Plant Propagation

There are two methods of plant propagation:

- **Sexual** (seed) - entails the recombination of genetic material, resulting in progeny that differ from each other and from their parents.
- **Asexual** (vegetative) - progeny are genetic copies of the parent plant (clones).

Definitions:

- Grafting: - joining the parts of two separate plants so that they will unite and continue to grow as a single plant
- Budding: - is a modification of grafting, involving the use of a scion with only a **single bud** attached to a piece of bark.
- Scion: - That part of the union to be attached to the rootstock
- Stock: - That part of the union which contains the root portion of the union

Grafting and Budding

- Grafting and budding involve joining two genetically distinct plants so that they unite to continue growth as a single plant

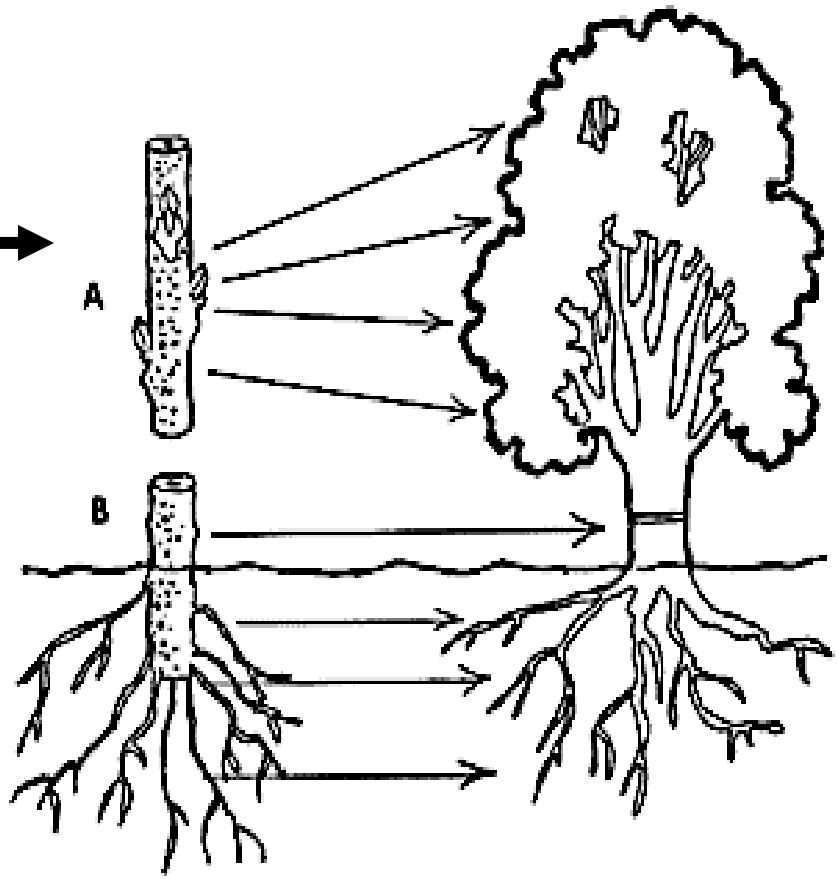
Scion and Stock/Shoot and Root

Scion

Forms the bearing parts and shoot system of the tree

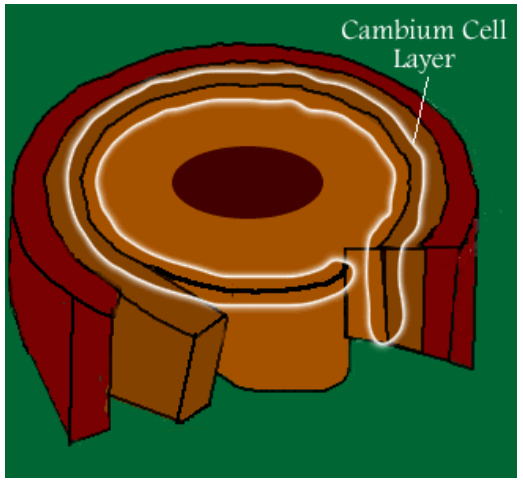
Stock

Forms the lower trunk and root system of the tree



Cambial Contact

- For union and growth to result, the cambial surfaces of the scion and stock need to make contact with each other



From: Schools.fwps.org/

- ***Cambium****: - the regenerative tissue or layer of cells, located between the bark and the wood of the plant*

Grafting and Budding

- **Grafting and Budding** are the most important means of propagating fruit and nut trees for two reasons:

1. Species and cultivars that cannot be propagated by cutting or layering can be propagated by budding and grafting.
2. Budding and grafting allows the use of rootstocks with desirable characteristics that make them preferable to growing a tree on its own roots.

Advantages and Disadvantages

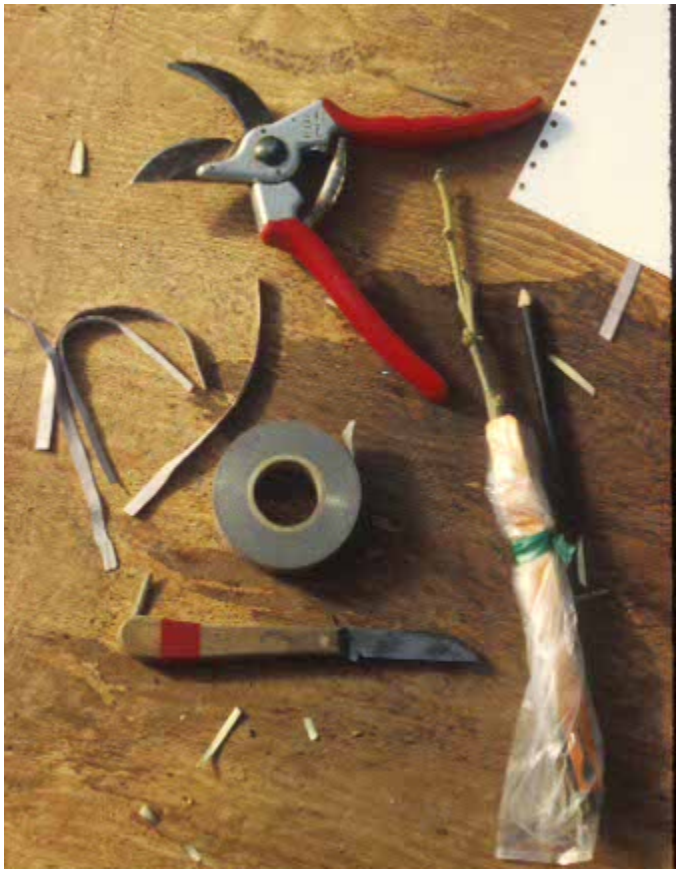
- Quick method of uniform propagation
- Plants with similar characteristics (color, fruit superiority etc.)
- Disease resistance especially in rootstock
- Greater ability of producer to control outcome

- Higher susceptibility to epidemics
- Hurricane tolerance lowered?

Grafting and Budding

Basic tools:

- Budding/grafting tape
- Budding/grafting knife
- Budding/grafting tape
- Pruning shares



Grafting and Budding

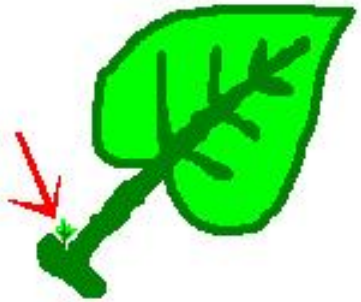
Time or season:

For most tropical hardwoods – when the **stock** is actively growing and the bark is 'slipping'

"Slipping" – when the bark can be pulled away from the wood without being torn apart

Scion-wood may be collected from older growth flushes, or when axillary buds begin to grow.

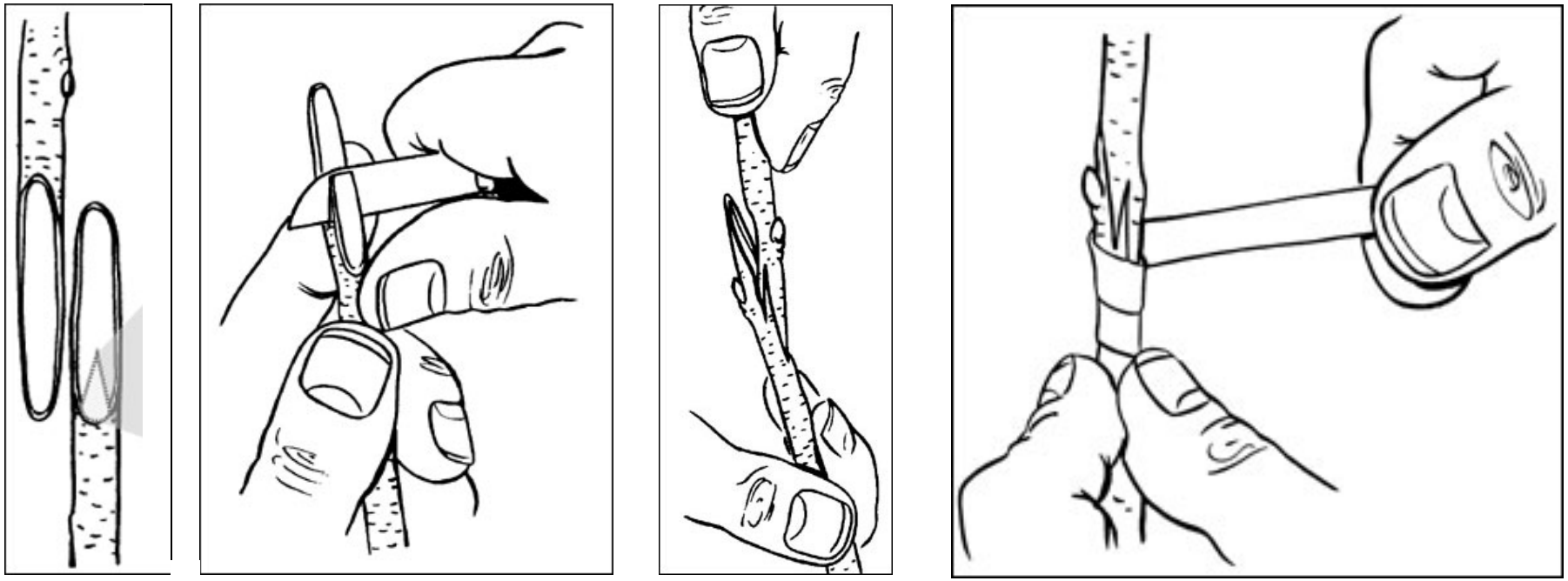
Axillary buds are the buds located at the base of the leaves



Common Grafting Techniques

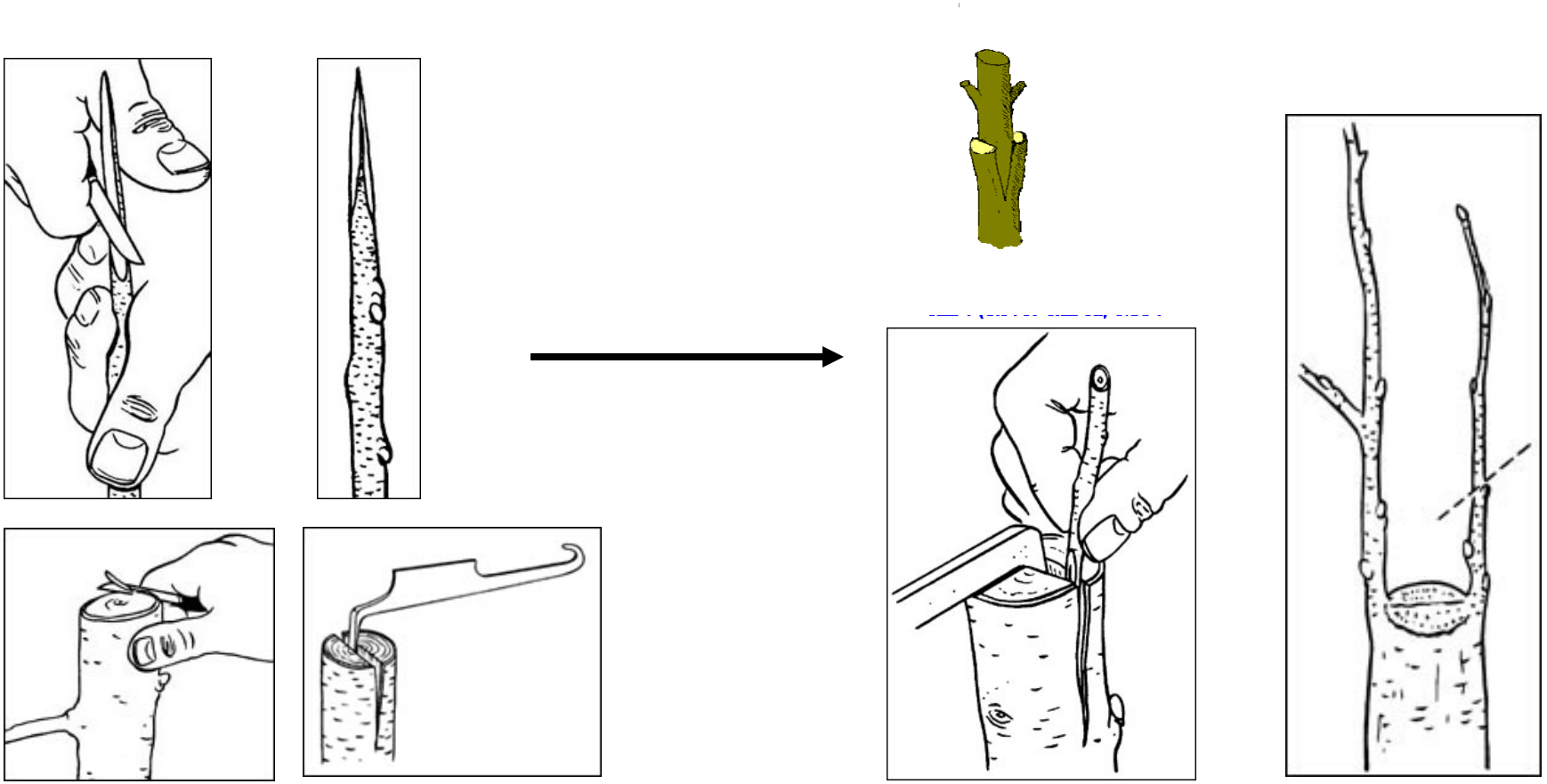
Whip and tongue graft

1 → 2 → 3 → 4



Common Grafting Techniques

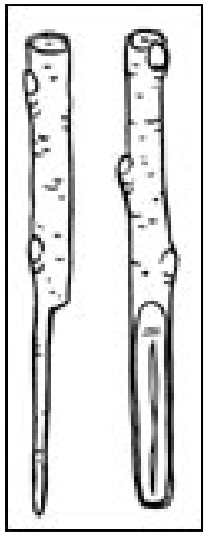
Cleft graft (& modified cleft graft)



Common Grafting Techniques

Bark graft

1



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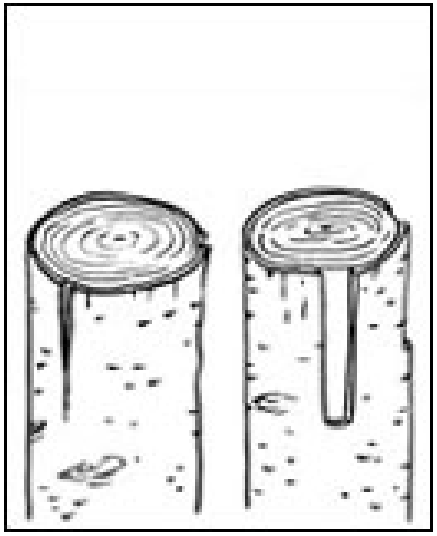

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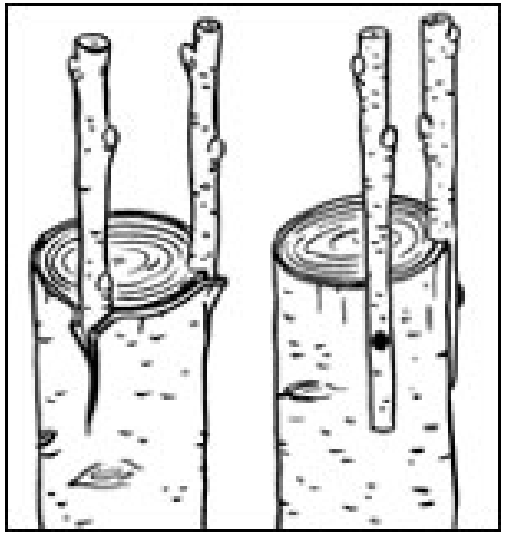
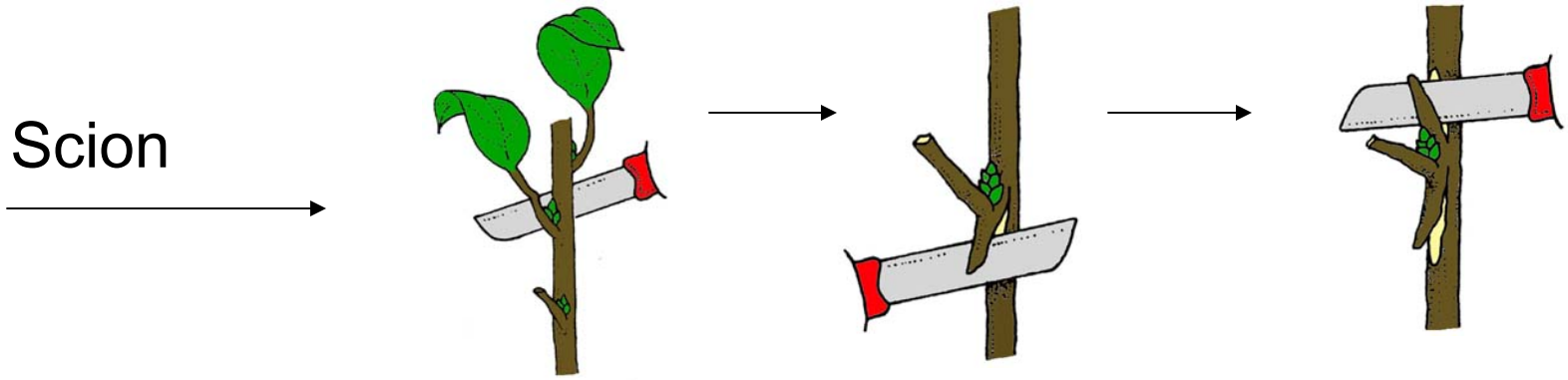


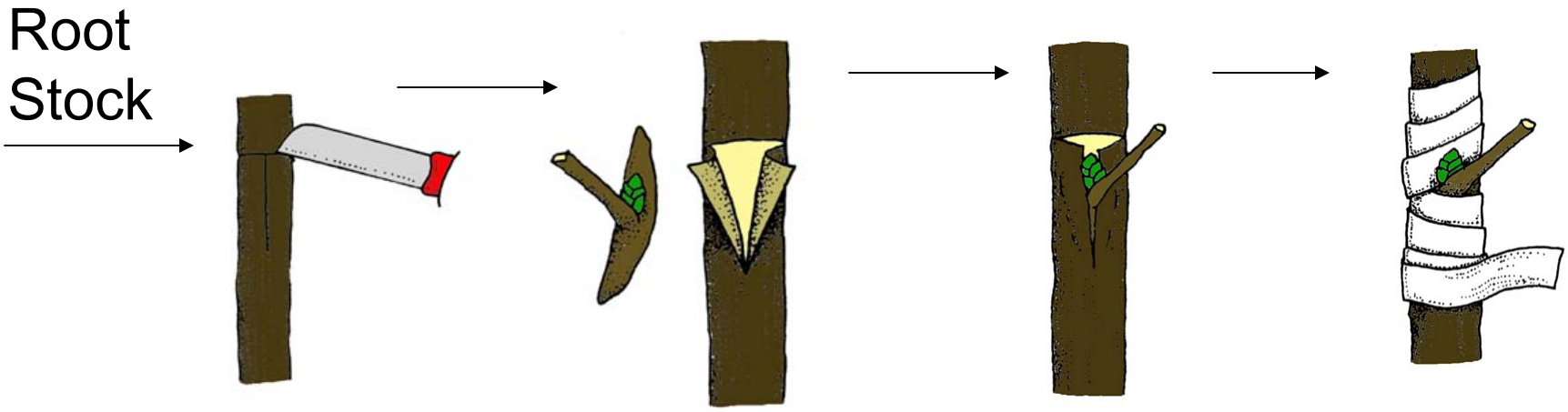
Common Budding Techniques

T-budding is the most common method for propagating fruit trees.

- A T-shaped cut is made in the stock.
- Buds (taken from budsticks or budwood) are inserted under the bark of small seedling stock plants a few inches above ground level.
- The buds are inserted and tied in place
- After growth starts the tops of the seedling rootstocks are cut off.
- T-budding is usually done in the late summer.

T-budding is the most common method for propagating fruit trees.

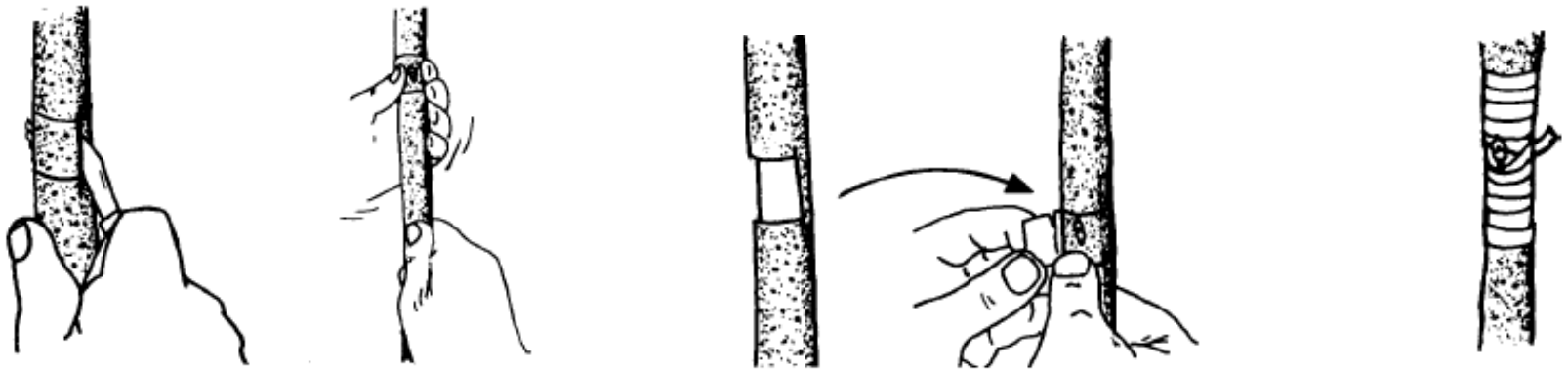




Patch-budding

- Patch-budding is used for thicker barked trees (walnut and pecan).
- A patch of bark is removed and a same-sized patch with the bud is inserted in its place.
- Normally done during the growing season when the bark separates readily from the wood along the cambial layer.

Patch-budding



Cut Twist Apply new bud Secure

Propagation by Cuttings

- A cutting is a piece of vegetative tissue (stem, root or leaf) that, when placed under suitable environmental conditions, will regenerate the missing parts and produce a self-sustaining plant.
- Used mainly in the ***clonal*** propagation of herbaceous and some woody ornamental species. Cuttings are less frequently used for fruit and nut trees.

Cuttings

- Some species can be readily propagated from hardwood cuttings of stems taken in late winter or early spring.
- Usually 6 - 12 " of stem, are placed in the ground in nursery rows with just the top bud showing.
- Cuttings will generate roots and can be transplanted as self sustaining plants.

Preparing Cuttings

Sanitation:

- The cutting propagation process fosters conditions that favor the development of disease and insect problems.
- Open wounds are avenues through which pest problems can enter plants

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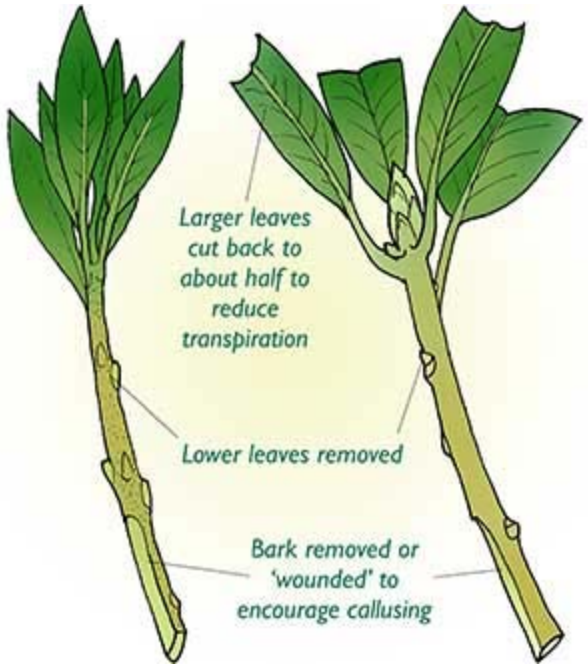
- Cuttings should be disease and insect free
- The instruments used to prepare cuttings should be clean
- The cutting preparation area should be cleaned before and after cuttings are prepared
- Be careful not to damage leaves and cuttings Damaged cuttings are more likely to have problems in rooting both from disease and insects as well as from pre-mature aging of damaged tissue

Preparing Cuttings

Hormones:

- Rooting hormones used in the nursery industry are synthetic versions of naturally occurring plant compounds called auxins.
- Hormones are needed by plants in very small quantities so they are sold in ready to use or ready to be diluted formulations mixed with something else.
- The most common forms are mixed with talc and come in a powder form

Preparing Cuttings

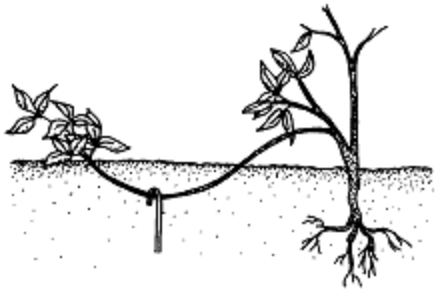


Layering

- The development of roots on a stem while the stem is still attached to the parent plant is called *layering*.
- A layer is the rooted stem following detachment (removal) from the parent plant.

Types of Layering

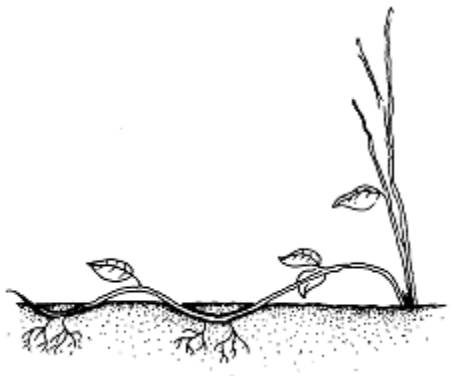
Simple layering



1. Bend a low growing, flexible stem to the ground
2. Cover part of it with soil, leaving the remaining 6 to 12 inches above the soil
3. Bend the tip into a vertical position and stake in place. *Wounding the lower side of the bent branch may help in rooting.*

Types of Layering

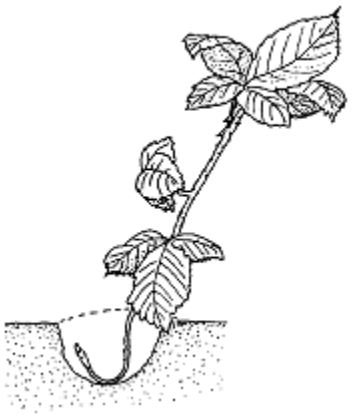
Compound layering



1. Bend the stem to the rooting medium as for simple layering, but alternately cover and expose sections of the stem.
2. Wound the lower side of each stem section to be covered.
3. Each section should have at least one bud exposed and one bud covered with soil. *This method works well for plants producing vine-like growth.*

Types of Layering

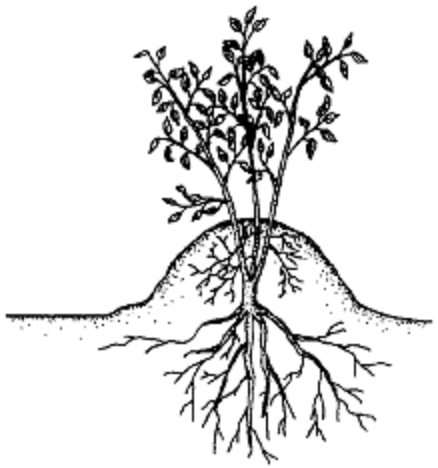
Tip layering



1. Dig a hole 3 to 4 inches deep
2. Insert the tip of a current season's shoot and cover it with soil
3. The tip grows downward first, then bends sharply and grows upward. *Roots form at the bend*. *The re-curved tip becomes a new plant.*

Types of Layering

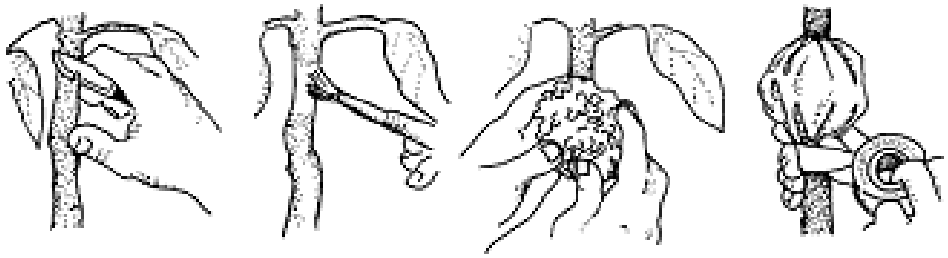
Mound layering



1. Cut the plant back to 1 inch above the soil surface in the dormant season. *Dormant buds will produce new shoots in the spring.*
2. Mound soil over the new shoots as they grow. *Roots will develop at the bases of the young shoots.*
3. Remove the layers in the dormant season. *Works well on heavy-stemmed, closely branched shrubs and rootstocks of tree fruits.*

Air layering

Differs, depending on whether the plant is a monocot or a dicot.



Air Layering Monocots

1. Make an upward 1- to 1 1/2-inch cut about one-third through the stem. The cut is held open with a toothpick or wooden match stick.
2. Surround the wound with moist, unmilled sphagnum moss (about a handful) that has been soaked in water and squeezed to remove excess moisture.
3. Wrap the moss with plastic or aluminum foil and hold in place with twist ties or electrician's tape.

Air Layering Dicots

1. With a sharp knife, make two parallel cuts about an inch apart around the stem and through the bark and cambium layer.
2. Connect the two parallel cuts with one long cut.
3. Remove the ring of bark, leaving the inner woody tissue exposed. Scrape the newly bared ring to remove the cambial tissue to prevent a bridge of callus tissue from forming. *Apply rooting hormone.*
4. Wrap and cover using the same procedure as that described for monocots.

Happy Gardening!!!