

HORT 201
Plant Propagation
Laboratory Exercise 4

Softwood Stem, Herbaceous Stem and Leaf Cuttings

Reference: Text pp. 350-354.

Key Words and Terms from the CD:

Adventitious roots, adventitious shoot formation, adventitious shoots, auxins, callus, cambium, chimera, cuttings, desiccation, direct sticking cuttings, distal, herbaceous cuttings, humidity, intermittent mist, kinetin, leaf cutting, mericlinal chimera, mist systems, periclinal chimera, phloem, proximal, root initials, root primordia, softwood cuttings, stages of root formation, talc auxin treatment, virus indexed, xylem.

Objectives:

1. To learn how to make herbaceous stem, leaf and leaf-bud cuttings.
2. To determine the effect of different auxin concentrations on rooting of chrysanthemum cuttings.
3. To observe cultivar differences in rooting ability of chrysanthemum cuttings.
4. To determine the effect of petiole length on plantlet formation in leaf cuttings. (*Saintpaulia*, *Peperomia*)
5. To observe plantlet formation in different kinds of leaf cuttings. (Jade plant, *Begonia rex*)
6. To observe the effects of leaf chimeras on type of plant formed. (*Sansevieria*)

Introduction:

The term "softwood" refers to the succulent nature of stem cuttings taken from new growth of woody plants. Such cuttings are usually harvested in the spring after the first flush of growth. Herbaceous cuttings are stem cuttings from herbaceous plants which can be harvested any time the plant is actively growing. Leaves are essential because there is little stored carbohydrate in newly-formed wood or in herbaceous stems. These cuttings are most often used to propagate deciduous woody shrubs (e.g. lilac, forsythia, weigela, spirea) and florist crops (e.g. poinsettias, chrysanthemums, carnations, geraniums, hydrangeas). Some deciduous trees (e.g. peach) and conifers (e.g. oriental arborvitae) can be propagated by softwood cuttings. Disease control and prevention of desiccation are of great importance with these types of cuttings. Rooting usually occurs quickly (2-4 weeks). Auxin treatment is not usually necessary although it is sometimes beneficial.

Leaf cuttings are a variation of softwood/herbaceous stem cuttings and consist of a leaf blade and its petiole. Individual leaves are harvested, leaving stems and the axillary buds intact on the stock plant. Adventitious root and shoot tissues arise at the base of the petiole, resulting in a new plant. Only a limited number of species can be propagated by leaf cuttings.

Leaf-bud cuttings are variation of leaf cuttings, and consist of a leaf, its petiole, and the subtending bud, taken with a small piece of the stem. These cuttings maximize use of available stock material since each node can make one (alternate leaf arrangement) or two (opposite leaf arrangement) new plants.

Cane cuttings are often used to propagate tropical plants with fleshy stems (e.g. dracaena, cordyline, and dieffenbachia). Each node will root, and a new top will grow out from lateral buds. Leaves are not necessary, as these fleshy stems have enough food reserves to support rooting and shoot growth.

Resources:

Hartmann, H.T., D.E.Kester, F.T.Davies & R.L.Geneve. 2002. *Hartmann and Kester's Plant Propagation: Principles and Practices*, 7th edition. Prentice Hall. (Excellent information on softwood cutting propagation)

Toogood, Alan. 1999. *American Horticultural Society – Plant Propagation*. DK Publishing, Inc. (Good resource on home propagation techniques).

Toogood, Alan R. 2003. *Plants from Cuttings*. DK Publishing, Inc.

Purdue Landscape and Nursery Thesaurus (PLANT)
<http://bluestem.hort.purdue.edu/plant> (select "Propagation" from the Index)

Procedure for Today's Lab:

A. Stem Cuttings

Chrysanthemums: Cuttings were shipped to us from a commercial source (Yoder Brothers Inc.). Note their appearance and the packaging used for shipment.

1. Each group should obtain 20 cuttings of 'Olympia' and 20 cuttings of 'Pele'. 'Olympia' is a white flowered pot mum cultivar and 'Pele' is a bicolor red/yellow cultivar. Both are suitable for culture in gardens or hanging baskets. They both flower in early fall in response to shortening day length.
2. Make a fresh cut through the stem near the base of each cutting so that all are of uniform length. To prevent the spread of pathogens, knife blades should be dipped in 70% ethanol prior to use. This will kill pathogenic organisms on tools and knife blades.

3. Make the following treatments to each set of 20 cuttings:
 - a. 5 cuttings treated with talc (control)
 - b. 5 cuttings treated with Rhizopon AA #1 (0.1% IBA = 1000 ppm)
 - c. 5 cuttings treated with Rhizopon AA #2 (0.3% IBA = 3000 ppm)
 - d. 5 cuttings treated with Rhizopon AA #3 (0.8% IBA = 8000 ppm)
4. Prepare labels including date, cultivar name, treatment, lab section and name identifying your lab group.
5. Stick these in 4 market packs (10 cuttings per pack) containing moist peat/vermiculite/dolomite (Premier ProMix PGX). Place these in the designated flat for your group. When the flat is full (6 packs) take it to the mist bench (Zone 16 bench 1) to prevent desiccation.

B. Leaf Cuttings:

Introduction: The natural production of organs by leaves is rare, but kalanchoe and the jade plant are examples where buds form on leaves giving rise to new plants. Leaves of many other plants can be induced to form roots, but shoot regeneration from leaf cuttings is more difficult. Nevertheless, the use of leaf cuttings is a standard method of propagation for many plants having fleshy leaves, leaves with enlarged, thickened petioles, or leaves with large veins. New growing points usually originate in the parenchymatous tissue closely associated with vascular tissues in the leaves. When vascular bundles of the leaf are severed and the proper conditions provided, new roots will be initiated. Shoots may also form, but this occurs with greater difficulty.

Procedure: Foliage of plants propagated from leaf cuttings will be available. **Do not use auxin treatments for leaf cuttings.** Follow these instructions:

Begonia rex (rex begonia) - a) The large veins are cut on the under-surface of a mature leaf. The leaf is placed flat on the surface of the media and pinned down with floral pins to insure good contact. New plants will form where veins were cut. b) Leaves are cut into large, triangular pieces. Triangles are rolled up and the proximal (basal) end is inserted into the medium. Make 1 cutting using technique 'a' and make 2 cuttings using technique 'b'. Place all three cuttings in 1 market pack.

Sansevieria trifasciata 'Laurentii' (variegated snake plant) – This variegated cultivar has yellow leaf edges because of a leaf chimera. We will see if the chimera is passed on to the new plantlets. The leaves are cut into 2-4 inch sections and the proximal (basal) end is inserted vertically for 1/4 of the cutting's length into the rooting medium. The proximal end is cut at a slant to insure that polarity is not reversed. Make 3 cuttings of this plant and place in 1 market pack.

Saintpaulia (African violet) and *Peperomia* - Make 6 cuttings of each type of plant. Cut petioles down to 0.5, 1.0 and 1.5 inch in length. (2 cuttings of each petiole length). The leaf plus petiole is placed in a vertical position in the medium, so that the leaf blade just touches the medium surface. Put cuttings of each species in 1 market pack. New plants form at the base of the petiole. Does petiole length influence ease of propagation?

Crassula argentea (jade plant) - Make 6 leaf cuttings of the jade plant. Place the base of each leaf in media up to about 1/2 the length of the leaf. Stick cuttings in 1 market pack.

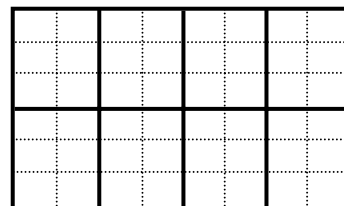
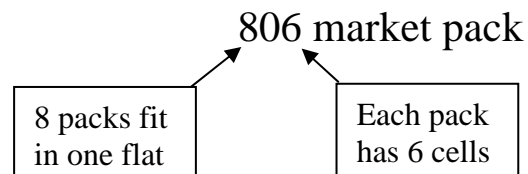
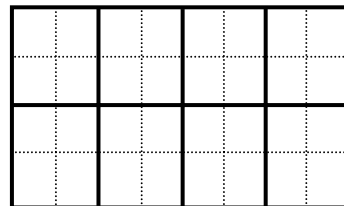
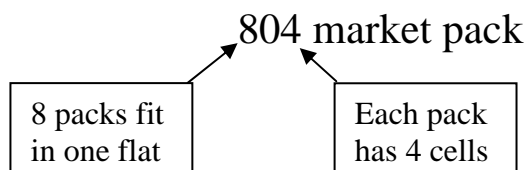
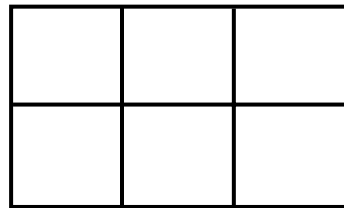
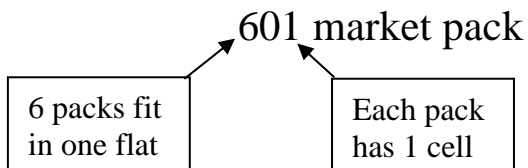
Leaf-bud Cuttings - Make 3 leaf-bud cuttings from either *Peperomia* or *Epipremnum aureum* (pothos) provided and stick in 1 market pack.

When each propagation flat is full (6 packs) place on mist bench (Zone 16). Watch cuttings carefully; as soon as they are rooted in 2-3 weeks (but before new shoots form) remove them from the mist. You will have to remove and pot up and place in Zone 21(or give away) items at different times outside of lab.

Market Packs

Market packs, also called cell packs or inserts, are commonly used in plant propagation. Individual packs are joined together so a set of market packs will fit a standard sized 11 x 21 inch flat. The packs are easily detachable so that plants in individual packs can be sold to consumers, thus the name ‘market pack’.

Market packs are labeled by a number which indicates how many packs fit a flat and how many cells are in a single pack as indicated below:



Market pack configurations include 201, 606, 1204, 1206, 1501, 1801, 1802, 1803, 1804, 3601. Nurseries choose the best market pack to use based on plant species, plant size, and the typical number of plants the average consumer prefers to purchase.

RESULTS: Softwood Stem and Leaf Cuttings

Use the space below for notes from your weekly observations. Be sure to note differences in root and shoot formation between cultivars and cutting types. You should understand why we didn't use auxin on the leaf cuttings.

1. Stem cuttings - *Chrysanthemums* - auxin & cultivar effects

2. Leaf cuttings - *Begonia rex* - root & shoot formation

3. Leaf cuttings - *Sansevieria* - root & shoot formation and presence of leaf chimera

4. Leaf cuttings – African violet & peperomia - petiole length effect

5. Leaf cuttings - Jade plant - root & shoot formation

7. Leaf-bud cuttings - peperomia or pothos – root formation