"Asexual or vegetative propagation of plants by cuttings is a very important part of horticulture. Asexual techniques allow the increase of plants so that all propagules are genetically identical to the parents. This differs greatly from sexual propagation where there remains the potential for diverse genetic variation. Seedling populations from many horticultural crops are so variable that asexual propagation affords the only way to practically maintain these individuals in order to retain their uniformity.

There are many different ways to propagate plants using cuttings. The process involves determining which cutting type is best suited for the propagation of large numbers of plants and then using the appropriate preparation of the plant material for propagation. Cuttings can be made from all vegetative portions of the plant including simple and modified stems (as for storage: bulbs, turbers or corms), leaves, and root tissues. In the rooting of stem cuttings one is involved in obtaining a detached plant part and placing it under conditions conducive to the regeneration of its missing parts, i.e., roots, to form a new, self-sustaining individual. In this case the cutting has been removed from a functioning root system and as a result the major life-support problem for this cutting becomes one of water relations. Thus, there is little or no water uptake by the cutting although transpiration will continue."

This laboratory exercise will demonstrate the preparation of the different types of cuttings.

**Objective**

To demonstrate and prepare some of the various types of cuttings that can be used to propagate plants.

**Materials**

- Appropriate plant material (see below)
- Flats with propagation media (Peat:Perlite; 1:1)
- Propagation knives and pruning shears
- Labels
- Marking pens
- Rooting hormones (1000, 3000, 8000 ppm IBA)

**Procedures**

A. Each student will receive a flat and work individually in the propagation; this flat will be placed in the misthouse. For some of the plant materials which do not do well under the high humidity conditions of the misthouse, you will share flats with other students.

B. Obtain a flat, labels, markers and your propagation knives.

Reference:

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C. Prepare and plant several cuttings from each of the following groups

**STEM CUTTINGS**

These are the most important and most commonly used types of cutting. In general, they can be divided into 4 groups: the hardwood, semi-hardwood, softwood or herbaceous, and the cane cutting. When preparing a stem cutting, a section of stem tissue with lateral or terminal buds is obtained. Typically, stem cuttings are made from the terminal ends of shoots, generally 3-5 inches long, and are removed from the parent plant at a point just below a healthy leaf. Except for hardwood and cane cuttings, the stem cuttings should have 3 to 4 leaves for quickest rooting. The leaves from the basal 1/3 of the stem cutting should be removed.

1. **Semi-hardwood cuttings.** These types of cuttings should be taken in mid summer from matured wood for best results, but we will attempt propagation on fairly young growth (almost softwood) of *Amelanchier*, azaleas, *Euonymus*, Holly, *Cotoneaster*, quince

   NOTE the actual species you used for semihardwood cuttings:

<table>
<thead>
<tr>
<th>Species Used</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lilac</td>
<td>a) Use terminal or lateral branches</td>
</tr>
<tr>
<td>Forsythia</td>
<td>b) Determine cutting length (ca. 3-6 in) and trim cutting</td>
</tr>
<tr>
<td>Scented Geraniums</td>
<td>c) Remove leaves from the basal third</td>
</tr>
<tr>
<td>Amelanchier</td>
<td>d) Apply rooting hormone (Hormodin 3)</td>
</tr>
<tr>
<td>Azaleas</td>
<td>e) Plant in media and firm</td>
</tr>
<tr>
<td>Euonymus</td>
<td>f) Put under mist</td>
</tr>
</tbody>
</table>

2. **Herbaceous or softwood stem cuttings.** These are prepared from the soft, succulent, herbaceous growth of an extremely wide range of horticultural plants (e.g., mums, hydrangea, fuschia, forsythia, privet, pyracantha, lilac, magnolia, weigela, spirea, cotoneaster, dogwood, etc). If the leaves of the cuttings are large, they may be cut in half in order to reduce water loss. Some of the following plant material may be available: Lilac, *Forsythia*, Scented Geraniums, deciduous azaleas, assorted herbs, *Sedum*,

   Make a note of the species you use:

<table>
<thead>
<tr>
<th>Species Used</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lilac</td>
<td>a) Follow procedures for semi-hardwood cuttings: remove cuttings, determine length, and trim cutting</td>
</tr>
<tr>
<td>Forsythia</td>
<td>b) Strip lower leaves</td>
</tr>
<tr>
<td>Scented Geraniums</td>
<td>c) Apply growth regulator (1000 or 3000 ppm IBA)</td>
</tr>
<tr>
<td>Amelanchier</td>
<td>d) Pre-dibble hole in media, plant, firm media around base of cutting</td>
</tr>
</tbody>
</table>
3. Cane cutting. These are used to propagate dumbcane, Chinese evergreen, dracaena, and similar plants which produce long cane-like stems. The cane which remains after a tip or stem cutting is removed from the parent plant can be cut off about 3 inches above the soil line. This portion of stem or cane is then cut into small sections 2-3 inches long so that each piece has at least two leaf scars and a dormant bud. We will use Diffenbachia

- a) Remove a portion of the stem
- b) Leave at least 2 nodes and a dormant bud
- c) Place stem on its side with dormant bud facing upward, bury stem into media 1/2 of stem diameter
- d) Place under mist

LEAF CUTTINGS

4. Different leaf cuttings. In most of these cuttings, adventitious shoots form along wound surfaces near vascular tissues.

- a) Whole leaf (African violet, Peperomia)
  1) Remove leaf with 1-2 inches of petiole
  2) Place leaf on media surface with petiole inserted into the medium.

- b) Whole leaf (Sedum) NOTE: share a flat for this plant; the propagules will be kept under shade rather than mist. In the mist house, these propagules tend to rot.
  1) Remove sessile leaf
  2) Place leaf on media surface

- c) Leaf piece (Sansevieria)
  1) Remove section of leaf
  2) Cut into pieces (2-3 inches segments) and plant in media maintaining polarity

- d) Leaf piece (Begonia)
  1) Remove a leaf from the plant leaving approximately 1/4 - 1/2 inch of petiole
  2) Divide leaf into triangular sections being sure to leave a portion of the petiole with each leaf piece.
  3) Place in media with petiole portion in the media
  4) Firm around the cutting
5. **Leaf bud cutting.** As the name implies, it consists of a single leaf attached to a piece of stem tissue (1 - 1.5 inches long). A dormant bud is located in the axil of the leaf and will give rise to the new shoot. (Plant material will be specified in lab)
   a) Remove section of stem
   b) Cut stem into sections, each with a leaf attached
   c) Place horizontally in media, with leaf exposed

**ROOT CUTTINGS**

6. **Root cutting.** These are applicable for the propagation of more woody plants than is commonly realized. They are also beneficial as a means of propagating fruit rootstocks. They also play a particularly important role in the propagation of herbaceous perennials. Root cuttings are usually obtained during the dormant season from young stock plants when the roots are well supplied with carbohydrates. Once the soil is removed from the root system by shaking or washing, the cuttings are then prepared by cutting to a length of about 4 in, although cuttings from plants such as phlox, anemones, and gaillardias may be smaller. (Plant material will be specified in lab.)
   
   a) Remove sections of roots from plant
   b) Thick roots (pencil size) should be cut into 3-4 inch sections
   c) Plant maintaining polarity (either in vertical or horizontal position), completely covered with media.
   d) Thin roots should be cut into 3-4 inch sections and place horizontally on surface of media and then covered lightly
   e) Place under mist.

**D. Other cutting/division - related propagation**

Division is a process where the plant part (such as rhizome, stem tuber, and tuberous root) is cut into sections.

You will have the opportunity to propagate a variety of herbaceous plants by divisions. The instructor will demonstrate how to handle such plants. The plants include: Hosta, Daylilies, Coral Bells, Spathiphyllum, Spider-plant, Bamboo, etc. Some of these plants should not be placed in the mist-house or they may rot.

**Follow-up Activities**

Observe the rooting patterns over the next few weeks
Remove and keep plants which rooted successfully.