Propagation
This is NOT the focus of this talk!
Plant propagation is as much an art as it is a science.
Two Broad Categories of Plant Propagation:

• Asexual/vegetative:

• Sexual:
Asexual propagation is basically the heart and soul of horticulture.
Cutting Terminology:

1. Source of the cutting
   a. leaf
   b. stem
   c. root

2. Type/age of stem wood
   a. softwood
   b. semi-hardwood
   c. hardwood
Root Cutting
Root cuttings sprouting
Stem Cuttings
Types of cutting

• The terms ‘softwood’, ‘semi-hardwood’, and ‘hardwood’ are used to describe the relative amount of woody tissue in a stem.

• Softwood- 3-4 weeks
• Semi-hardwood 6-9 weeks
Softwood Stem Cuttings

- The term herbaceous cuttings is used for non-woody plants like geranium, coleus, chrysanthemum.
Softwood Cuttings

- **Softwood cuttings** are soft, succulent, new growth of woody plants.

- just as it begins to harden (mature). Shoots are ready when they can be snapped easily when bent.

- For most woody plants, this stage occurs in May, June, or July.
Softwood Cutting

Softwood is the term used to describe the stage of growth on a deciduous woody plant that’s neither the new, green growth at the end of a shoot nor the stiff, woody growth near the base of the stem. The softwood lies between the two. The best way to know if a shoot has reached the softwood stage is to bend it. If the softwood snaps, the shoot is ready to be taken as a cutting. If the shoot is very flexible and doesn’t snap, it’s too green. If the shoot is not flexible at all, it is too far gone.
This Viburnum was stuck in a pure sand bed on July 22, treated with rooting hormone, and rooted by August 25!
Hardwood – dormant,

- wisteria,
- spirea,
- crape myrtle
- roses
Hardwood Cutting
Time of year to take cuttings?

*for broadleaf plants (dogwoods, forsythia, Viburnum, spirea), in general, the best time is following a spring flush

• for evergreen plants (spruce, junipers, arborvitae), in general, the best time is after exposure to cold temperatures (late fall/winter)
Today, plant propagation is just like cooking. Books and the internet are full of ‘recipes’ for propagating plants by seed and cuttings. These recipes are helpful in deciding when to propagate and what is required.
Given a preference, choose the terminal cutting on the right that has not set a flower bud. IF all shoots have flowers/flower buds, simply remove prior to sticking cutting.
Rooting Media

- In general terms, we are want:
  - sterile,
  - well drained,
  - and provides for adequate aeration.
Rooting Media

• The most common components would be: coarse perlite, coarse vermiculite, peat moss, or sand.
Favorite media recipes:

- ✔ 50% coarse perlite: 50% peatmoss
- ✔ 50% coarse perlite: 50% coarse vermiculite
- ✔ 100% coarse perlite (well drained!)
- ✔ 100% sterilized, coarse sand
Effect of media type on rooting
Callus

- Callus is the white tissue that forms on cut surfaces of the cutting
- It is from callus that roots form.
Typical relationship rooting to top growth
Environmental Considerations for Rooting

- Moisture
- Temperature
- Light
Moisture - air

- Except for dormant cuttings, protect water loss from the leaves.
- Keep the atmosphere around the leaves near 100% humidity.
- Either trap moisture from the media or ‘mist’ the air.
Moisture - media

- Moist, but not too wet!

- A media that holds some moisture but provides for good aeration is ideal.
• For most cuttings, rooting media (65-75° F) than the air temp. (55-65° F).
• promote rooting in the media, but minimize stress on the leaves/stem
Light

- While some sunlight is necessary
- too much can ‘burn’ the leaves.
- Keep cuttings out of direct light.
Remember that until the stem forms new roots it cannot replace water lost through leaves or stems. Low humidity or high temperatures around the cutting can accelerate the water loss process—and stop rooting.
Mist is simply micro-droplets of water
Many choices

Simply trapping soil moisture
other options:
Bottom heat:
Transporting Cuttings
Typical semi-hardwood terminal cutting
Leaves removed to reduce water loss

Nodes (3 node cutting)
Dip cutting in hormone talc

Base will be inserted below media

Dip cutting in hormone talc
Stick cuttings
Place in rooting chamber to elevate moisture around cutting. Avoid direct sunlight.
Air layering: root the stem while it is still attached to the plant.
The first step in air layering an overgrown houseplant is to remove the outer layer of tissue.

Next, moist long fiber sphagnum is packed against the cut to retain moisture and humidity—critical for proper rooting.

After several weeks the new roots can be seen through the clear plastic wrap. When they are several inches long, the top of the plant is ready to be removed.

After several weeks, gently remove the plastic and peat to expose the newly-formed roots.

The old top has become a new plant and the original plant will grow a new top at a friendlier height.
Seed
Seed Propagation

• primary method to propagate annuals & vegetables; some perennials
• Seed propagation is also used to propagate some woody trees and shrubs.
• Advantages include:
  – access to large numbers of propagules
  – ease of harvest/storage.
• The primary limitation is that many plants do not come true from seed.
Natural variability from seeds
Similar to cutting propagation, there are many very complete ‘recipe’ books available. These books outline in detail when to harvest the seed, how to store the seed, how to sow the seed, and post-germination issues.
COLLARD AND KALE

Brassica oleracea

Recommended Cultivar: Tall Utah

Sowing Directions: To get a jump on the season, sow seeds indoors in late winter and transplant the seedlings into the garden in early spring. For very early garden crops, sow indoors 6 to 8 weeks before the last frost. Sow directly in the garden 2 to 3 weeks before the last average frost date. Space seedlings 6 to 10 inches apart within the rows, and space the rows 2 to 3 feet apart. For production of winter kale, plant in fall 1 to 2 weeks after the ground has frozen. After the first hard freeze, protect plants with burlap or straw for winter harvest.

Harvesting Tips: Harvest stalks by cutting off the base at soil level with a knife. Harvesting the base of the stalk will allow the plant to produce fresh new leaves for winter harvest.

Days to Maturity: 80-140

Growing On Temperature: 60°F

Days to Germination: 21-25

Growing Garden Temperature: 70°F

Days to Harvest: 60 days

Harvest Tips: Harvest when the leaves are very tender, usually 8-12 weeks after transplanting. Remove the bottom leaves to encourage new growth. Continue harvesting the outer leaves as they mature. Remove the outer leaves to encourage new growth. Continue harvesting the outer leaves as they mature. Remove the outer leaves to encourage new growth. Continue harvesting the outer leaves as they mature. Remove the outer leaves to encourage new growth. Remove the outer leaves to encourage new growth.
Collection/harvest of seed:

• Consult books for time and method for harvesting seed.

• In many cases, the pulp/flesh of certain fleshy fruits is removed before storage or sowing the seed.
Scarification typically involves soaking the seeds in concentrated acid or hot water, or, by mechanical etching using a file or sand paper. Use of the acid method is recommended only for professionals!
Scarification

• rub small seeds between layers of sand paper or use a file on larger seeds.
Stratification

- Stratification: Cool, moist storage period.
- Mimicking Mother Nature.
Oak seed (acorns) in a stratification tray
Seed Germination

- Again, consult ‘recipe’ books for specific requirements (light, temperature) for your type of seed.
Covering seed. depth of planting, etc.
Germination chamber
Light requirements
First true leaves

Cotyledons (‘seed leaves’); 2 cotyledons so a dicot
Woody Plant example: Oakleaf Hydrangea

1 week

4 weeks

Harvest seed

Sow seed
Asexual Propagation

• Grafting, budding, division
• Used to maintain traits of the parent plant.
Dividing Perennials

- Divide spring bloomers in the fall
- Divide fall bloomers in the spring
- Summer bloomers can be divided spring or fall.
Division
Form of vegetative propagation.
Common for daylilies, hosta, iris, etc.

Divide rhizome (‘fan’)
Layering
Grafting

- more expensive and difficult
- commonly used in the production of most fruit and ornamental trees
Grafted Trees

English Walnut

Weeping Cherry
Side-veneer grafting: Step #1

- Slice a vertical slit through the ‘bark’ of the rootstock.
- Across the top of that slit, make another short slice.
- Basically a ‘T’ cut.
Side-veneer grafting: Step #2

Fold ‘bark’ back to form a pocket
Side-veneer grafting: Step #3

Prepare scion. In this case we are grafting a weeping tree (scion wood) onto the rootstock of the same species that grows
Side-veneer grafting: Step #4

Prepare scion wood by slicing to form a flat faced point.
Side-veneer grafting: Step #5

Insert scion into pocket in rootstock. Concerned about good fit.
Side-veneer grafting: Step #6

Wrap union with grafting tape to hold pieces together until union forms.
Only time will tell