PROPAGATION OF POINSETTIA BY SOFTWOOD CUTTINGS

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The Poinsettia Manual, by Paul Ecke, is complete and easy to understand, written by the world's leading poinsettia specialist. What I have for you today is an extract from his book, the part which deals with propagation by softwood cuttings. You will find the same rules will be most useful for other species.

The term "softwood cuttings" applies to vegetative branch tips carrying one or more mature leaves. This is different from hardwood cuttings, which are taken from mature stems, with or without leaves, and usually stripped of leaves if they exist.

There are basic criteria which must be satisfied if success in propagation is to be assured. These include:

1. Absolute freedom from disease.

2. Elimination of moisture stress once cuttings have been removed from the mother plant.

3. Adequate bottom heat (70-72°F) during rooting.

Conditions during propagation are highly favourable to spread of and infection by disease organisms. The program of sanitation must be directed towards eliminating disease rather than attempting to suppress it. The program must start *before* cuttings are taken from the stock plants.

In the outline to follow one or more of the three criteria listed above are involved in each step. Normally cuttings can be considered internally clean when removed from the mother plant. Surface carried, inactive spores may be a source of contamination if not eliminated. Procedures listed below have given excellent results in propagation. This does not mean that deviations and alterations of these procedures will not also be successful. Common sense and constant attention to sanitation are primary requisites for success.

1. Use a spray program on stock plants at one-week intervals, spraying one or two days before the cuttings are to be taken. The objective is to provide protection against possible surface contamination being carried into the propagation bed. The following combination has been successfully employed as a fine mist coverage:

AMOUNT PER 100 GALLONS WATER: 8 oz. Captan 50W, 2 oz. Benlate 50W, 1 fl. oz. wetting agent; or household bleach to give

50 ppm active ingredient (dilute @ 1:1,000) +1 fl. oz. wetting agent.

It is of interest that wetting agents materially improve the ability of subsequent mist to thoroughly wet leaf surfaces. There is some variability with cultivars. Also, it appears that the improved wetting results in improved color retention.

2. Rooting media can be any clean and well drained combination of sand, peat, perlite, vermiculite, or other available materials of similar properties suitable for soil mix composition. Preformed media are also available and can be used. The medium should have a pH of 5.5 to 6.0 for best results, since excessive acidity slows rooting and excessive alkalinity contributes to chlorosis. Fertilizers as used in regular potting media incorporated into the rooting medium do not seem to inhibit rooting. Cuttings can be rooted in pots or pans containing soil mix in which they will be finished, thus saving one or two steps in handling and avoiding additional opportunity for contamination. The procedure is termed "direct rooting" and is rapidly attaining popularity for starting multiple plant pans. The procedure saves approximately one week in the forcing schedule and will produce uniform pots if carefully managed. The procedure is fairly simple but does require special care in handling cuttings. Uniformity is most important. Cuttings should be of the same age (taken from the shoots of equal length). They should be similar in length, caliper, and color and should be stuck to the same depth. Finally, uniform mist coverage is required to produce plants of equal size and growth rate.

3. Cuttings should be removed from stock plants by means of a clean, sharp knife making the cut anywhere between the third and fourth fully expanded leaves on a mature shoot. Ideally, the cut will leave at least two mature leaves on the mother plant stem as a source of new growth and subsequent cuttings. Do *not* remove leaves from the cuttings as this reduces both stored food reserve and provides additional injury for possible infection.

4. Collect cuttings in sterile containers. Plastic containers pre-rinsed with dilute bleach are ideal (1 gallon 5% household bleach diluted to 10 gallons with water is satisfactory.)

5. Avoid any moisture stress by undue exposure to dry air during period of collection. Ideally, though not always practical, cuttings should be taken in the evening, at night, or very early in the morning when moisture stress is minimal.

6. For efficient and rapid handling do not collect too many cuttings at any one time. Transport each batch under sanitary and moist conditions to the propagation area. Stick cuttings as soon as possible in steamed or otherwise decontaminated rooting media. Start mist as soon as possible to minimize moisture stress.

7. All personnel handling cuttings should thoroughly wash hands with soap and water followed by rinse with a hospital or dairy type disinfectant. The product Dettol, used at 3 fl. oz per 5 gallons water, has been fairly popular. Other materials are equally satisfactory and non-irritating. Shallow tubs or basins of disinfectant should be kept handy for frequent rinsing of hands and/or tools.

8. If cuttings are to be spread out on any surface for handling, be sure that such surfaces are sanitary. Plastic covering is desirable and can be easily disinfected by washing with one of the hospital disinfectants or with bleach. Any cutting which accidentally falls to the floor or contact non-sterile surfaces should be discarded.

9. Cuttings should be stuck by placing in preformed holes or by simple pushing into soft media. Do *not* flood them in after sticking, but *do* commence mist or other humidity supply immediately upon sticking. Flooding causes the rooting medium to compact around the stem, increasing the moisture and reducing the air in this zone. This condition is highly conducive to bacterial soft rot infection, which can occur within the first two or three days after sticking.

10. Mist frequency and duration should be such that leaves always have a film of moisture covering them. In very bright weather moderate to heavy shading is required to protect against rapid drying and high light intensity bleaching of the foliage.

11. At the end of one week there should be evidence of callus formation. At this time fertilizer plus fungicide can be employed as a protective drench and a means of setting the medium around the cutting. Callus formation seems to occur best when there is a large amount of air surrounding the cutting, but root initiation occurs most rapidly under slightly less open conditions. Choices of fungicide and/or fertilizer are numerous, with the following having been satisfactorily employed:

AMOUNT PER 100 GALS. WATER APPLIED
4 oz. Benlate 50W
2 lbs. Captan 50 WP
8 oz. ammonium nitrate

12. At 14 to 21 days root initiation should be at a stage which permits reduction or elimination of mist. If day temperatures can be adequately controlled, mist should be turned off, since surface applied water does have a bleaching and nutrient leaching effect on the foliage. All effort should be exercised to maintain good fertility in the rooting medium as soon as callus and root initials appear. If stretching and bleaching are a problem, spray with Cycocel @ 1500 ppm to reduce stretch and hold color.

13. Transplanting should occur as soon as practical after roots are established in order to minimize "shock" due to root disturbance. Use of fertilizer in mist is practiced by many growers and has been advocated by numerous researchers. Experience to date indicates considerable variation in results due to materials and methods employed. Unless previous experience has provided the necessary background, the grower is advised to approach the program on a trial basis. Elements most rapidly leached from the foliage by mist are nitrogen and potassium. Phosphorus seems to encourage stretching. As a guide for initial trials the following mist water composition is suggested:

AMOUNT PER 1,000 GALLONS WATER APPLIED
4 lbs. ammonium nitrate
2 lbs. potassium nitrate

As previously mentioned, rooting can take place in a variety of media and containers. Preformed rooting media which are rapidly appearing on the market are being successfully used. Any *new* approach should be given adequate trial before being used on a large scale. Rooting in beds is quite common, but care must be exercised in lifting cuttings to avoided injury to roots.

Where rooting media are shallow, there is frequently an interface effect which results in waterlogging in the zone occupied by the base of the cutting. Such a condition will cause darkening and deterioration of the stem and give the appearance of disease, even though disease organisms may not be present. The reaction is acutally due to lack of oxygen. To minimize this possibility, rooting beds should be six inches or more in depth. Where direct rooting in containers is practiced, they should preferably be nested in sterilized sand, perlite or vermiculite to effectively increase the soil column height of shallow containers. Good contact with a wood surface can also provide a certain amount of "blotter" effect causing free water to move out of the bottom of the pot.

Excessive crowding of cuttings in the propagation bed should be avoided in order to reduce soft growth, stretch and slower rooting. In bed rooting allow at least twelve square inches (2" x 6") per cutting. For rooting in 2¼" pots allow fifteen square inches 3" x 5") per pot.

Although rooting hormones are not used by all propagators and are not essential to root initiation of poinsettia cuttings, experience has indicated that they do speed up the rate of rooting and improve uniformity. Normal acceleration is several days to a week or more. One of the most convenient methods of hormone treatment is to provide a quick-dip of cutting base in liquid solution. Synerol has been successfully employed at 1/5th strength. A calculated risk in employing this treatment is the possibility of spreading disease from one infected cutting to all other cuttings

dipped in the same solution. An insurance practice which has been shown to be beneficial is to add ten drops of household bleach per pint of hormone solution. The use of hormone powders reduces the chance of cross contamination, particularly if some Captan is mixed with the powder. Dusting the powder on the base of the cutting is less apt to spread disease than dipping cutting in powder. However, the use of powder provides less uniform treatment than the liquid quick-dip.

RECENT ADVANCES IN BIOLOGICAL CONTROL OF PLANT PATHOGENS WITH RELEVANCE TO THE NURSERY INDUSTRY

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Abstract: The application of biological control of root rot diseases in nurseries is discussed. In Australia, isolates of the bacterium *Bacillus* have controlled damping-off of bedding plants caused by Pythium and Rhizoctonia. Some *Bacillus* isolates have increased the growth rate of bedding plants and given increased yields of field crops such as carrots, sweet corn and grains. Biological control of crown gall is now used commercially in Australia.

Biological control of root diseases is a reasonable reality and a growing number of people accept with guarded optimism that plant disease control by biological means in the broad sense has immense potential for the future(14). The field of biological control has recently been reviewed by Baker and Cook(2).

Aerated Steam Treatment of Soil Potting Mix. Nurseries almost universally grow their plants in steamed or chemically treated soil to reduce losses from soil-borne diseases such as *Pythium, Rhizoctonia* and *Phytophthora* and to control weeds and insect pests. High dosages of fumigants or steaming at 100°C for 30 minutes or longer tend to produce a "biological vacuum" and when a pathogen is accidentally introduced it may luxuriate producing severe losses.

Aerated steam treatment at 60-71°C for 30 minutes is now commonly used to kill root pathogens and leave a residual flora of saprophytes antagonistic to the pathogen. Components of mixes that are nearly devoid of micro-organisms (e.g. perlite, vermiculite, and sands mined from deep in dunes) cannot provide this protection following treatment by aerated steam.