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GROWING

Gardenias



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GROWING GARDENIAS

The gardenia, also widely known as the Cape-jasmine, is a desirable evergreen garden shrub in the Southern States as far north as the Coastal Plain region of Virginia. Its fragrant flowers appear over a period of several months, most of them in May and June.

Gardenia jasminoides is the most widely grown species, although several others are sometimes grown in gardens. *Gardenia veitchi*, classed by several authorities as a form of *G. jasminoides*, flowers more freely in the winter and its varieties, Hadley and Belmont, are most used in greenhouse culture.

In addition to its value as an ornamental shrub, the gardenia is one of the most important of the cut flowers grown in the open ground in the South. It is one of the best flowers for florists' use, supplying a most pleasing green foliage with the flower and lovely fragrance in addition to possessing the ability to keep well in storage.

The industry of growing the gardenia out of doors occupies a considerable acreage. The flowers are shipped to practically all northern florists. The largest volume is sent for Memorial Day, but shipments continue during the summer as long as the flowers are available. Although a large market is found for the flowers, the present supply appears ample for the demand, if not in excess, so that persons beginning gardenia culture for the market must meet keen competition with established growers.

OUTDOOR CULTURE

Southern growers propagate the plants by cuttings in the open nursery or in coldframes. The cuttings, 6 or 7 inches long, are made in late winter or early spring. They should be planted in sandy soil, which should cover two-thirds of their length. During the succeeding several months care is necessary to prevent a crust from forming around them and to prevent the soil from becoming hard. It is important to avoid moving the cuttings while working around them. They are usually left in the nursery row for 2 years, after which they are ready for transplanting to the field where they are to be grown for cut flowers.

In transplanting them the roots should be "balled" and more than usual care exercised in handling so as to avoid disturbing the soil around the roots. Other cultural practices that will favor the development of the plants are pruning the branches to encourage the formation of flowering shoots and watering sufficiently to keep the soil moist at all times.

Under favorable conditions a few flower buds may be expected the second season. The plants are in their prime during their third, fourth, and fifth seasons. When they become older they tend to produce small buds with little foliage. Careful pruning to shorten the older wood and fertilizing to induce moderately robust growth make it

possible to lengthen their productive life for several years.

The flowers can be kept for several weeks if they are packed well and stored near ice, or even in an ordinary cool cellar, although they do not last very long if exposed to air and sunlight.

Flowers are cut when fully open. They may be removed either with or without some foliage. Cutting foliage with the flower may reduce later yield. Flowers are laid in trays on wax paper and usually sprayed with a fine mist of water. The flowers are tightly fastened in lined boxes so that no injury occurs in transit. Bruising the petals of gardenias causes them to turn brown.

GREENHOUSE CULTURE

Gardenias in the greenhouse need a free circulation of air, especially during the summer, and a maximum amount of light during midwinter. Most growers find that these requirements are met more satisfactorily in a detached house than in one in a connected range.

Raised benches offer some advantages over solid beds, including ease of sterilizing the soil to destroy nematodes, supplying mild bottom heat in midwinter, and better control of moisture in the soil.

The best of judgment is required to solve problems of nutrition during the winter, to provide proper temperature and moisture, and to control pests, among which nematodes are most troublesome.

Greenhouse gardenias are propagated by means of cuttings made during December and January. Immature wood is taken at a stage of growth when the stems are just beginning to harden. For the rooting medium a mixture of sand and granulated peat is considered desirable, in the proportion of two-thirds sand to one-third peat by

measure. Good rooting may be obtained, however, in clean sharp sand free from organic matter. During the 6 or 8 weeks while it is in process of rooting, the bed of cuttings is enclosed in a glass-covered case to maintain high humidity. A little ventilation should be given daily for about an hour. The temperature is maintained as near 70° F. as possible. When rooting starts, more fresh air is admitted, the amount being increased daily until the cuttings are fully exposed for several days before they are removed for potting. While the newly rooted plants are becoming established in the pots they are kept under conditions similar to those in the cutting bed, except that the air is not confined around them. Although the soil must be kept moist at all times, it is necessary to avoid overwatering. Growth without checks is encouraged by maintaining an even temperature and by repotting before the plants become pot-bound.

A soil mixture suitable for potting and for the beds in the greenhouse may be prepared by adding upland peat to the ordinary greenhouse compost in the proportions of about one-fourth peat to three-fourths compost. Peat formed from decayed oak leaves is desirable for this mixture, but commercial granulated peat is often used. If the compost has a clay base, sufficient sand should be added to insure free drainage. As an additional aid to drainage the bottoms of the beds are provided with cracks or holes.

The soil should be mildly acid. The addition of peat as suggested will usually provide the needed acidity without further special treatment. The degree of acidity regarded as most suitable is about pH 6 as expressed in terms of soil

analysis. A depth of 5 to 7 inches of soil in the beds is sufficient.

May is the usual time for transplanting the potted plants to the benches. The plants are spaced from 15 by 18 inches to 18 by 24 inches. If they are spaced too closely the inside plants will not set buds as freely as those at the edges. In greenhouse culture the plants are usually grown 2 years and then discarded.

During the summer, while growth is active, the humidity is kept high. Beginning late in August, the soil and air are kept a little drier, to harden the growth and favor the formation of buds for winter flowering, but care is needed to avoid checking the plants too much during the autumn. Late in September ventilation is reduced and humidity increased. Humidity is kept very high until buds can be seen. The buds must continue development without check until near the end of December.

The plants may be fertilized during the summer and early autumn by light applications of ammonium sulfate ($\frac{1}{2}$ pound per 100 square feet), tankage, cottonseed meal, or similar high nitrogen mixtures that tend to increase acidity.

CULTURE IN THE HOME

The exacting requirements of the gardenia when grown indoors are indicated by the comments on greenhouse culture. It is an unpromising plant for the home window garden not only because of its need for carefully regulated temperature and humidity but also because it is susceptible to several diseases and insect pests that are difficult to control in the home. Some of the more common of these troubles are discussed in the following section.

DISEASES

Chlorosis

The loss of the normal rich green color may be due to any one of several causes, such as insufficient light, overwatering or poor drainage, too low a soil temperature, iron deficiency, or disease in the roots or stems. According to several investigations, a soil temperature below 70° F. induces chlorosis. Iron may be lacking in the soil or unavailable because of an alkaline condition of the soil. Certain fertilizers (calcium and sodium compounds) tend to change the pH of the soil to the alkaline side, thus preventing the assimilation of iron. Under such conditions a small amount of sulfur ($\frac{1}{2}$ pound to 100 square feet) or aluminum sulfate (1 pound to 20 square feet) added to the soil will prevent or correct the condition.

Nematodes and stem canker may cause or accentuate chlorosis symptoms.

Bud Drop

One of the most difficult problems in gardenia culture is bud drop, or bloom failure. This may be caused by poor illumination, by the soil becoming dry, by overwatering or poor drainage, by sudden changes in temperature, by dry atmosphere or high humidity combined with lack of light, or by high soil temperature.

A generous supply of light, favorable and uniform temperature and moisture, and disbudding, to allow only one bud to a shoot, are necessary to control bud drop.

Experiments indicate that bud formation and complete development can be secured by maintaining a low soil temperature at night.

Stem Canker

Stem canker is caused by a fungus (*Phomopsis gardeniae*). Early symptoms are slightly sunken discolored areas on the lower stem; sometimes these occur below the soil level. The infected tissues gradually enlarge and the surface becomes rough and cracked. On these cankered areas the spores of the fungus are produced in great numbers and distributed by splashing water, by cultivation, or by necessary handling of the plants.

The leaves of attacked plants become pale green, then yellow, and many may fall. Flower buds are more subject to shedding than those on normal plants. The plants may wilt or appear sickly, but the decline in health is rather slow.

No cure is known. The best control measure is prevention of wounds and the use of clean soil.

The disease spreads rapidly under the warm, humid conditions most suitable for the gardenia. The soil becomes infested and plants become infected from this source. Since the disease can enter the plant only through wounds, care should be taken to avoid even slight injuries. If the disease is found in a planting, the infected plants should be destroyed or isolated.

Suggested preventives:

(1) Bordeaux mixture, 4-4-50, as a spray (purchase from horticultural supply firm, and use according to directions); or

(2) 20-percent copper-lime dust or red copper oxide (cuprocide), 1 part in 100 parts sand, scattered around the crowns.

Precautions in all the handling of the plants will help to prevent the spread of the infection. When cuttings are made for propagation they should be placed in a solution of potassium permanganate (1 ounce to 5 gallons of water) for 5 to 10 minutes before they are planted.

Leaf Troubles

TIPBURN.—In a plant affected with tipburn the leaf tissues, especially at vein terminals, become discolored and die. This condition seems to be caused by a lack of balance in the moisture supply.

LEAF SPOTS.—Several fungi attack gardenia leaves and produce spots of various types. Bordeaux mixture spray is recommended to control these fungi.

SOOTY MOLD.—A crusty black substance appears on the leaves and stems of plants attacked by sooty mold, and may cover them. The substance is a fungus growth. It injures the plant by shading and smothering the leaves. It follows infestation by certain insects. If the insects are controlled, the sooty mold will disappear. To hasten the process a spray of burgundy mixture¹ can be used.

BROWN LEAF MARGINS.—Brown margins, usually appearing on older leaves, seem to be brought about by a lack of potash. To combat the condition, potassium sulfate or potassium chloride should be added to the soil at the rate of 3 pounds to 100 square feet. For a 6-inch pot, 1/8 ounce or less is sufficient.

Small dark-green leaves and short internodes indicate a lack of phosphorus. This condition may be corrected by adding acid phosphate (superphosphate) to the soil at the rate of 5 to 25 pounds to 100 square feet of soil.

SUN SCALD.—Some leaf spots are caused by strong sunlight on wet leaves.

¹ A suggested formula is 1 pound-copper sulfate and 1 1/2 pounds sal soda (hydrated sodium carbonate) to 50 gallons of water. The concentration may be increased 2 to 4 times for use on hardy foliage. Sal soda should always be dissolved in water before it is mixed with copper sulfate. This spray produces a less conspicuous coating on foliage than does bordeaux mixture; its general properties and uses are similar to those of bordeaux mixture.

NEMATODES

Nematodes are perhaps the most serious pests of gardenias. They are small parasitic worms that attack the roots, producing enlargements of various sizes and causing dwarfing and generally unthrifty symptoms in the plants.

Hot water at 120° F. into which the roots are plunged for 30 minutes has been found to kill nematodes, but this treatment is so near the danger point for the plants that it is not recommended except where facilities are available for accurately controlling the water temperature during immersion of the plants. Complete sterilization of the soil before planting and avoiding the introduction of infested plants into the beds are the best means of preventing nematode troubles.

INSECT PESTS

Whiteflies

Whiteflies occur as pale-yellow scalelike nymphs on the underside of the leaves or as white, wedge-shaped adults that fly about when disturbed. Besides producing an unhealthy condition of growth by feeding on the gardenia, these sucking insects excrete a liquid, called honeydew, that provides a medium for the growth on the leaves of black, sooty mold fungus.

Mealybugs

Mealybugs devitalize the gardenia plant by sucking the juices from leaves, buds, and stems. Sooty mold, which develops on the honeydew excretion produced by the mealybugs, becomes conspicuous on

leaves of badly infested plants. Mealybugs congregate in small groups and cover themselves and their eggs with fluffy white cottony wax. They are usually located in crevices near the bases of leaves, on stems, or around the base of the flower bud. Infested buds usually drop before the flower opens.

Scale Insects

Gardenias are frequently attacked by scale insects, particularly the soft scale. These small insects occur on the twigs and leaves as oval bodies, which are brown or greenish. They give the branch a lumpy appearance. The Florida Wax scale, recognized by its thick white or pink-tinted waxy covering, and the orthesia scale, pale brown in color and with a long-fluted egg sac, also occur on stems of gardenia. These scales weaken the plant by their feeding, and a black, sooty mold develops on the excretions that they drop on the leaves.

Aphids

Three species of aphids, or plant lice, damage gardenias by sucking the sap from plants grown in the greenhouse and out of doors. One species, the melon aphid, is about one-sixteenth inch long and is yellowish green to almost black. The melon aphid feeds on the buds, tender tip leaves, and older foliage. Black, sooty mold develops on the secreted honeydew that accumulates on the leaves.

The foxglove aphid, a larger species, is nearly one-eighth inch long and is a light shining green. It feeds on the tender new shoots and causes distortion of young leaves.

The crescent-marked lily aphid, intermediate in size and green, feeds on the young leaves. It causes less leaf distortion than the foxglove aphid.

Spider Mites

Gardenias grown under conditions of low humidity, as in the home, or near sunny walls or terraces often become injured by spider mites. Removal of chlorophyll by the feeding mites causes infested leaves to become pale green and stippled yellow. Heavily infested leaves may be covered with fine webbing. Spider mites are green or reddish with brown spots. They are difficult to see with the naked eye.

Thrips

Flower thrips enter the developing flower buds of gardenia and feed on the tender flower parts. The feeding causes the petals to become flecked and discolored and the flowers to be deformed. The active adult thrips are slender brownish-yellow insects about one twenty-fifth inch long. Their larvae are lemon yellow.

The banded greenhouse thrips feed on foliage of gardenia in the home. In the South it also feeds on outdoor plants. The dark-brown adults and milky-white larvae are found on the underside of the leaves, where they suck the juices from cells and cause a coarse white stippling of the foliage.

Fuller Rose Beetle

Adults of the Fuller rose beetle are oval insects about one-third inch long. They are brown and

have a diagonal buff stripe on each side. They attack gardenias and other plants in northern greenhouses and outdoor plants in the warmer southern areas. They are found during the day clinging to twigs or hiding in folded leaves. At night they eat rounded notches in the margins of the leaves. The larvae—small dirty-yellow grubs with brown heads—feed on young rootlets and the bark of older roots and underground stems. Such plants are weakened or may be killed.

Leaf Rollers

Gardenias in greenhouses are sometimes attacked by leaf rollers, such as the omnivorous leaf roller. These small green caterpillars tie two leaves together and feed on the inner surfaces or bore into young buds. The larvae develop into small, triangular, brown moths.

CONTROL OF INSECT PESTS

You may use malathion to control the following insects: whiteflies, mealybugs, scale insects, aphids, and thrips. Use dicofol to control spider mites; use carbaryl to control leaf rollers.

If possible, move the gardenias outdoors before you spray. When you spray indoors, take all normal precautions and spray only in a well-ventilated room, away from children and pets. Follow the directions and heed all precautions on the label. For additional information on dosage or formulation, consult your county agricultural agent.



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PRECAUTIONS

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers—out of reach of children and pets—and away from foodstuff.

Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. Avoid prolonged inhalation of a pesticide spray or dust. When applying a pesticide it is advisable that you be fully clothed.

After handling a pesticide, do not eat, drink, or smoke until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical atten-

tion. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Dispose of empty pesticide containers by wrapping them in several layers of newspaper and placing them in your trash can.

It is difficult to remove all traces of a herbicide (weed killer) from equipment. Therefore, to prevent injury to desirable plants do not use the same equipment for insecticides and fungicides that you use for a herbicide.

NOTE: Registrations of pesticides are under constant review by the U.S. Environmental Protection Agency. Use only pesticides that bear the Federal registration number and carry directions for home and garden use.

Prepared by Northeastern Region, Agricultural Research Service

This edition replaces all previous editions of this publication. Because of changed insecticide recommendations, earlier copies should be destroyed.



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