Grafting Basics

Bruce Mines 2014

University of Saskatchewan

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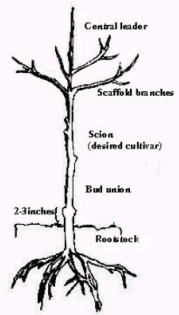

Grafting

- Brings together a desirable top cultivar (scion) & a desirable root system (rootstock)
- Almost all fruit trees are grafted
- Fruit bushes usually are not grafted

Grafting tools:

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Compatibility: Will my Scion Survive?

- Rootstock and scion must be closely related
- Usually same species
- Occasionally different species or genera
- Some varieties of the same species won't work well together
  - Scion & rootstocks combinations are often tested for commercial production

Scion & rootstock combinations tested for commercial production

Incompatibility
Varying degrees

- Rare but can happen
- Won't take
- Lasts a year or so
  - Useful as a nurse graft
- Structural weakness
  - Heavy wind or fruit load may break
  - Can be decades later that it breaks

Nurse Graft

- Often when rootstock and scion are different species
- Temporary
- Plant deep
- Scion will eventually make roots

Incompatibility
Solutions

- Try different varieties
- Use as rootstock, seedlings of the tree you want to propagate
- Clean up stock
- Interstems
- Improve technique

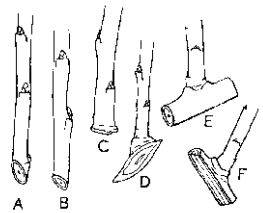
Scion Production

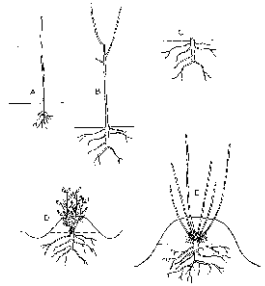
- Mother plants are pruned severely to keep in vegetative state
- > 25% removal each year
- Want longer growth of current year
  - 18 inches or more
- Harvest in fall after dormant
- Store at cool 2 to 5C in damp peat or sand

Propagation of rootstocks

Straight and heeled cuttings

A. Straight cutting with bud close to its base.
B. Straight cutting with base between buds. An 'internodal' cutting.
C. Straight basal cutting. Cut at the junction with older shoot.
D. Cutting with heel of older wood.
E. Mallet cutting.
F. Cleft-mallet cutting.

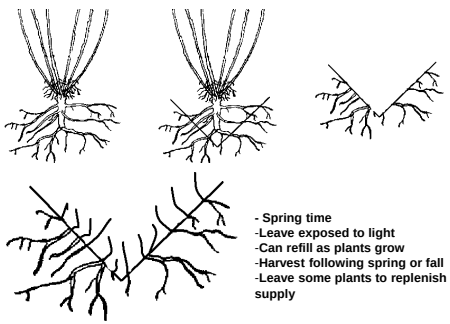




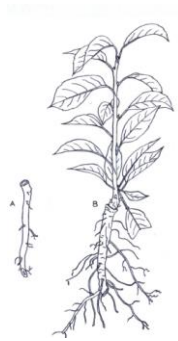
The stooling method

A. Newly-planted parent.
B. Established parent.
C. Cut down one year after planting.
D. Earthed a first time in early summer.
E. Rooted shoots on the stool in winter.

Field-produced root cuttings



- Spring time
-Leave exposed to light
-Can refill as plants grow
-Harvest following spring or fall
-Leave some plants to replenish supply



Propagation by root cuttings

A. Cutting of sweet cherry (P. avium) as planted in early spring.
B. The same the following autumn.

Topworking

- **Change existing tree to a new variety**
- **Multiple varieties on same tree**
- **Larger branches with smaller scions**
  - **Rind, Cleft, Kerf grafts**
- **May need grafting compound or wax**

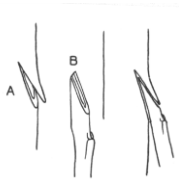
Changing varieties

Old-time Trick

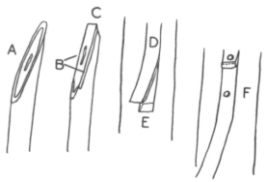
- **Increase hardiness of varieties by grafting onto a side branch of a very hardy variety**
  - **Example: Hardy crabapple (zone 1) topworked with a zone 4 apple might survive in zone 2!**

Bridge or Repair Grafting

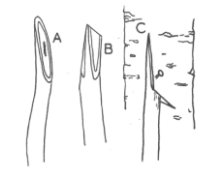
- **When rabbits or voles destroy base of a tree**
- **Fixes girdled trees by reestablishing cambium between tops and roots**
- **Or can supply new roots.**
- **Healing**
  - **Whole season little growth**
  - **May benefit from dramatic pruning**



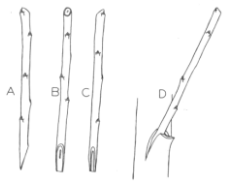
Cleft inarching



Rind marching
A. The smaller partner receives one long slicing cut. B. Two very shallow side cuts are made merely to straighten the edges. C. The thin tip is removed by a cut on the opposite side to the first. D. The larger partner receives two parallel incisions. E. An inclined incision permits the raising of the rind. F. The Components fitted, nailed, and surplus rind removed.



Rind marching with an L incision
A. The principal cut upon the member to be inserted. B. A second shallow cut to expose the cambium on the opposite side, and a thin shaving to straighten the edge. C. A vertical incision in the rind, joined by an upward inclined cut, permits the rind to be raised. The prepared end is pushed under the rind and fixed by nailing.



Side graft

Bud Grafting
This is the method we use in the U of SK Fruit Breeding Program

- Very easy for beginners
- Fast
- We do it mid August, ideally when temps cool
- We have an all day workshop at the U of SK in early August
  - Details at www.fruit.usask.ca

Parafilm makes grafting so much easier!

- Very easy to use
- Messy grafting compound not needed
- No knots or tucks needed
- Buds can grow through it

1.Question:

What are some of the signs of a good graft union?

1a. Answer:

- **The short term signs of a good graft union are :**
  - **If a petiole is left on the scion it eventually turn yellow then brown and drops off (if unsuccessful, the petiole turns black and won't fall off)**
  - **Does not have a large callus**
  - **Has a smooth synchronous union**
  - **Has only a small change in bark wood from rootstock to scion.**

1b. Answer:

- **The long term signs of a good graft union are :**
  - **Does not have a large callus**
  - **Has a smooth synchronous union**
  - **Has only a small change in bark wood from rootstock to scion.**
  - **The scion grows into a healthy tree**

2. Question:

Besides grafting, what are some other forms of apple propagation?

2. Answer

- **Other forms of apple propagation are:**
  - **Tissue Culture**
  - **Seeding**
  - **Layering**
- **But these are rarely used because dwarf trees are considered very desireable**

3. Question:

True or False: The plant material that will produce desirable fruit characteristics is known as the scion?

3. Answer

- **True**
  - **The scion is the plant material that contains such desirable characteristics as:**
    - **Fruit colour and texture**
    - **Storage life**
    - **Fruit flavour**
    - **Fruit Size**
    - **Blossom colour and fragrance**
  - **The Scion is grafted onto the rootstock.**

4. Question

When is the best time to collect scion graft wood?

4. Answer

- **The best time to collect scion graft wood is in late fall, before major snow fall, but after leaf drop.**
- **It is then over wintered in cold storage, in barely moist peat moss, in double poly bags kept at a temperature of -3°C to +5°C.**

5. Question

When is the best time to perform grafting?

5. Answer

- **The best time to perform grafting is in mid to late spring when the bark is slipping, using scion wood collected from the previous year.**
- **The beginning of June signals the end of the grafting season, as grafts that are performed after this date may not have time to harden off in time for winter.**

6. Question

What are some of the advantages of grafting?

6. Answer

- **Some of the advantages of grafting are:**
  - **To propagate a desired cultivar where other forms of propagation fail**
  - **To create space saving multi graft trees.**
  - **To add a pollinating genotype to the orchard or tree.**
  - **To change cultivars, retaining the established rootstock.**
  - **To achieve special ornamental effects.**
  - **To benefit from rootstock effects on the scion cultivar, such as:**
    - **Increased disease resistance**
    - **Increased pest resistance**
    - **Increased cold hardiness**
    - **Dwarfing of a large tree**
    - **Decreased suckering**
  - **To repair damage to a tree using bridge grafts.**
  - **To produce larger trees which produce fruit the next season**

7. Question

Why must you always place the graft union above the soil line?

7. Answer

- **The graft union should always be placed above the soil line when transplanting to prevent the scion wood from forming roots and possibly reversing the positive effects of the graft.**

8. Question

Does grafting allow the scion and rootstock to exchange genetic material?

8. Answers

- **No, there is no exchange of genetic material between the scion and rootstock, therefore a grafted apple is NOT a genetically modified organism (GMO).**
- **The rootstock only supports the scions growth, supplying it with water and nutrients.**