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BASIC TECHNIQUES FOR PROPAGATING PLANTS

Many types of plants in and around the home can easily be propagated using fairly simple, inexpensive procedures. This fact sheet highlights a few of the basic and most widely applicable techniques for vegetative propagation of plants. Some of these techniques can be used for houseplants, annual flowers, and bedding plants, whereas other techniques are more effective for woody ornamental trees and shrubs, ground covers, and vines.

There are many reasons for propagating plants. One basic reason is simply to make multiple plants from a single plant. Another reason is to make a young attractive plant from an old, leggy plant. Other reasons are to propagate a particular plant because of its unique or attractive features and to propagate plants for sentimental reasons. Regardless of the reason for propagating plants, there are some basic factors that are useful to ensure success:

- use only healthy, vigorous source plants;
- use the most appropriate method, growth stage, and timing for the plant;
- protect propagation material from heat and from drying; use the material as quickly as possible after it is prepared;
- give newly propagated plants extra attention and care during their establishment phase;

TECHNIQUES:

This fact sheet focuses on techniques for vegetative propagation of plants. Plants propagated using these methods have the same characteristics as the parent or source plant since vegetative material is used and no genetic recombination is involved. The key techniques for propagation that will be highlighted are: **leaf cuttings, stem cuttings, simple layering,** and **air layering.**

Although many of the techniques can be used for a range of different types of plants, it is important to know that some plants root better at a particular stage of growth, at a specific time of year or using a particular technique. Numerous reference books and experience will help to determine the best time and method to propagate specific plants.

BASIC TOOLS AND EQUIPMENT:

As with any procedure, there are some basic tools and equipment that are necessary in order to complete the job and the following list highlights some necessary and optional items:

- pruning shears
- scalpel, sharp knife or razor blade
- paint brush

- wooden matches[1]
- small wooden sticks
- wooden or plastic stakes[1]
- soil-less potting mix or a 1:1 mix of peat moss and clean, coarse sand
- sphagnum moss[1]
- wire or wire coat hangers
- propagation mat (used for bottom heat)
- tape[1]
- pots or flats of various sizes
- rooting hormone[2]
- clear plastic bags and plastic wrap

[1] used specifically for air layering and/or simple layering.
[2] rooting hormone is usually sold as indole butyric acid (IBA) and is available in many formulations and concentrations; for plants that are readily propagated by vegetative methods, use of hormones promotes more root growth in a shorter period of time; for plants that are not easily propagated by these methods, rooting hormones will not help with root development.

LEAF CUTTINGS:

A number of plants will readily produce new plants from leaf cuttings. Although there is no dependable way to distinguish these plants from others, most plants that root successfully from leaf cuttings have thick, fleshy leaves which often grow in rosettes. These include many of the common houseplants such as gloxinia, African violet, begonia, and peperomia. (Refer to Figure 1.)

Procedure-

- the best time to start leaf cuttings is when the plants are in a strong growth phase, usually from early summer to early fall;
- select a pot or flat of the appropriate size for the number of leaf cuttings that you will be rooting;
- prepare the rooting medium (either a soil-less potting mix or peat moss and coarse sand); this should be moist but not wet; fill the pots with the medium;
- select and cut healthy leaves with petioles from the source plant using a sharp, clean knife;
- trim the base of the petiole but leave enough to insert into the rooting medium without the leaf touching the surface;
- dip or lightly dust the cut surface with rooting hormone (this is optional, depending on the plant); in order to avoid contaminating the hormone, put a small quantity in a cup rather than sticking the cutting into the original container;
- make a few planting holes in the rooting medium with a small, clean stick;
- gently insert each leaf cutting into a hole so that the leaf is just above the rooting medium; carefully firm the medium around each cutting with your fingers but avoid injury to the petioles;
- place a wire frame over the pot or flat; put the container into a clear plastic bag making certain that the frame is supporting the plastic bag so the plant material is not touching the bag; this creates a "mini-moist chamber" to keep moisture around the leaves as they root;
- place the chamber in a warm location **out of direct sunlight!** a propagation mat as a source of bottom-heat is helpful but not necessary;
- occasionally inspect the pot for condensation and add water as necessary to keep the potting medium moist but not wet;
- after 3-5 weeks (depending upon the plant being propagated), roots should have started to form;
- when plants have developed a sufficient root system, gradually "harden-off" the

new plants by opening the bag and increasing light levels;
- place the newly rooted plants into individual pots using care to avoid injury to the new roots.

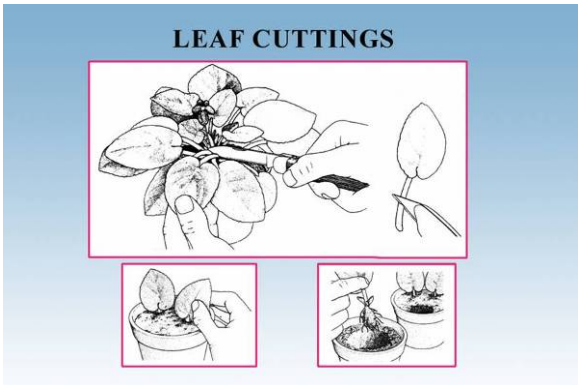

Figure 1. Steps in taking leaf cuttings.

STEM CUTTINGS:

This technique is probably the most versatile of all methods used for vegetative propagation. It can be used for both herbaceous and woody material. **Herbaceous stem cuttings** can be made from houseplants, annual flowers and bedding plants, ground covers, and some perennials. Stem cuttings from woody ornamentals can be taken at different stages of development and are categorized as softwood, semi-hardwood, and hardwood cuttings. **Softwood stem cuttings** are taken in late spring or early summer and consist of tender shoots of current season growth. **Semi-hardwood stem cuttings** are taken from mid- to late-summer and consist of current season growth that is firm and has begun to form woody tissues. **Hardwood stem cuttings** are taken in late fall or winter and consist of woody stems that have just completed their first season of growth. For deciduous plants, these are taken after the plants have dropped their leaves. (Refer to Figure 2.)

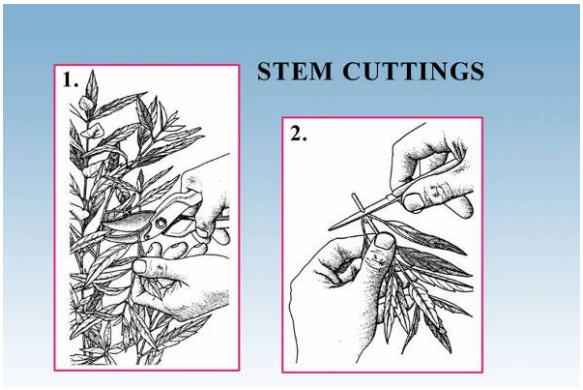

Figure 2. Steps in propagating by stem cuttings.

<u>Herbaceous and Softwood Stem Cuttings</u>

These types of cuttings are appropriate for many popular houseplants such as philodendron, Christmas and Thanksgiving cactus, jade, and coleus, many annual or bedding plants such as impatiens and geranium, popular ground covers such as pachysandra and English ivy, and woody ornamentals such as magnolia and maple.

<u>Procedure-</u>

- these cuttings can be taken at the time appropriate for the particular plant to be propagated (e.g., for houseplants or bedding plants this is when new shoots appear in spring; for woody plants it is when the new shoots have expanded and are still tender in late spring or summer);
- select a pot or flat of the appropriate size for the number of cuttings that you will be rooting;
- prepare the rooting medium (either a soil-less potting mix or peat moss and coarse sand); this should be moist but not wet; fill the pots with the medium;
- select and cut terminal shoots (preferably not in flower) from the source plant using a sharp, clean knife or pruning shear; the length of the cutting is determined by the source plant (cuttings usually vary from 2-8 inches in length);

- remove the leaves near the cut end making certain that some leaves (3-8) remain on the cutting; if the cutting is in flower, carefully pinch off the flowers and flower buds;
- use a clean, razor blade or scalpel to remove a thin slice of tissue about ½ - 1 inch long on two opposite sides of the cut end or base of the cutting; this provides a surface for root development;
- lightly dust the cut sides of the cutting with rooting hormone, as necessary; in order to avoid contaminating the hormone, put a small quantity in a cup rather than sticking the cutting into the original container;
- stick the cuttings into the pots or flats of prepared rooting medium about one-third to one-half of the total length of the cutting; carefully firm the medium around each cutting with your fingers but avoid injury to the stem;
- place a wire frame over the pot or flat; put the container into a clear plastic bag making certain that the plastic bag is supported by the frame so the plant material is not touching the bag; this creates a "mini-moist chamber" to keep moisture around the leaves as the cuttings root;
- place the chamber in a warm location **out of direct sunlight!** a propagation mat as a source of bottom heat is helpful but not necessary;
- occasionally inspect the pot for condensation and add water as necessary to keep the potting medium moist but not wet;
- after 5-8 weeks (depending upon the plant being propagated), roots should have started to form;
- when the cuttings have developed a sufficient root system, gradually "harden-off" the new plants by opening the bag and exposing the cuttings to increasing light levels;
- place the newly rooted plants into individual pots using care to avoid injury to the new roots;
- new cuttings will require extra care during the establishment phase.

Semi-hardwood Cuttings

Follow the same techniques for herbaceous or softwood cuttings but select cuttings at the appropriate stage of growth (e.g., mid- to late-summer). These types of cuttings are appropriate for woody ornamentals such as azalea, rhododendron, butterfly bush, rose, and euonymus.

Hardwood Cuttings

Follow the same techniques for herbaceous or softwood cuttings but select cuttings at the appropriate stage of growth (e.g., late fall or winter). These types of cuttings are appropriate for woody plants such as blueberry, juniper, arborvitae, holly, and yew.

SIMPLE LAYERING:

This technique can be used for some houseplants as well as a number of woody plants. Simple layering is particularly useful for plants that are difficult to root from stem cuttings or leaves. Unlike stem cuttings which are taken from the source before rooting has occurred, this technique allows roots to develop on a stem while it is still attached to the source or "mother" plant. The basic assumption is that roots will develop when a position on the stem is forced into close contact with a rooting medium. (Refer to Figure 3.)

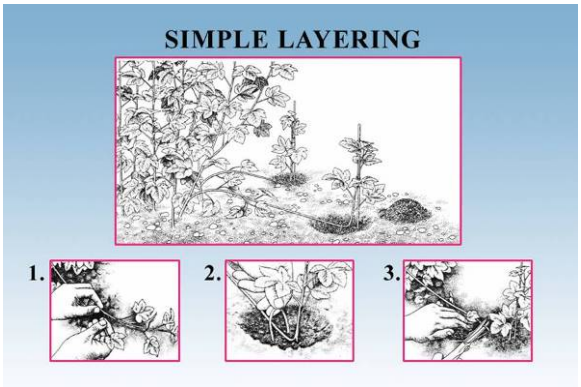

Figure 3. Steps in simple layering.

Houseplants

This technique works best on plants that have a naturally trailing growth habit such as ivies and philodendrons.

Procedure-

- the best time to start these is when the plants are in a strong growth phase, usually from early summer to early fall;
- select a pot of the appropriate size for the stem that you will be rooting;
- prepare the rooting medium (a soil-less potting mix is preferred); this should be moist but not wet; fill the pots with the medium;
- select a stem (or stems since more than one plant can be layered from a mother plant at a time) long enough for layering; remove any leaves from the area of the stem where roots will develop; this is usually several inches from the growing tip of the stem;
- carefully pin the section of the stem for rooting down into the pot with rooting medium with a U-shaped piece of wire (old-fashioned hair pins work well); sometimes a slight nick in the stem with a razor blade or scalpel will help; (another option is a light touch from a paint brush with rooting hormone);
- make certain that the stem is slightly buried in the mix;
- water as necessary;
- new growth at the tip is usually an indication that rooting has occurred;
- carefully cut the young plant free of the mother plant with a clean, sharp knife;
- repot the plant as necessary; new cuttings will require extra care as they become established.

Shrubs and Woody Plants

This technique works best on plants that have a naturally trailing growth habit such as rambling or climbing rose, raspberry, wisteria, and clematis but can also be used for low-growing shoots of upright shrubs such as lilac and butterflybush. Deciduous plants are best layered in fall or winter whereas evergreens are best layered in fall or spring.

Procedure-

- select a healthy, flexible, vigorous shoot that has grown in the current year;
- gradually and carefully bend it down until a point of the shoot about 9-12 inches from the growing tip reaches the ground;
- dig a hole about 3-4 inches deep at the point where the shoot touches the ground; partly refill the hole;
- strip the leaves (if present) from the part of the branch that will be rooted;
- cut a shallow slit in the underside of the branch with a clean, sharp knife, razor blade or scalpel and gently give the branch a slight twist; (optional: you can dust the cut surface with a rooting hormone using a paint brush)
- place the prepared stem section into the hole and carefully bend the tip of the shoot upward;
- secure the stem into the hole with a U-shaped wire around 6-8 inches long (this process is called “pegging”); bend the tip of the shoot upright and support it with a sturdy stake;

- fill the hole with the remaining soil and cover the pegged area of the stem;
- thoroughly water the area and water as necessary during the rooting process;
- plants usually root within 12 months; you can check for rooting by gently pulling the soil away from the plant;
- once roots are visible and well-developed, sever the new plant from the parent plant using a clean, sharp knife or pruning shear; leave the newly rooted plant in the site for a 2-3 week period of adjustment;
- dig and gently lift out the rootball and replant;
- newly rooted plants will require extra care during the establishment phase.

AIR LAYERING:

This technique is used for plants that are difficult to root and it is especially helpful for houseplants that have become tall and "leggy" such as an aging rubber plant, codiaeum or dracaena. Air layering can also be used to propagate woody plants with stiff, upright limbs that can't be propagated by simple layering such as some types of holly. As the name suggests, the objective is to stimulate root growth at some point on a stem without lowering the stem to the surface of rooting medium or soil. Old houseplants are usually good candidates for air layering whereas one year-old stems of woody ornamentals are best for air layering. Older stems can be used but the rooting process is substantially slower. (Refer to Figure 4.)

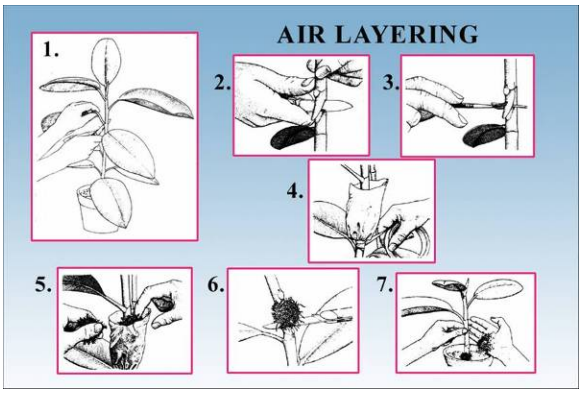

Figure 4. Steps in air layering.

Procedure-

- select the portion of the stem where you want the roots to develop;
- if leaves are present in that area, carefully remove them;
- use a clean sharp knife or scalpel to make a 1-1½ inch upward-slanting cut, starting below a leaf node, if possible;
- carefully prop the cut surface open (a wooden match works well) and dust the surface with a paint brush containing a rooting hormone; remove the match so the cut will close;
- wrap a piece of clear plastic wrap or a piece cut from a clear plastic bag around the stem under the cut section;
- secure the plastic around the stem with tape;
- pack the cut portion of the stem with moist, but not wet, sphagnum moss; make certain to press the moss to the base of the stem so no air pockets are left;
- twist, seal, and secure the top of the plastic wrap tightly around the stem with tape;
- if air layering a houseplant, place the plant in indirect sunlight;
- if air layering a woody plant outdoors, routinely check the air layer packet for buildup of water and insert drain holes if necessary;

- for houseplants, new white roots should be visible through the plastic within 8-10 weeks; for woody ornamentals, rooting usually takes one full year;
- remove the plastic and cut the stem right below the newly developed roots with a clean, sharp pruning shear or knife;
- put the new houseplant into a new pot or transplant the woody shoot into a protected site for several months;
- newly rooted plants will require extra care during the establishment phase.

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