tremely difficult to propagate. Everytime I get over-confident and think I have the answer, I all flat n my face.

In conclusion, here is what I think works best for me:

1. Take cuttings as early in the year as possible — April if you can — and so soft they are almost limp. Take them very early in the morning and quit by 10 A.M. Water the stock plants the day before.
2. Dip the cuttings in Jiffy Grow #2, diluted 20 to 1. Do not wound but water in well.
3. For a rooting medium use ⅔ coarse sand and ⅓ Sponge Rok, medium grade.
4. Use a plastic tent about 3 ft. above the bench, primarily as a "Fail-Safe" system in case the mist goes off.
5. Mist lines: Use your own judgement as to mist interval. The leaves are coarse and hairy and with this type of leaf there is likely to be more leaching through the leaves.
6. I put heating cables down but don't use them until the nights become cool.
7. At about 10 weeks I give a foliar spray of Jiffy Grow #2 at 25:1 dilution.
8. If the cuttings are very slow to root, inject liquid fertilizer into the mist lines for a day. I use Liquinox 10-10-5 because of it's detergent type action for wetting the coarse leaves.
9. When you think you can't wait any longer, transplant the cuttings to a cool house for the winter then move the plants out to full sun the following spring.

I now stick 10,000 cuttings a year and have had 70% rooting as my best effort. I believe that someday these will be rooted by the hundreds of thousands. It has been said that the rhododendron is the King of shrubs. The Exbury azaleas then are the aristocracy.

MODERATOR CURTIS: The next topic on the program concerns factors influencing rooting of rhododendron cuttings. Mr. Johnson, our next speaker, has a B. S. degree from Colorado State University. In 1964 he spent a year in Copenhagen, Denmark, and then returned to Oregon State University in 1965. Mr. Johnson.

LEAF AND APICAL BUD REMOVAL AS A MEANS OF STUDYING THE INFLUENCE OF FLOWERING ON ROOTING IN RHODODENDRON

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Both internal and external factors are important in adventitious root formation. We are interested in the endogenous physiological factors, particularly the influence of flower initiation on rooting. Although flowers are viewed mor-

phologically as shoots with metamorphosized leaves, their structure and function are quite different from leaves (11). The stimulus responsible for flower induction is unknown. Flowering, as well as rooting, is probably brought about by a constellation of chemical reactions.

It is generally considered that shoots with terminal leaf buds root better than those with flower buds (4). Kemp (5) suggested that flower buds inhibited rooting in the *Rhododendron* shoot. De Boer increased the rooting of flowering rhododendron shoots by removing flower buds (2), as did O'Rourke with *Vaccinium* (7). Turezkaya, as reviewed by Selim (9), found that rooting in cuttings of *Perilla* and *Soja* decreased with flower initiation, and disappeared completely during anthesis. She concluded that the flowers and fruits mobilized plant auxins leaving none for root initiation. Recent evidence (6) supports this conclusion, showing an acropetal transport of IAA after flower initiation. Adams (1) noted that flower initiation in *Rhododendron* 'Roseum Elegans' began when the shoot and largest leaf were half expanded. He found the enlarged leaves resulting from flower initiation did not have the rooting-potential of smaller leaves from non-flowering shoots.

We are using growth analysis, following leaf and flower bud removal, to study the flowering-rooting phenomenon. Roberts (8) by mechanical leaf removal on plum, and Fulford (3) using defoliating sprays on apple found complete defoliation prior to flower initiation caused terminal buds to produce new vegetative growth. The buds produced flowers when shoots were defoliated after initiation, serving to index time of flower initiation in relation to shoot development. The rhododendron bud has been found incapable of vegetative reversion after 90 - 100 mm of shoot extension. Certain leaves on the shoot are more important in flower initiation than others. Early removal of these should hinder flowering and thereby enhance rooting. This technique could also be helpful in studying the importance of leaf position in rooting. For example, leaf removal in a certain position could enhance the rooting in another.

Flower bud removal is a direct means of studying the flowering-rooting relationship. This method of study has proved satisfactory in research on cultivar 'Pink Pearl' this past year. Lateral buds in the second or third leaf axils subtending the terminal flower bud were removed and dissected at different stages of shoot elongation. Previous studies have shown that shoots arising from this position usually terminate in flower buds. Their flowering nature was substantiated by the heavy flowering of remaining shoots. The mature flower bud usually contained 18 bud scales and about 16 flowers. Expanding shoots were found to produce 18 scales when 36 mm long, so it seemed reasonable to expect that apical bud removal before this time would eliminate the flowering stim-

ulus. Apical buds were removed from such expanding shoots at 6 stages of elongation:

Stage	Shoot Length
1	20 - 28 mm
2	29 - 34 mm
3	35 - 45 mm
4	46 - 55 mm
5	56 - 65 mm
6	66 - 115 mm

Leaf-petiole cuttings were taken the last of August for evaluating the rooting capacity of the shoots. The rooting response was determined on the basis of actual root-ball diameter and the rooting-potential was calculated as root-ball diameter per 10 cm² leaf area.

In general, larger leaves were found to be associated with flower initiation, but apical bud removal before flower initiation reduced leaf size. However, the terminal 3 - 4 leaves were nearly always equal in size regardless of bud removal treatment. Thomas (10) found that expanding leaves in *Chenopodium amaranticolor* were stimulated most during flower initiation. The middle leaves were expanding during flower initiation but the terminal leaves were not, thus leaf expansion in relation to flower initiation helps explain the differences in leaf size.

Larger leaves produced slightly greater root-ball diameters than smaller ones but the smaller leaves had greater rooting-potential. Apical bud removal before flower initiation increased rooting response. In most cases rooting was increased by apical bud removal at all stages of shoot elongation. This increase is attributed to the elimination of the competitive sink established by developing flower buds, which attract materials essential in rooting.

Summary. Flower initiation is known to decrease the rooting of *Rhododendron* cuttings. Leaf and flower bud removal were used for studying the flowering-rooting relationship. Leaf removal was useful in determining time of flower initiation and studying leaf position influence. Apical bud removal before, during, and after flower initiation was a more satisfactory means of studying the flowering-rooting relationship. Bud removal before initiation reduced leaf area and increased rooting-potential. Later removal did not affect leaf area but did slightly enhance rooting. It appears that bud removal at the right time eliminates a sink which competes for factors essential in rooting.

LITERATURE CITED

1 Adams, David G 1967 A morphological approach to predicting the rooting potential of the *Rhododendron shoot* Ph D Diss, Oregon State University, Corvallis

2 DeBoer, S 1953 Some aspects of propagation by cuttings of ornamental

trees and shrubs In *Rept 13th Int Hort. Cong*, London, 1952. Vol I *Royal Hort. Soc* pp 443-446
3 Fulford, R M 1960 The use of defoliating sprays for the control of biennial bearing in apple *Jour Hort Sci* 35 202-213
4 Gorter, Chre J 1957 The rooting of cuttings of vegetative and flowering plants *Proc Akad van wetenshappen, Amsterdam, Ser C*, 60 61-66
5. Kemp, E E 1948 Some aspects of plant propagation by cuttings with special reference to the selection of material *Jour. Royal Hort. Soc* 73. 291-305
6 Naqui, S M and S A Gordon 1965 Auxin transport in flowering and vegetative shoots of *Coleus blumei* Benth *Plant Physiol.* 40 116-118
7 O'Rourke, F L 1940 The influence of blossom buds on rooting hardwood cuttings of blueberry *Proc Amer Soc Hort Sci* 40 332-334.
8 Roberts, R H 1923 Effects of defoliation upon blossom bud formation· American plum species *Wis Agric Exp Sta Res Bull* 56
9 Selim, H H A 1956 The effect of flowering on adventitious root-formation *Meded Landbouwhoogesch Wageningen* 56 (6) 1-38
10 Thomas, Roderick G 1961 Correlations between growth and flowering in *Chenopodium amaranticolor* II Leaf and stem growth *Ann. Bot* 25: 255-269
11 Zeevaart, Jan A D 1962 Physiology of flowering *Science* 137. 723-731

VICE-PRESIDENT TICKNOR: For the last session of the 1967 meeting, Dr. Howard Brown, Head of the Ornamental Horticulture Department, California Polytechnic College at San Luis Obispo, will be our moderator. We will have a session now on varieties and teaching. Howard, will you get the program underway?

MODERATOR BROWN: Our first speaker for this panel has been in the field of plant propagation and plant growing for many years. In fact he was telling me last night he taught his first class in plant propagation 46 years ago. He taught at Rutgers and received his doctorate from Columbia University. He came to Washington and was engaged in cranberry farming before he went into the nursery business. He now operates Clarke Nursery at Long Beach, Washington, and is a specialist in rhododendron production. His topic today is naming and registering plants. It is my pleasure to present Dr. J. H. Clarke:

NAMING AND REGISTERING PLANTS

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The naming of plants is not strictly a part of propagation but is closely allied with it. All plants we work with have names, or numbers, or identification tags of some kind.

Some of our members are plant breeders and perhaps they have the greatest responsibility in this matter of naming — responsibility to themselves and their own good name, and to the public at large.

Many of our members are engaged in research. Every good plantsman knows that different kinds of plants, and dif-