Budding and Grafting Demystified

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GRAFT / BUD UNIONS

English on Black Walnut

Rootstock Sucker, Main Tree Never Grew

English on Paradox Walnut

Almond

Apricot
Grafting Terms

- **Grafting** – branch or bud of a plant inserted into the stem or trunk of another
- **Budding / bud grafting** - inserting a single bud (scion) onto a stock
- **Budwood** – current-season’s shoot used for budding
- **Scion wood** - 1-year-old branch for grafting
- **Topworking** – grafting onto large limbs to change the species or variety
Cross-Section of Trunk

- Bark
- Sapwood
- Heartwood
- Vascular cambium
- Functional phloem
Meristematic Growth

- **Meristem** – undifferentiated plant tissue from which new cells and new plant tissues arise.
  1. **Apical meristem** – forms terminal growth
  2. **Vascular cambium** (“cambium”) – actively dividing layer of cells between bark and wood; produces new sapwood to the inside and new phloem to the outside; causes thickening

- **Callus** – undifferentiated tissue that forms a around a wounded plant surface
Growth of Cells
1 Day After Graft
Growth of Callus Cells
5 Days After Graft

Scion

Callus bridges

Stock

Callus bridges
Budding and Grafting
Reasons

- Produce new fruiting tree from rootstock sucker of dead, injured, or fruitless tree
- Repair tree with dying trunk
- Add pollenizers
- Make fruit salad trees
- Make tree or shrub with different colored flowers
Folding T-budding knife with bark lifter

Knife with folding T-budding and grafting blades
Popular Grafting Methods

**Budding**
- T-budding
- Chip budding

**Grafting**
- Whip graft
- Bark graft
- Cleft graft
Popular Grafting Methods

**Budding**
- T-budding
- Chip budding

**Grafting**
- Whip graft
- Bark graft
- Cleft graft
T-Budding

- Removal of **bud** of desired variety (without wood), insertion in stock
- Bark must be “slipping”
- Spring → branch for current season
  Late summer → branch for next season
- Use vigorous 1-year-old shoots, > ¼ in.
- Cut branch ½ in. above top of bud to force growth
Remove leaves from scion, leave petiole.
T-Budding

STOCK

Top of T cut into bark

Downward cut into bark
T-Budding
STOCK

Peel back bark
T-Budding

Cut under bud, starting ½” below bud

Cut through bark only, ½” above bud
T-Budding

Squeeze bark, remove bud shield from wood

Or remove thin strip of wood too
T-Budding
Insert bud shield into T cut
T-Budding
Wrap with budding rubber or parafilm
T-Budding

Bud that “took”

Fall budded, headed in winter, new spring growth
Forcing Growth (if needed)

Girdling (Shown Here) and Notching

3 months after spring girdling

Dormant season
Popular Grafting Methods

**Budding**
- T-budding
- Chip budding

**Grafting**
- Whip graft
- Bark graft
- Cleft graft
Whip Graft
Whip Grafting

- Removal of 1-yr.-old branch of desired variety, insertion in stock (tongue in groove)
- Done before bud swell
- 1-year-old wood – match size
- Angled cut 1-1½ in. long in stock, scion
- Vertical cut 1/3 the distance from cut tip
Fig. 57  Whip-and-tongue graft
Choose stock & scion of similar caliper

Make 1” to 1 ½” angled cuts in stock & scion
Whip Graft

Slice off "tail"

Top of stock

Equal cuts in stock & scion

Bottom of scion
Whip Graft

¼” vertical cut starting 1/3 the distance from the tip

Twist the knife outward to make insertion easier
Whip Graft

Scion inserted into stock

Parafilm tape wrapped
Whip Graft

3 weeks later

Remove competing shoots
Whip Grafting on an Older Branch or Trunk
Whip Grafting on an Older Branch or Trunk
Whip Grafting on an Older Branch or Trunk
Whip Grafting on an Older Branch or Trunk
Popular Grafting Methods

**Budding**
- T-budding
- Chip budding

**Grafting**
- Whip graft
- Bark graft
- Cleft graft
Chip Budding

- Removal of **bud** of desired variety (with wood), insertion in stock
- Bark doesn’t need to be “slipping”
- Done in dormant season, early spring (budwood stored in fridge), or late summer
- Use vigorous 1-year-old branches > ¼ in.
- Cut branch ½ in. above top of bud to force growth
Budwood for Chip Budding

- Collect just before budding
- Base of current-season, fast-growing shoot (late summer) OR 1-year-old dormant “whip” (late winter / early spring)
- Buds that are mature, leaves removed
- Refrigerate immediately if needed, store in plastic bag with moist paper towel or newspaper
Chip Budding
Chip Budding
Chip Budding

Remove leaves from scion, leave petiole
Chip Budding

**SCION**

Angled cut ½” below bud

Cut under bud to first angled cut
Chip Budding

Chip (inverted) with angled cut $\frac{1}{2}”$ below bud

STOCK

Make the same two cuts in the stock
Chip Budding

Chip inserted into stock

Smaller chip inserted on one side
Chip Budding

Parafilm wrapped (single wrap over bud)
Popular Grafting Methods

Budding
- T-budding
- Chip budding

Grafting
- Whip graft
- Bark graft
- Cleft graft
Bark Graft

In spring:
Cut off limb, scrape bark

In winter:
Choose scion wood with plump buds
Bark Graft

Choose 1-yr-old scion below bend

Make long sloping cut

Make small sloping cut on back side
Bark Graft

Make 2 cuts through bark the width of the scion
Bark Graft

Peel back bark between cuts

Cut bark flap, insert scion
Bark Graft

Inserted scion, nail in flap & scion

Wax over all cuts
Alternative Bark Graft Method

Dual sloping cuts

Use single cut in bark, push knife laterally
Alternative Bark Graft Method

Insert scion

Inserted scion (no nail)
Alternative Bark Graft Method

Wrap tightly with plastic tape

Wax over tape & all cuts