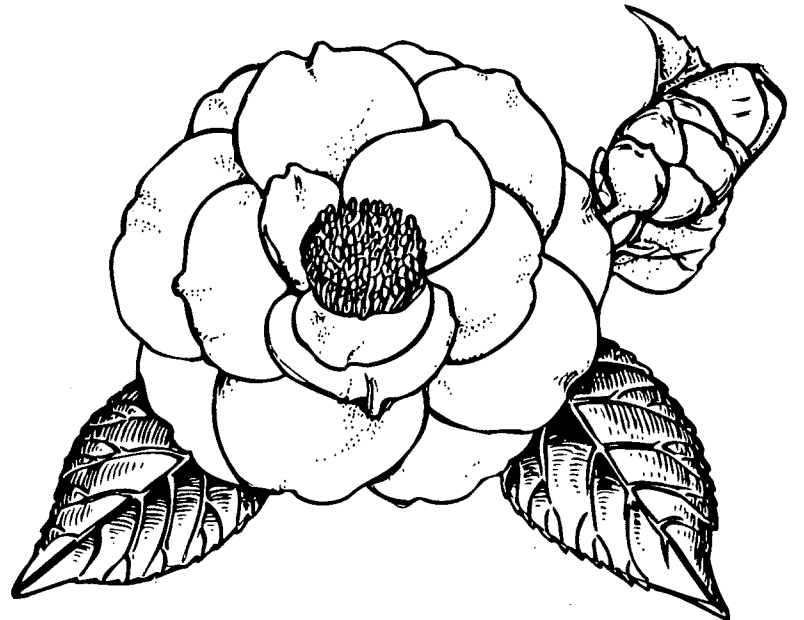


CAMELLIA CULTURE FOR BEGINNERS



Camellia Culture for Beginners

FOREWORD

This booklet is published by the American Camellia Society to assist beginning camellia growers. Membership in the American Camellia Society is strongly recommended in order to learn more about camellia care. ACS members receive four issues of *The Camellia Journal* and the bound *American Camellia Yearbook* annually. Workshops demonstrating camellia culture are held regularly at ACS headquarters and at other locations around the country.

This booklet, edited by the Education Committee of the American Camellia Society, was first published in 1987 and reprinted in 2001.



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TEMPERATURE

Protection against the freezing temperatures of winter is the most serious consideration of greenhouse growers. Solar heat is the great advantage of a greenhouse. Various types of heaters may be used to provide supplemental heat. Little heat is needed as camellias generally prefer a "cool" greenhouse with minimum temperatures of 35°F.

During the day, heat from the sun is often sufficient while supplemental heat may be needed at night.

HUMIDITY

Humidity is also needed in the greenhouse in some areas. Humidifiers or mist nozzles may be used or other arrangements can be made. Some growers wet the floor of the greenhouse or "wash" the leaves of the plants in the summer. High humidity may help increase the size of blooms and protect tender young growth on the plants.

VENTILATION

Ventilation is necessary in the greenhouses where plants remain during the summer. On a sunny day temperatures will rise rapidly to 20° or more above those outside. In warmer areas ventilation may also be needed during the winter months. Fans may be used, or removable sides or top can solve the problem. Fresh air and circulation are required for healthy plants.

WATER

Watering should also be considered when building the greenhouse. This will be the most consistent activity performed and outlets should be planned for convenience and safety. Remember, plants in the greenhouse are dependent on the grower for water. Requirements may be greater as temperatures may be higher than those outside. An automatic watering system may be used but most people prefer to water by hand to allow for individual plant differences.

MEMBERSHIP IN THE AMERICAN CAMELLIA SOCIETY

Please call 478-967-2358 to join ACS. We will be glad to send you information by fax, email or regular mail. As a member you will receive four colorful issues per year of *The Camellia Journal* and the American Camellia Yearbook both of which are dedicated to culture of camellias.

Our website address is www.camellias-ac.com or www.camellias-ac.org.

You can email us at ask@camellias-ac.com or fax us at 478-967-2083.

Our mail address is: American Camellia Society
100 Massee Lane
Fort Valley, GA 31030
USA

4. Contain particles of non-rotting matter to provide air space (perlite, vermiculite)

Mix containing organic matter should be renewed periodically to restore texture and nutrients to the soil.

EXAMPLES:

Soil mix 1

- 1 part sawdust, ground bark, etc.,
- 1 part leaf mold or rotted compost,
- 1 part topsoil
- 1 part coarse sand, 1 part half-rotted manure

Soil mix 2

- 1 part peat moss or other organic material, 1 part top soil, 1 part coarse sand

Other factors that should be closely watched in container culture are fertilization, pH, temperature fluctuations, and the perishability of the containers. Plants must also be moved into larger containers as they grow to prevent them from becoming pot-bound. Large plants can be root pruned periodically (fig. 12).

The greatest advantage of container growing is that plants are portable and may be easily moved for landscaping effect or for protection from the elements. Container grown camellias can be moved to areas where no open ground is available such as decks. When the plants are no longer blooming, they may be moved to a less visible location. Container culture allows growers in colder areas to have outdoor camellias when the weather is suitable and in a protected area during the colder months.

Although growing camellias in containers is more difficult than in open ground, the reward of the beautiful flowers is well worth the effort.

GREENHOUSE CULTURE

In cooler climates a greenhouse may be a necessity for those who wish to grow many camellias, while for others in a milder climate it can fulfill a desire to have the best camellia blooms possible throughout the entire blooming season. Just as the culture of camellias in containers requires special time and attention, greenhouse culture adds further personal involvement because it is another step removed from nature.

Camellias in a greenhouse may be grown in containers or planted in the ground in specially prepared beds. Many camellias grown in the greenhouse are taken outside during the summer, or the top of the greenhouse may be removed to protect plants from heat build-up.

The size and style of greenhouse will vary depending on the needs and desires of the grower. However, certain needs for growing camellias must be met. These include light, temperature, humidity and ventilation.

LIGHT

Camellias prefer to grow in a semi-shaded condition. Outdoors, camellias are often grown under pine trees which provide shade in both summer and winter. In greenhouses, direct sunlight can burn the leaves of the plant. Shade cloth or wooden lath is often used to provide protection from the sun. Too much shade, however, can reduce bloom size.

HISTORY

Camellias have been known for centuries in the Orient. *Camellia sinensis*, the tea plant, was used as a beverage by the Chinese as early as 500 B.C, according to written record. Legend, however, has Nung discover tea as a beverage in 2737-2705 B.C. Tea was a rare commodity in Japan during the Tang Dynasty (618-905 A. D.) and the tea ceremony developed for royalty and the elite. Tea probably came to England in the late 16th or early 17th century where it was kept in locked silver tea caddies or boxes.

The first appearance of camellias in Occidental literature was a description and drawing of *Camellia japonica* by James Petiver in 1702, an apothecary with an interest in natural history. A museum with a large collection of woods, seeds, dried plants and stuffed animals and birds was maintained by him. A *Natural History of Birds* published by George Edwards in England in 1745 contained a colored plate with a camellia which he called a "Chinese Rose".

The exact date when camellias were brought to Europe from the Orient is not known. There is a claim that the camellia first came to Portugal in the first half of the 16th century. However, the earliest documented evidence shows camellias in Portugal in 1808. It has also been documented that two camellias, 'Alba Plena' and 'Variegata', were brought to England in 1792 by Captain Connor of the East India Company. Many others followed in the next 35 years. In 1829 William Beattie Booth read a paper which described six species of camellias which had been introduced into England. The first *C. reticulata* was brought to England in 1820 from Canton, China by sea Captain Richard Rawes and was subsequently named 'Captain Rawes'. Camellias first arrived in Australia in 1831 with a consignment of camellias for the Macarthur family's Camden Park. These included such varieties as 'Alba Plena', 'Rubra Plena', 'Incarnata', 'Myrtifolia' and 'Anemoniflora'.

The first species of camellia to enter the U.S. was the tea plant. Tea growing in the U.S. was attempted in both Savannah and Charleston but was a failure in both locations due to insufficient capital and other complications. *Camellia japonica* was imported from England in 1797 or 1798 by John Stevens of Hoboken, NJ and became popular in the Northeast as greenhouse plants. In the early 1800's the camellia collections of the South were started. Magnolia Gardens and Middleton Place of Charleston, SC became famous for their camellia collections which were begun in the 1830's. James L. L. F. Warren of Sacramento had plants shipped there in 1852 and camellias gained in popularity. By 1920 Sacramento was named Camellia City.

Camellias were named in posthumous honor of George Joseph Kamel by Carolus Linnaeus, a Swedish botanist who developed the binomial system of naming plants still in use today. He named many plants that he had not seen. Kamel, whose name in Latin was Camellus, was a Jesuit priest who served as a missionary to the Philippines. Although Kamel collected plant specimens to be sent to England, there is no evidence that he ever saw a camellia as they are not native to the Philippines where he died.

In America, camellia interest took on new life after the turn of the 20th century. Camellia shows became popular in the 1930's and in 1945 the American Camellia Society was formed. The Society has a permanent headquarters near Fort Valley, Georgia, and has members in 44 states and 22 foreign countries. Its quarterly Journals and Yearbook are respected for their information on camellia culture, research, new varieties and camellia show reports.

PLANTING AND CARE

Camellias are grown successfully out of doors in the United States from Long Island, NY, south along the Atlantic Coast, the Gulf Coast, along the Pacific Coast from California to Washington, and in interior sections of the country.

The camellia plant usually survives occasional temperatures as low as +10 to 0°F. Some of the newer cold-hardy camellias can survive temperatures as low as minus 15°F extending the areas where camellias can be grown. Camellia flower buds are damaged at temperatures below +10° to +15°F. and open camellia blossoms are damaged at temperatures below +26° to +28°F.

SITE

Most camellias grow and produce better flowers in partial (50 to 70%) shade. Plants located in full sun can become less dormant during warmer periods of the winter. Plants with a northern or western exposure, or otherwise protected from intense morning sun, will usually stand more cold weather than those with an eastern or southern exposure. Choose a planting site with well-drained soil. Do not plant where shade trees with shallow root systems will compete with camellias for nutrients and water.

SOIL PREPARATION

Camellias will grow in most well-drained, acid soil. A soil pH (degree of acidity or alkalinity) of 5.0 to 6.0 is best. A soil test made before planting will tell you what is needed to bring the soil to the desired pH and fertility level. Practically all soils need additional organic matter before planting. A mix of 50% soil and 50% humus (peat moss, leaf mold, sawdust, pine bark or cow manure) is recommended. This provides improved fertility of the soil and also improves drainage.

PLANTING

Camellias are generally planted in the late fall through the early spring although they may be set out any month of the year if properly cared for. The late fall through early spring period is preferred because the plant is approaching dormancy, or is dormant, allowing the plants to become well established in the soil. The newly developed roots will provide enough moisture for the plant to start growth when spring arrives. Adequate moisture is a necessity until the roots become well established.

In some lower Gulf coastal areas camellias are planted on top of the ground because of soil pathogens. Please call ACS for specific instructions.

Allow a minimum of five feet between plants, preferably more, when planting. Proper preparation of the planting hole is essential. More camellias are killed from planting too deep than from all other causes. The following steps should be followed:

1. Dig a hole 1-2 feet wider than the root ball but

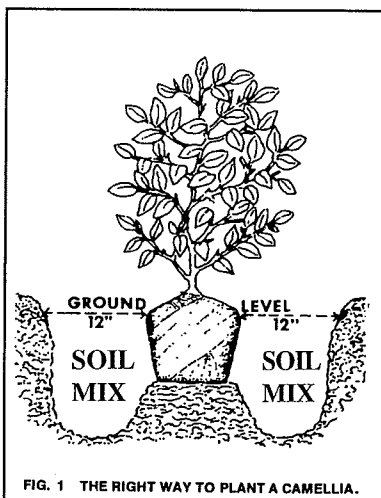


FIG. 1 THE RIGHT WAY TO PLANT A CAMELLIA.

roots by late summer or fall. The air layer will feel harder as it develops roots.

5. When the roots are visible through the moss, or when the root ball feels hard, cut the limb from the mother plant at the bottom edge of the moss with sharp clippers. Remove plastic (fig. 11).
6. **Do not** remove the moss as it will damage the tender roots. Best results will be obtained by planting first in a container although it can go directly into the ground.

SEED

Growing plants from seed presents the gardening enthusiast with a real challenge. Camellias do not come true from seed and only rarely is a good plant produced. Out of thousands of seedlings, the chances for a superior variety are slim.

Camellia seeds ripen at different times depending on variety and location. If you are not able to plant the seeds immediately upon cracking, soak the seed for 12 hours, or crack the hard coat to help germination. Plant in good soil, peat moss, or a combination of peat moss and sand. Keep the soil damp. Seed usually germinate in one month. Transplant into containers or outside. Cutting off the tip of the tap root will encourage a more fibrous root system.

CONTAINER CULTURE

Culture of camellias in containers is more complex than ground culture. It is an artificial method which requires meticulous care from the grower. All needs of the plant (water and nutrients, etc.) must be provided by the grower. When the roots are confined to a container, the ability of the roots to extend out in search of nutrients and water is severely limited. Therefore, unless these vital necessities are faithfully supplied by the grower, the camellia plant will suffer or die. Closer attention to all cultural details is a necessity.

Drainage in the container is a matter of life and death for the plant since surface runoff is not possible as in open ground. The potting soil becomes a filter which must function properly to allow surplus water to escape or a soggy condition will arise. This condition prevents aeration of the roots and allows accumulation of salts from fertilizers. Install drainage holes approximately one inch in diameter on four sides of the container near the bottom.

A good potting mix with the following characteristics is essential. It should:

1. Drain well
2. Hold moisture well and decompose slowly
3. Be acid in reaction

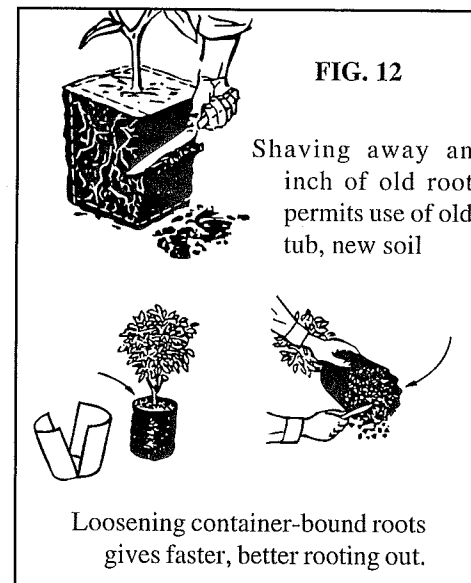


FIG. 12

Shaving away an inch of old root permits use of old tub, new soil

Loosening container-bound roots gives faster, better rooting out.

To reduce dehydration, the leaves left on the cutting may be trimmed back one-half.

A growing media of one-half sand and one-half peat has proven successful. Also used are vermiculite and perlite. A medium barren of nutrients is used to induce the plant to send out roots in all directions to search for nutrients. Any box, pot, or container, or bed at least 4-6 inches deep with good drainage is suitable for the medium. Although not necessary, a rooting powder may speed up rooting if applied to cuttings before inserting into the medium.

Place cuttings in mixture about 2 inches apart and 2-3 inches deep. A pane of glass, newspaper, or cheesecloth over the pot will help retain moisture. Cuttings should be kept moist but not wet, at all times.

AIR LAYERING AND LAYERING

Air Layering is a method of reproducing good-sized plants in one year. It may be done at any time of the year, but the best time is in the early spring when the plants are beginning to grow. Air layering is based upon the centuries-old propagating process developed by the Chinese of layering (rooting) plants by placing sections of branches that are still attached to the plant in the ground and covering them with earth, having first removed or roughed the bark on the underside.

Air layering is a simple process and can be completed in one season. It is probable that it developed from the discovery of the layering process, with the rooting medium in the air instead of in the ground.

1. On a healthy limb completely remove a ring of bark 1.5 to 2 times the diameter of the branch to be air layered. This should be 12-18 inches from the tip of the limb. Two parallel cuts should be made with air layering scissors or a sharp knife, and the strip lifted off (fig. 8). The branch may be in new growth; however, the girdled wood must be hardened off.
2. Eliminate all traces of the cambium layer (green tissue) by scraping with a knife. Dust the exposed surface with a rooting hormone powder recommended for hardwood cuttings.
3. Cover the ringed area with a handful of presoaked sphagnum from which the excess water has been squeezed (fig 9). Wrap this tightly with medium weight plastic and secure with twist ties above and below the ball of moss. Cover this ball with a square of aluminum foil, dull side out to discourage birds' attention (fig. 10).
4. Air layers started in the early spring usually form

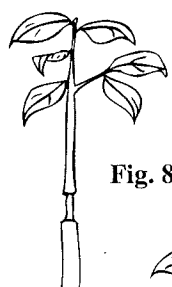


Fig. 8

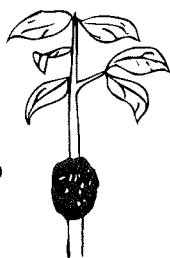


Fig. 9

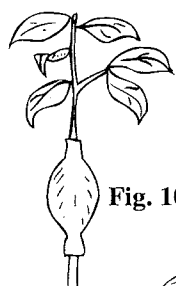


Fig. 10

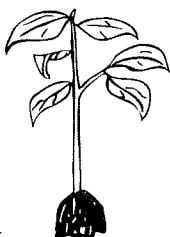


Fig. 11

leave the soil in the center of the hole undisturbed to prevent settling, as illustrated in figure 1.

2. Place root ball on column of soil. The top of the root ball should be slightly above soil level. When transplanting a container plant, wash away the outer one inch of soil from the root ball with a water hose and loosen the outer roots with fingers or hand cultivator. This allows for better root penetration into the soil.
3. Fill the hole around the root ball with a mixture of top soil, organic matter, and coarse sand.
4. Build a soil berm around plant 3 feet in diameter to stop water from running off.
5. Mulch around the plant with straw or other organic matter.
6. Water well after planting and soak soil about once a week during dry weather.

WATERING AND MULCHING

Camellias prefer moist, but not soggy, soil at all times. When watering, the soil should be wet to a depth of 14 to 18 inches. Mulching the surface around camellias can help eliminate weeds and moderate the effects of temperature extremes. Two to four inches of pine straw, sawdust, peat moss, bark, or other organic matter makes a good mulch.

FERTILIZATION

Camellias are strong feeders which do best with uniform moisture and a properly balanced fertilizer with nitrogen, phosphorus, and potassium present roughly in the ratio of 1:2:2 (N-P-K), although slow release fertilizers may contain higher nitrogen content. Two basic forms of fertilizers are available - organic and chemical.

Organic Fertilizers are slower to react, bulky, and are dependent on warm temperatures for their reaction. They are also variable in their analysis. However, due to their low analysis, they are safer to use and seldom cause burns or salt build-up.

Chemical Fertilizers are quicker to react and available in a wide range of concentrations. They are usually well balanced but will leach more quickly from the soil than organic fertilizers and must be replaced more often. Slow-release fertilizers are available that minimize burning and quick leaching.

Fertilizer of any type should be applied in the same manner. It should be cast on the soil in a doughnut shape starting halfway between the trunk and dripline and extending 6-12 inches beyond the dripline. Apply on top of mulch and allow to wash in. The fertilizer should be well watered in after application.

The basic feeding schedule consists of two to three feedings. First apply in spring before major growth occurs. The second application should be about the time the flower buds are beginning to form, with the third in the fall to encourage better bloom color, etc. The fertilizer used in the fall should be low in nitrogen, 0-10-10 or 2-12-12 to discourage any further leaf growth. For the first two feedings a regular garden fertilizer can be used or a special camellia fertilizer 12-6-6 or 16-4-8 is preferable. Apply at a rate of 1.5 - 2.5 pounds per 100 feet once a year, or half the rate if applied twice. Use one level tablespoon per one gallon for container grown plants, or one level tablespoon for each foot of height for plants grown in the ground. On good soil one feeding a year in the spring may be adequate.

PRUNING

Camellias may be pruned any time during the year and should have attention when any dead wood appears. The best time is when the plants have finished blooming and before the new cycle of growth begins. The strength of the wood remaining will produce healthier new growth.

Pruning should be done to produce desired shape, remove weak stems that cannot adequately support blooms, provide adequate space between limbs so disease and insects can be controlled by spraying or by pruning, and to allow bloom harvest without damage.

DISEASE PROBLEMS

Camellias are healthy plants but several disease problems can occur on them. Root rot and dieback are the two most important diseases that can cause death to camellias. Flower blight is a serious flower problem but it does not cause death to plants since infection is restricted to flower tissue.

DIEBACK

Dieback caused by the fungus *Glomerella cingulata* is a serious disease of both *C. japonica* and *C. sasanqua*. This fungus usually enters the plant through a wound. Leaf scars and hail injury are common sources of entry. Wounds created from lawn mowers, pruning cuts, falling branches, and insects are also points of entry for the fungus. The fungus is spread by certain insects and rain.

Dieback is characterized by sudden wilting and death of new growth, particularly in late spring or early summer. When infection occurs through leaf scars, affecting stem tissue from which very young growth occurs, the leaves promptly drop.

When infection occurs on, and kills more mature stems, leaves typically cling to the dead stems, turning first an olive green color and leathery in texture, to a tannish-brown color and dry and brittle in texture.

Cankers characteristically form at the base of the dead twigs, and are usually evident about 3 months after twig death. They form pinkish masses of spores during extended wet weather when temperatures are favorable (65-85°F).

There are several approaches to control. Sanitation is always an important method and this involves cutting out and destroying dead wood. When a branch dies, remove it so that no dead tissue remains on the severed stem portions still attached to the plant.

The fungus survives in at least two major ways: (1) in cankers and (2) in or on vegetative buds. Fungicidal sprays will not kill the fungus when it is inside the camellia tissue. Therefore protection is the control method of choice during the leaf-fall season or during grafting. A combination fungicidal spray is recommended for protection. The leaf-fall season extends for 6 to 8 weeks but the time of leaf fall differs from place to place. Apply as you see old fallen leaves.

ROOT ROT

Camellia root rot is caused by the soil-borne fungus, *Phytophthora cinnamomi*. This pathogen occurs in soil usually brought in on infected roots of camellias, rhododendrons, and other woody ornamentals. Most *C. japonica* varieties are susceptible to root rot, while *C. sasanqua* and *C. oleifera* are not as susceptible.

Root rot is usually associated with poorly aerated or poorly drained soils. Symptoms

1. The stock should be prepared by cutting off the top with sharp shears or saw about 2 to 4 inches above the soil. Make a sloping cut and trim smooth with a sharp knife. A vertical incision should be made with a sharp knife about two inches deep.
2. Prepare the scion by making a wedge-shaped cut at the base (fig. 3). Scions may be soaked up to 30 minutes in a solution to discourage disease.
3. Hold the slit open in the understock with a screwdriver or knife. Insert the prepared scion (fig. 4) so that the cambium (green layer inside bark) on the stock and scion match (fig. 5). It is vital that the cambium layers match to have a successful graft.
4. Hold the graft tight with a rubber band, weatherproof string, or electrician's tape (fig. 6). The union point can be protected with grafting wax, pruning compound, or aluminum foil.
5. A jar or plastic bag is used to cover the graft and keep humidity high (fig. 7). It is desirable to cover the soil with an inch of sand. Protect the young graft from sun with burlap, paper bag, etc.
6. Callusing should start within a few weeks and in two months be firmly knit. When firmly callused, the jar can be raised *very gradually*. If wilting appears at any time, the jar should be put back on until it ceases. This is the most critical part of aftercare. If possible, choose a cloudy, humid day when removing the jar to minimize wilting.

Grafts usually grow 15-30 inches the first season and often bloom the second year. Do not fertilize the first year.

CUTTINGS

One of the most common methods of propagating a camellia is by rooting cuttings. It is not the quickest method, but it is certainly the easiest and least expensive way to reproduce plants. One advantage in growing cutting is that the resulting plants will be exact duplicates of the original plant. However, if the cutting is taken from a branch that flowers a mutation (sport) of the original cultivar, often the cutting will be a reproduction of the sport rather than the original plant.

Not all camellias root readily from cuttings, but with good facilities, bottom heat, continuous mist, and rooting hormones, almost any camellia cutting can be rooted successfully. Cuttings of new growth are the easiest to root. They should be taken soon after the tender growth matures and hardens. The cut should be made preferably below the fifth node (the node is the tiny bud-like growth at the base of the leaf junction with the stem). Cuttings of this length are long enough to remove the two lower leaves, leaving eyes from which roots will develop in addition to those at the cut end. A tapering cut should be made at the base of the cutting. This allows more surface for roots to develop.



Fig. 3

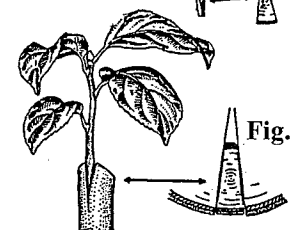


Fig. 5

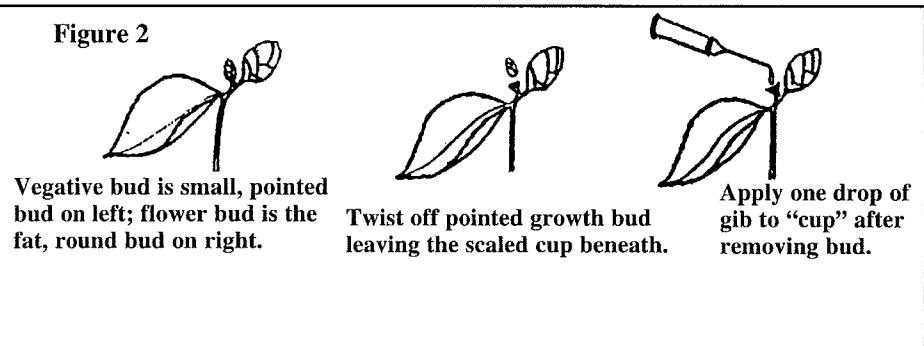


Fig. 4

Fig. 6

Fig. 7

Figure 2



Testing over the years has proved the time required for a treated bud to flower cannot be accurately predetermined. The general condition of the plant, the size of the flower bud, and the weather are a few of the variables which affect the time element, and considerable variation occurs among varieties. Early flowering varieties may bloom within 30 days of treatment; varieties that normally bloom late often require 60-90 days to open.

The time when to apply gib differs geographically. The first application is usually as soon as the flower buds are well-formed. It is best to gib at weekly or other intervals rather than in one session. This will ensure that you have flowers over a longer period of time. Camellias set flower buds only once a year, so an autumn-gibbed bud will not be replaced for spring.

The larger the bush, the more buds you can treat. Most people like to leave up to 50% of the buds untreated. Apply gib sparingly to a young plant. As terminal vegetative buds on treated stems usually fail to make normal growth in the spring. It is best to cut treated flowers or to prune the stems back.

Gibberellic acid can be purchased from the American Camellia Society in powdered form. Directions are included. It is easy to mix and can give outstanding results. One gram of activity will treat hundreds of flower buds.

PROPAGATING

Camellias can be propagated by the following methods:

GRAFTING

Grafting is one way to get flowering plants in a shorter time as a graft will usually flower in 2 years. To understand grafting, it is important to know the terms *scion* and *understock* or *stock*. The scion is the part of the stem with a growth bud of the variety one wishes to propagate and the understock or stock is that portion of the plant that furnishes the root system. Large stocks are generally not suitable for grafting. A stock that is .5 inches in diameter is desirable. Prepare the scion by taking one to two inches of mature, current season's growth with one or more growth buds from a healthy plant. The scion should have one to three leaves.

The best season to graft is late winter to early spring, just before new growth begins. *Camellia sasanqua* is often used as understock because it is resistant to root rot disease. Cleft grafting is one of the most popular method of grafting and is described here.

may appear at any time but they often show up during periods of hot dry weather. The first symptom is poor growth either with or without yellowing leaves. In more advanced stages branches wilt and finally die. When roots are examined they are brown to brownish-black. Three approaches to control exist:

- (1) Use *C. sasanqua* and *C. oleifera* as understock for grafting,
- (2) Use vigorous, fast-growing varieties. With heavy levels of the fungus in the soil this is of questionable value.
- (3) Use a fungicide as a soil treatment. This is expensive and rarely rids soil of the fungus. Most important is to provide good drainage.

CAMELLIA FLOWER BLIGHT

This is a fungus disease caused by *Ciborinia camelliae* Kohn. It occurs only on flower tissue and does not damage other parts of the plant. Since camellias are grown mainly for their flowers, this is a serious disease.

Flower blight is not usually a problem until colder weather is present. However, it may occur earlier if conditions are correct for the fungus. This disease is characterized by brown spots on the petals which enlarge until the entire blossom is blighted. Infected flowers fall to the ground where the fungus produces hard bodies called sclerotia. This is the only survival stage of the fungus. These sclerotia may remain under the bush on the soil or under debris for years. With proper weather conditions (moist with temperatures from 45-70°F) they germinate in late winter or early spring and develop saucer-shaped mushrooms varying in size from .25 to .5 inches in diameter. Spores are forcibly discharged from them and are carried by the wind to cause infection when they land on camellia flowers. They do not attack flowers of other plants.

Control measures involve the removal and destruction of *all* fallen blossoms. If flower blight has not been found in an area, it is important not to bring flowers or infected soil on plants into this area. ACS is continuing to support research on this problem and reports regularly any progress to its membership.

OTHER DISEASES

Other diseases of camellia include leaf gall, sooty mold, lichens, nematodes, and virus variegation. None of these is serious. For more information on diseases contact the American Camellia Society and ask for the camellia disease information sheet.

INSECTS AND PESTS

There are a number of insects and other pests which cause occasional damage to camellias, but only a few are of importance. Only those which are common on camellias are discussed here. Damage to camellias caused by insects is common but many growers fail to recognize symptoms before serious injury occurs. Examining camellias regularly for pests can help prevent injury to plants.

SCALE

Scale insects are the most common and troublesome pests on camellias. Representing a large part of the insect problems for these plants, scale can go unnoticed until a large population has developed and considerable damage has been done. They injure plants by sucking vital juices from them. Many have several generations each year.

TEA SCALE

This is the most common, and probably the most damaging, insect pest of camellias. Tea scale infests only the underside of camellia leaves. Males appear whitish while females are dark brown. Symptoms include yellow chlorotic splotches on the upper leaf surface and, when infestation is severe, general unthriftiness of plants. White, wooly-like masses, secreted by males, can be seen on the under surface of infested leaves.

CAMELLIA SCALE

Like tea scale, this scale infests only the leaves of camellias. The female is light to medium brown and oystershell-shaped, about 1 inch long. The male is similar but smaller.

PEONY SCALE

This scale is less common than either tea or camellia scale. However, when present it is a serious pest. Infestations may kill branches and even entire plants when not controlled. Peony scale affects stems and branches of camellias and azaleas. They are hard to recognize since they are well camouflaged. The hard shells which cover their bodies are blended to match the color of stems. If the shell is removed, a white, circular, waxy spot is left on the stem.

WAX SCALE

This scale is found on stems and trunks of camellias and on other woody ornamentals. The waxy covering is white or slightly pink, oval, and about .25 inch in diameter.

CONTROL OF SCALE INSECTS

Scale infestations are difficult to control when populations are heavy. Growers should make spray applications when scales are first seen. An oil emulsion spray gives effective control when applied properly. It is a contact insecticide and for it to be effective, the plants must be covered thoroughly. Oil emulsion sprays should be applied only during spring or fall when temperatures are between 40 and 85°F. Spraying during midday heat may result in leaf burn. As a rule, do not apply more than three times per year, with at least 60 days between sprays. Oil sprays are compatible with other insecticides.

APHIDS OR PLANT LICE

These pests can become a problem during the peak growing time. These small insects form colonies on the undersides of leaves or along the stems of tender new growth. They injure plants by sucking plant juices. Aphids excrete honeydew, a sticky substance which supports growth of sooty molds. Aphids are relatively easy to kill although repeated sprays may be necessary.

MITES

Mites are very small, sucking pests that are generally found on the underside of plant foliage. Spider mites spin webs similar to other spiders, only much smaller. They are difficult to see, so a magnifying glass is necessary. Symptoms include a dusty, gray appearance of the foliage. Heavy infestations may cause defoliation. A single spray, using an approved miticide applied during mid May, usually provides good control.

CAMELLIA BUD MITES are extremely small pests that occur under scales of vegetative and flower buds. Flower buds with heavy infestations show brown edges on

the bud scales early. Left unchecked, the buds turn brown and drop before blooming. Thorough spraying is essential to control these mites.

RUST MITES (eriphid mites) sometime cause severe distortion (downward curling) and leaf drop on new growth. The affected leaves turn brown on the lower surface. Control is the same as for camellia bud mites.

GOOD GARDEN VARIETIES



The selection of varieties to plant is a most important factor in successfully growing camellias. Selection can be influenced by four factors: the flowers, the growth habit, individual preference, and the suitability of the variety to the climate. By visiting local camellia shows and growers, you can get a good idea of the types that appeal to you. Purchase plants from a reputable nursery near your home if possible. Select cultivars that are known to grow well in your area. Choose plants with clear, bright green leaves, clean limbs free of scale, and stock that has no cuts or scars.

Thousands of camellia varieties are offered by commercial nurseries and many new varieties are offered each year. Varieties range in color from pure white to brilliant crimson. Mid-season flowering varieties that bloom from November-January are best suited for areas with warmer winters. In cooler climates, early and late-flowering varieties are recommended. Many varieties will withstand temperatures as low as 5-10°F without plant damage. Temperatures below 28°F will damage open flowers. The specially bred cold-hardy camellias will withstand temperatures as low as -15°F. Many *C. reticulatas* are sensitive to cold weather and can only be grown out-of doors in the U.S. in warmer climates.

Specific varieties of camellias to plant will not be recommended in this booklet. It is recommended that selections be made after viewing blooms at camellia shows and after discussions with successful local camellia growers.

USING GIBBERELIC ACID FOR EARLY BLOOMS

The use of gibberellic acid by camellia growers has become very popular in recent years. Most of those using it are well pleased with the results obtained. Varieties bloom earlier, and the flowers are often larger. In some instances, color is intensified. Many varieties can be made to bloom before severe freezes and also ahead of petal blight in areas where this disease is present. By using gibberellic acid many varieties can be forced to bloom earlier.

A solution of gibberellic acid must be applied to individual flower buds to stimulate them into action (fig. 2). The flower bud is plump and round while the vegetative bud is smaller and pointed. Select a vegetative bud next to a plump, well-developed flower bud. Gently twist out the vegetative bud leaving a "cup" of bud scales at the base. Place a drop of the prepared gib solution into this cup. The chemical will be translocated to the flower bud, which should begin noticeable growth activity within two weeks.