Section 3

Florist Azalea

Roy A. Larson, North Carolina State University, Professor Emeritus

In 1995, there were 564 azalea growers who produced 16,033,000 plants at a value of $57,656,000. In 1970, California was the leading producer of the florist azalea, followed by Florida, New York, Alabama, and Oregon. By 1995, New York and Oregon were the leading states and statistics weren't revealed for Florida and Alabama so individual operations wouldn't be identified. Many liners and larger plants are produced in those states, however.

Azaleas can be grown and sold in containers ranging in size from 2-inch pots to 12-inch hanging baskets, or as braided trees. Some growers put two or even three rooted cuttings in a 6.5-inch pot, which gets the crop to a marketable size faster than if only one cutting is used. The 6-inch or 6.5-inch size accounts for most of the U.S. azalea sales. Several cultivars can survive winter temperatures encountered normally in the Southeast and on the West Coast, adding to the versatility of the crop in such areas, although a "test" winter can destroy the flower buds, if not the plants.

The florist azalea is a member of the genus *Rhododendron,* and has been classified as different species by several taxonomists. The Belgian indica types were classified as *R. simsii* by one prominent authority, and the Kurume types were classified as *R. kiusianum.* The Belgian indica azaleas are known for their large flowers, while Kurume azaleas average more flowers per plant, but the flowers are much smaller.

Azalea growers can select cultivars of several colors and forms. Red is perhaps still the most popular color, but it has been challenged by the pink and variegated colors. Flower forms range from single types to double hose-in-hose (the petals are doubled in number, and the sepals are transformed to petals), with other forms between these two extremes. Examples of some of the colors and forms available are shown in Figures 3-1, 3-2, and 3-3.

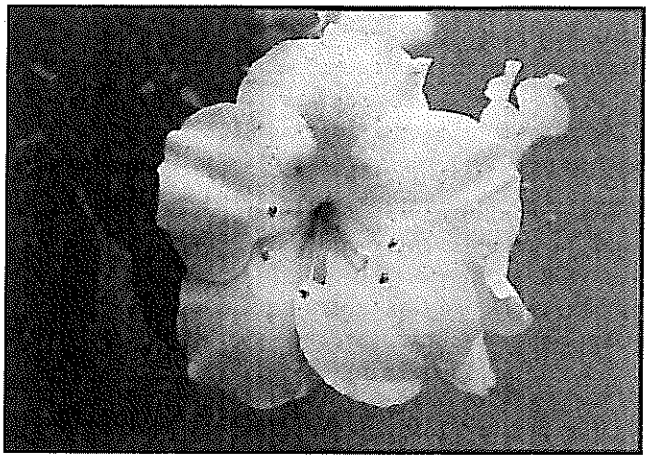

Figure 3-1. Sport of "Nancy Marie" – single flowers.

Figure 3-2. "Gloria" – hose-in-hose.

Figure 3-3. "Leopold Astrid" – semi-double.

Propagation

At one time, many growers took cuttings from their own plants growing in the field or greenhouse and practiced all the cultural procedures until the flowering plants were ready for the market. Now, most growers rely on propagators in warmer climates to furnish them with vegetative liners, or plants even

further along in the production cycle. As a result, some growers actually only force and finish the plants. Such plants might only occupy greenhouse space for six months or even as little as four to six weeks.

Specific information on azalea propagation is available in several propagation texts or in books devoted solely to azalea culture.

Media And Water Quality

The ideal potting medium for azaleas is one which is high in organic matter with an acidic pH. Acid peat moss meets these specifications better than almost any other medium, but not all products sold as peat moss are the same and the quality can vary tremendously. Substitutes for peat moss have been tried, and azalea potting media now might consist of several ingredients. Pine bark humus, aged sawdust, and similar materials have been used in combination with perlite or vermiculite. Most azalea forcers don't have to consider what media to use, because they can purchase liners or more mature plants which might not require transplanting, or the shift to a larger pot will not require much additional media.

Water quality varies from one part of the country to another, or sometimes even within the same state. In some areas, water quality is satisfactory and no water treatment is necessary. In other areas, poor water is so detrimental to the plants that water treatment is essential. Research has shown that optimum growth of azaleas is supported when the following guidelines are not exceeded:

Chlorine and sodium – less than 100 ppm.

Sulphate – less than 200 ppm.

Iron – less than 1 ppm.

Boron – less than 0.5 ppm.

Carbonates (Mg and Ca) – less than 80 ppm.

Water pH is important, since azaleas grow best when the pH is around 5.0. Nutrient deficiencies can occur if alkaline water is used, and maximum growth will not be realized. A chemical such as phosphoric acid might be needed to keep the pH in the proper range.

Irrigation Strategies

The fact that azaleas are grown in potting media high in organic matter makes irrigation extremely important. Such media can be very difficult to rewet if they are allowed to dry out excessively. Many azaleas forced in the greenhouse are manually watered with a hose, because automated watering systems have their drawbacks. Tube watering might not apply water to the whole root ball. Subirrigation, such as with the ebb and flood system, is not often used because root systems can be adversely affected if the medium stays too wet too long. Some forcers do use spray stakes or overhead watering, but water can be wasted with this method and foliar diseases can be troublesome. Water is most often applied by sprinklers to azaleas in the field but the handicaps of that procedure are the same outdoors as indoors. Overhead watering can reduce leaf temperatures on bright days, but the effect is not long lasting.

Sprinkler irrigation definitely is not the best way to water flowering azaleas, because flower life is shortened and diseases such as petal blight and *Botrytis* can become greater problems.

Fertility Regimes

A general recommendation is to use half as much fertilizer for azaleas as one would use for most flowering potted plants. High soluble salts can destroy the root system, especially as the medium dries out. When this occurs, leaf burn, leaf drop, and even plant death, are often inevitable.

Fertilization often ceases two to three weeks before plants are subjected to the dormancy-breaking treatments. If the plants have been fertilized adequately before then, they won't need fertilizer during forcing. This means that growers who only force azaleas will not have to worry about the fertilizer regime; they can only hope the supplier did it properly.

Growing Temperatures

Temperature recommendations often can be so confusing that potential azalea growers or forcers give up, or feel they just cannot provide those temperature requirements.

Azalea growers and forcers are just trying to simulate nature with temperature control. Under natural conditions, the plants flower in the spring and new lateral growth surrounds the old flower. Warm temperatures (minimum of 65°F) favor vegetative growth. A temperature of 65°F also promotes flower bud initiation, which occurs on the vegetative shoots in late summer when the days get shorter. Flower buds will continue further development until cool autumn temperatures slow down the process. The flower buds then become dormant. This is a protective mechanism to prevent flowers from opening when damaging winter temperatures pre-

vail. Dormancy will continue until an adequate number of cold temperature hours have been fulfilled. Kurume azaleas require approximately 700 hours of cold temperature, while the Belgian indica types require 1,000 hours. The dormancy requirements usually are satisfied in early spring as the temperatures increase and the buds begin to swell and eventually open.

Azalea producers can provide these temperatures in greenhouse production and reduce the production time from one year to only six months. The timed or final pinch is equivalent to the plants flowering outdoors, and temperatures of 65°F or warmer following the pinch will accelerate vegetative growth. About eight weeks later, flower buds can be initiated. After approximately another eight weeks, the flower buds will be developed to such an extent that they become dormant. At that time, the plants can be placed in refrigerated storage at temperatures ranging from 35 to 50°F. Flower buds will freeze at colder temperatures than 35°F and dormancy will not be broken at temperatures higher than 50°F. Plants precooled at 45 to 50°F usually will force faster than those precooled at 35 to 40°F.

Natural cooling can be used in some parts of the country and is more economical, but it is more difficult to precisely time flowering with this procedure. Plants also can be "held" at temperatures ranging from 35 to 40°F, but the greenhouse should be shaded so the plants will not be exposed to high light when the root ball is cold and water cannot be absorbed or translocated fast enough to replace that lost by transpiration at high leaf and air temperatures.

Plants generally are forced at temperatures of 60 to 65°F. Night temperatures should not exceed 70°F. Flowering can be hastened at higher temperatures, but the flowers can be "soft" and longevity is reduced.

The temperature requirements could be summarized as follows:

Vegetative growth – 65°F and warmer

Flower initiation and early development – 60 to 65°F

Breaking dormancy – 35 to 50°F

Forcing – 60 to 65°F

Lighting Considerations

The response of azaleas to daylength was mentioned briefly with the temperature discussion. Vegetative growth is favored by long days and flower initiation is favored by short days, but the responses are not as pronounced as for crops such as poinsettias and chrysanthemums.

Shade, to reduce light intensity, is needed on the propagation bench, even when mist is used. Reduced light also is beneficial when the rooted cuttings are transplanted. Azalea liners grown in the field often are grown in full sun at some nurseries, while a material such as saran is used at others. Azaleas can tolerate high light intensities if they have enough water. Research conducted 35 years ago showed that flower bud initiation occurred sooner under a high light intensity than under shaded conditions.

Azaleas subjected to 35 to 40°F to break dormancy do not have to be lighted in the cooler, but those placed at 45 to 50°F do require lights to reduce leaf drop. The light usually is provided with incandescent bulbs, because installation is cheaper than with fluorescent fixtures; but the incandescent lights can increase the temperature in the cooler when they are on for 12 hours daily. At one time, it was believed that only a few footcandles of light in the cooler were adequate, but recent research has shown that forcing occurs sooner and more uniformly if intensities as high as 125 footcandles are provided. Plants precooled at 45 to 50°F also will require watering while in the cooler, as often as twice a week. A relative humidity of 80 percent to 90 percent is recommended.

Azaleas can be forced under full light, but the flowers will last longer if some shade is provided when the flowers begin to open. Sunburn also can occur on darker colored flowers if the sun is bright and water is even slightly limited.

Pinching

Azaleas are multi-branched plants, and plant size is determined by the number of pinches the plants receive. Although some plants are sold based on container size, the plant size (diameter, such as 8 inches by 10 inches) or number of pinches are better guidelines.

A grower has a few options when vegetative shoots are large enough to be pinched. Manual pinching, such as with pruning shears, is very slow and often is "stoop labor" at its worst. Mechanical pinching is faster, but the plants usually are not as well shaped as manually pinched plants when some judgment can be made in the trimming of shoots. The fastest procedure is to use chemical pinching agents, such as Atrimmec or Off Shoot-O, which allow you to

treat a field of plants in a couple of hours that could take weeks to pinch manually. Label instructions should be followed to get the best results with no phytotoxicity. See Figure 3-4 for an example of a pinched plant.

Chemical Growth Regulator Strategies

Chemicals can be used to pinch azaleas to stimulate lateral branching, to promote flower bud initiation, and to break flower bud dormancy. Off-Shoot-O was the first chemical used commercially to pinch azaleas. The material destroys the shoot apex, but only works on vegetative plants. Cultivars differ in their response to Off-Shoot-O, and weather also has an effect. Under conditions of high temperature and low humidity, the material evaporates from the shoot tips before sufficient damage is done. The same rate applied at cooler temperatures and high humidity could cause excessive leaf burn, so trial runs are recommended to make certain the chemical will be effective with little phytotoxicity. The material is applied as a spray at 30,000 to 70,000 ppm, and it must be directed to the shoot apexes. Atrimmec at 3,125 to 6,250 ppm, applied as a foliar spray, also is effective, but its mode of action is much different than that of Off-Shoot-O. The chemical works within the plant, and one cannot tell if the material was effective for at least a couple of weeks. The material should not be applied too frequently to the same plants, or phytotoxicity can occur.

Cycocel (1,800 to 2,800 ppm), B-Nine (5,000 ppm), and Sumagic (5 to 16 ppm, but cleared only in Florida) are applied as foliar sprays to stop vegetative growth and promote flower bud initiation. The chemicals usually are applied five to six weeks after the final or "timed" pinch, which is about 9 to 10 weeks before dormancy treatments are begun. Bonzi, applied as a foliar spray at 100 ppm or a drench at 5 to 15 ppm, promotes initiation and also inhibits bypass shoot development when it is applied seven weeks before plants are placed at cool temperatures to break dormancy. Growers are urged to consult experts in their states to make certain the chemicals have label clearance, and strict adherence to label instructions is essential.

The effect of cool temperatures to break flower bud dormancy has been mentioned, but one can also use gibberellic acid (GA) for the same purpose. The plants can remain where they are in the field or greenhouse, and no refrigerated storage facilities are necessary. The chemical used is GibGro 4LS, and the chemical has only recently received federal label clearance. A grower has two choices in the use

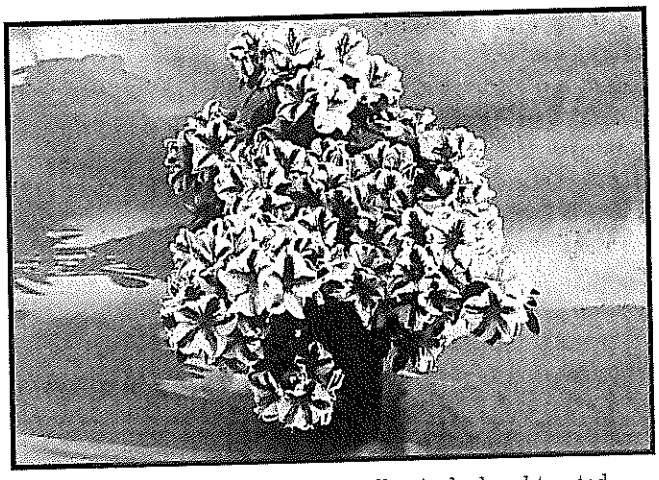

Figure 3-4. "Nancy Marie" – manually pinched and treated with B-Nine.

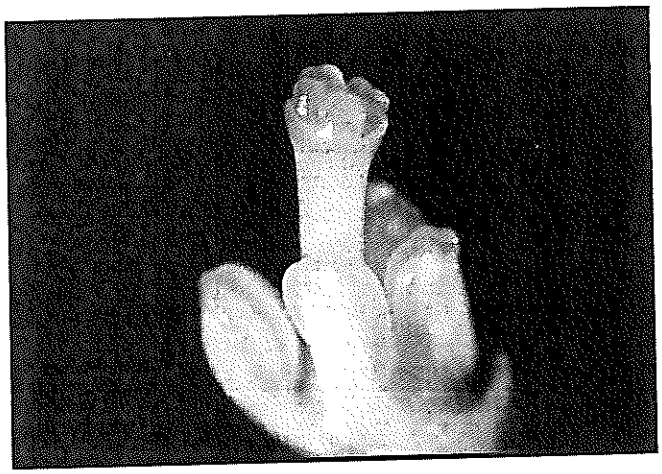

Figure 3-5. Stage 5 – style elongated and closed.

of gibberellic acid to break dormancy. One can place the plants in the cooler for three weeks to begin the "dormancy breaking" process, finishing the process as plants are moved to forcing temperatures by applying three applications of GA at 250 to 500 ppm. Secondly, you can break the dormancy by using GA alone by applying a treatment at a rate of 1,000 ppm each week for four or five weeks. It is essential that plants be at the proper stage of floral development before GA alone is applied (Figure 3-5: Stage 5, style elongated and closed). Further instructions are given on the GibGro 4LS label.

Common Pest Problems

The duration of an azalea crop can make plants more vulnerable to insect and disease organism attacks than quicker crops, but the pest problems are not insurmountable. Good field or greenhouse practices can greatly reduce insect or disease problems. Growers who only force the plants will seldom encounter pest problems if the plants were purchased from a reliable source.

Insects. Plants grown in the field are more likely to encounter insect problems than those confined to the greenhouse. Azalea leafminer can be a serious problem, even in the greenhouse, and the damage done does not resemble at all the damage done by the leafminers found on chrysanthemums (Figure 3-6). There are no tunnels on the foliage with azalea leafminer, but the tips of the foliage curl up and turn brown. The larvae inside the curled up leaves are protected from sprays, but often one does not know that leafminers are present until the brown tips are evident.

Spider mites also can be serious problems. When the foliage develops a bronze appearance, and the underside of the leaves seems littered with debris, spider mites usually can be found. Frequent inspections can detect this pest before severe damage is done.

Outdoor azalea plants are often attacked by azalea lace bug. Foliage can develop a white cast. Overhead watering can lessen the infestation by spider mites and lace bugs, but plants watered by sprinklers can be subjected to foliar diseases, when the organisms are spread by splashing water.

Diseases. Root knot nematodes were once a major disease problem, but liner producers have really reduced their incidence. Some other disease problems have been more persistent. One of the most damaging diseases can be *Cylindrocladium* blight and root rot, caused by the fungus *Cylindrocladium scoparium.* It can infect the plants from the propagation bench to the flowering stage, and it can infect roots, stems, and foliage. Spores generally are spread by splashing water.

Azalea decline or littleleaf disease, caused by the fungus *Phytophthora cinnamomi,* is a root rot which develops quite slowly, in contrast to *Cylindrocladium*. The organism is a water mold, and azaleas in poorly drained media are particularly susceptible to this disease.

Powdery mildew can be a problem at high humidities or when air circulation is poor, two characteristics of refrigerated storage.

There are other diseases, such as petal blight, but they usually are more troublesome on azaleas in the landscape than on florist azaleas. There are cultivar differences in disease susceptibility, but the most susceptible cultivars are usually dropped from nursery inventories. Fungicides are available

Figure 3-6. Azalea leafminer damage.

to help control the disease organisms, and growers should refer to state agricultural chemical manuals or contact local experts to obtain advice. The first step is to get the disease diagnosed correctly.

Physiological Disorders

There are some problems which are not caused by pathogens, but can result in unsaleable plants. Examples would be failure to flower, an excessive number of bypass shoots, and leaf drop. Pinching too late can result in failure of the shoots to develop flower buds. Allowing too much time between the final pinch and breaking of dormancy can result in the production of numerous bypass shoots around the flower buds. Causes of leaf drop have already been mentioned.

Year-Round Flowering Schedule

Azalea flowering can be accurately scheduled if one has the proper facilities to accomplish it. A general schedule would be:

1. Final or "timed" pinch. Eight weeks of long days, either with natural long days (April 1 to August 31), lights from dusk to midnight, or from 10 p.m. to 2 a.m.
2. Apply growth regulators five to six weeks after the pinch to promote flower bud initiation.

   OR

   Provide natural short days from September 1 to March 31, or pull black cloth from April 1 to August 31 (9- to 10-hour days). Eight weeks of short days are necessary.

3. Place plants at 35 to 40°F or 45 to 50°F to break flower bud dormancy for four to six weeks.

   OR

   Apply gibberellic acid after 10 weeks of short days (see section on breaking flower bud dormancy for more details). Plants should be in flower in four to five weeks.

4. Force at 60 to 65°F.

Marketing

For maximum longevity of the flowering plants, they should be sold when only 25 percent to 30 percent of the flowers are open and the rest of the buds are showing color. Such plants can remain attractive for four weeks or more if light is adequate and plants are not allowed to dry out. There are occasional demands for azaleas which are in full flower at the time of purchase, but such plants have a limited "shelf life."

OFA