



Selecting and Growing Azaleas



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Contents

Introduction	5
Grouping Azaleas by Characteristics	5
Evergreen vs. Deciduous	5
Flower Forms and Petal Shapes	5
Time of Bloom	6
Native vs. Introduced Cultivars and Hybrids	6
Considerations When Selecting Plants	12
Cold Hardiness	12
Flowering Sequence	12
Mature Plant Size and Flower Color	12
Plant Health	12
Your Landscape Needs	12
Planting Time	13
Site Selection	13
Planting Procedures	13
Maintenance	14
Mulching	14
Watering	15
Fertilization	15
Pruning	15
Common Azalea Problems	16
Cultural and Environmental Problems	16
Insects	17
Diseases	19
Propagation of Azaleas	22
Suggested References	23

Selecting and Growing Azaleas

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Introduction

Few plants can rival the spectacular floral displays of azaleas. Their vivid colors, profusion of flowers, and adaptability to a wide range of soils and climates make them one of the most popular flowering shrubs in Georgia. Although most people associate azaleas with spring, several bloom in summer and fall. By carefully selecting plants, you can have azaleas blooming at least eight months of the year.

Botanically, azaleas are members of the *Ericaceae* (Heath) family, which includes blueberries and mountain laurel. All azaleas are rhododendrons, and both are in the genus *Rhododendron*. The term "rhododendron," however, is commonly used to refer to the group of plants usually with large, leathery, evergreen foliage, while "azalea" refers to those with smaller, thinner leaves. Generally, azaleas and rhododendrons have the same cultural requirements.

The Royal Horticultural Society in London maintains an International Rhododendron Registry that lists over 800 species and several hundred named cultivars. To be registered, a cultivar must have a unique name and unique characteristics that set it apart from others. Some hybridizers in the United States register their new cultivars with the Rhododendron Society of America.

Grouping Azaleas by Characteristics

Azaleas are grouped into categories based on a number of plant characteristics, including whether they are evergreen or deciduous (shed their foliage in winter), and whether they are a native plant

species or an introduced cultivar. Evergreen azaleas are described according to flower form, petal shape, variation in petal colors, plant size, time of bloom and growth habit. Many hybrid evergreen cultivars are grouped according to the name of the plant breeder who introduced them or the location where they were developed. These various groups and characteristics are described below.

Evergreen vs. Deciduous

Evergreen azaleas maintain some of their leaves throughout the year, while deciduous azaleas lose their leaves in autumn.

Most evergreen azaleas originated in Japan, but some came from China, Korea or Taiwan. Several deciduous azaleas are native to North America; others originated in Eastern Europe, Japan, China and Korea. Others come from hybrid crosses.

Flower Forms and Petal Shapes

Azaleas are often described according to the shape or form of their flower. In order to understand the terminology used to describe flower forms, it is helpful to review the parts of a flower (Figure 1). The **stigma**, **style** and **ovary** make up the female part of the flower. These three parts are collectively called the **pistil**. The male part of the flower includes the **anthers** and **filament**, which make up the **stamen**. The petals are the showy part of the flower. Below the petals are the sepals. In some flowers, the sepals are green and leaf-like, while in others they are colored like petals.

Deciduous azaleas typically have tubular flowers with long stamens that extend beyond their petals. Evergreen azaleas, on the other hand, may have a wide variety of flower forms. Figure 2 shows six flower forms used to describe the flowers of evergreen azaleas.

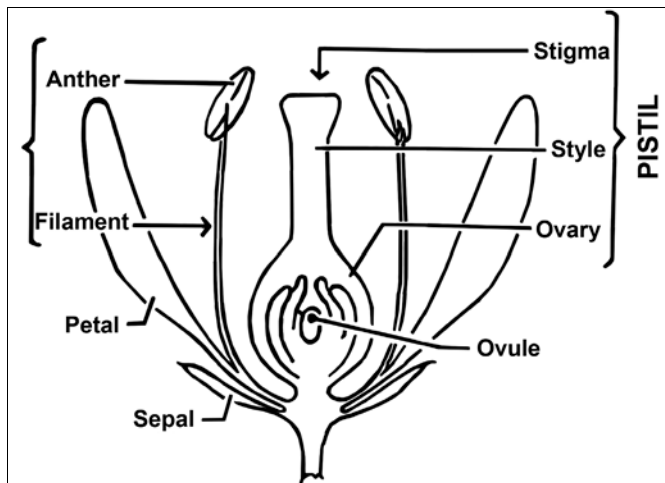


Figure 1. Parts of a flower.

Single flowers consist of five or more petals with five to ten stamens and a single pistil. This is the most common flower form. Semi-double flowers have had some stamens transformed into petals. Double flowers have had all their stamens transformed into petals. Hose-in-hose types consist of two flower forms that appear to be inserted into one another; the top flower is derived from the petals and a lower flower consists of colored sepals. Then there are semi-double hose-in-hose types, which combine the features of semi-double and hose-in-hose forms, and double hose-in-hose types, which combine the features of double and hose-in-hose forms. Hose-in-hose and double flower forms tend to hold their blossoms after flowering. The blossoms turn brown and wither on the plant instead of dropping off.

Azaleas also may have a wide variety of petal shapes, including strap-like petals, star-shaped petals, spider-like petals or round petals. Petals may be one solid color, or they may be flecked or bordered in a different color.

Time of Bloom

Another way azaleas are grouped is whether they bloom early, mid-season or late. Early flowering types generally bloom from mid-February through March, mid-season types bloom in late April and May, and late-flowering types bloom from June through October.

Native vs. Introduced Cultivars and Hybrids

Native Azaleas

Several species of azaleas are native to Georgia and the Southeast. Their flower color ranges from white to pink, yellow, orange, scarlet or crimson, with several shades in between. Plant size is also variable, ranging from 3 feet to more than 20 feet. Although native azaleas are considered more adaptable and more hardy than introduced species, it is important to approximate their native growing environment if they are to be grown successfully.

The following are some native azalea species found in Georgia:

Alabama Azalea, *R. alabamense* [ah-luh-ba-MEN-see] bears white flowers with a yellow blotch. It has a lemony-spice fragrance. This low to medium size shrub grows in Alabama and western Georgia.

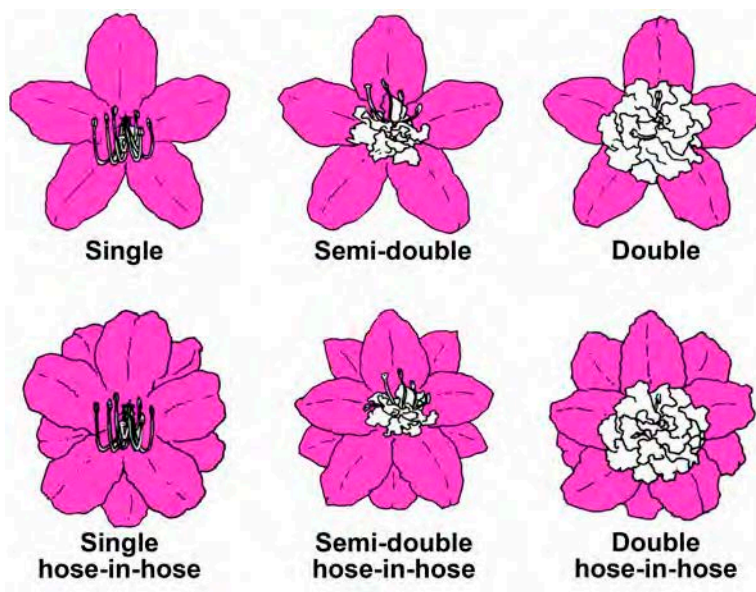


Figure 2. Flower forms.



Strap-like

Photo: Richard Clapp



Star-shaped

Photo: Richard Clapp



Spider-like

Photo: Frank Bryan



Round petal

Photo: Frank Bryan



Red self

Photo: Frank Bryan



Sectored

Photo: Frank Bryan



Margins/borders

Photo: Allison Fuqua



Flecked/striped

Photo: CES slides

Figure 3. Petal Shapes and color variations.

Piedmont Azalea, *R. canescens* [kuh-NES-enz] has white to pinkish tubular flowers with stamens two to three times longer than the petals. This tall-growing plant may attain a height of 15 feet. Some have flowers with a musky-sweet, honeysuckle-like fragrance. As the common name implies, the Piedmont Azalea is native to the Piedmont region of Georgia and other states.

Flame Azalea, *R. calendulaceum* [kuh-len-dew-LAY-see-um] has flower colors ranging from brilliant shades of yellow to orange or red, with a large prominent yellow to orange blotch on the upper lobe (petal). Its flowers tend to be larger than the other native species. Flame azalea is native from the Appalachian Mountains to the Piedmont region.

Sweet or Smooth Azalea, *R. arborescens* [ar-bo-RES-enz] has white flowers, sometimes with a pinkish tinge, and red stamens. It has glossy leaves and red fall foliage. Flowers have a strong, cinnamon-like fragrance. This species is native to west-central Georgia. It may attain a height of 8 feet.

Coastal or Dwarf Azalea, *R. atlanticum* [at-LAN-tih-kum] has white flowers that sometimes are flushed with pink. The plant grows 3 to 5 feet tall and is smaller than most of the other native species. It is native to the Coastal Plain from Pennsylvania to Georgia. Flowers have a rose-like fragrance.

Pinxterbloom Azalea, *R. periclymenoides* [pair-ih-kly-men-NOY-deez], previously classified as *R.*

nudiforum, has narrow, wavy flowers that are either white, pale pink or deep pink. It is native from the Appalachian Mountains to the Piedmont and Coastal Plain.

Swamp Azalea, *R. viscosum* [viss-KO-sum] has white to pink flowers that have a spicy, clover-like fragrance. The plant is variable in size and usually grows in low areas along stream banks from Maine to Georgia and west to Texas.

Florida Azalea, *R. austrinum* [aw-STRY-num] has yellow to orange flowers with a reddish tube. Some plants have a lemony fragrance. This tall-growing species can be found in Florida and the Georgia-Alabama Coastal Plain.

Cumberland Azalea, *R. cumberlandense* [kum-bur-lan-DEN-see], previously classified as *R. bakeri*, has bright orange-red flowers. Plant height varies from 1 foot up to 6 feet. It can be found from the Kentucky-Tennessee-Cumberland plateau to the mountains of north Georgia.

Oconee Azalea, *R. flammeum* [FLAM-ee-um], previously classified as *R. speciosum*, has yellow, yellow-orange or red flowers with a large yellow blotch on the top lobe (petal). This species is native to low elevations in open woods and on slopes across central Georgia.

Plumleaf Azalea, *R. prunifolium* [prew-nih-FO-lee-um] has flowers that range in color from apricot to orange or red. The petals have a deep red blotch.

Plants are usually 5 to 8 feet tall, although some mature plants may attain a height of 20 feet. Plumleaf Azalea is native to a small region in

southwest Georgia and eastern Alabama. It is the signature plant of Callaway Gardens in Pine Mountain, Georgia.



Alabama azalea, *R. alabamense*
Photo: Frank Bryan



Piedmont azalea, *R. canescens*
Photo: Frank Bryan



Flame azalea, *R. calendulaceum*
Photo: Frank Bryan



Sweet or Smooth azalea, *R. arborescens*
Photo: Frank Bryan



Coastal or Dwarf azalea
R. atlanticum Photo: Richard Clapp



Pinxterbloom azalea
R. periclymenoides
Photo: Frank Bryan



Swamp azalea
R. viscosum
Photo: Richard Clapp



Florida azalea, *R. austrinum*
Photo: Frank Bryan



Cumberland azalea
R. cumberlandense
Photo: Richard Clapp



Oconee azalea, *R. flammeum*
Photo: Richard Clapp



Plumleaf azalea, *R. prunifolium*
Photo: Frank Bryan

Deciduous Hybrids

Native azaleas have been crossed to produce many colorful, deciduous hybrid cultivars. These include 'Exbury,' 'Knap Hill,' 'Ghent' and related hybrid groups developed in England and Belgium. Because of their native-azalea parentage, several hybrids are fragrant. Most of these, however, do not grow well in Georgia, where the climate is hot and drought is common.

Selected forms and crosses of native azaleas have been made at Transplant Nursery in Lavonia, Georgia, and by the late Fred Galle at Callaway Gardens in Pine Mountain, Georgia. Crosses of the English cultivars with the native Florida azalea have been made by Dr. Eugene Aromi and at Dodd and Dodd Nursery in Mobile, Alabama. These hybrids have outstanding colorful blooms, and they can withstand hot weather. Among the adapted selections is 'Gibraltar,' a Knap Hill deciduous hybrid that performs better in central Georgia than most English and Belgian deciduous cultivars. It has fragrant, frilled, crimson-orange flowers in a ball-shaped cluster. 'Red Pepper' (vivid red flowers) is an example of a heat-tolerant Aromi cross. 'Stonewall Jackson' and 'Admiral Semmes' are examples of heat-tolerant Tom Dodd crosses.

Introduced (Non-native) and Hybrid Evergreen Azaleas

Dr. Fred Galle, former Director of Horticulture at Callaway Gardens in Pine Mountain, Ga., described more than 70 hybrid groups of evergreen azaleas in his book on azaleas (See "Suggested References"), and many more have evolved since then. Some of the major hybrid groups are described below.

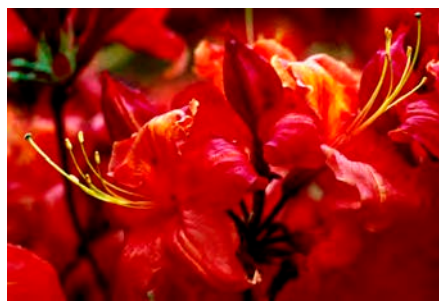
Kurume Hybrids: Kurume azaleas are one of the most commonly grown azaleas in Georgia. They were imported from Kurume, Japan, to the Arnold Arboretum in Boston in the early 1900s and soon made their way into the nursery trade. Most Kurume hybrids are low- to medium-growing

shrubs (2 to 3 feet), but a few grow to 5 to 6 feet. Flowers are small but quite numerous, often masking the foliage. Colors range from white to pink, salmon or red, and some are bicolored. Most are cold hardy throughout Georgia. Popular Kurume hybrids include 'Hinode Giri' (rose-red flowers), 'Coral Bells' (soft pink flowers), and 'Snow' (white flowers).

Southern Indian Hybrids: Southern Indian (also called Southern Indica) hybrids were developed from plants at Magnolia Plantation in Charleston, S.C., and therefore are well adapted to the southern and coastal regions of Georgia. They are not reliably cold hardy in the northern half of Georgia, however. Most Southern Indian azaleas are fast growing and become quite large (5 to 8 feet tall and 5 to 10 feet wide), making them undesirable for foundation plantings. In south Georgia, they are often planted under pine trees, where they have filtered shade and plenty of room to grow.

Most Southern Indian hybrids bloom after the Kurume hybrids. Popular cultivars include 'Formosa' (deep magenta-purple flowers), 'George Lindley Tabor' (white flowers with purplish-pink blotch and purple throat), and 'Delaware Valley White' (pure white flowers with ruffled petals).

Glenn Dale Hybrids: Glenn Dale hybrids were developed by B.Y. Morrison at the U.S. Department of Agriculture Plant Introduction Station in Glen Dale, Maryland. More than 450 cultivars were hybridized from variable parentage. They are cold hardy to -10 degrees F and have a wide range of bloom times, flower colors, flower forms and plant growth habits. Many are not widely available in the trade, but their unusual flower colors and combinations of colors make them appealing. Interesting cultivars include 'Zulu' (vivid purple flowers with dark blotch), 'Cinderella' (white and red flowers or white striped with red), 'Ambrosia' (deep yellow-pink flowers), and 'Sagittarius' (vivid pink flowers with orange undertones).



'Gibraltar,' a Knap Hill hybrid
Photo: Frank Bryan



'Stonewall Jackson,' a Tom Dodd hybrid.
Photo: Frank Bryan



'Admiral Semmes,' a Tom Dodd hybrid.
Photo: Frank Bryan



'Coral Bells,' Kurume hybrid
Photo: Allison Fuqua



'George Lindley Tabor,'
Southern Indian hybrid
Photo: Frank Bryan



'Cinderella,' Glenn Dale hybrid
Photo: Frank Bryan



'Marian Lee,' Back Acre
hybrid. Photo: Richard Clapp

Back Acre Hybrids: Back Acre hybrid hybrids were also developed by B. Y. Morrison after his retirement to Pass Christian, Mississippi, in 1964, where he continued his azalea breeding work on his farm called Back Acres. More than 50 Back Acre cultivars resulted from his crosses. Plants have a wide array of flower colors and unusual color combinations, and many have frilled or double flowers. Examples are 'Marian Lee' (white petals with a tint of pink and carmen-red border), 'May Blaine' (light purple double flowers), and 'Debonair' (vivid pink flowers with deep pink edges and light pink to greenish centers).

Robin Hill Hybrids: Robin Hill hybrids were developed in New Jersey, so they are cold hardy throughout Georgia. This group, consisting of 69 cultivars, is noted for having attractive foliage and large flowers that offer a spectrum of colors and color blends, many with soft pastel hues. Robin Hill azaleas bloom late and thrive in either sunny or semi-shady locations. Most plants are low growing (2 to 3 feet). Cultivars include 'Nancy of Robin Hill' (pastel-pink semi-double hose-in-hose flowers), 'Olga Niblett' (white flowers with yellow-green throat), and 'Conversation Piece' (white to purple-pink flowers having wavy edges).

August Kehr Hybrids: Dr. August Kehr, former geneticist with the U.S. Department of Agriculture, developed some spectacular azalea cultivars having double or semi-double camellia-like flowers. Cultivars include 'Anna Kehr' (double rose-pink flowers with wavy edges), 'Mary Lou Kehr' (light pink, semi-double fragrant flowers), 'Great Expectations' (reddish-orange double flowers), and 'White Rosebud' (white double flowers with yellow-green center). The plants are hardy to 0 degrees F.

Gable hybrids: Gable hybrids were introduced by the late Joseph B. Gable, a nurseryman and hybridizer in Stewartstown, Pennsylvania. They are among the hardiest evergreen azaleas, adaptable to hardiness zone 6b (to -5 degrees F). They bloom

mid-season and have a dense, spreading growth habit and medium height (5 to 6 feet). Several cultivars have double, hose-in-hose flowers that look like roses. The cultivar 'Rosebud,' for instance, has purplish-pink double rose-like flowers. Other cultivars include 'Big Joe' (purplish-pink flowers having a brown blotch), 'Elizabeth Gable' (deep red flowers with frilled edges), and 'Polaris' (white hose-in-hose flowers with greenish throat).

Linwood Hybrids: Linwood hybrids were developed for greenhouse forcing and the florist trade. Flowers are double and semi-double, and most are hose-in-hose types, 1½ to 2½ inches across. Plants are generally low-growing. Many are hardy to 0 degrees F. Examples are 'Linwood Lavender' (vivid purple flowers, semi-double and hose-in-hose form), 'Janet Rhea' (strong fuchsia-colored flowers with white edges, semi-double, hose-in-hose form), and 'Hardy Gardenia' (double white flowers with hose-in-hose form).

Pennington Hybrids: The Pennington hybrid group, consisting of 16 named cultivars, was developed by the late Ralph Pennington in Covington, Georgia. His former nursery had one of the largest collections of azaleas in the Southeast. Most Pennington hybrids grow 3 to 6 feet tall and are hardy to at least 5 degrees F. Examples are 'Ralph Pennington' (single white flowers with a greenish blotch), 'Beth Bullard' (yellowish pink flowers, 3 to 4 inches across) and 'Bill Bullard' (reddish-orange flowers).

Harris Hybrids: The Harris hybrid group was developed by James Harris in Lawrenceville, Georgia. Several cultivars have large vivid-red flowers with light-colored centers and dark margins. Some have a cascading growth habit and are excellent for hanging basket culture. Most bloom mid-season. 'Pink Cascade' (deep yellow-pink flowers with red blotch) is one of the popular cultivars. Others include 'Fascination' (single pinkish-white flowers with deep-red borders), 'Parfait' (pastel pink flowers with red dots), and



'Nancy of Robin Hill,' Robin Hill hybrid. Photo: Richard Clapp



'Anna Kehr,' August Kehr hybrid. Photo: Richard Clapp



'Rosebud,' Gable hybrid. Photo: Allison Fuqua



'Janet Rhea,' Linwood hybrid. Photo: Richard Clapp



'Beth Bullard,' Pennington hybrid. Photo: Richard Clapp



'Fascination,' Harris hybrid. Photo: Frank Bryan



'Wakaebisu,' Satsuki hybrid. Photo: Richard Clapp



'Hampton Beauty,' Pericat hybrid. Photo: Allison Fuqua



'Autumn Rouge,' Encore hybrid. Photo: Flowerwood Nursery

'Midnight Flare' (single, deep red flowers with wavy edges).

Satsuki Hybrids: Satsuki hybrids from Japan consist of hundreds of cultivars. In Japanese, *Satsuki* means fifth month of the Japanese lunar calendar (June). So plants bloom late (May, June and July), when most other azaleas are no longer blooming. Single, hose-in-hose and double flower forms are available. Flower size ranges from less than 1 inch to more than 5 inches across. Flower patterns include solids, stripes, multicolored sections, colored rings or margins, speckles and combinations of these. Many cultivars have variations of flower color and patterns on the same plant. Popular cultivars include 'Pink Gumpo' (single, light-pink ruffled flowers), 'White Gumpo' (single, white flowers with small flecks of purplish pink and a light-green blotch), and 'Wakaebisu' (deep yellow-pink flowers with rounded petals, hose-in-hose form).

Pericat Hybrids: The Pericat hybrids were developed in Pennsylvania for greenhouse forcing. Unfortunately, many cultivars in this group are not readily available in the nursery trade. 'Hampton Beauty,' however, is obtainable. It has deep-pink flowers with a dark pink blotch. Pericat hybrids are generally of medium height (3 to 5 feet), bloom mid-season, and are as cold hardy as Kurume hybrids (zone 7a — to 0 degrees F).

Encore Hybrids: Encore hybrids were developed by Robert Lee in Independence, Louisiana, and are among the most popular azaleas on the market today because they bloom both spring and fall. The names of the cultivars in this group begin with the word *autumn*, due to their fall-blooming characteristic. Most grow to 3 to 5 feet high and wide. Examples are 'Autumn Rouge' (rose-colored, semi-double flowers), 'Autumn Embers' (bright-red, semi-double flowers with wavy edges), and 'Autumn Amethyst' (single, vibrant purple flowers).

Considerations When Selecting Plants

Cold Hardiness

When selecting azaleas, check the cold hardiness zones to which they are adapted. Cold hardiness zones are based on the average winter temperature of a region of the United States. In Georgia, there are five cold hardiness zones, ranging from zone 6b in the north Georgia mountains to zone 8b in southern and coastal Georgia (see Figure 4). Southern Indian hybrids, for instance, are best adapted to zones 8a and 8b and may not be reliably cold hardy in zone 7.

Flowering Sequence

Native azaleas, as well as the introduced hybrids, bloom at different times of year, so planting an assortment of species and hybrid cultivars extends the floral display in the landscape. Table 1 (page 11) shows the flowering sequence of several native azaleas.

Likewise, when selecting evergreen azaleas, you can achieve up to 8 months of color with azaleas by carefully selecting and matching plants from the various hybrid groups (Table 2, page 11). For instance, for early spring color, plant Kurume or Pericat hybrids. In south Georgia, Southern Indian

hybrids provide early spring color. Add to these a few Back Acre hybrids for color in May and Satsuki hybrids, such as Pink Gumpo or White Gumpo, for late May/early June flowers. Then add a few Encore hybrids that re-bloom in August through fall frost, and the color show lasts from early spring to late fall.

Mature Plant Size and Flower Color

Be sure you know the mature size of plants so they can be grouped according to height in the landscape. Place tall plants in the background and short plants in the foreground. Also, make certain the flower colors are harmonious in case their bloom periods overlap. Orange-flowering cultivars often clash with pinks and reds, so plant these colors in separate locations. Also, planting three or more plants of the same cultivar in a group provides a more appealing color display than a hodge-podge of different cultivars.

The best time to shop for azaleas is when they are in bloom so you can see their flower colors and forms. Also, by purchasing plants in bloom, you will know they are true to type and not mislabeled.

Plant Health

Buy plants that are sturdy, well-branched and free of insect damage or diseases. Avoid plants with weak, spindling growth and a poor root system. Before purchasing plants, examine their roots by carefully placing your hand over the top of the root ball; invert the plant and slowly remove the container. The roots should appear healthy and light brown, not dark brown or rotted.

Your Landscape Needs

Like other plants in the landscape, buy azaleas with a specific objective in mind. Consider how they will fit your landscaping plan. Perhaps you want to create a dazzling display at the entrance of your home or a colorful reflection in a water feature. You may want a particular color that blends well with other plants in a perennial or shrub border, or you may want just one plant to provide a dramatic focal point. Whatever your intentions, use azaleas to complement other plants in the landscape, not overshadow them.

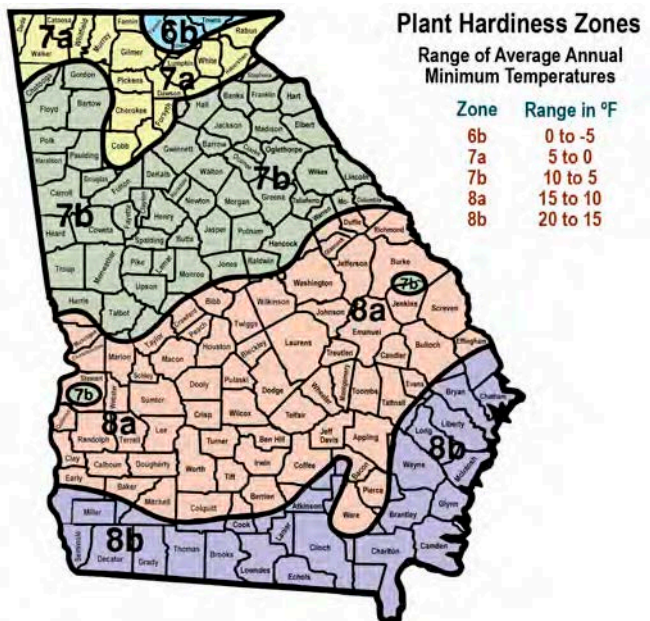


Figure 4. Cold Hardiness Zones in Georgia.

Table 1. Flowering sequence of several native azaleas

	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov
<i>R. canescens</i>	*****								
<i>R. austrimun</i>		*****							
<i>R. flammeum</i>			*****						
<i>R. viscosum</i>				*****					
<i>R. prunifolium</i>					*****				
<i>R. aborescens</i>						*****			

Table 2. Flowering sequence of several hybrid evergreen azalea groups

	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov
Kurume	*****								
Glenn Dale	*****								
Gable		*****							
Southern Indian		****							
Back Acre		*****							
Robin Hill			****						
Satsuki			*****						
Encore		****				*****			

Planting Time

Azaleas can be planted successfully any time of year, provided they can be watered during establishment. Fall planting is best because it is less stressful to the plant than spring and summer planting. During the fall, temperatures are cooler and plants are going dormant. As top growth decreases, there is less demand on the roots for water and nutrients. Roots continue to grow and become established throughout the fall and winter months, even when the top is dormant. By spring, the well-established roots are ready to support new growth and flowers.

Site Selection

Azaleas thrive in moist, well-drained soils high in organic matter. Filtered shade is best since some light is necessary for flower bud formation. An exposure with morning sun and afternoon shade is ideal. Avoid planting azaleas near unshaded sidewalks, driveways or west-facing walls because these surfaces radiate heat that may cause moisture stress during the hot summer months.

Azaleas will not survive in wet, poorly-drained soil. Do not plant in depressions where water may puddle after rain or near downspouts where they experience wet/dry fluctuations in soil moisture. On the other hand, azaleas are sensitive to drought and require irrigation during periods of limited rainfall.

Azaleas prefer acidic soils having a pH between 4.5 to 6.0. A soil test, available for a nominal fee through your local county Extension office, will determine the pH and nutrient content of your soil and provide recommendations for fertilizer. When grown in soils having a pH above 6.0, plants may appear anemic when certain nutrients such as iron become deficient. Materials commonly used to lower soil pH are wettable sulphur or ferrous sulfate. Do not use aluminum sulfate to acidify the soil; it has been shown to be toxic to azalea roots.

Avoid planting azaleas under trees. Although trees provide filtered shade, they compete with azaleas for moisture and nutrients.

Planting Procedures

Before planting azaleas, always water them thoroughly. A dry root ball is difficult to re-wet once it is in the ground.

When planting container-grown plants, carefully remove them from the pot and examine their roots. If the plants appear pot-bound and have a thick, dense mat of fibrous roots along the surface of the root ball, used a knife to make three to six vertical cuts, about 2 inches deep, equally spaced around the sides of the root ball. Then use your hands to gently loosen the roots where cuts were made and pull the roots outward. This process stimulates new root growth and allows water and nutrients to penetrate into the root mass. If the roots are not pot-bound, it is not necessary to slice them with a knife, but it is beneficial to loosen and pull them outward with your hands.

When planting an individual plant, dig the planting hole two to three times wider than the root ball of the plant but no deeper than the root ball. Likewise, when planting a group of azaleas, cultivate the planting area no deeper than the depth of the root ball. This prevents the root ball from settling after planting and becoming stressed.

Thoroughly mix organic matter, such as ground pine bark, shredded decayed leaves or compost, into the soil until the mixture is one-third to one-half organic matter. Then, backfill with the amended soil, and use your hands to firmly pack it in the bottom of the hole to minimize settling.

Planting depth is critical because azaleas are shallow-rooted plants. In sandy soils, set the root ball in the hole so the top is about 1 inch above the surrounding soil grade. In clay soils and poorly drained soils, place the top of the root ball 2 to 4 inches above the soil grade, gradually sloping the soil to meet the original grade. This allows for settling and assures that the roots will be in the

upper layer of soil where they can readily obtain oxygen, water and nutrients (Figure 4).

Once the plant is in place and at the proper depth, backfill with amended soil, and use your hands to firmly pack the soil around the roots.

Don't fertilize at planting time. Fertilizer can dehydrate and injure sensitive new roots. Wait until the plants are established before fertilizing them.

Apply 3 to 4 inches of an organic mulch such as pine straw, pine bark mini-nuggets or shredded leaves on the surface. Use your hands to pull the mulch away from the trunk an inch or two. This helps keep the trunk area dry and reduces the chances of wood decay. It also discourages rodents from gnawing on the trunk. Organic mulches gradually decompose and provide nutrients to the plants.

The final step in planting, and one of the most important, is to water thoroughly immediately after planting. Apply water slowly so the soil can absorb it without causing run-off.

Maintenance

Mulching

Mulching is a simple yet beneficial cultural practice for azaleas. Mulches conserve water in the soil, insulate roots against summer heat and winter cold, and discourage weeds. Replenish mulches annually, as needed, to maintain a 3- to 5-inch layer on the soil surface. Fine-textured organic mulches such as pine straw or shredded bark are best. Fall leaves are an excellent mulch.

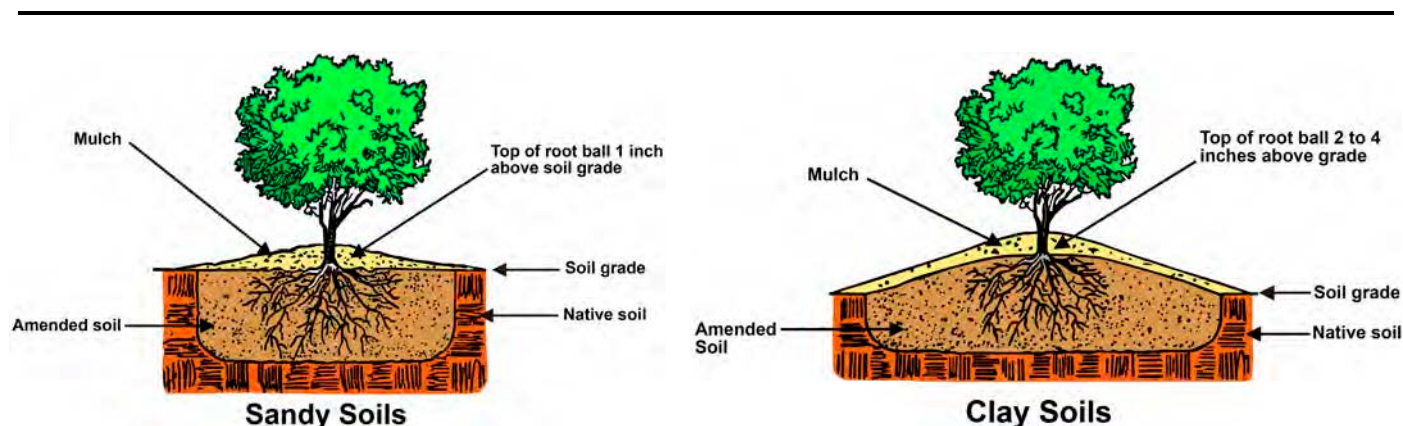


Figure 4. Planting depth.



Pine straw mulch. Photo: Frank Bryan

Watering

Because azaleas are shallow-rooted, they are among the first plants in the landscape to show moisture stress. Leaves may turn gray-green or they may wilt, curl inward or scorch along their margins. Pull back a small area of mulch near the plant canopy once a week in summer and check the soil moisture level. When the soil appears dry, water thoroughly to wet the soil to a depth of 8 to 12 inches. One inch of water (6 gallons applied over 10 square feet) is enough to saturate most soils to a 12-inch depth. Use drip irrigation or a soaker hose to apply water slowly at a rate the soil can absorb, and avoid flooding the soil all at once. Overhead irrigation can be used, but it encourages foliar diseases like petal blight and azalea leaf gall (see "Diseases"). If overhead irrigation is used, irrigate in early morning so the moisture will be evaporated from the foliage by the rising sun.

Fertilization

Unlike other shrubs in the landscape, azaleas are shallow rooted and can be easily injured by excess fertilizer. In fact, some experienced azalea growers do not apply chemical fertilizers at all. They have found that plants usually can obtain sufficient nutrients for growth and flowering from the organic matter added to the planting hole and from the decaying mulch on the soil surface.

Supplemental fertilizers, however, are occasionally needed. Pale green leaves or inter-veinal chlorosis are good indicators of a need for fertilizer. A soil test, available for a nominal fee through your local county Extension office, is the most scientific way of determining what type of fertilizer is best. If

soil test recommendations are not available, an azalea/camellia specialty fertilizer is generally recommended. This fertilizer contains primary, secondary and minor nutrients specifically formulated for azaleas. Because fertilizer analysis and nutrient content varies from product to product, follow manufacturer recommendations on application rate.

Apply fertilizer just after flowering. On spring-flowering cultivars, a second application of fertilizer can be made in June, at one-half the spring rate, if necessary. Avoid fertilizing after July 1 because bud set and winter hardiness may be reduced.

Broadcast fertilizer over an area extending 4 to 6 inches from the trunk to beyond the dripline or edge of the canopy. Be careful when broadcasting fertilizer over the top of plants, because the fertilizer granules may collect in the leaf whorls and cause foliar damage as it dissolves. Always fertilize when the foliage is dry, then use a broom or rake to brush residual fertilizer from leaves or stems. Apply overhead irrigation soon after application to wash any residual fertilizer from the foliage and to dissolve the fertilizer applied. Do not remove the mulch when fertilizing. The fertilizer will dissolve and move through the mulch with irrigation water and rain.

The old adage "if a little is good, a lot is better" certainly does not hold true when fertilizing azaleas. Over-fertilization may cause foliar burn, sudden leaf-drop or death of the plant.

Pruning

The best time to prune azaleas is after they bloom. Always prune, however, with a purpose in mind, not just because it is the time to prune. Some plants may need pruning to remove tall, lanky



Drip irrigation. Photo: Gary Wade



Prune azaleas after flowering, if necessary. Photo: Gary Wade

growth or vigorous suckers that detract from the overall form and shape of the plant. It may be desirable to prune to maintain a more compact form. Sometimes it is necessary to prune old, overgrown plants to rejuvenate them or to reduce their size. Like many other broadleaf plants, healthy azaleas can be pruned to within 6 to 12 inches of ground level and will respond with an abundance of new shoots growing from the old wood.

Spring-flowering azaleas form their blossom buds for the next year during the summer, so avoid pruning them after July 1.

Two pruning techniques are used: heading and thinning. Heading is the indiscriminate cutting back of branches to a uniform length (Figure 5). Shearing is a type of heading. It is done to reduce the size of the plant and to increase the number of branches. Rejuvenating old, overgrown plants by cutting them back close to ground level is another form of heading. New shoots emerge within 6 inches of where each pruning cut is made, so heading encourages an abundance of new shoots.

Thinning is the complete removal of a branch back to another branch, bud or main trunk (Figure 5). It is used to remove leggy branches that extend beyond the canopy of the plant, to reduce the size of the plant, or to remove any damaged or diseased wood. Thinning is the preferred pruning technique because it opens up the canopy, improves air flow and helps minimize diseases. It also results in a more natural growth form than heading and requires less routine maintenance.

Azaleas are favorite plants of bonsai growers. Bonsai is an ancient Japanese art form in which

plants are trained as miniature trees in containers. Special skills and patience are required to develop azaleas into bonsai specimens.

Occasionally, azaleas are pruned and trained to grow as single-trunk tree forms, or standards. In some Japanese gardens, groups of azaleas are pruned into tight geometric shapes and appear like flowing clouds when in bloom.

Common Azalea Problems

Cultural and Environmental Problems

Leaf Chlorosis

Leaf Chlorosis, characterized by dark-green leaf veins with yellow areas between them, usually indicates a deficiency of iron. Iron deficiency may be caused by high soil pH or high phosphorus levels in the soil. Leaf chlorosis also may be caused by poor drainage, nematode injury to the roots, or excess fertilization. Determining the real cause of the chlorosis is the first step in correcting the condition.

If the problem is iron chlorosis, it can be corrected by applying ferrous sulfate to the soil at a rate of 1 ounce (2 tablespoons) per 10 square feet. For a quick but only temporary improvement in the appearance of the foliage, ferrous sulfate can be dissolved in water (1 ounce in 2 gallons of water) and sprinkled on the foliage. Some garden centers sell chelated iron, which provides the same results. Follow the label recommendations for mixing and applying chelated iron.

Small, yellow leaves and stunted growth are signs of water stress brought on by water-logged soil or wet/dry fluctuations in soil moisture. Foliar wilting and bronzing are other symptoms some-

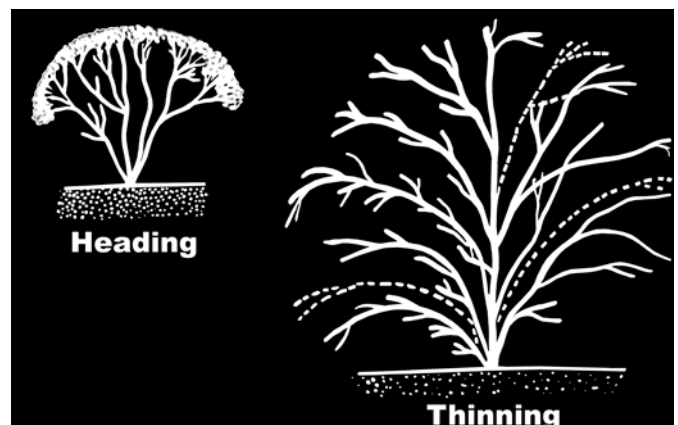


Figure 5. Heading vs. thinning



Left: Iron chlorosis. Photo: UGA Plant Pathology



Right: Azaleas dying in poorly-drained soil. Photo: Gary Wade



Leaf scorch caused by over-fertilization
Photo: Gary Wade



Bark splitting from freeze
Photo: Frank Bryan



Bud freeze. Photo: Frank Bryan

times shown by plants growing in wet, soggy soil conditions. In water-logged soils, roots die or are killed by fungi and are unable to absorb water and nutrients. Avoid planting azaleas in low spots or near drain spouts where water may stand after rain or irrigation.

Leaf Scorch

Leaf scorch (death of leaf tissue along the margins) is usually caused by over-fertilization or drought stress. It can also result from broadcast application of fertilizer when the foliage is wet.

Cold Injury

Cold injury on azaleas may be expressed as foliar browning, bud abortion, leaf drop or bark splitting. The type and severity of damage depend on a number of factors, including the degree of hardiness of the plant at the time of the freeze, the location of the plant in the landscape, the severity and duration of the cold, and the daily temperatures prior to the freeze. Selecting cold hardy cultivars, making certain the plants are well-mulched and watered prior to a freeze, locating the plants in areas where they are

protected from cold northwest winds, and covering the plants with cardboard boxes or wrapping them in blankets, are ways to minimize freeze injury. Plants usually recover from leaf scorch or bud abortion, but they seldom recover from bark splitting when it occurs on the main trunk.

Insects

Azalea Lace Bug

Azalea Lace Bugs are major pests of azaleas. They feed on the underside of leaves, but the damage they cause is most apparent on the upper leaf surface, which appears stippled when groups of adjoining leaf cells become chlorotic. Brown to black droplets of excrement and old "skins" of the nymphs (immature lace bugs) are visible on the undersides of damaged leaves. Adult lace bugs are flattened and rectangular in shape and $\frac{1}{8}$ to $\frac{1}{4}$ inch long. The area behind the head and the wing covers form a broadened, lace-like covering over the body of the insect. The wings of most lace bugs are light amber to transparent in color.



Azalea lace bug.

Photo: Kris Braman



Azalea bark scale

Photo: www.bugwood.org,
Clemson University



Southern red mite

Photo: Kris Braman



Azalea leafminer damage

Photo: Kris Braman



Azalea caterpillar.

Photo: www.bugwood.org,
Chris Evans

Lace bug nymphs are flat and oval with spines projecting from their bodies in all directions. A lace bug nymph goes through five growth stages (instars) before becoming an adult. At each stage the nymph sheds its skin (molts), and these old skins often remain attached to the lower surface of infested leaves.

Azalea lace bug eggs are football-shaped and are transparent to cream colored. The eggs are found on the lower leaf surface, usually alongside a leaf vein. Adult females secrete a varnish-like substance over the eggs that hardens into a scab-like protective covering. The egg stage overwinters in leaves of evergreen azaleas. There are four generations per year. Control of the first generation in March may reduce the need for additional insecticide applications and conserve the many predators and an egg parasite that are natural control agents of the lace bug.

Azalea Caterpillar

Adult moths of the azalea caterpillar are about 1 inch long and brown. Mature (2½ inches long) larvae have a reddish brown head, legs and "neck" area, while the body is black with rows of white or pale yellow spots. There is one generation per year. Larvae feed from late summer through early fall. Caterpillars feed together when they are young, then disperse as they get older. They overwinter as pupae in the soil. Entire branches can be defoliated by large larvae.

Caterpillars can be removed by hand when only a few are present. *Bacillus thuringiensis* may be applied when caterpillars are numerous and are less than ¾ inch long. Residual insecticides can be applied for larger larvae.

Azalea Bark Scale

This insect prefers azalea or rhododendron but can infest andromeda, maple, willow, poplar and other plants. There are two generations per year in Georgia. Adult females may be ⅛ inch long. White felt-like sacs are secreted in May that enclose the body and eggs. Overwintering nymphs are about 1/16 inch long, gray, and can usually be found in twig forks.

Azaleas can tolerate low numbers of these insects. Honeydew, sooty mold and leaf yellowing with dieback are signs associated with infestation by this insect. Beneficial insects often control this insect. Light pruning or dormant oil may be used to suppress overwintering nymphs on twigs. Dormant oils and insecticidal soap may be used to control crawlers that emerge from eggs.

Southern Red Mite

This mite has a broad host range but is very common on broad-leaved evergreens including azalea. Red eggs overwinter on the underside of leaves. There are several generations each year, but they are most active in the spring and fall. Adults are approximately 0.5 mm long. White stippling on upper and lower surfaces is characteristic. Leaves turn gray or brown and may appear "dusty" from cast skins and egg shells.

When mites are suspected, tap leaves over white paper to dislodge mites. Count the slow-moving southern red mites, but also look for long-legged, faster moving predatory mites that may be feeding on these pests. Application of dormant oil in the winter may reduce spring populations. Use of hor-

ticultural oil or insecticidal soap may help conserve beneficial organisms. When heavy infestations of mites are present, residual miticides may be needed.

Azalea Leafminer

Young larvae tunnel inside the leaf and form elongate blotches in April or May. These blotches may resemble leaf spot diseases. Older larvae exit the tunnels, curl the leaf tip and feed inside the curl. Large populations cause the leaves to turn brown and drop from the plant. There are two generations. Adult moths are about $\frac{3}{8}$ inch long with wings folded. They are yellowish-brown with purple markings. Mature larvae are about $\frac{1}{2}$ inch long. Treat in May if numerous. Shake plants in June and July to make adults fly and estimate whether re-treatment is necessary.

For information on controlling any of the insects listed above, contact your local county Extension agent or garden center professional, or visit the following web sites:

<http://www.caes.uga.edu/departments/ent/lpm/>

http://www.ent.uga.edu/pmh/Hm_Ornamentals.pdf

http://www.ent.uga.edu/pmh/Com_Ornamentals.pdf

<http://www.caes.uga.edu/departments/ent/lpm/ornamentals/ornamentals.html>

Diseases

Numerous diseases affect azaleas in landscapes and plant nurseries. The most common diseases are described here. In order for a plant disease to develop, three major factors need to be present at the same time: 1) a susceptible host, 2) a disease-causing organism (pathogen) capable of causing disease on that host, and 3) an environment that favors disease development — often humid, wet conditions. This is often referred to as the “disease triangle.”

To control plant diseases, at least one side of the disease triangle must be removed. For example, if a

pathogen requires a wet leaf surface to infect, then changing irrigation type from overhead sprinklers to drip irrigation or soaker hoses, which do not wet the plant foliage, can reduce disease development. For the following diseases, cultural methods and/or fungicides are used to control. Contact your local county Extension agent or consult the *Georgia Pest Management Handbook* for specific and current fungicide control recommendations.

Leaf Gall

Leaf galls, caused by the fungus *Exobasidium vaccinii*, are common on azalea in the spring during wet, humid, cooler weather. The fungus invades expanding leaf and flower buds causing these tissues to swell and become fleshy, bladder-like galls. Initially, the galls are pale green to pinkish. Eventually, they become covered with a whitish mold-like growth. Fungal spores are produced within the white growth and are spread by water-splashing or wind to other expanding leaf or flower buds, or they adhere to newly formed buds, overwinter, and infect these buds the following spring. Older leaves and flowers are immune to infection. As the galls age, they turn brown and hard. The disease does not cause significant damage to affected plants. It just looks unsightly.

Azalea leaf gall can be prevented in subsequent years by removing the galls by hand as soon as they are detected and destroying them before they turn white and release spores. Fungicides are generally not needed or recommended for control of this disease.

Petal Blight

Petal blight, caused by the fungus *Ovulinia azaleae*, is a serious disease of flowering azaleas. It starts as pinhead-sized pale or whitish spots on colored flowers and rust-colored spots on white flowers. The spots enlarge rapidly into irregular tan blotches. The flowers become soft, then slimy and

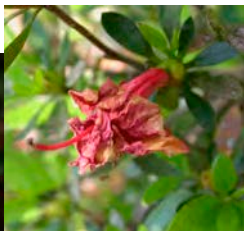


Azalea leaf gall. Photo: Jean Woodward



Azalea petal blight

Photo: Jean Woodward



Azalea petal blight sclerotia

Photo: NC State University



Freeze injury instead of petal blight. Affected flowers do not break apart when rubbed gently between fingers.

Photo: Jean Woodward

fall apart when rubbed gently between fingers. This test distinguishes diseased flowers from those injured by freeze damage, in which infected flowers dry and cling to the plant. The blight can spread rapidly when plants are in bloom.

Small, black sclerotia (survival structures) are produced on the infected flowers six to eight weeks after infection. Blighted flowers fall to the ground or can remain attached to the plant until flower bud break the following year. Small cup-shaped structures (apothecia) develop from the sclerotia in the spring. Fungal spores are propelled from these structures to flower buds in the lower plant canopy, or they are carried by wind to adjacent plants to cause new disease.

Rake and remove flower debris from beneath plants and, if possible, remove old flowers still attached to plants. Apply new mulch around the base of plants to serve as a barrier to new infection. On large azalea plantings, where it is not practical to remove infected flowers, make weekly fungicide applications beginning just before bloom and continue until the last buds open.

Rhizoctonia Web Blight

Dieback of the interior leaves of compact, tightly-growing azaleas within irrigated landscape beds may be due to a web or aerial blight caused by the fungus *Rhizoctonia*. (Photo on page 19.) *Rhizoctonia* web blight is often seen during the warmer, humid summer months. Infection begins in the interior of the plant as the fungus survives in the soil or container rooting medium.

Infected leaves develop brown lesions and eventually the entire leaf will brown and separate from the stem. The affected leaves often remain matted together by the fungus's web-like growth (hyphae) that holds the brown leaves within the canopy. As the temperature cools in the fall, the fungus stops growing and the matted leaves drop from the plant.

The disease is only a problem in landscape azaleas that are sprinkler irrigated. Wet foliage and high humidity favor infection. Use drip irrigation or soaker hoses to irrigate landscape beds. Also, remove fallen leaf debris from beneath plants. Fungicides can provide some control but should not be relied upon solely. Apply fungicides at the first sign of disease and continue through the summer months.

Twig Blight

Twig blight of azaleas is caused by several fungi, including *Phomopsis* and *Botryosphaeria* and infects larger branches. Symptoms include wilting of leaves on only one or several branches but never on the entire plant. Eventually the entire branch turns brown and dies. If the bark is scraped off of infected branches, a reddish brown discoloration can be found underneath. Infection occurs through wounds, fresh leaf scars and cracks in the bark. Environmental stresses such as drought and freeze injury often predispose plants to infection.

Twig blight may be reduced by preventing moisture stress and stem splitting as much as possible. Prune out infected branches as soon as detected. Fungicide applications are ineffective in reducing twig blight.

Phytophthora Root Rot

Phytophthora root rot can be one of the most serious diseases of azaleas. It infects plants in poorly drained soils or where plants are over irrigated and soils remain saturated. The entire plant canopy may become off-color, dull or chlorotic (yellow). Stems may wilt, and eventually the plant dies. Roots of affected plants are darkly discolored and necrotic.



Rhizoctonia web blight.

Photo: Jean Woodward



Internal discoloration caused by **Phytophthora root rot.**

Photo: Virginia Tech



Poor root growth.

Photo: Jean Woodward

The wood beneath the bark at the soil line may be discolored reddish-brown.

Remove infected plants and correct excessive soil moisture. The disease only develops in landscape beds with too much water. Correct poor site conditions to reduce root rot disease development. Avoid over-watering, compacted soils and planting plants too deeply. Chemical control through fungicides is neither effective nor recommended in landscapes.

Poor Root Growth or Root Rot Disease

Azaleas within landscapes often show symptoms of thinning foliage or poor growth. This is most likely due to some kind of root injury or disease. Plants with poor roots cannot support a full leaf canopy, so interior leaves drop and all that remains are tufts of new growth at the ends of branches. Root rot disease, planting plants too deep, planting in compacted soils, girdling roots, over-watering and/or over-fertilizing plants contribute to foliage decline and poor plant growth. The only way to determine the cause of the poor growth is to dig up the plant and evaluate root health, pattern of growth, and the soil and area in which the plants are planted.

If roots are soft and brown, and slough off between your fingers when tugged, then the problem is most likely a root rot disease, which is due to over-watering, or planting in an area with poor soil drainage or where water pools around plants. If the root ball is flattened or roots are encircling the root ball, then the soil is compacted or the plant is root-bound with girdling roots. Compacted soils are prevalent in heavy clay soils, and they prevent root growth downward and outward from the root ball. Always break apart root balls from container-grown plants upon transplanting. If roots are growing from the lower stems and branches, then the original root ball was planted too deep, which will kill the original root ball and force the plant to develop roots higher within the plant canopy. Transplant plants at the same level or slightly higher than they were growing in the container.

The only way to correct poor root and plant growth is to correct planting site conditions: avoid over-watering, break up compacted soils, redirect water flow from gutter downspouts, etc., away from landscape beds, and do not plant plants too deeply.

Propagation of Azaleas

Azaleas can be propagated from cuttings, seeds, or by a process called layering. Most evergreen azalea cultivars are propagated from cuttings to maintain their genetic purity.

To propagate azaleas from cuttings, take terminal cuttings (mid-June to September), 2 to 3 inches long, when new growth has hardened. Make the cut just below a node, and remove the lowest leaves. Then pinch out the terminal bud, leaving two to three leaves on the stem.

Next, dip the cut end of the cutting in a rooting hormone, such as Rootone or Homodin, and insert it into a prepared growing mix. Many growing mixes are available in bags at garden centers and nurseries, or you can make your own by mixing finely ground pine bark, perlite, vermiculite and/or sand. The medium should stay moist yet drain well.

Cuttings may be rooted in flats, cell packs, plastic drink containers, milk cartons or other convenient and economical containers. Make certain the container has adequate drainage holes and drains well. Water the growing mix before and after the cuttings are in place.

If you do not have a greenhouse, you can simulate one by placing a clear plastic bag over the rooting container and sealing it with a twist-tie. Place the container in a warm, shaded location, and check the moisture level frequently. If there is con-

densation within the bag, moisture level should be adequate. Some azalea growers place cuttings under artificial light because it enhances rooting.

Rooting time depends on cultivar, but most will begin to form roots within 4 to 6 weeks. Once the cuttings are firmly rooted, they can be transferred into larger containers. They should be ready for transplanting into the landscape in about 1 year and should be blooming in 2 to 3 years.

Azalea hybridizers and some hobbyists grow azaleas from seed. Seeds are borne in terminal pods after flowering. Harvest the pods in October, remove the seeds, and sprinkle them on top of moist milled sphagnum moss in a covered seeding flat. Place the flat under artificial lights (gro-lights or full spectrum bulbs are recommended). Use a timer to control light duration so the seeds receive 16 hours of continuous lighting each day. In 2 to 3 weeks, small seedlings will appear. When they are about an inch tall, transplant them into small, 3- to 4-inch pots, and keep them moist. It takes about 3 years to produce a blooming plant from seed.

A third way azaleas are propagated is by layering, a technique that induces root growth along an existing branch. Two methods of layering are commonly done: stem layering or air layering. Both methods are slow and used only when a few plants are desired.

Stem layering is done by selecting a vigorous branch long enough to bend and touch the ground, at least 12 inches from the tip. Next, wound the



A plastic bag is used to create a mini-greenhouse.



Flat of rooted cuttings ready for transplanting.



Seed pods on native azalea.



Stem layering.



Air layering.

Photos: Frank Bryan

branch where it contacts the ground by removing a 1-inch ring of outer bark all the way around the stem, or by making a slight cut in the branch at an angle about halfway through the branch. Cover the wounded area with 3 to 4 inches of soil, then place a brick or rock on top of the soil to hold the branch in place. Keep the area moist. After several weeks, roots will form in the wounded area, and the plant can be separated from the mother plant and transplanted.

Air layering is done in late spring on the previous year's wood. Select a vigorous branch and a location along the branch for the layer, then remove any leaves in the immediate vicinity. Make a shallow cut, approximately 1 to 2 inches long, at an angle on the underside of the stem, being careful not to sever the stem. Then dust the cut with a rooting hormone and place approximately 1 cup of damp sphagnum moss around the cut stem and tie it in place with string. Next, cover the moss with plastic secured on both ends with twist-ties. Then cover the plastic with aluminum foil to reflect heat and to prevent heat build-up during the summer months. Rooting usually occurs within 6 to 12 months.

By purchasing healthy, pest-free plants adapted to your area, planting properly, and following the

cultural guidelines provided in this publication, you will be rewarded with years of colorful blooms and lasting landscape beauty.

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Callaway Gardens, Pine Mountain, Georgia.

Photo: Frank Bryan

