Module 6:

Plant Propagation - Vegetative

LSU AgCenter Home Gardening Certificate Course

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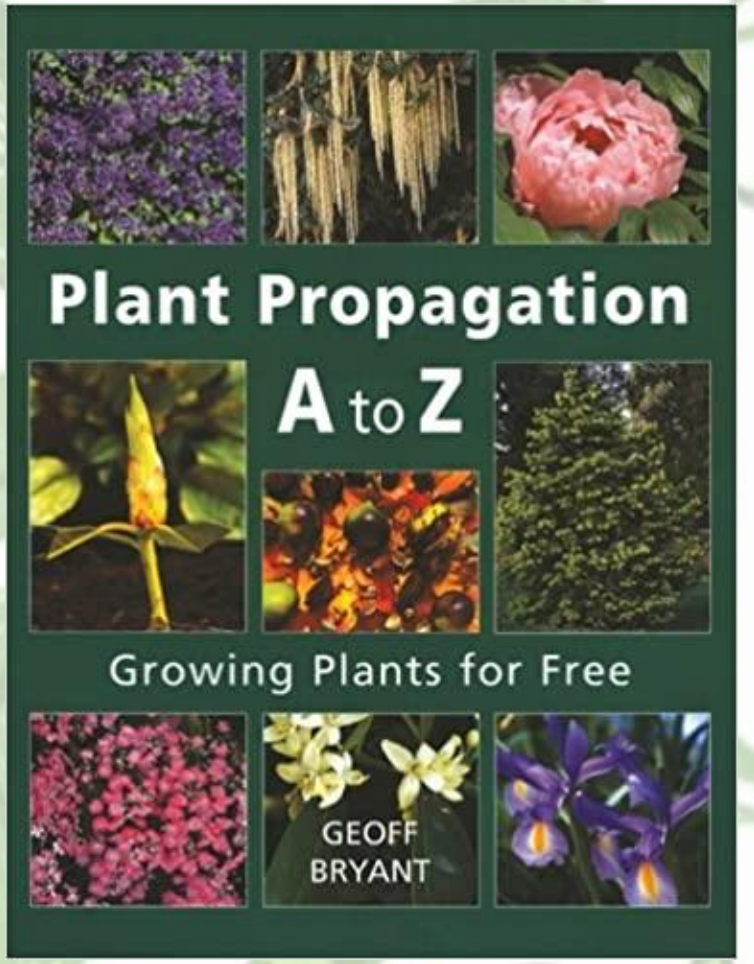
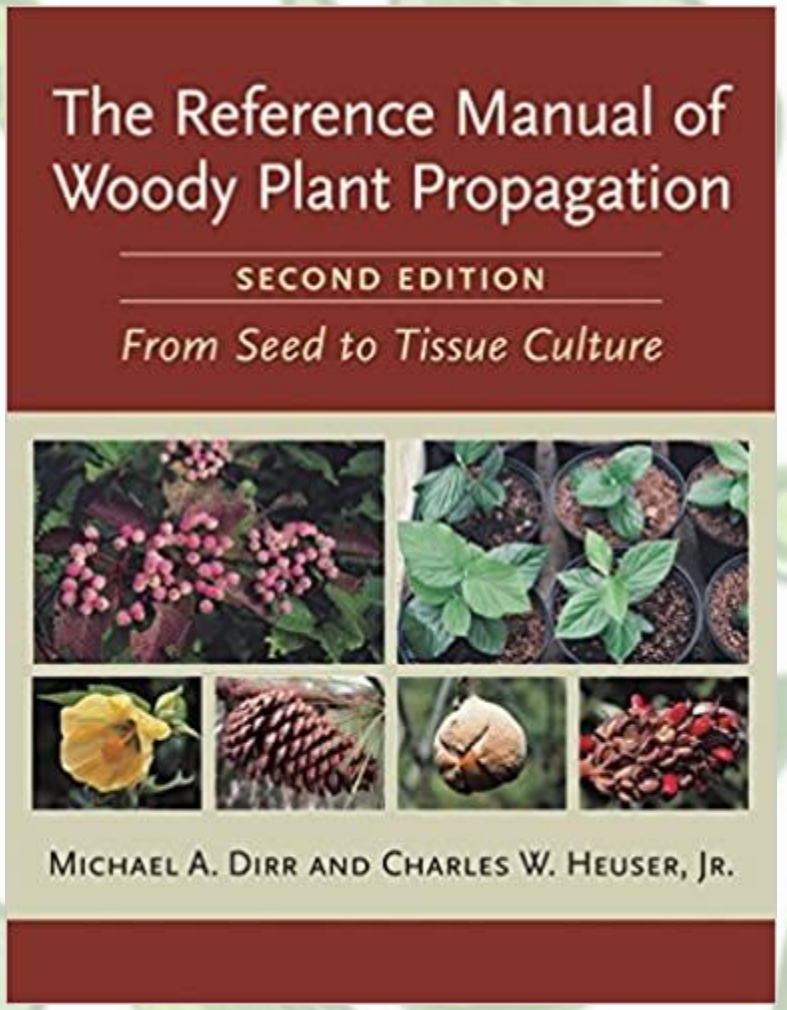
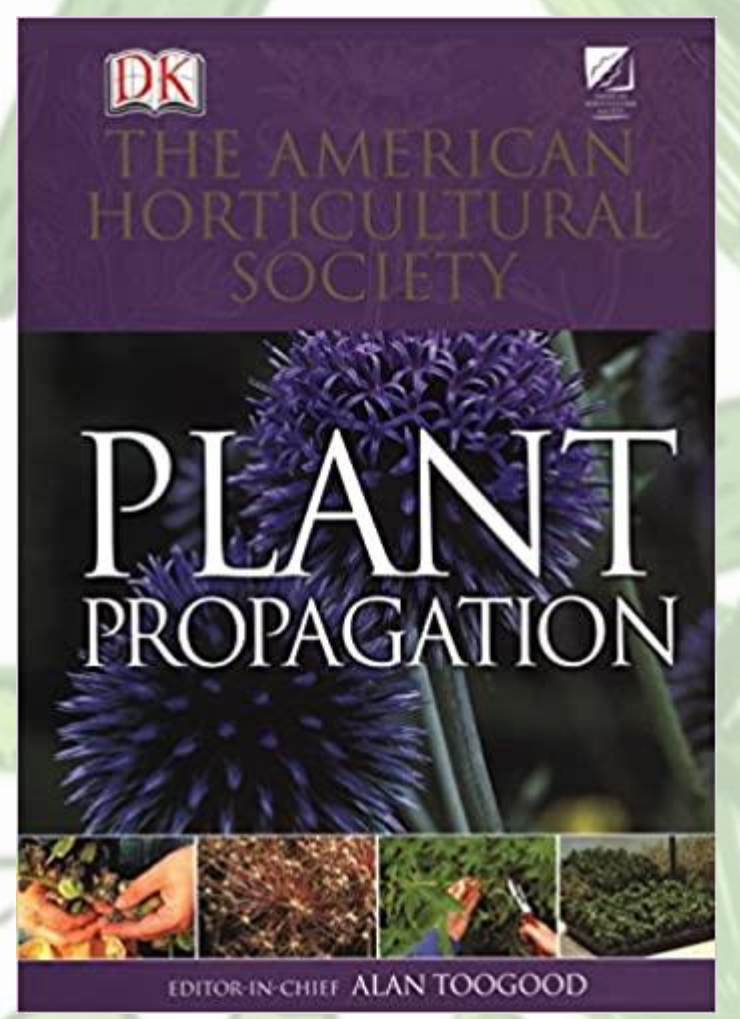
Good Resources







Rooting Hormones

Rooting Hormones are auxins (natural plant hormones) that are involved in cell elongation and adventitious root formation.

1. Difficult or slow to root crops can benefit greatly from rooting hormone application
2. Uniformity and speed of rooting can be increased

Rooting Hormones - Powders

1. Powdered hormone can be applied to basal end of the cutting.
2. Use a duster to apply to the stem only.
3. Avoid getting powdered hormone on the leaves.
4. Do not dip the stem into a container of hormone….this is a sanitation risk.
5. Do not coat the stem with a solid layer of powder.
6. Tap the cutting to remove excess powder before sticking.

Rooting Hormones - Liquid

1. IBA can be applied as a liquid basal application with typical rates of 500-1000ppm.
2. Dip N Grow and Rhizopon AA are two commonly used hormones for this type of application
3. Do not allow solution to get on the stems or leaves of the cutting.
4. Do not dip stems directly into the solution.....this is a sanitation risk.
5. Make a dilution in a separate containter (often provided)

Advantages of Vegetative Propagation

1. Produce More Plants Faster
2. Propagate Plants That Do Not Produce Viable Seed
3. Produce Plants Identical to Parent Plant
4. Produce Plants Past the Juvenile/Seedling Stage

Vegetative Propagation Methods

1. Division
2. Layering
3. Storage organs
4. Grafting
5. Tissue Culture
6. Cuttings

Divisions

1. Separation of one plant into several self-supporting ones
2. Generally confined to herbaceous perennial plants

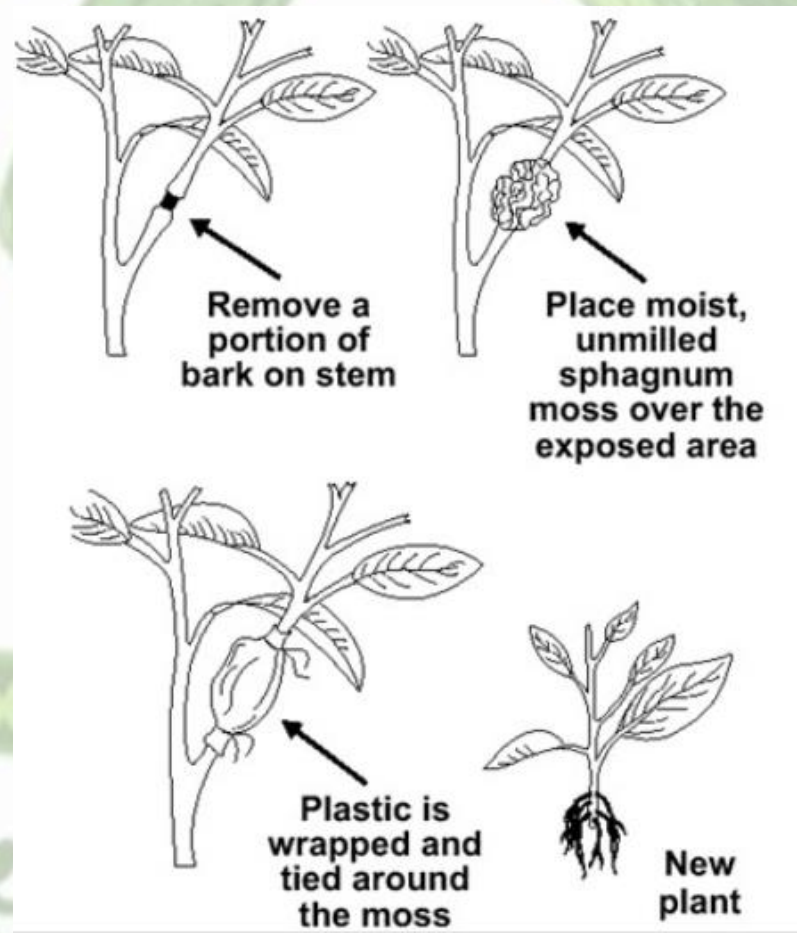
Layering

Layering - plants form new roots and entire plants where stems contact the soil or medium

1. Air-layering – wrap moist media around a wounded stem
2. Simple layering – branch is bent to make contact with soil
3. Tip-layering – arching stem tip is buried
4. Trench-layering – bury whole stem which is later dug and divided
5. Mound Layering – Mounding soil around the plants crown

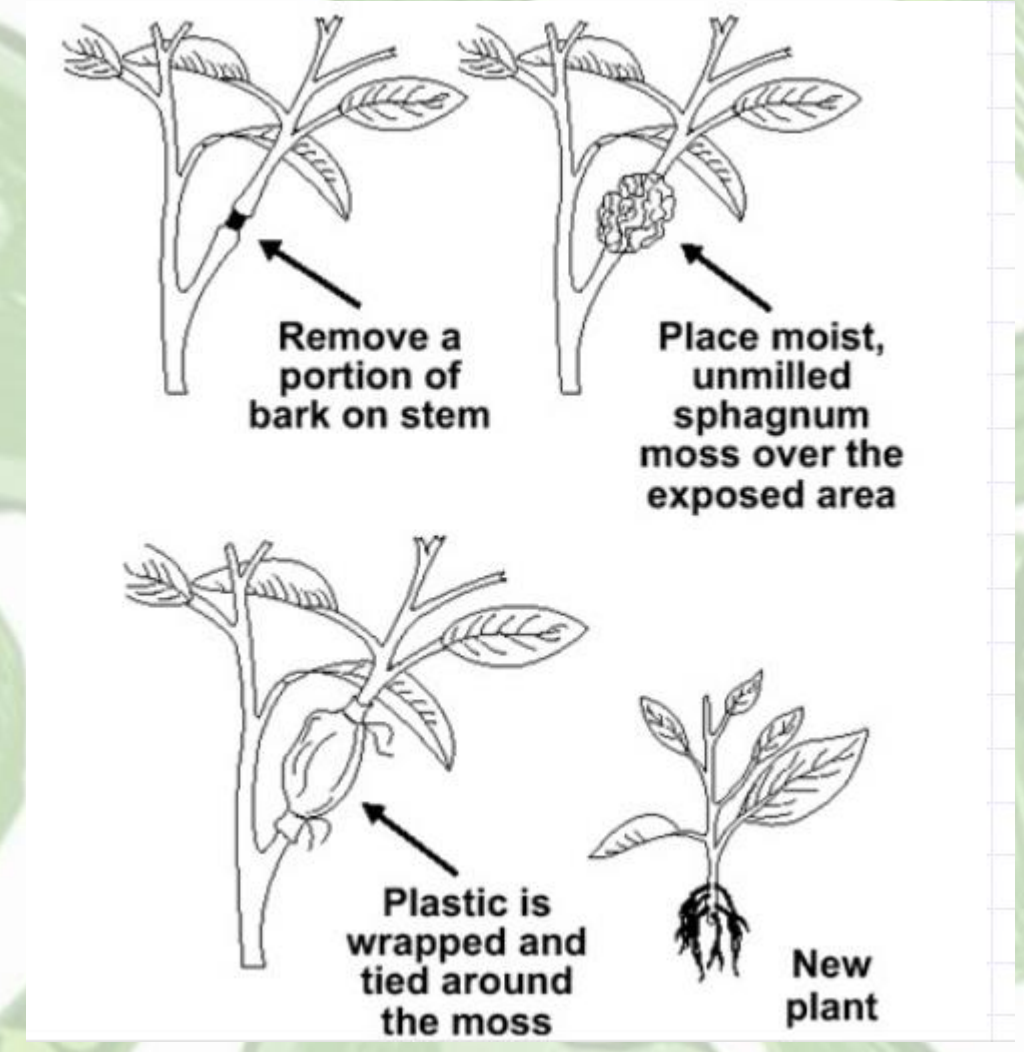
Air-Layering

1. Select a stem about the size of a pencil and and measure 12-15 inches from the branch tip.
2. Remove the leaves and any twigs on the stem 3-4 inches above and below the layering point so the stem is completely clear of any foliage.
3. Make parallel score cuts on the branch to create a 1-inch ring and remove the bark to expose the bright inner green of the cambium layer.



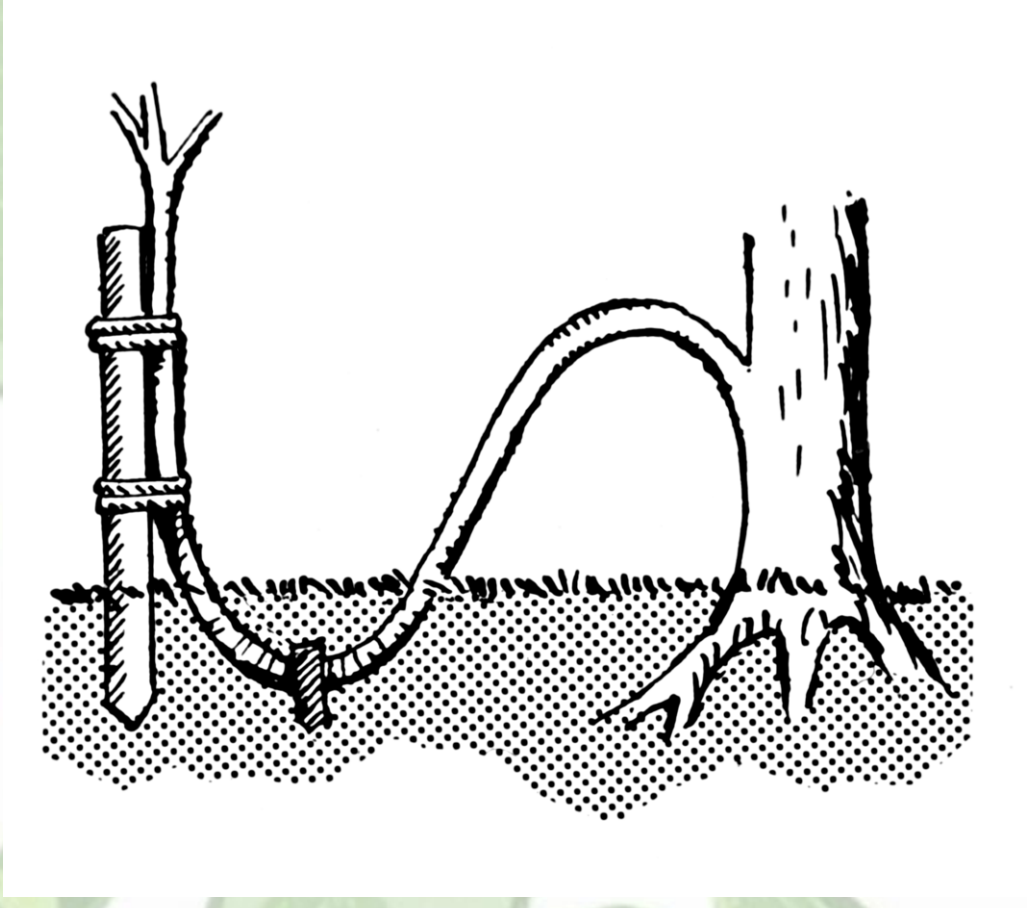
Air-Layering

4. Dust the exposed area with rooting hormone and wrap the exposed site on the branch with damp sphagnum peat moss that has been soaking in water for several hours.
5. Using wire twist ties, secure plastic wrap around the moss bundle on either on either side of the girdled branch.



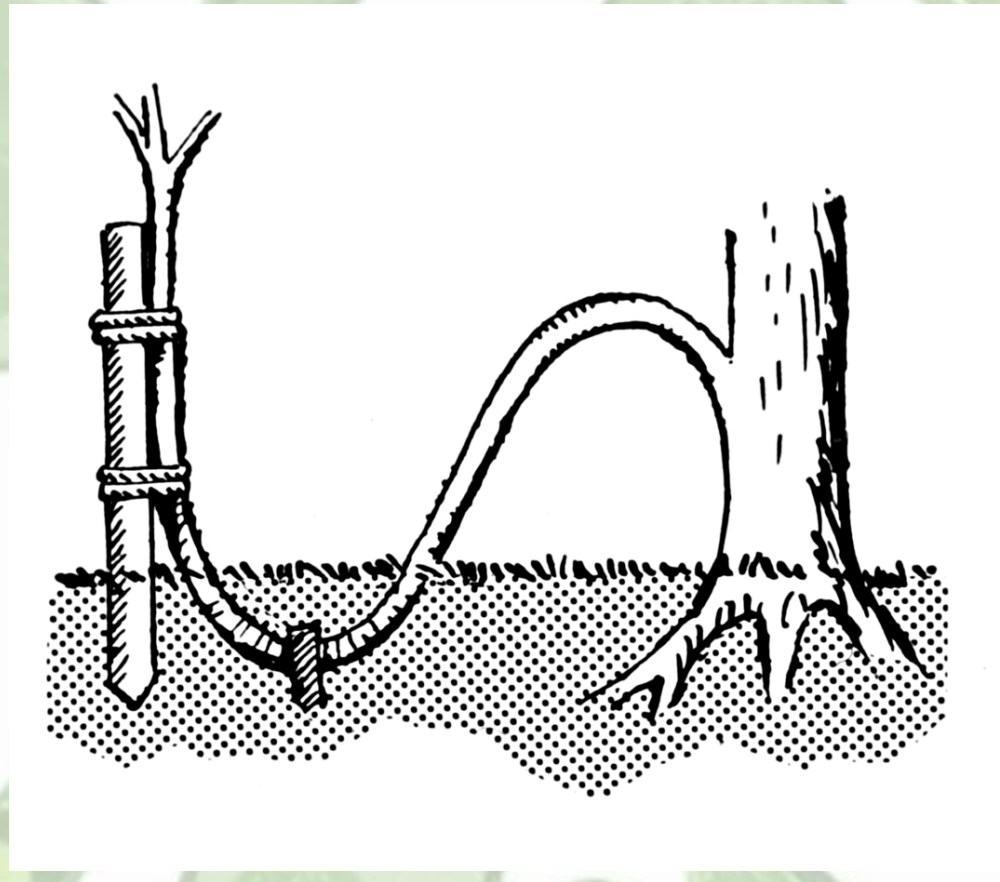
Simple-Layering

1. Choose a low growing branch about a pencil-width in diameter.
2. Remove any leaves where the branch will contact the ground
3. Wound its underside using a sterilized knife to create small thin slits.

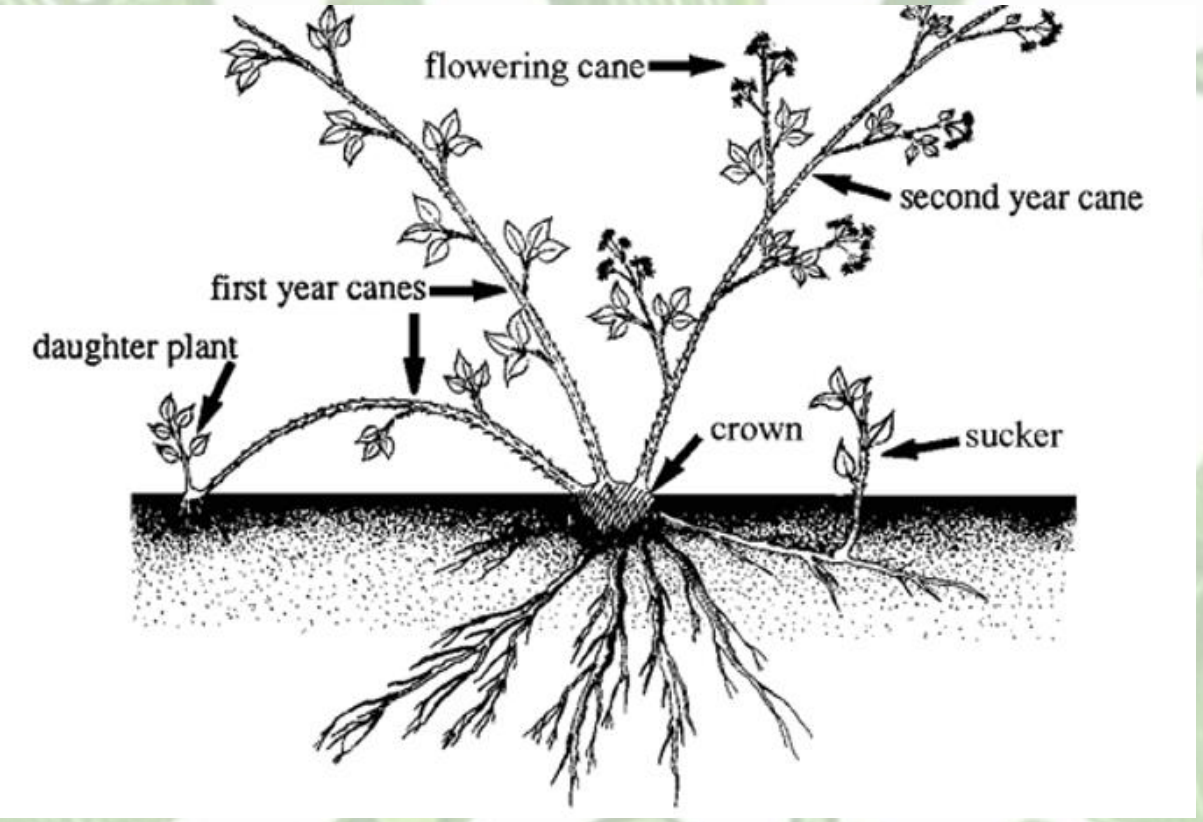


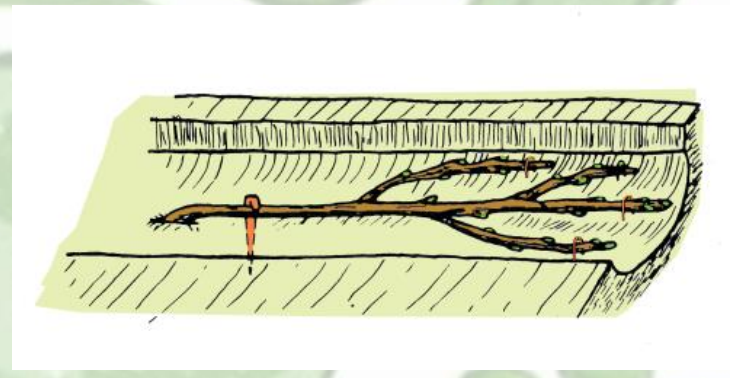
Simple-Layering

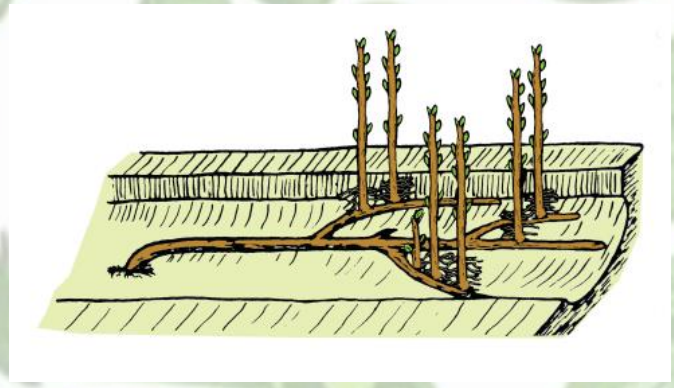
4. Dig a shallow trench where the branch meets the soil and dust the wounded, exposed branch with rooting hormone.
5. Bury the wounded portion of the stem.
6. You can stake the branch's tip above ground with a small wood stake to ensure that it grows straight.

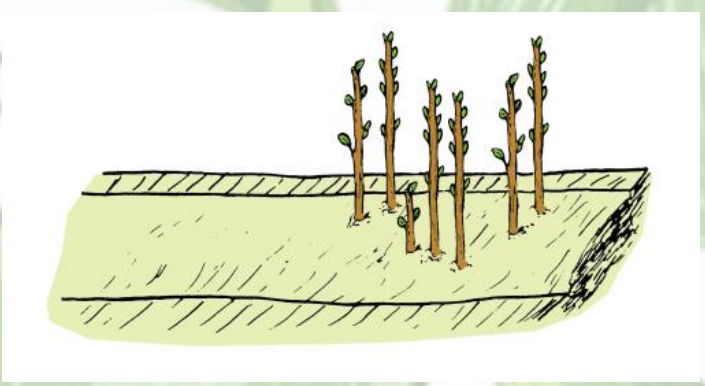


Tip-Layering and Trench-Layering



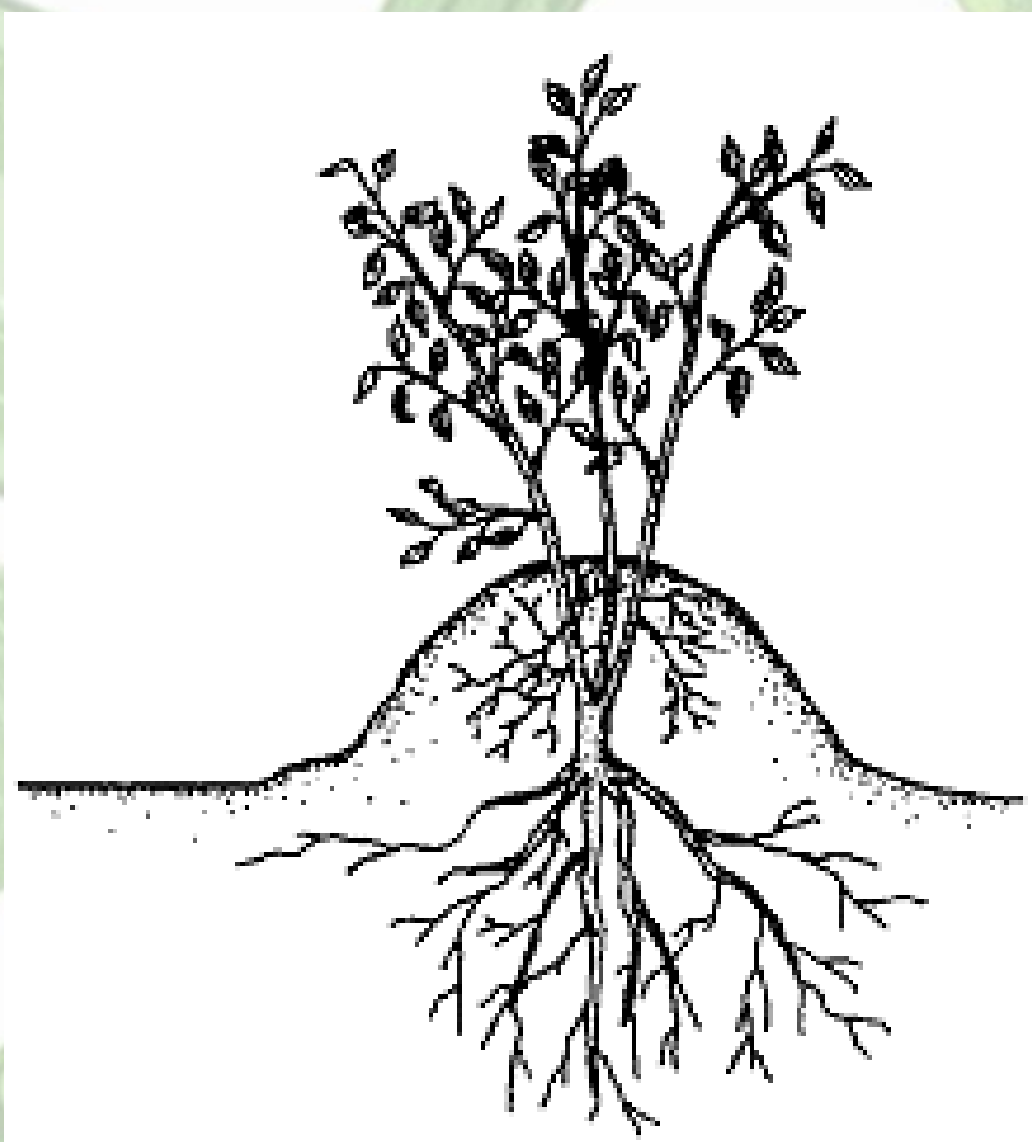






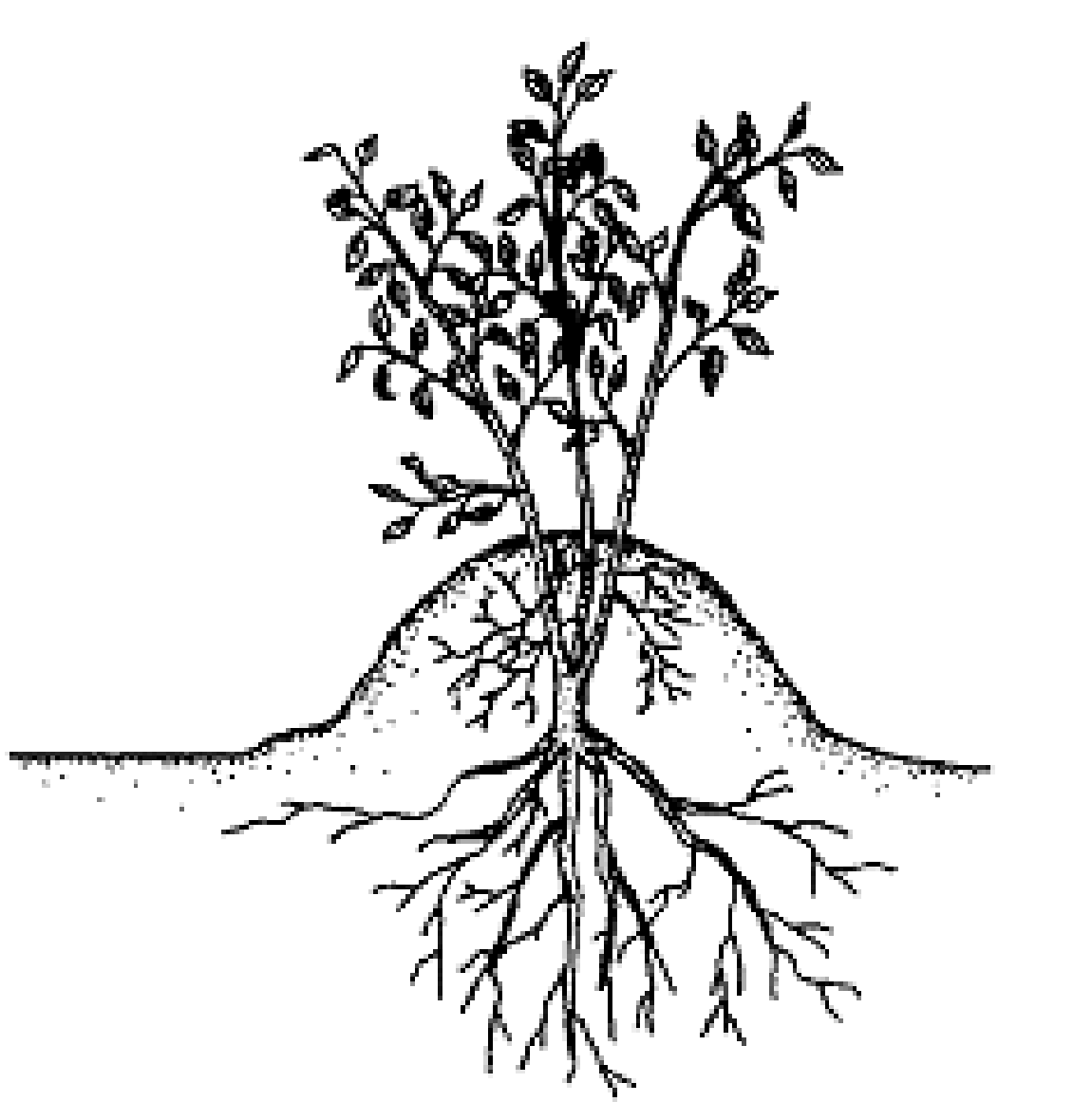
Mound-Layering

1. Cut the plant back to 1 inch above the soil surface in the dormant season.
2. Dormant buds will produce new shoots in the spring.
3. Mound soil over the new shoots as they grow.



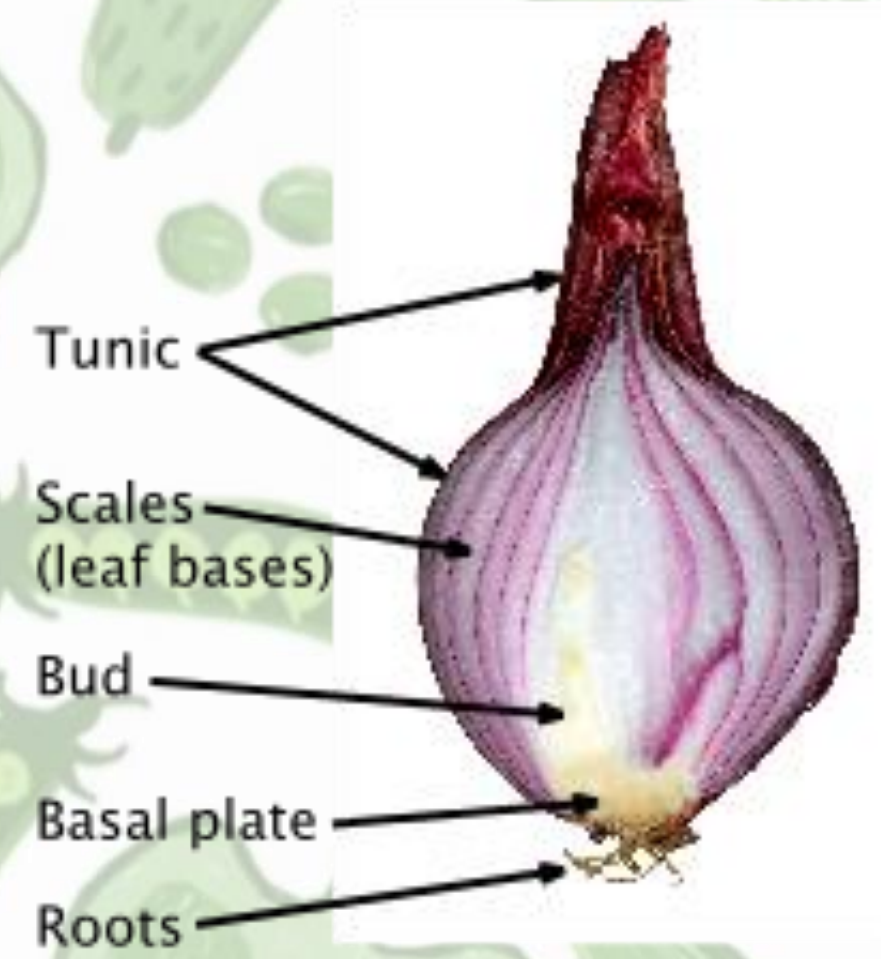
Mound-Layering

4. Roots will develop at the bases of the young shoots.
5. Remove the mound and cut away the new plants during the dormant season.



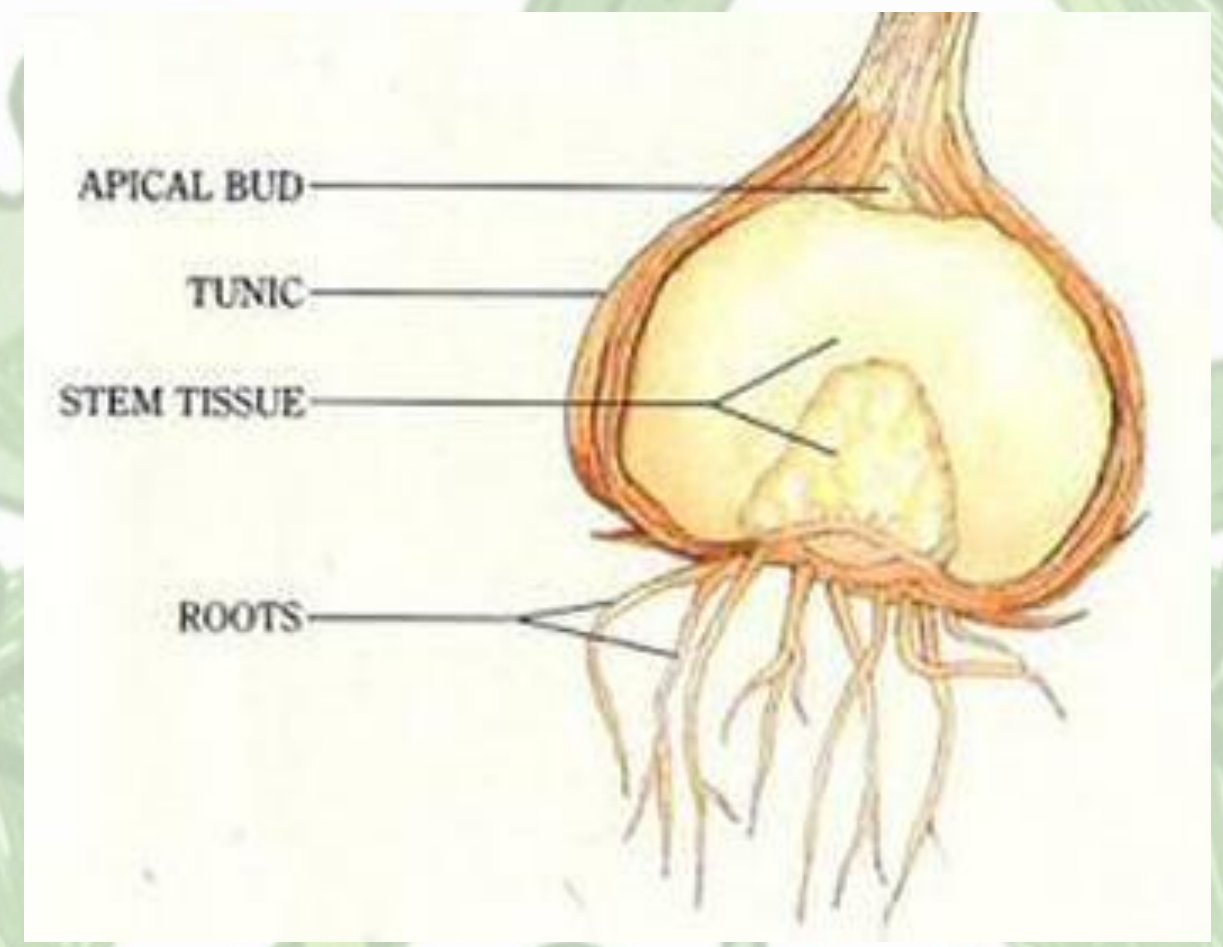
Storage Organs - Bulbs

1. Botanically, a true bulb is a short stem with fleshy leaves or leaf bases that function as food storage organs during dormancy.
2. In gardening, most underground plant storage organs that can produce a new plant are called just "bulbs“.



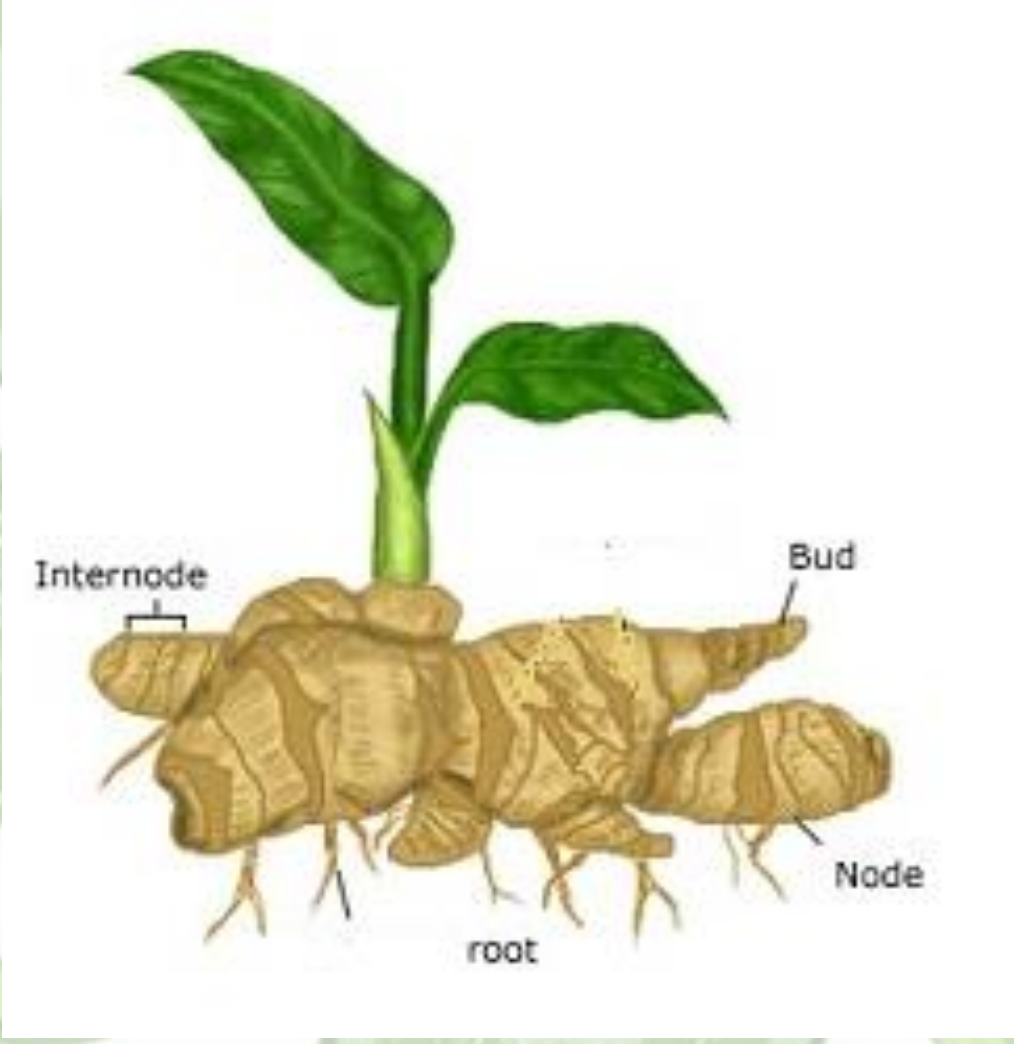
Storage Organs - Corms

A corm is a short, vertical, swollen underground plant stem that serves as a storage organ.



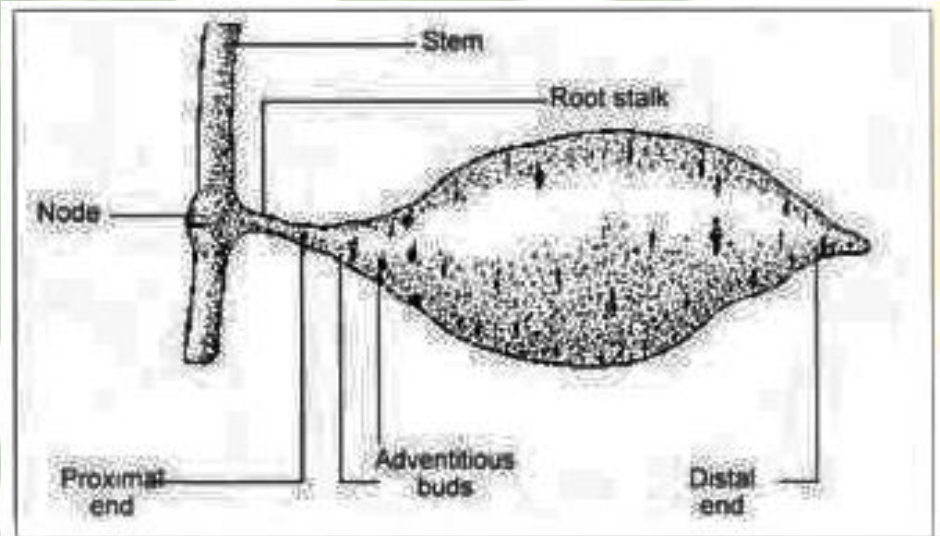
Storage Organs - Rhizomes

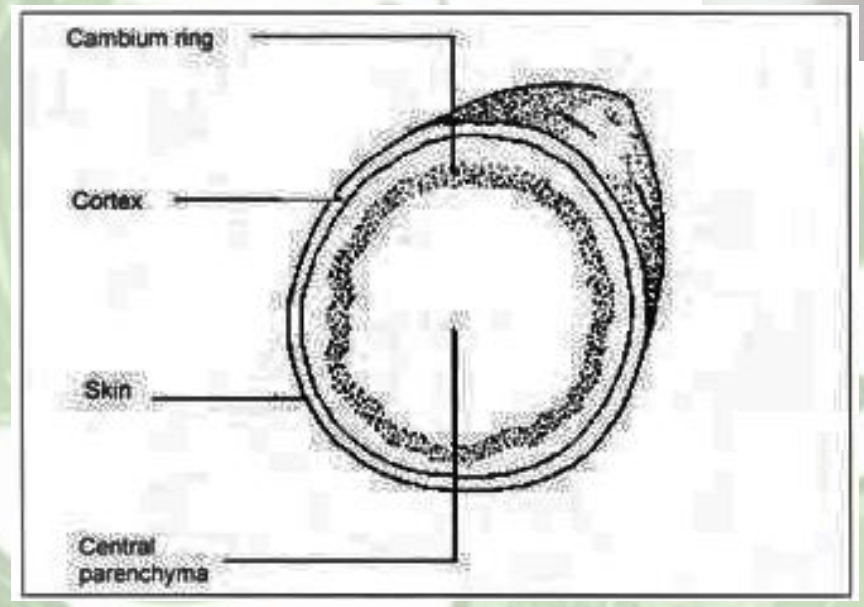
Rhizomes are horizontal underground plant stems capable of producing the shoot and root systems of a new plant.



Storage Organs - Root Tubers

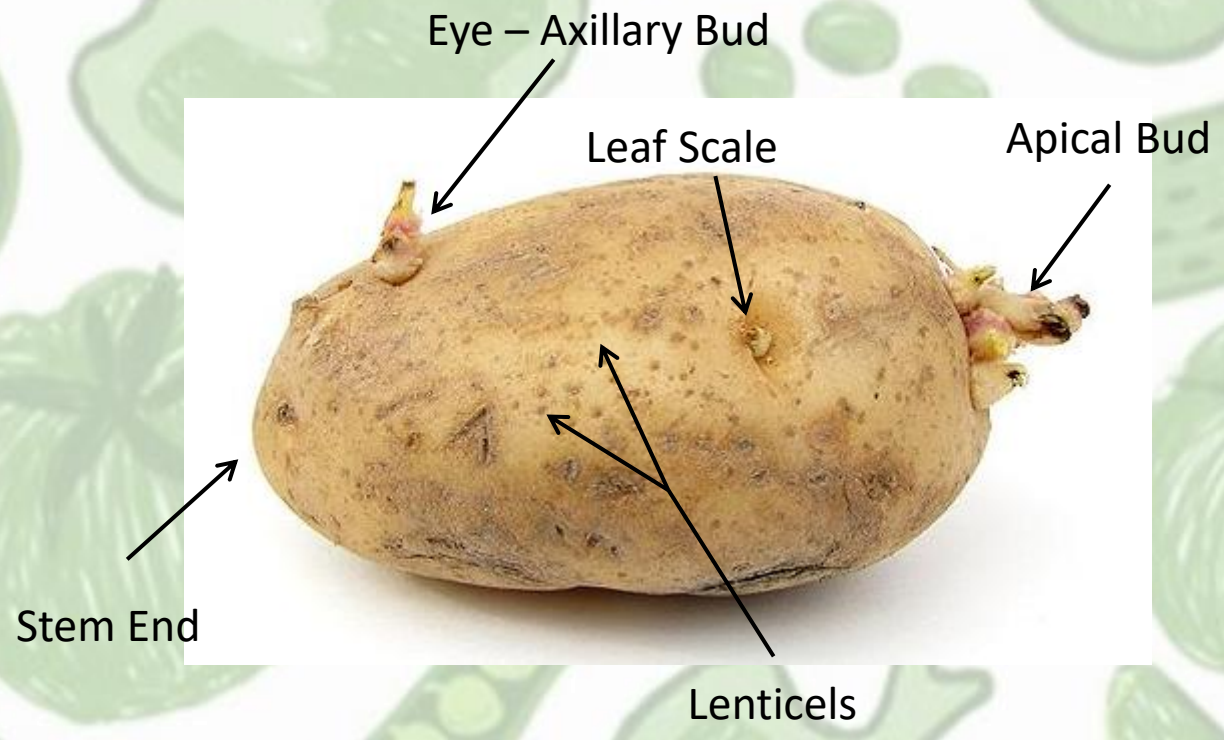
A root tuber is a swollen modified lateral root that functions as a storage unit for the plant.





Storage Organs – Stem Tubers

A stem tuber is a swollen modified underground stem that functions as a storage unit for the plant.



Grafting

1. Grafting -The joining of two separate plants so they function as one
2. Grafting is a skill, a science and an art.
3. Labor intensive
4. Grafting can add disease resistance and size control to the scions (top growth)

Tissue Culture

Plant tissue culture is defined as culturing plant seeds, organs, explants, tissues, cells, or protoplasts on a chemically defined synthetic nutrient media under sterile and controlled conditions of light, temperature, and humidity.

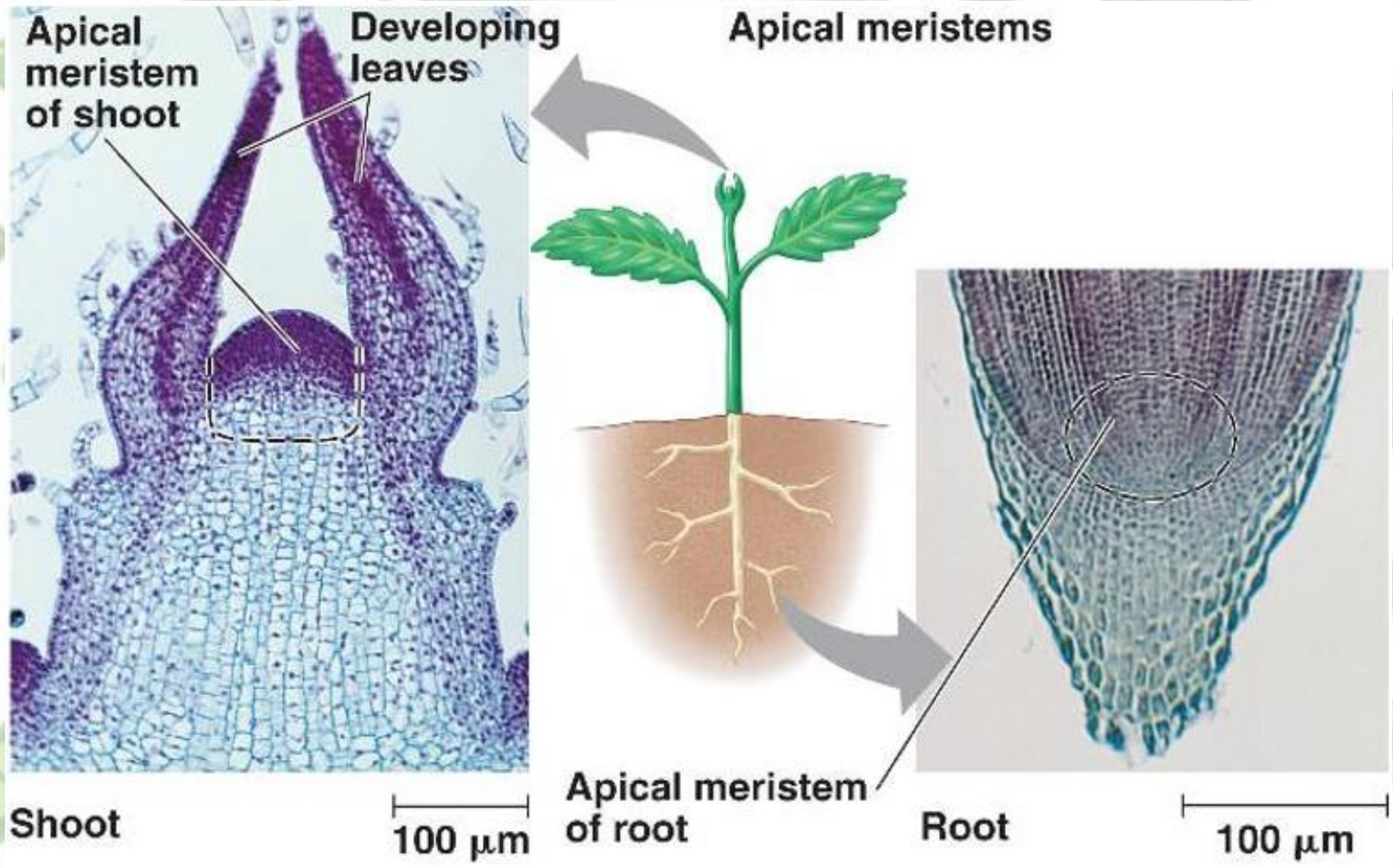
Cuttings

1. Most plants have the ability to regenerate a whole new plant from a small piece of tissue or even one single cell (totipotent)
2. Plants appear to be unique in this phenomenon
3. When you take cuttings, you exploit this phenomenon

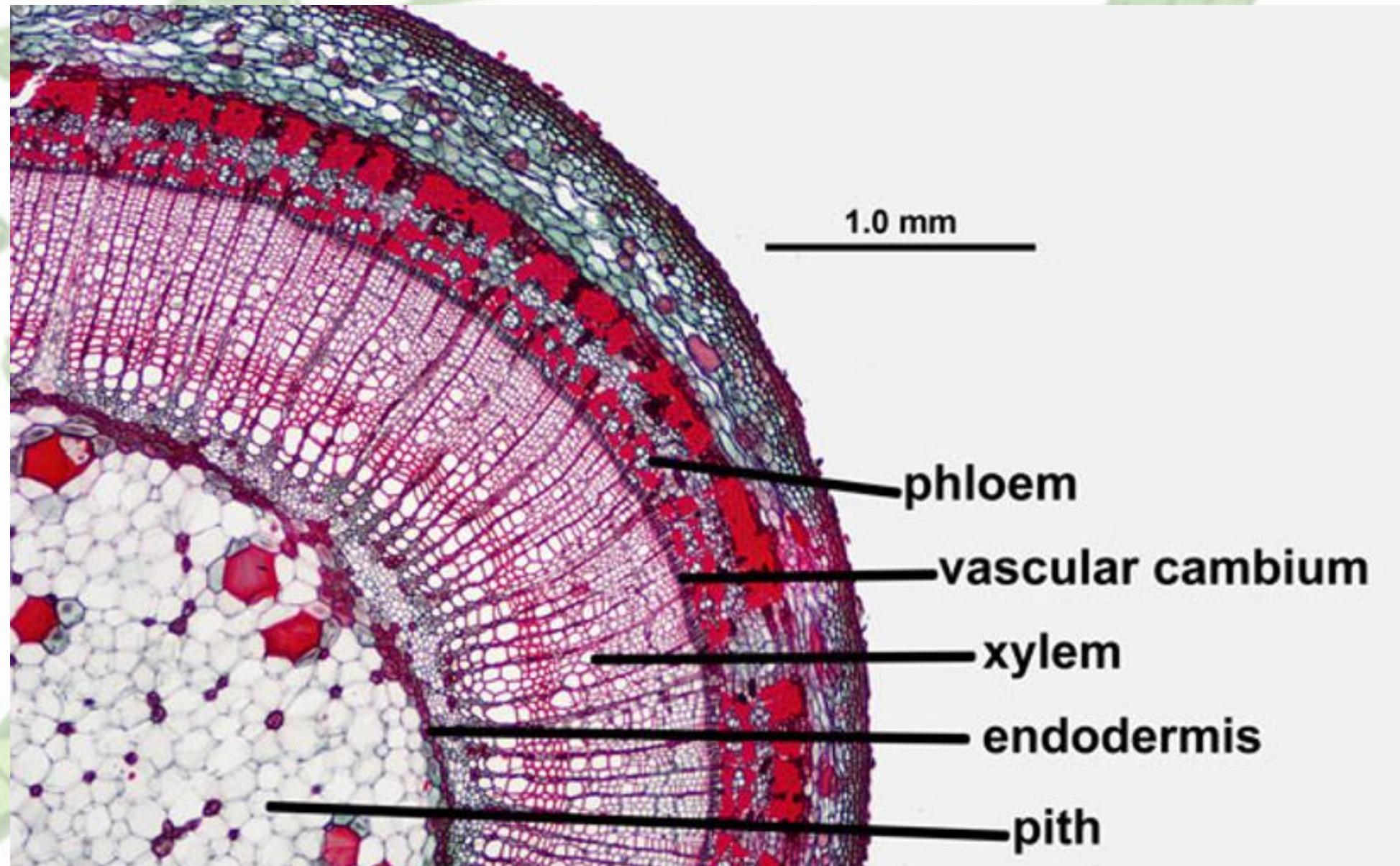
Cuttings

1. Difficult to change a mature, differentiated plant cell
2. Meristematic cells are undifferentiated cells found in specific areas of the plant
3. Meristematic cells can divide indefinitely to produce new cells
4. These meristematic plant cells can differentiate into new plant parts and entire plants
    1. Shoot tips
    2. Root tips
    3. Vascular cambium

Cuttings – Meristematic Tissue

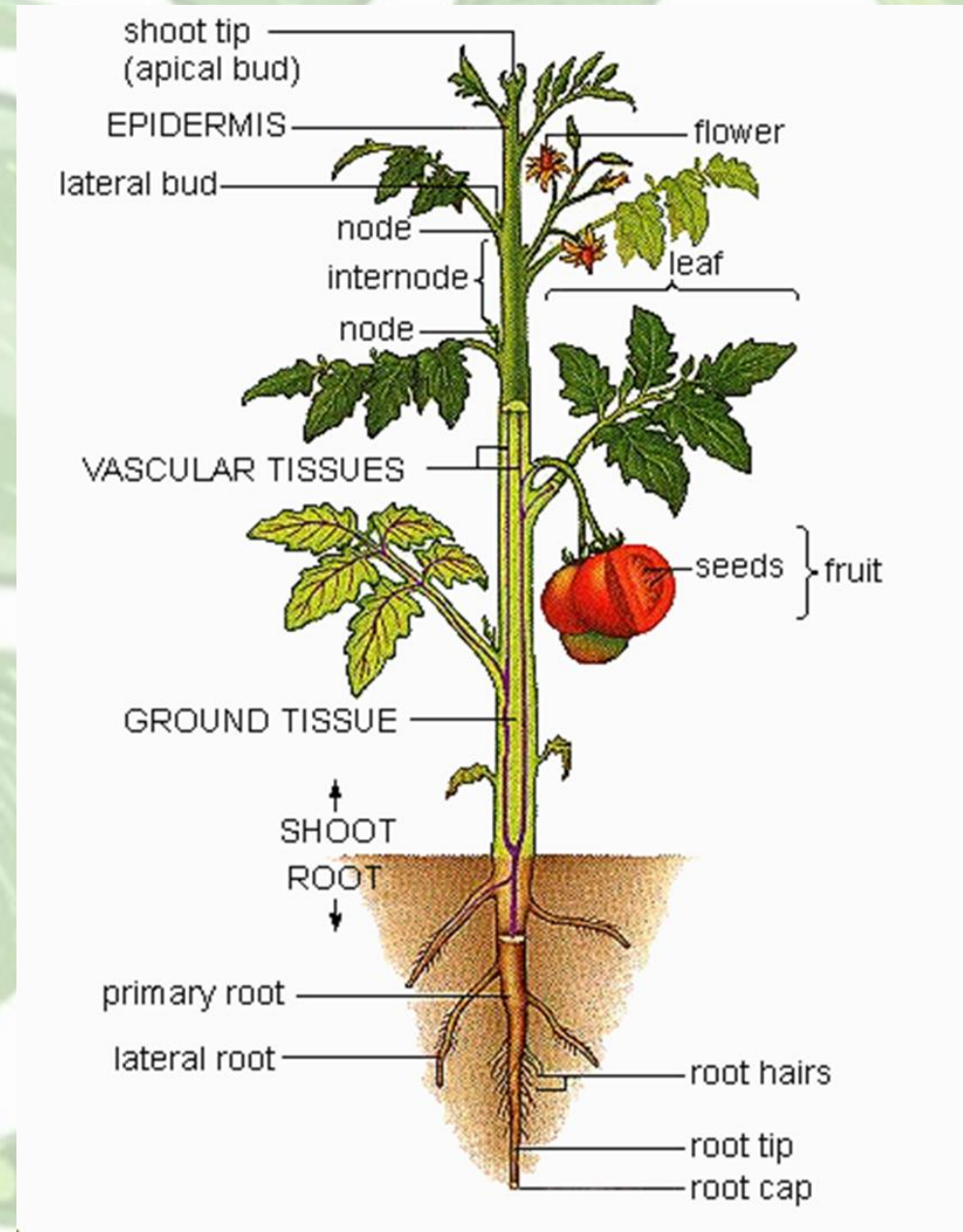


Cuttings – Meristematic Tissue



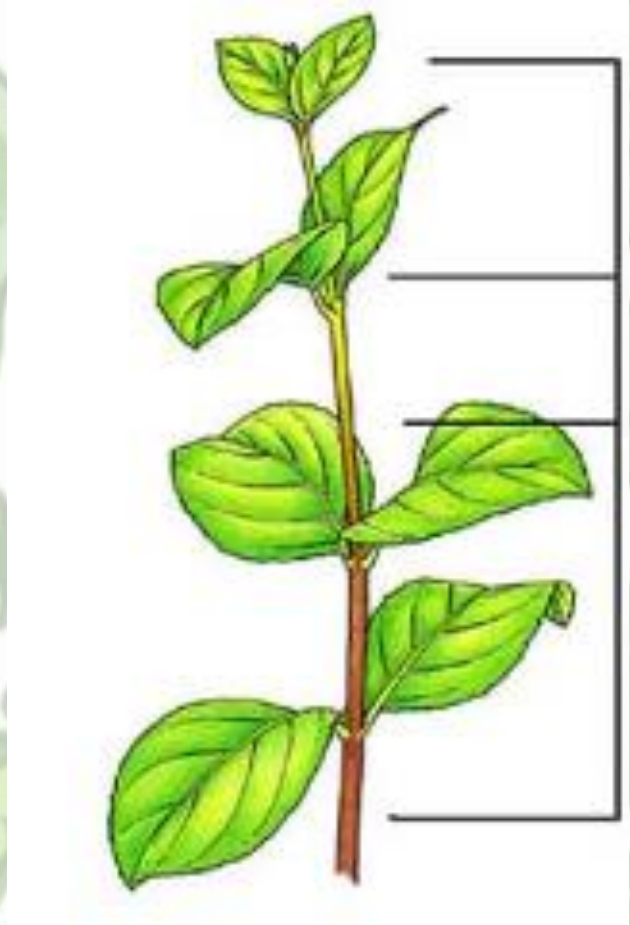
Types of Cuttings

1. Stems
2. Leaves
3. Roots



Types of Stem Cuttings

1. Softwood – spring, soft succulent new growth
2. Semi-hardwood – summer, recent growth, begun to harden
3. Hardwood – late fall, 1 yr. growth



Taking Stem Cuttings

Softwood Cuttings – first flush of new growth

1. Take cuttings in the morning or a cool part of the day with a very sharp knife or pruners
2. Put cuttings in plastic bag and cooler.
3. Dip in rooting hormone
4. Make hole in rooting media, then insert cutting

Taking Stem Cuttings

Semi-hardwood Cuttings – axillary buds have formed

1. Cut just below a node with a very sharp knife or pruners
2. Trim leaves to reduce moisture loss
3. Wounding may or may not be necessary
4. Dip in rooting hormone
5. Make hole in media, then insert cutting

Taking Stem Cuttings

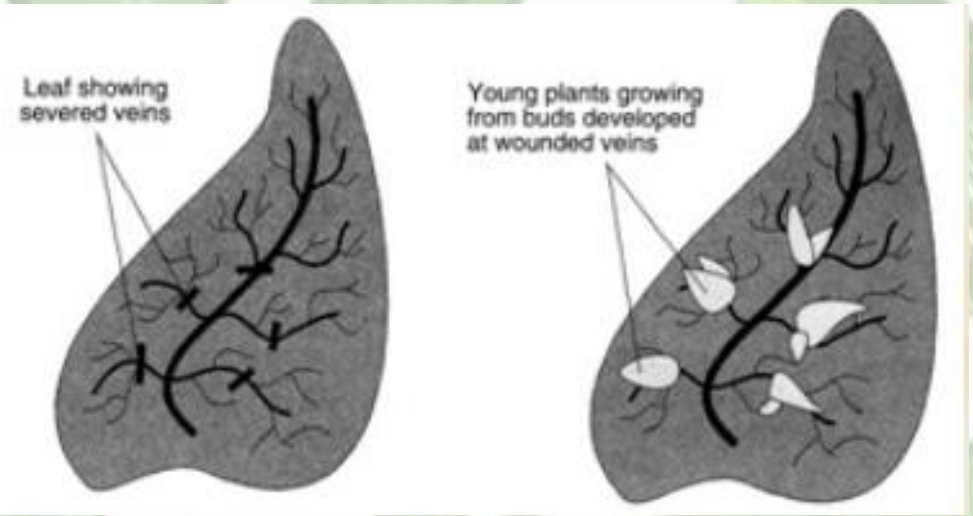
Hardwood cuttings – dormant mature stems

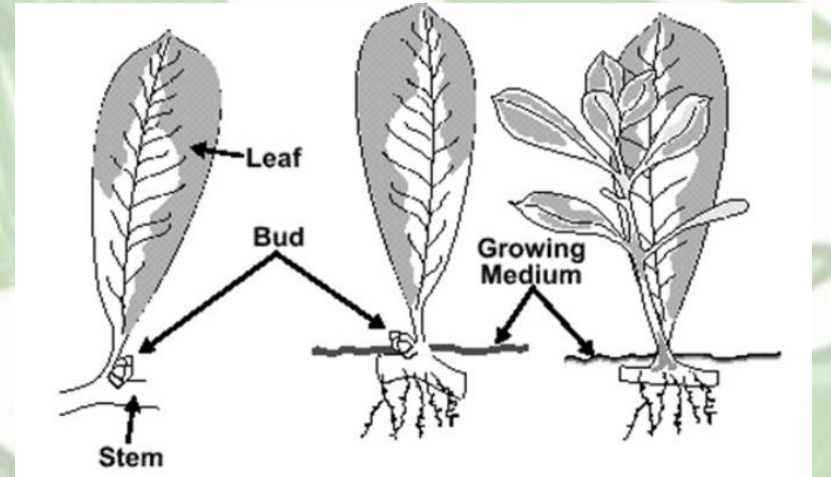
1. Take cuttings before spring growth begins or just after the last leaves fall using very sharp pruners
2. Cut at the junction of 1 and 2 year old wood
3. Discard Semi-hardwood section
4. Remove/reduce leaves
5. Wounding may be necessary
6. Dip in rooting hormone
7. Stick in rooting media

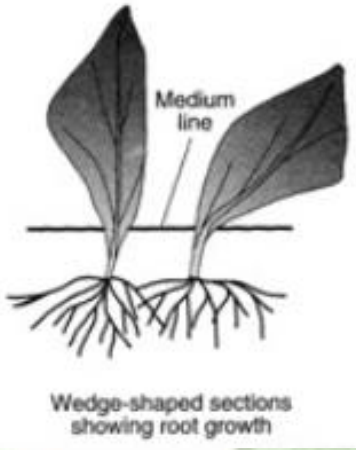
Types of Leaf Cuttings

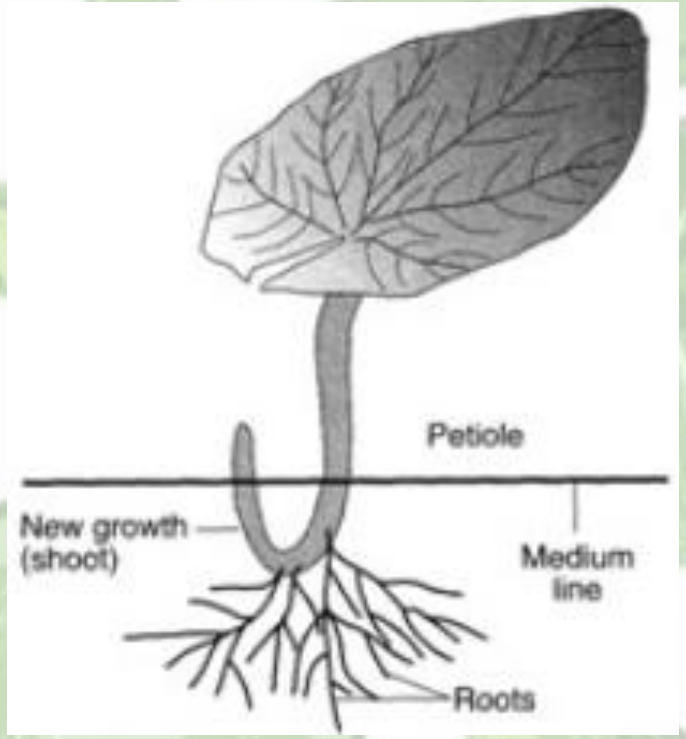
A Leaf Cutting Consists of:

1. Leaf blade only
2. Leaf blade and petiole
3. Leaf blade sections
4. Leaf bud cutting (leaf, petiole, stem piece with bud)









Root Cuttings

1. Root cuttings are pieces of root cut from plant roots
2. Take cuttings late winter or early spring, before the plant breaks dormancy. Roots have high levels of carbohydrates before they begin their spring growth.
3. Dig up the parent plant and cut a 2- to 3-inch root tip. Use a very sharp knife or pruners
4. Replant the parent plant immediately.
5. Lay cuttings horizontally on moist starting mix. Remember: the shoots grow from the cut ends.
6. Cover the root pieces with about a half-inch of mix.
7. If you have thick pieces of root, plant them vertically with the cut end up.

Rooting Media

Varies depending on the type of cutting and cultural practices

Media needs to:

1. Hold Moisture
2. Provide Good Aeration
3. Have Good Drainage
4. Be Disease and Weed Free

Rooting Media

Commonly used:

1. Peat moss and perlite – good moisture retention, good aeration
2. Vermiculite – good moisture retention
3. Sand – good aeration
4. Sand and peat moss – good mix of moisture retention and aeration

The Propagation Environment

Most plants will require a controlled environment while forming roots

1. Humidity
2. Light
3. Temperature

Humidity - Critical

1. 98-100% constantly
2. Leaves can absorb water, gentle intermittent mist is advantageous
3. Moist, sealed environment

Light

1. Light drives photosynthesis
2. Photosynthesis requires water
3. Photosynthesis provides food to developing roots
4. Too much light will burn and dry out plants because they don’t have any roots yet
5. Most plants root best in filtered light or light shade

Temperature

1. Most plants root best at 70°F
2. Can root as low as 55°F
3. Higher than 75°F may promote pathogens

Rooting “Chambers”

Potential Problems

1. Diseases from constant moisture
2. Insect pests can explode in controlled and confined environment
3. Weeds and algae can become a problem
4. Enclosed and sealed environments can get hot very fast

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