

Plant Propagation - Greenhouse Project

Plant propagation is the process of producing new plants, by sexual reproduction or by asexual (vegetative) means. The most common method of propagation in higher plants is by seeds, the products of sexual reproduction. However, many plants can be propagated asexually. It is often desirable to use vegetative methods of propagation because the genetic type of the original is preserved in the offspring. In horticulture and in agriculture this permits the growth of plants that have the most desirable combinations of characteristics.

Throughout the term, you will use a number of methods of plant propagation to augment your Biology 203 experience. This lab exercise will give you a start with some suggestions for plant propagation and for your term-long greenhouse project. You are encouraged and expected to add your own materials and to experiment with additional types of plants and propagation methods. Each of you is responsible for maintaining your greenhouse projects. The students enrolled in this class are totally responsible for the greenhouse. No one except you will water and care for your plants. You will need to check your plants for water and other needs everyday. Be sure to allocate time in your schedule to do this.

Propagation Journal

You will keep a journal throughout the term of all of your propagation and greenhouse activities. A science journal is the objective account of what you are doing including accurate data collection about the propagation materials you observe throughout the term. The writing should be such that someone else could replicate your project and expect to obtain similar results. Although it is not essential, you are encouraged to keep a photographic or video record of your activities, which will help you to see the progress you and your plants have made during the ten weeks.

Your propagation journal should include the following:

- Purpose of the project
- Procedure - what did you do to start the project
- Daily record of your observations about the project – data recording
- Project summary – what happened, analysis and conclusions

Materials Needed – Most materials will be available in the greenhouse. You are encouraged to bring in sample materials for your propagation projects and to share with others.

Apart from a starter supply of soil mix and plastic and Dixie cups, students must supply their own sterile soil and pots for their propagation projects.

Begonia and Coleus for stem cuttings
African violet or *Peperomia* plants for leaf cuttings
Woody plants for air layering and semi-woody cuttings
Strawberries or Spider plants with runners
Radish and other seeds for germination
Carrots with tops
White potatoes
Sweet potatoes
Assorted plastic cups for starting cuttings
Dixie cups or seedling flats for seed germination
Knife
Toothpicks
Aluminum foil
Plastic wrap
Plastic bags
Rubber bands
Clay or plastic pots for transplants
Potting soil
Rootone or similar IAA powder
Twist ties
Sphagnum moss

Greenhouse Exercises

Exercise 1. Propagation by Seeds

A seed consists of an embryo, nutrients, and a protective seed coat. If the appropriate conditions for germination are provided: growing medium, appropriate temperature, and adequate moisture, most seeds germinate to continue the life history of their species. Some seeds have very specific requirements for germination, which may include exposure to a period of cold or soil moisture before germinating. Such requirements are generally listed on seed packets, along with advice on planting depth and seed spacing.

It is generally best to plant seeds where you want them to grow. However, many seeds are germinated indoors and transplanted after the seedlings are established and do well. If you plan to transplant your seedlings, it is best to start them in a porous soil to minimize root damage when you move them.

Start a number of seeds, including different kinds, in your propagation flats. Follow the instructions on the package for soil depth. You may wish to start seeds now for transplanting to your home flower or vegetable garden later in the term.

Exercise 2. Vegetative Propagation

A. Cuttings

1. Herbaceous Stem Cuttings

The most common way to propagate plants vegetatively is by stem cuttings. This method is especially effective with many common houseplants such as *Philodendron*, *Begonia* and *Coleus*.

With a sharp knife, cut off a 4-inch to 6-inch growing shoot tip of *Coleus*, *Begonia* or other provided plant just below a node and remove the lower leaves so that about one-third of the stem is bare. If available, dip the cut end in a root-inducing powder, such as Rootone, to speed up root growth, and then insert it in moist coarse sand or a perlite-peat mixture. (Perlite is a glassy volcanic rock with a pearly luster.) You can even start many herbaceous cuttings in water.

2. Semi-woody Cuttings

Semi-woody plants, such as rubber plants, crotons and split-leaf philodendron, can be propagated by stem cuttings that include a single node, a single leaf, and its axillary bud. Insert each cutting in moist *Sphagnum* moss in a clear plastic bag, with the leaf left exposed outside. Then tie the bag firmly around the stem and place it out of direct sunlight. When roots can be seen inside the bag, pot the new plant.

3. Leaf Cuttings

Some plants, such as African violets and some *Peperomia* species, can be propagated by leaf cuttings. Place some foil or wax paper across the mouth of a plastic cup and secure the foil or paper with a rubber band. Gently poke small holes in the foil. Insert the petioles of African violet or *Peperomia* leaves through the holes. Dust half the petioles with hormone powder (Rootone) before putting them in water. Use separate containers for the treated leaves. Compare your results as the term progresses. Be sure to maintain water levels while waiting for results.

4. **Root Cuttings**

Many plants with good taproots can produce new shoots from root cuttings. Dandelions thrive in lawns because they can produce new shoots from the portion of root which remains buried in the ground after they have been weeded.

Place a carrot top (about 1 - 2 cm) in water using toothpicks to balance it on the rim of the container. Make sure that the carrot rests in sufficient water. New roots and shoots should develop within a few weeks. Be sure to change the water frequently to minimize the growth of bacteria and molds.

Suspend half of a sweet potato with toothpicks in a jar so that most of the sweet potato is into the jar. Fill the jar with water and set aside. Change the water twice a week.

B. Tuber Propagation

Potatoes, some Begonias, ginger plants and Iris are generally propagated from tubers. The "eyes" on potatoes are dormant shoot buds. Plant a section of a potato that has 2 or 3 eyes in soil. New shoots should develop within a few weeks.

C. Division

Plants that grow in clumps or with multiple stems can often be divided at their base. Daffodils and other bulb plants often have clumps of bulbs and bulblets that are easily separated. *Peperomia*, *Sanseveria* and many ferns can also be divided.

If an appropriate plant is available, sever a portion with a sharp knife. It may not be necessary to remove the original plant from the soil to do this; simply slice down into the soil and remove the new plant, along with roots, if possible. It is important to include some of the original main stem with the new plant.

D. Air Layering

Some relatively large plants, such as *Dieffenbachia*, *Scheffiera*, rubber trees, and fiddle-leaf figs, are propagated by air layering. With a sharp knife, cut partway into the stem of an available plant at a steep angle and insert a match or other object into the wound to keep it open. Mold a wad of wet *Sphagnum* moss around the cut, wrap a sheet of plastic around it, and tie the plastic to the stem at the top and bottom. In about four weeks the moss should be permeated with roots. Cut off the stem below the roots and pot the new plant. The old plant should also continue to grow.

E. Runners

Runners, or stolons, are long slender stems that grow along the surface of the soil and produce new "plantlets" (shoots and roots) when nodes on the runner come in touch with soil. They are important in strawberry propagation. The Spider plant also produces runners.

Remove a plantlet from a spider plant or a strawberry plant and plant it in soil mix. To ensure maximum success, you can keep the runner attached to the parent plant and place the plantlet in a pot adjacent to the parent. It's best to "pin" the plantlet into the soil with a large paper clip or hairpin. The runner can be severed in 4 - 5 weeks.

Cleaning Up

It is essential that the Greenhouse remains clean and tidy, and that we restrain ourselves to the space allotted to our section. You are responsible for keeping the greenhouse in a respectable condition. The entire campus can view our efforts. Put materials away when you are finished with them.