

LAB 3 - ASEQUAL PROPAGATION

Asexual propagation is used to reproduce or multiply many horticultural plants. Plants that are propagated asexually are genetically the same as the mother plant. This is also called cloning. Although cloning is being talked about a lot today, it is not a recent development. Farmers have been cloning crop plants since before recorded history. One of the oldest clones in existence is Thompson seedless grapes. The plant with the largest number of daughter plants is the navel orange. All clones originate from a single plant and all of the plants that are propagated from it, asexually, are genetically the same.

Some asexually propagated crops that are grown extensively are: tree fruits, cane fruits, strawberries, sugar cane, potatoes, sweet potatoes, cassava, cranberries, and most herbaceous and woody ornamental plants. Almost all the flower crops and green plants grown as greenhouse crops are also propagated asexually.

Plants are propagated asexually for the following reasons:

1. to preserve the genetic characteristics of a particular plant;
2. to propagate plants that do not produce viable seeds (bananas, pineapple, seedless grape, etc.);
3. to propagate plants that produce seed that is difficult to germinate or has a very short storage life (cottonseed, willow);
4. to bypass the juvenile stage of plant growth when the plants will not flower and bear fruit (apple).

By far the most important of these is the first. This is the main reason that many horticulture plants are propagated asexually.

Asexual propagation may be done by making cuttings from the stem, root or leaves of the desired plant. Stem cuttings are made by removing a small branch or twig from the plant. This cutting will usually contain two or more buds, one of which will grow into the top of the plant. With proper treatment, **adventitious*** roots will be produced on the end of the cutting that was closest to the root of the original plant. Root cuttings are made in a similar fashion, but produce an adventitious stem on the end of the cutting that was nearest to the stem of the original plant. Leaf cuttings produce both roots and stems when the leaf is placed under proper conditions.

***adventitious** [not properly belonging to] Referring to a structure arising from an unusual place, such as buds at other places than leaf axils, or root growing from stems or leaves.

Grafting is another type of asexual propagation. In the process of grafting, a part of the stem of one plant is mechanically joined to the stem or root of another plant. If the graft is to be successful, the stem (scion) and the root (stock) must be closely related taxonomically. Grafting is used primarily for woody plants and most tree fruits are propagated in this manner. The scion may be a single bud (budding), or it may have several buds (grafting).

Some plants can be propagated asexually by dividing clumps of the plants. This is called division and is used for such plants as iris, some lilies, orchids, many house plants and perennials. In division, the clumps are cut or torn apart and the individual plants replanted. These will then make another clump which can be divided to keep the process going.

Plants can also be asexually propagated by layering. The process of layering is as if you rooted a cutting while it was still attached to the plant. There are several different ways to layer a plant, but generally the process involves placing a part of the plant stem under conditions favorable for rooting. Once roots have formed the new plant is separated from the mother plant and established in a new location.

Over the last several years tissue culture propagation has been perfected as a way to propagate plants asexually. Tissue culture uses very small cuttings that are sterilized and grown in test tubes under aseptic conditions. In some instance the cutting can be as small as a single cell isolated from various plant tissues. Once the cutting (explant) is established in a test tube, the medium on which the explant is to grow can be modified to promote the production of numerous stems or roots. Usually the culture is first manipulated to produce many stems. These stems are then placed under cultural conditions to promote rooting. Plants can be reproduced very rapidly using tissue culture methods. A single bud from a potato plant can be multiplied a million times in a single year.

NOTES - PLANT PROPAGATION VIDEO

SPECIALIZED PARTS

Bulbs

Corms

Tubers

Tuberous roots

DIVISION

What

How

MICRO PROPAGATION

Explants

Sterile medium

Controlled environment

Advantages

1.

2.

3.

4.

ASEXUAL PROPAGATION BY VEGETATIVE PARTS

1. Cuttings

Four main groups of stem cuttings:

- a. Hardwood- dormant
- b. Semi-hardwood - late summer
- c. Soft wood - late spring or early summer
- d. Herbaceous - when actively growing

2. Sanitation

3. Environment

4. Transplanting

5. Harden-off

LAYERING

AIR LAYERING

GRAFTING OR BUDDING

1. Scion
2. Stock
3. Union
4. Cambium

LAB EXERCISE 3 - ASEXUAL PROPAGATION - CUTTINGS

Objective: To acquaint the student with some of the basic techniques used in propagating plants using cuttings.

Materials Needed: Stock plants, knives, pruners, packs to hold medium, rooting compound, pot labels, pencils.

Points of Emphasis: 1. Keep things clean.
2. Keep cultivars

identified.

Procedures:

I. Preparation of herbaceous cutting (Swedish Ivy and Wandering Jew or others provided).

1. Select growing tips that are 3 to 4 inches (8 - 10 cm) long and contain at least 2 nodes. Cut the tips from the stock plant. Remove leaves from the basal 1.5-2.0 inch (4 - 5 cm). Make the cuttings as uniform as possible.
2. Each team should make 24 cuttings of one species.

BE SURE TO MAKE COMPLETE LABELS FOR EVERYTHING. These should include your name, date, plant name, treatment given. These must be in pencil or water proof ink or they will wash off.

3. Divide the cuttings into 4 groups of 6 cuttings each.

Treat each group as follows:

- Group 1: No rooting compound - bottom heat.
- Group 2: Rooting compound - bottom heat.
- Group 3: No rooting compound - no bottom heat.
- Group 4: Rooting compound - no bottom heat.

To treat cuttings in rooting compound, dip in water, shake off excess water and dip into rooting powder. Then place in rooting media in packs.

II. Take cuttings from any of the additional plants provided.

Begonia - Leaf cutting; Sansevieria - Leaf cutting; African Violet - Leaf cutting; Dieffenbachia (Dumbcane) - Stem cutting - 2" (5 cm) segment; lay horizontal on media; Peperomia - Stem, leaf or bud and leaf cutting; Others with permission

III. Check progress of plants after 7 and 14 days. Hand in results with your recommendation of the best treatment for propagating the plant you worked with. The additional cuttings are for your information only and may take longer to root.

LAB 3 - WORKSHEET

Name _____

1. Check progress on cuttings after 7 and 14 days. Tabulate data and make conclusions from observations. (Lab Procedure Part III)
2. Define asexual propagation. How does it differ from sexual propagation?
3. What are three reasons plants are propagated asexually?
4. What is the purpose of applying growth regulators to plants?
5. List 4 environmental factors which are important in helping cuttings to develop roots.