

Plant Propagation Lab Exercise

Module 2



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CONTROLLED POLLINATION

An introduction to plant propagation laboratory exercises by:
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Most plant improvement comes about through seeds produced via the normal sexual reproduction cycle. This occurs through the selection of superior individual seedlings from the seedling progeny resulting from cross-pollination between chosen parents. These superior seedlings are then called “selections” and may be propagated asexually or sexually, depending on the plant species involved. In this lab, you will conduct a controlled pollination experiment on petunias.

LAB OBJECTIVES

- Introduce students to the basic steps of controlled pollination
- Familiarize students with flower sexual reproductive structures
- Demonstrate cross pollination and seed production techniques for petunia

Basic Steps in Controlled Pollination

1. Selection of parent plants
2. Bringing chosen parents into flower simultaneously
3. Collection of pollen from the male parent
4. Emasculation and pollination of female parent
5. Protection of the pollinated flower
6. Growing of ripening fruit from pollination to maturity
7. Extraction of seed from fruit
8. Seed germination
9. Seedling growth and transplanting
10. Transplanting to final evaluation site
11. Field selection among hybrids
12. Propagation of selected seedlings

Parent plants with the desired characteristics should be selected. In this lab, petunias of two different flower colors will be selected for cross-pollination in order to observe flower color results in their progeny. Parents should be brought into flower simultaneously if possible. Cross pollination requires a working knowledge of flower reproductive structures. Monoecious flowers possess both male and female parts. The male part is known as the stamen. Stamens are composed of a filament which supports an anther. The anther holds pollen sacs. The female structure is known as the pistil or carpel and is composed of an ovary, a style, and a stigma upon which the pollen lands to begin the process of fertilization.

Here is an illustration of the stamen and pistil on a petunia flower

In addition to parent plants, this lab will require tweezers, a paint brush, and jewelry tags. Emasculation is the removal of male parts of the flower which has been selected for pollination. Select a flower that has not opened, open the corolla and remove the stamens. If pollen was collected from a red flower, be sure to emasculate white flowers before transfer and vice versa for transferring pollen from a white to red flower. Emasculation is unnecessary if flowers are dioecious or are male-sterile.

Choose an open flower for pollen collection. Inspect the open flower to ensure pollen has matured and is ready for transfer to the pistils before collecting. In this lab, collect pollen of the opposite color flower from the one you wish to pollinate.

Pollination is achieved by transferring pollen onto the pistil of an emasculated flower. Pollen can be collected and transferred using a paintbrush or by removing the entire flower by hand and rubbing the anthers of the male directly on the pistil of the female.

Flowers should be protected by wrapping the petals gently back around the pollinated pistil so that additional pollination is not possible. Label the pollinated flower with a jewelry tag and include information on the male and female parents. Some breeders use a log book and record the information about the parents in the book and write the journal entry number on the tag.

Cross-pollinated flowers should be monitored for production of ripening fruit. Empty ovaries of petunia flowers that were not pollinated are light tan in color and are small and round. Ripened ovaries that were pollinated also have a light tan color, are about $\frac{1}{4}$ inch long, and are cone shape. The seed are extracted by opening the dry capsule.

Once mature seeds have been extracted, cleaned, and dried, it is time for germination. Fill two trays with an equal number of peat plugs and water thoroughly or place under a mist bench until fully expanded. Place one to a few seeds from a given cross on each plug within a tray. Repeat for the other cross treatment. Place back into the mist bed until seeds have germinated.

Note germination success and monitor growth of progeny seedlings until they are large enough to transplant to larger containers. They can now be removed from the mist bench but ensure they are watered regularly until maturity.