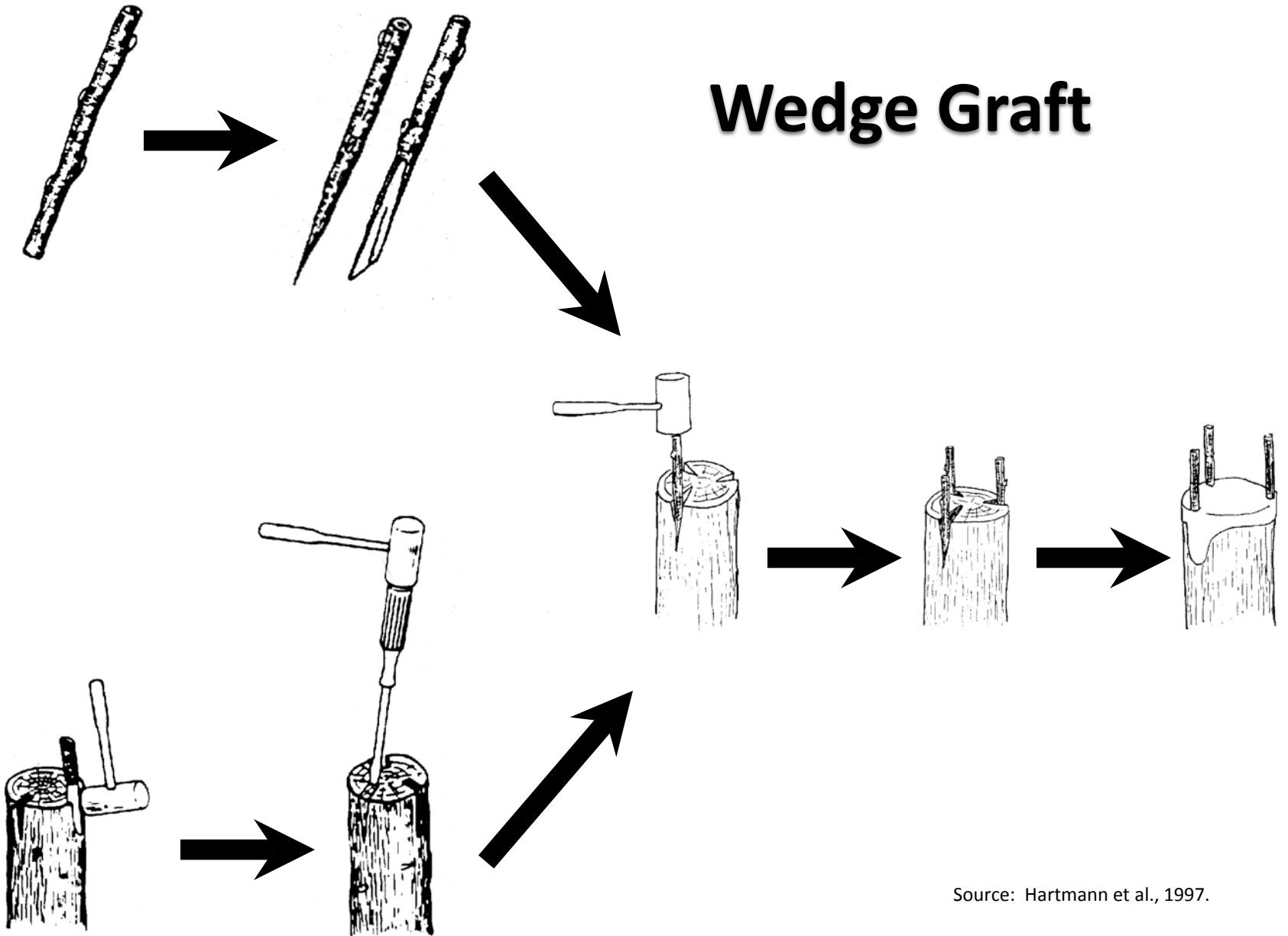


Source: Hartmann et al., 1997.

Wedge Graft

- Similar to cleft graft.
- V-shaped wedges made with heavy knife or saw.
- Two or three scions may be used per rootstock stub.

Wedge Graft



Source: Hartmann et al., 1997.

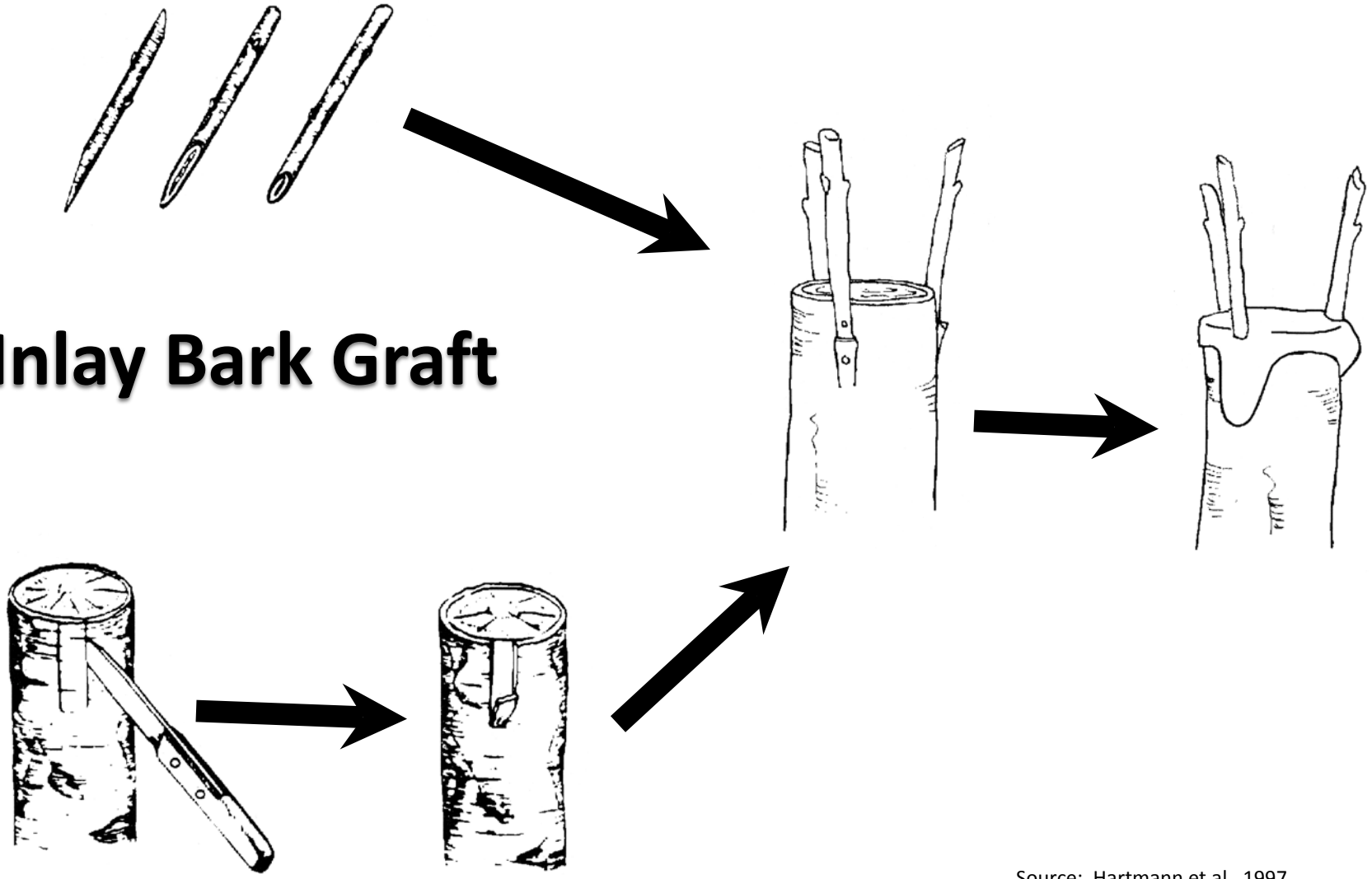
Bark Graft and Inlay Bark Graft

- Use rootstock stubs 1"-4" diameter.
- Scion wood:
 - Collected during dormancy.
 - $\frac{1}{4}$ " – $\frac{1}{2}$ " diameter.
 - 2-3 buds.

Bark Graft and Inlay Bark Graft

- Usually done early in growing season.
 - First month or so.
 - Rootstock's bark must be slipping.
- Inlay bark graft is better than regular bark graft for thicker-barked trees (e.g., walnut, pecan).

Inlay Bark Graft



Source: Hartmann et al., 1997.

Budding

- Uses a single bud instead of a “stick” with buds.
- Useful in nursery propagation and topworking.
- Budding results in a very strong union.
- Simple—even for the novice.

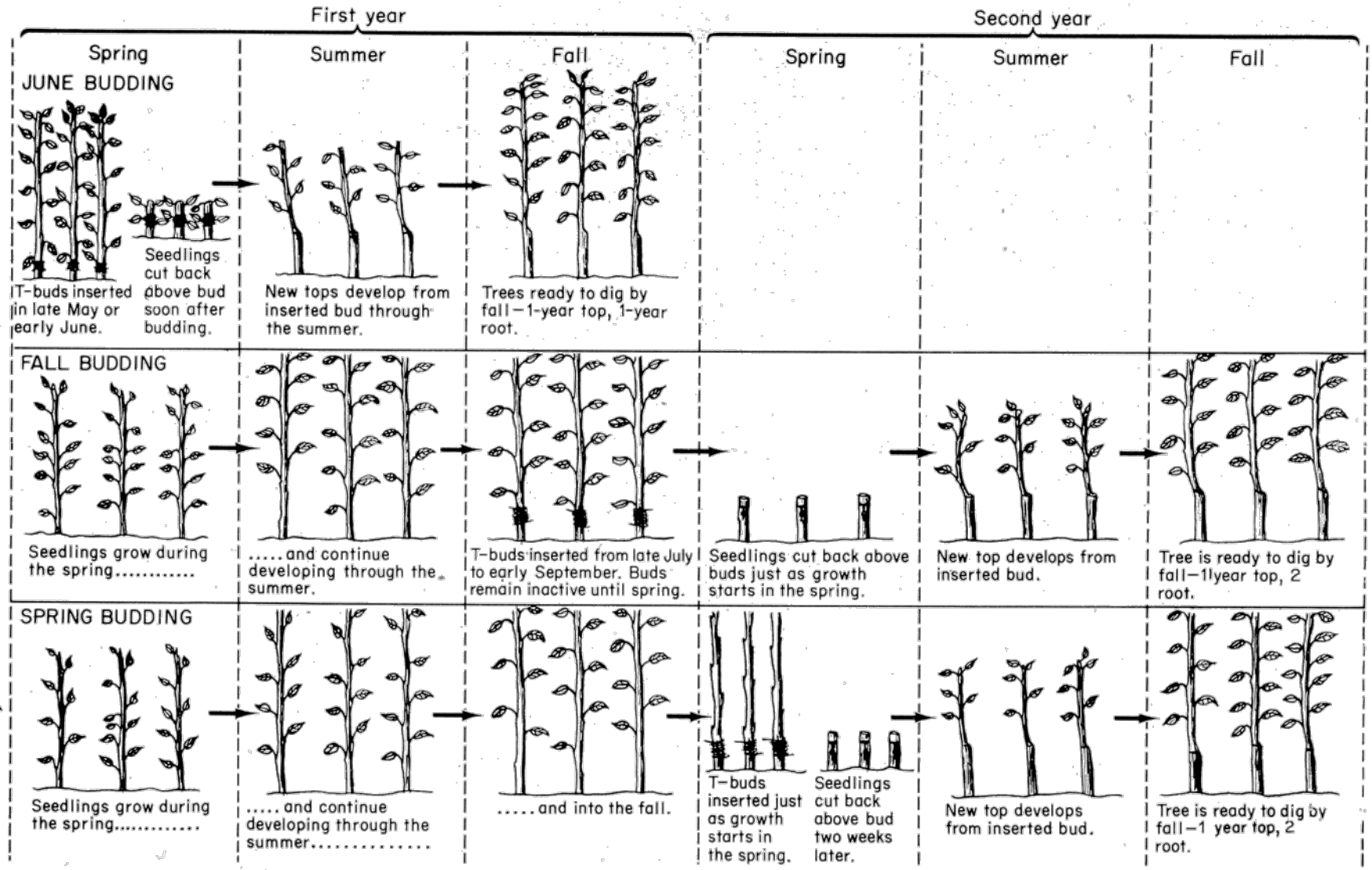
Budding

- Budwood (scion wood) for patch and T budding:
 - Consists of “current-season” shoots, 3/8” or larger in diameter.
 - Usually collected shortly before budding is to be done.
 - Leaves removed (if present).
 - Stored in plastic bag with wet paper towel. (ice chest is good).

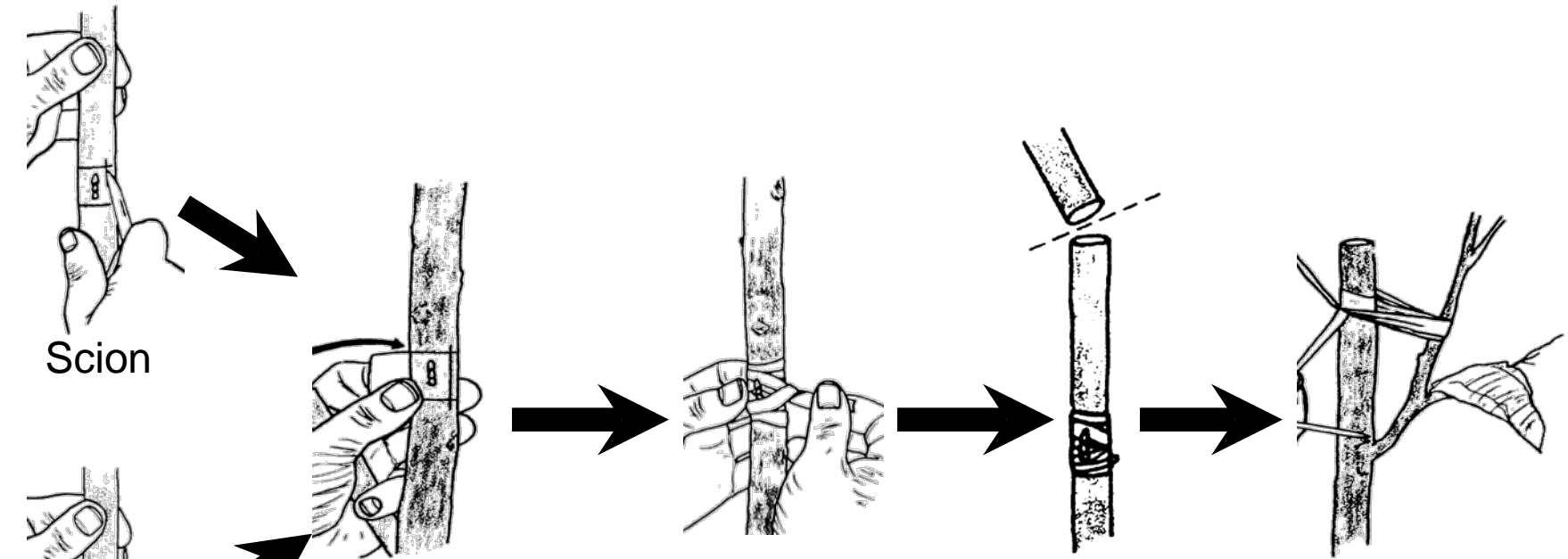
Budding

- Rootstock:
 - Bud to current season shoots $\frac{1}{4}$ "- 1" in diameter.
- Timing:
 - Patch and T-budding require that bark be slipping.
 - Chip budding used for dormant material.
 - Three times for budding:
 - Fall Budding (mid-July thru September)
 - Spring Budding (March or April)
 - June Budding (May thru early June)

Budding



Patch Budding

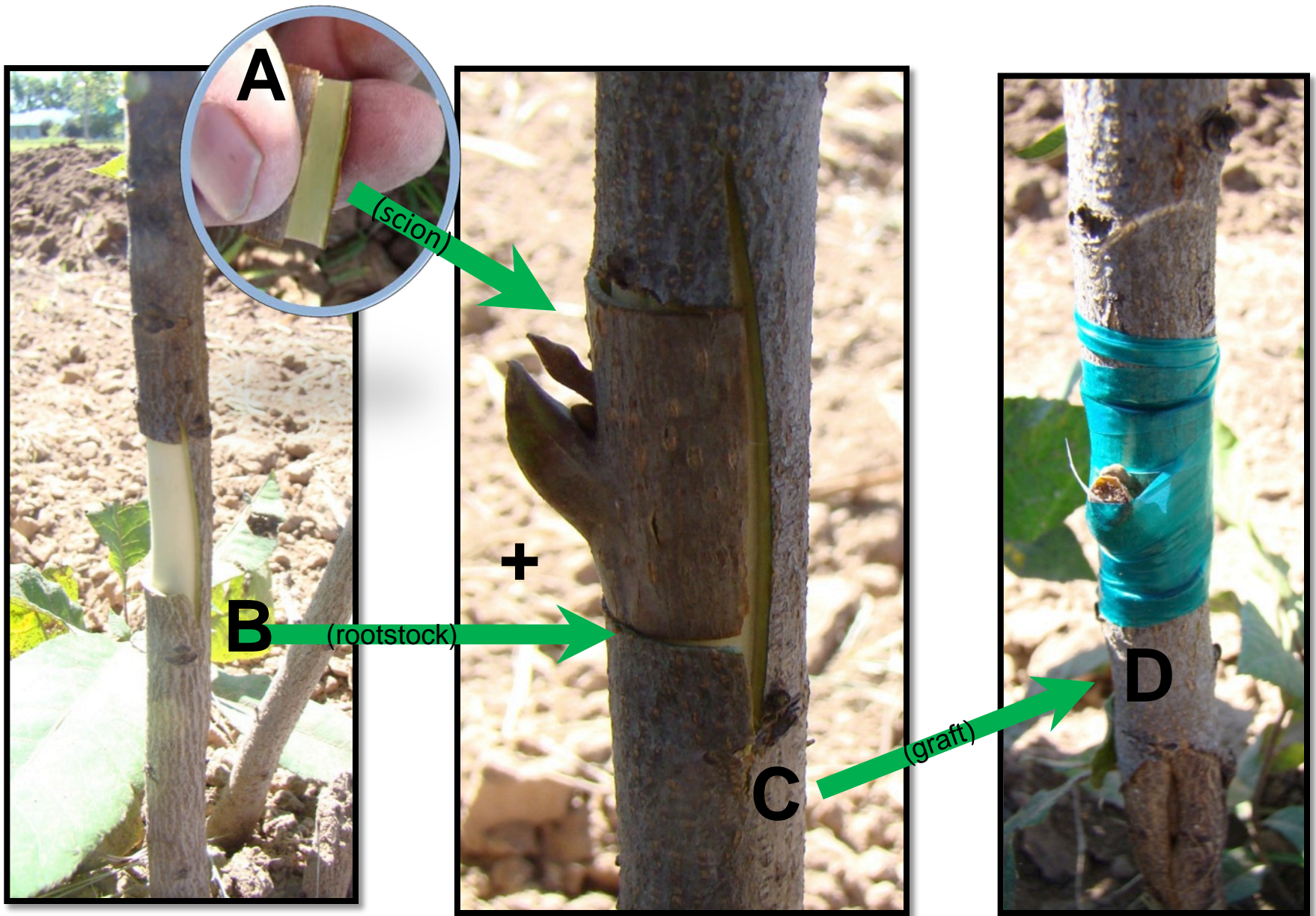


Scion

Rootstock



More information: Guide H-624
(www.cahe.nmsu.edu)

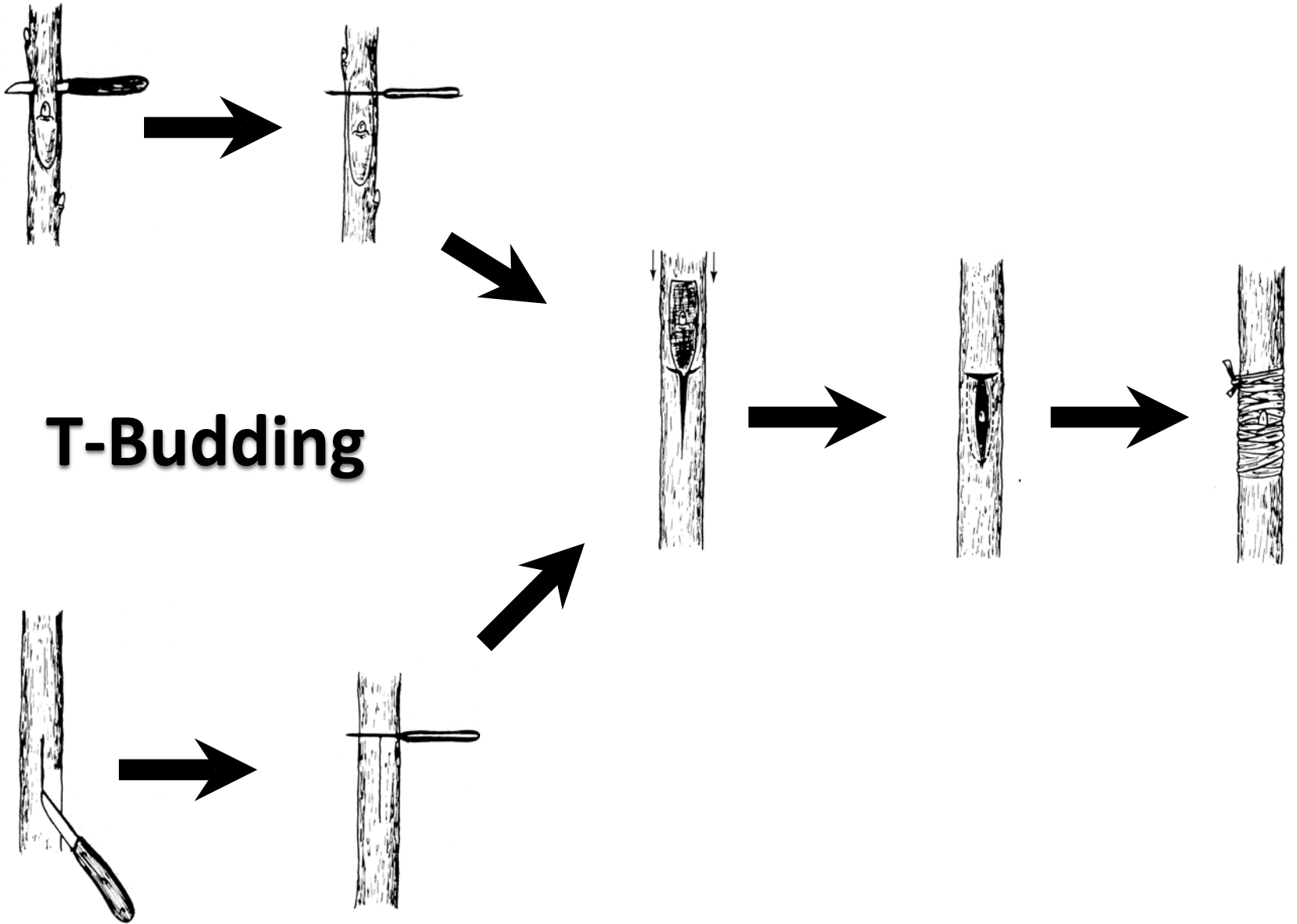






American Plum Borer (*Euzophera semifuneralis*)

T-Budding



T-Budding



T-Budding





Graft or bud union of one of the 100 year old pecan trees at the NMSU Fabian Garcia Horticulture Center

Sources & Further Reading:

- Plant Propagation: Principles and Practices (Hartmann *et al*, 1997)
- Texas Pecan Growers Handbook (McEachern and Stein, 1997)
- NMSU Cooperative Extension Publications H-613 and H-634.

Online Videos:

- Patch Budding Pecans, Southwest Yard & Garden
 - <http://aces.nmsu.edu/ces/yard/howtovideo/patchbudding.html>
- Grafting Jujube Trees, NMSU ACES YouTube Channel
 - <http://www.youtube.com/watch?v=fFLwOWe0KQ4>

