Obtaining Additional Rhododendron Growth During the Cold Months

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Rhododendron is one of the more popular flowering landscape shrubs in use today and provides a significant percentage of the income of many production nurseries. The value of a rhododendron increases rapidly as plant size increases, so growers are constantly striving to produce the largest plants possible in the shortest amount of time. Unfortunately, rhododendrons are relatively slow-growing shrubs. At least some types of rhododendron can be grown year-round in the northeast when warm temperatures and long photoperiods are provided during the winter months. Research has been conducted to examine economical ways of coaxing additional growth from rhododendron plants during the off-season.

Maintenance of cool (40°F) or warm (65°F) temperatures during the entire winter has been tried with success. Elton Smith (1972) found that a variety of shrubs and groundcovers increased 1 or 2 grades in only one growing season when a minimum (40°F) winter temperature was maintained. It is likely that, for the majority of growers, the cost of heating a greenhouse for the entire winter will outweigh the benefits seen in extra plant growth.

One alternative to heating all winter is to heat for only part of the cold season. Some success has been reported with fall heating of summer-rooted rhododendron cuttings. Timmerman and Havis (1982) were able to get 10 times the growth and double the number of shoots on Rhododendron 'PJM' when growth was stimulated by an inductive warm period (65°F for 10 days) followed by cool temperatures (40°F). A 3-hour light break was provided between 11 p.m. and 2 a.m. during both the warm and cool periods.

Several potential problems exist with forcing growth in the fall. Since dormancy is delayed by the artificial heat and light, one cannot let temperatures drop to unheated values without risking some cold injury to unhardened plant tissue. Therefore, once a forcing program is initiated a grower is committed to maintaining above-freezing temperatures in the greenhouse for the duration of the winter at extra cost. If a grower is successful at maintaining sequential growth flushes through the winter, he must provide for the increased space requirements of larger plants. If crowding occurs, plants can become misshapen and foliar diseases are likely to occur in the high humidity of the greenhouse.

It is also possible that only one growth flush will occur and that plants may remain in a state of "summer dormancy" for the duration of the winter. If this occurs, it may be possible to stimulate additional flushes by providing another warm inductive period after 4 to 8 weeks of cool temperatures. Blazich and Wright (1986) have had success using this technique to yield multiple flushes on umbrella pine in a single season.

Perhaps a more advantageous and economical time of the year to stimulate extra growth flushes in rhododendron is in late winter or early spring. By waiting until this time of year to stimulate growth, plants can accumulate a significant amount of normal chilling during the fall and winter and are "charged up" for growth. A chilling period will make the spring growth response uniform across all plants.

Heating costs will be lower in the spring than in the winter months and day length will be increasing, which will further stimulate growth. Crowding resulting from plant growth will not be as great a concern in the spring as in the fall, because by the time the growth flush is maturing, the grower can begin to move plants into outdoor growing areas.

John Havis (1983) found that Rhododendron 'Nova Zembla' summer-rooted cuttings which had received 60 days of chilling at 34-37°F could be easily forced into growth by beginning growth-stimulating treatments on February 1. A recommended method for 'Nova Zembla', Catawbiense hybrids and, possibly, many others is as follows:

Allow the plants to go dormant naturally and provide them with environmental conditions typical of an overwintering structure.

February 1 - raise the minimum temperature to 40-45°F
March 1 - raise the minimum temperature to 65-70°F
March 15 - lower minimum temperature to 40-45°F

Plants kept at 40-45°F after the warm induction treatment can be expected to mature one flush of growth by the end of May, while those maintained continuously at 65-70°F after the warm induction treatment can be expected to mature 2 flushes of growth. By the end of September, plants given both types of treatment should produce 3 growth flushes. Approximately 600 more gallons of No. 2 heating oil are needed to maintain a 100 x 14 ft quonset-type house at 63°F from February 15 to May 15 than to maintain the same structure at 41°F (Havis 1983).

Since plants kept at the lower temperature will attain the same size by the end of the growing season as those kept at the higher temperature, most growers would prefer to run the greenhouses cooler and save on fuel costs. The use of higher temperatures may be helpful if larger plants are needed early in the season. It is interesting to note that a 3-hour light break around midnight does not benefit growth.

Photoperiodic lighting has not always been found to provide a substantial benefit. The effect of lighting depends on many factors, including time of season, light intensity, light quality, duration of exposure, plant species involved, temperature and a variety of other environmental factors. Daggett and Klingaman (1985) found that light from incandescent bulbs provided from 10 p.m. to 2 a.m. did stimulate additional growth in some shrubs. The stimulatory effect was more pronounced at 64°F than at 41°F.

The use of red light rather than incandescent light (a combination of red and far red light) to extend photoperiod was examined by Kasperek and Havid (1986). They found that 3 hours per day of red light provided to 'PJM' rooted cuttings for 3 weeks yielded plants with more desirable, shorter shoots than when incandescent light was used. No additional bud breaks were evident. Unfortunately, 'Roseum Elegans' plants exposed to red light did not produce shorter shoots and more compact growth, but performed identically to those under incandescent bulbs. It should be noted that fall lighting did have the disadvantage of delaying initiation of growth in the spring.

A relatively inexpensive structure which might be suitable for use in an accelerated growth program for rhododendrons would be a double layer, plastic-covered, quonset-shaped greenhouse. The outside layer should be 4 mil milky plastic and the inner layer 4 mil clear plastic. The films should be separated by forced air from a blower. Heat could be supplied by a gas-fired furnace which supplies heat to the root zone if plants are on benches, or down the length of the house through a perforated poly tube. If possible, a shutter system with a fan is desirable to maintain temperatures below 80°F.

The success of an accelerated growth program for rhododendron demands that the plants receive no stress which might induce dormancy. Regular watering and fertilization are required. In some instances, for particularly valuable plants, there may be a need to raise CO_2 levels to further enhance growth (Gidvilas, 1988). Each grower must ultimately decide if it is economically feasible to force extra growth on their rhododendrons and which techniques will prove to be the most useful in their operation.

References

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