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Insect Pests of Azaleas and Camellias and Their Control

By

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Contents

AZALEA INSECTS	3
Azalea Lacebug	3
Azalea Mealybug	5
Thrips	6
Peony Scale	7
Azalea Whitefly	8
Azalea Leaf Miner	9
Red Mite (Spider)	10
Yellow Mite	11
Leaf Eating Insects	12
CAMELLIA INSECTS	13
Tea Scale	13
Camellia Scale	14
Other Insects	15
Mites	16
SPRAYERS	16
SPRAYING	17
SPRAY SCHEDULES AND DILUTIONS	17
PROPORTIONS FOR MIXING SPRAYS	18

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FOR SEVERAL years there has been a rapidly increasing interest in the culture of azaleas and camellias for ornamental planting. As a result of extensive private and commercial plantings there has been a growing demand for information about insect pests which infest these plants. This publication contains information on the appearance, life habits, and control of the most important of these insects.

AZALEA INSECTS

Azalea Lacebug

Importance and Type of Injury.—The azalea lacebug, *Stephanitis pyrioides* Scott, (Fig. 1) is a major pest of azaleas. Both adults and nymphs cause damage by sucking juices from the underside of the leaves. Withdrawal of sap and chlorophyll causes the leaves to become gray spotted or almost completely blanched, depending on the degree of infestation. The underside of the leaves is discolored by a black and brown varnish-like excrement (Fig. 2) and molt skins adhere to the underside of the leaves for a time. In addition to reducing the vitality of the plants, visible lacebug damage reduces their sale value. Only a few bugs are necessary to produce considerable damage.

Appearance, Life History, and

Habits.—The lacebug is about 1/8 of an inch long and 1/16 of an inch wide, with beautiful lace-like wings which have brown and black markings. The legs and antennae are light brown. Newly hatched forms are small, almost colorless, and dif-

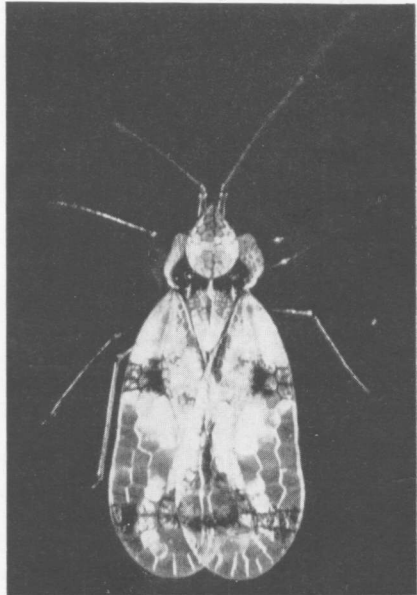


FIGURE 1.—Azalea Lacebug (X13).

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ficult to see. As they grow older their bodies become black and spiny. After the fourth molt wing pads show distinctly.

Elongate eggs are deposited within the tissues of the leaves on the underside, mostly along the veins. Sometimes the eggs just barely crack the upper epidermis of the leaf producing a tiny red lesion. The eggs incubate for 20 to 25 days and nymphs molt 5 times at 2- to 4-day intervals producing adults in 10 to 20 days. Females begin depositing eggs in 5 to 7 days after becoming adults. The life cycle, from egg to egg, is completed in 35 to 45 days. Adults have lived for 3 weeks in small cages.

Eggs deposited in the fall begin to hatch in February under favorable weather conditions. In 1938 the lacebug population be-

came dense during the months of March, April, and May. Subsequently the population declined and did not reach economic proportions again that year. In 1939 the spring population was low but built up to a high density in July, August, and September. Thus it appears that a dense population may appear either in the spring or late summer.

Control.—The best control has been obtained with a white-oil spray, such as *Florida Volck*, using 1 gallon to 100 gallons of water, plus 1 1/2 pounds of powdered derris root.* An oil spray with nicotine sulfate (*Black Leaf 40*) added was less effective. Nicotine and derris dusts were not effective.

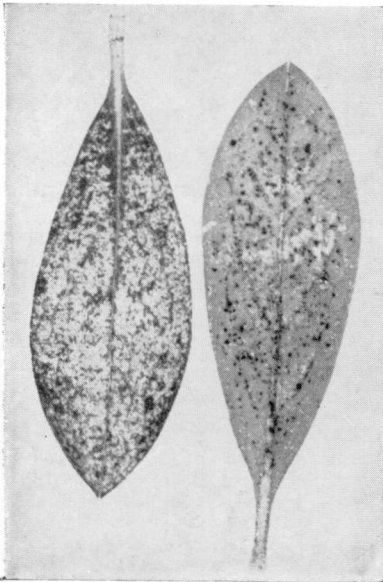


FIGURE 2.—Lacebug Damage to Azalea Leaves.

Two to three applications of an oil emulsion-derris spray are necessary to control the azalea lacebug in flower gardens. Severe infestations may require spraying in the early spring before the plants bloom. This application is followed by a second spraying just after the plants finish blooming. A third spraying should be made the latter part of September. When moderate infestations occur, the first spring application may be omitted.

Since the eggs are deposited in the leaf tissues, cuttings should not be made from infested plants. Nurserymen who desire to "clean up" an infestation should spray at intervals of 3 weeks.

*Containing not less than 4 per cent rotenone.

Azalea Mealybug

Importance and Type of Injury.—Light infestations of the azalea mealybug, *Eriococcus azaleae* Comst., (Figs. 3 and 4) do very little damage, but if uncontrolled, the infestation may become dense enough to seriously defoliate or even kill plants. In addition, the sale value of plants is seriously reduced by the presence of sooty mold which grows in the honey-dew excreted by the mealybug.

Appearance, Life History, and Habits.—Cottony masses, about 1/10 of an inch in diameter, enclosing the dark red females and their eggs, are usually observed in forks of branches and twigs of infested plants. Males usually attach themselves to the underside of leaves. Their white coverings are smaller but more elongate than those of the females.

Tiny, reddish-brown crawlers hatch in about 3 weeks in the spring. They emerge from the cottony sack of the mother and move upward to new foliage. They generally lodge in the axils of the leaves for feeding, but may move from place to place. The nymphs develop slowly and as they grow a short white covering is secreted. In 100 to 110 days after birth the females settle in the forks of twigs and begin to lay eggs. As the cottony covering is filled with eggs the body of the female shrinks and dies. In summer the life cycle is completed in about 130 days; in winter, 250 days.



FIGURE 3.—Azalea Twig Infested with Azalea Mealybug (About normal size).

For the most part, the winter is passed in the nymphal stage. Females reach maturity and usually begin to deposit eggs in March. Hatching, which begins in April, is usually complete by the last of May. The nymphs from another generation hatch in September and these individuals overwinter.

Control.—Excellent results have been obtained by the use of 1 1/2 gallons of *Florida Volck*, plus either 1 1/2 pounds of powdered derris root or 1 pint of *Black Leaf 40* in 100 gallons of water. The nymphs are easily killed by contact insecticides, but the females and eggs enclosed in cottony masses are very resistant. Consequently sprays should not be applied until the last of May, after all

of the eggs have hatched. Successful spraying may also be done the last of September after the eggs from the second generation

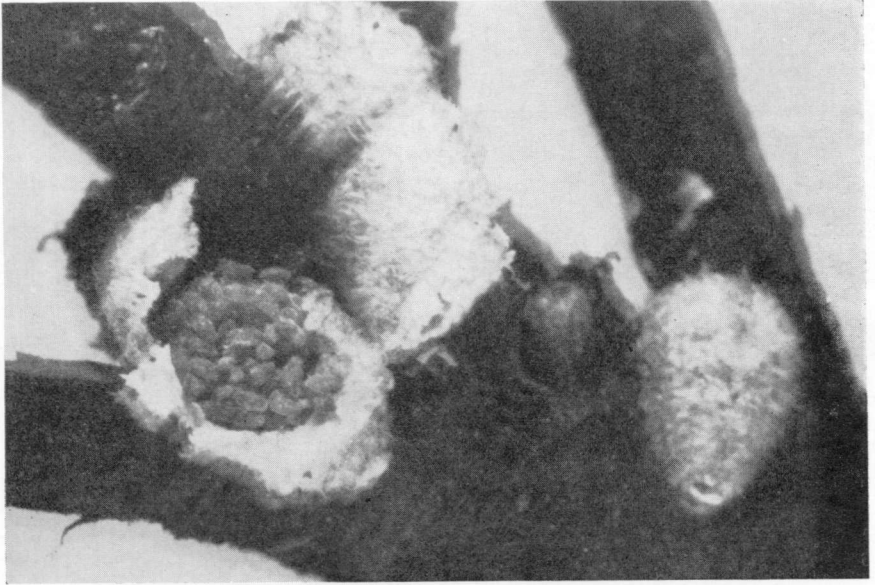


FIGURE 4.—Azalea Mealybug, Females and Eggs (X17).

have hatched. Proper timing and thorough spraying are essential for successful control.

Cuttings from infested plants should not be used for propagation and infested plants should be isolated.

A tiny, parasitic wasp, *Coccophagus immaculatus* How., helps to reduce infestations of the azalea mealybug, but sprays must be used for practical control.

Thrips

Importance and Type of Injury.—The greenhouse thrips, *Heliothrips haemorrhoidalis* (Bouche), (Fig. 5) may cause extensive damage to plants in gardens and nurseries and to plants and cuttings in greenhouses. Most of the feeding on plants out-of-doors is on the underside of leaves but in greenhouses both leaf surfaces may be damaged. The epidermis of the leaf is rasped so that the juices and chlorophyll can be lapped up by the mouth parts. Injured areas become pale and dry, and defoliation may occur. The leaves are spotted with black excrement.

Appearance, Life History, and Habits.—The adult thrips is a flat, black bodied insect with short legs and narrow light-brown

wings which lie along its back. It is about 1/20 of an inch long, relatively fast moving, and can be seen without a lens. Newly hatched nymphs are microscopic and almost colorless. As the nymphs grow they become pale yellow.

The eggs are deposited in the leaf tissue. Minute nymphs hatch in 4 to 8 days. They feed in colonies, molt several times, and reach maturity in 15 to 25 days. Thrips apparently overwinter in both the adult and egg stages. The infestation begins to build up in the spring and reaches greatest density in the summer months.

Control. — Sprays containing derris have not been as effective as those containing nicotine. When plants require one or more applications of an oil spray for the control of other insects, thrips may be controlled by adding a pint of *Black Leaf 40* per 100 gallons of spray. In greenhouses where thrips is the specific problem frequent applications of nicotine sprays should be made. A good wetting agent, such as *Penetrol* or *Grasselli's Spreader SS-3*, should always be used with *Black Leaf 40*, if an oil spray is not used.

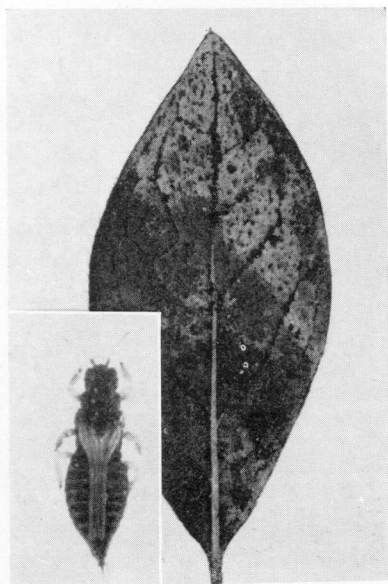


FIGURE 5.—Thrips Damage to Azalea Leaf. Inset: Adult Thrips (X20).

Peony Scale

Importance and Type of Injury.—The peony scale, *Pseudaonidia paeoniae* Ckll., (Fig. 6) infests the twigs and branches of azaleas. An infestation may reduce the vitality of the plants to such an extent that the foliage becomes thin. Twigs and even larger branches may be killed. Infestations may be confined to 1 or 2 bushes in an entire planting.

Appearance, Life History, and Habits.—Infestations are likely to be first noted by the white areas on azalea branches from which old scale coverings have dropped. The convex, nearly circular covering of mature females is about 1/10 of an inch in diameter. The covering of the male is smaller and more elongate. Except for the light-brown nipple, this scale covering can scarcely be distin-

gushed from azalea branches and twigs. In fact, the hairy outer bark of the azalea tends to grow over the scale and obscure it so completely that the branches appear to have small nodules on them.

The purple sac-like body of the female may be seen in the late fall and winter if the scale covering is carefully raised. The thread-like beak of the female is inserted into the bark of the plant for the removal of plant juices. Crawlers, when hatched, are also purple, but this color is almost completely lost after the second molt and immature females are nearly white. At maturity they again become purple.

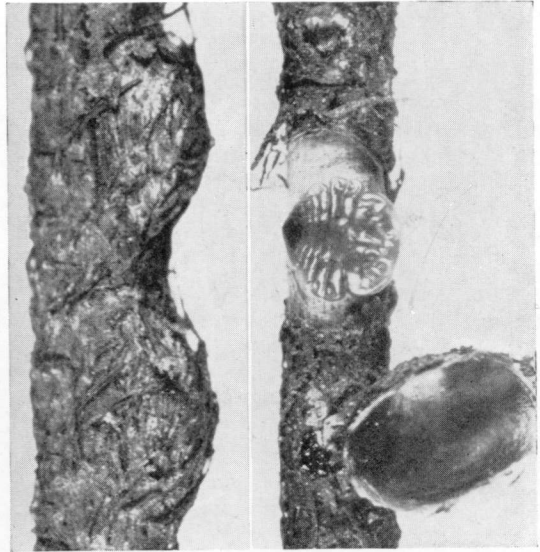


FIGURE 6.—Females of Peony Scale with the Covering of One Inverted (X10).

Eggs are deposited under the shell of the scale and as egg deposition proceeds the body of the female becomes smaller until she finally dies. Crawlers hatch from about the first of April to the last of May, but the peak emergence occurs about the middle of April. The tiny crawlers move from under the shell of the mother and migrate to neighboring branches and twigs of the plant. In a few days they settle and begin to secrete a covering. At this stage they appear as white specks among the hairs of the branches. Two molts take place, after which the shell is gradually enlarged to take care of the growing insect. Development is very slow and maturity is not reached until late in the fall. There is only one brood per year.

Control.—A white oil emulsion, such as *Florida Volck*, diluted at the rate of 2 gallons per 100 gallons of water, should be applied thoroughly the last of May or the first of June for control of this scale. Proper timing of the spray application is very essential since mature scales are resistant to sprays, whereas the young are readily killed.

Azalea Whitefly

Importance and Type of Injury.—The azalea whitefly, *Aley-*

rodes azaleae B. & M., (Fig. 7) is not a major pest of azaleas for it may infest only a few bushes even in extensive plantings. Damage is caused by the withdrawal of plant juices by nymphs feeding on the underside of the leaves. The foliage is discolored by a sooty mold which grows in the sticky honeydew secreted by the nymphs. The small white adults swarming around the plants do not feed.

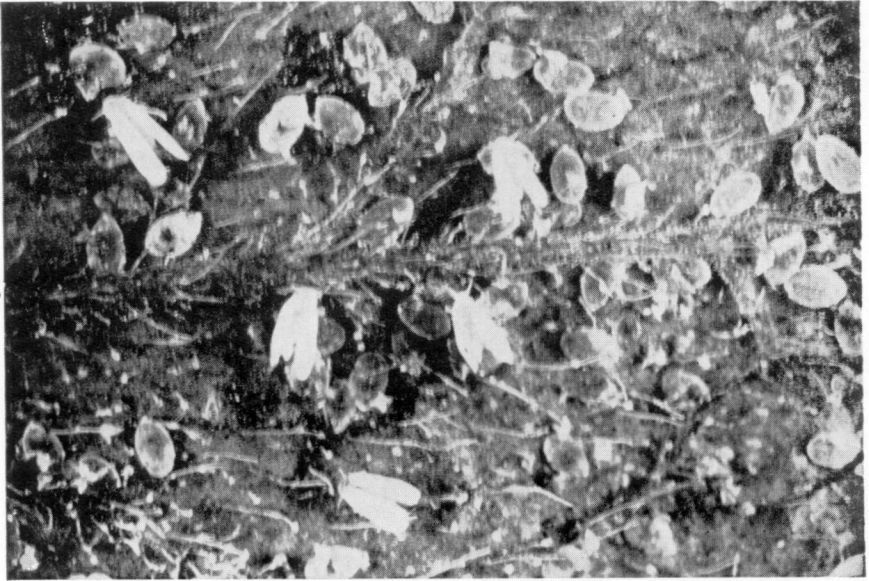


FIGURE 7.—Azalea Whitefly (X11).

Appearance, Life History, and Habits.—The pale-yellow eggs which are deposited on the underside of leaves by the adults are too small to be seen with the unaided eye. Tiny nymphs, which hatch from these eggs, crawl about over the leaf but soon settle to feed and grow. When nearly mature the nymphs thicken and the eyes appear as 2 black dots. The nymphal skin splits permitting the adult to emerge.

Control.—This pest may be controlled by the use of an oil emulsion, such as *Florida Volck*, diluted at the rate of 1 1/2 gallons per 100 gallons of water. Since oil emulsions are not effective against adults the spray should be applied to kill the nymphs on the underside of leaves in the early spring before adults begin to emerge. Plants which are sprayed once or twice a year with an oil spray for the control of other pests will not be damaged to any extent by the whitefly.

Azalea Leaf Miner

Importance and Type of Injury.—The azalea leaf miner, *Gracilaria azaliella* Brants, is of very little importance on plants grown

out-of-doors but may do considerable damage to cuttings in the greenhouse. Injury usually is not noted until brown blisters appear in the leaves, or until the tips and margins of leaves are rolled and damaged by larvae feeding inside.

Appearance, Life History, and Habits.—Eggs are deposited singly on the underside of the leaf by the small moth which has a wing spread of about 1/2 inch. The larvae hatch in about 4 days, enter the leaf, and feed between the two leaf surfaces. At this stage the leaf appears to have a blister on it and if held up to the light the larva may be seen inside. When about 1/3 grown the larva emerges and moves to the tip of a new leaf and rolls it up for protection while feeding and growing. When nearly grown the larva rolls up the margin of a leaf and spins a cocoon inside. Moths emerge from the cocoons, mate, and deposit eggs for another generation.

Control.—Because of the manner in which the larva protects itself by mining and rolling the leaf, this insect is not easy to control. Spraying with lead arsenate, 1 ounce to 2 gallons of water, has been recommended.*

Red Mite

Importance and Type of Injury.—The red mite, *Paratetranychus ilicis* McG., (Fig. 8) commonly known as red spider, is a major pest of azaleas. The mites feed on both leaf surfaces, rasping the epidermis, withdrawing plant juices, and causing the leaves to become reddish brown on their upper surfaces. Severe infestations may discolor all of the leaves and cause some of them to drop.

Appearance, Life History, and Habits.—Adult females may be nearly black, but males and nymphs are light red. The body of the mite is covered with spiny hairs which curve backwards. The red eggs are spheroidal. Azalea leaves heavily infested with mites appear as if sprinkled with red pepper. Examination with a hand lens will show the active, dark red mites.

The eggs are deposited on both leaf surfaces but more are deposited on the underside than on the upperside. In warm weather they incubate from 4 to 7 days, but in cooler weather twice as much time may be required. The larvae molt 3 times at 2- to 3-day intervals and become adults in 6 to 7 days after hatching. Egg laying begins 1 to 5 days later.

The habits of the red mite almost parallel those of the citrus red mite, *Paratetranychus citri* McG. It is mainly a pest during cool weather. Infestations slowly build up during the winter months and reach the greatest population density in the spring. Under

*White, Richard P. and C. C. Hamilton. 1935. Diseases and Insect Pests of Rhododendron and Azalea. N. J. Agr. Expt. Sta. Cir. 350.

favorable climatic conditions infestations may extend into the summer, but usually are not of economic importance at this season.

Control.—Mite infestations must be cleaned up while the population density is low if discoloration of foliage is to be prevented. An application of a white oil spray, such as *Florida Volck* diluted at the rate of 1 to 1 1/2 gallons per 100 gallons of water about the first of October, is the best insurance against mite damage. Usually this

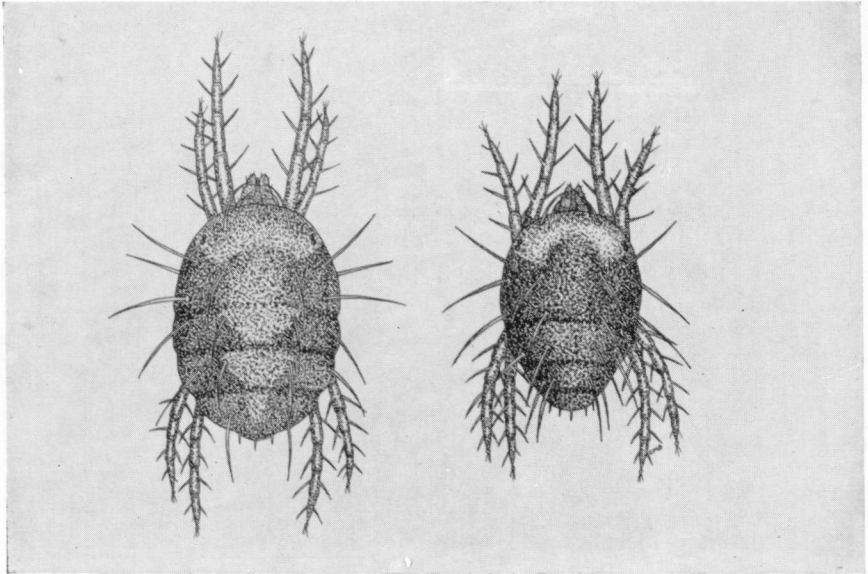


FIGURE 8.—Red Mite *Paratetranychus ilicis* McG. (Greatly enlarged).

spraying will prevent damage until the plants are through blooming in the spring. After the plants have bloomed a second application of oil may be necessary. When infestations extend into hot summer days they may be checked with sulphur dust, but because sulphur is not effective in cool weather it cannot be entirely relied on for satisfactory control of this pest throughout the year.

Yellow Mite

Importance and Type of Injury.—Injury to azaleas by the yellow mite, *Tetranychus* sp., (Fig. 9) is not so severe and extensive as that done by the red mite, but infestations of both mites often occur on the same plants. The yellow mite spins a web on the underside of the leaves and, for the most part, lives in the restricted area covered by the fine web. Within this confined area, however, feeding may be exhaustive, the effect showing as a reddish area on the upper leaf surface. This discoloration should not be confused with the natural reddening of old leaves.

Appearance, Life History, and Habits.—The mites are robust, pale-yellow, hairy creatures, with dark-brown areas on the sides near the hind and middle parts of the body. The yellow eggs are deposited on the underside of the leaves. The eggs hatch in 3 to 8 days in warm weather. The larvae molt 3 times at 1- to 4-day intervals and reach the adult stage in 5 to 8 days after hatching.

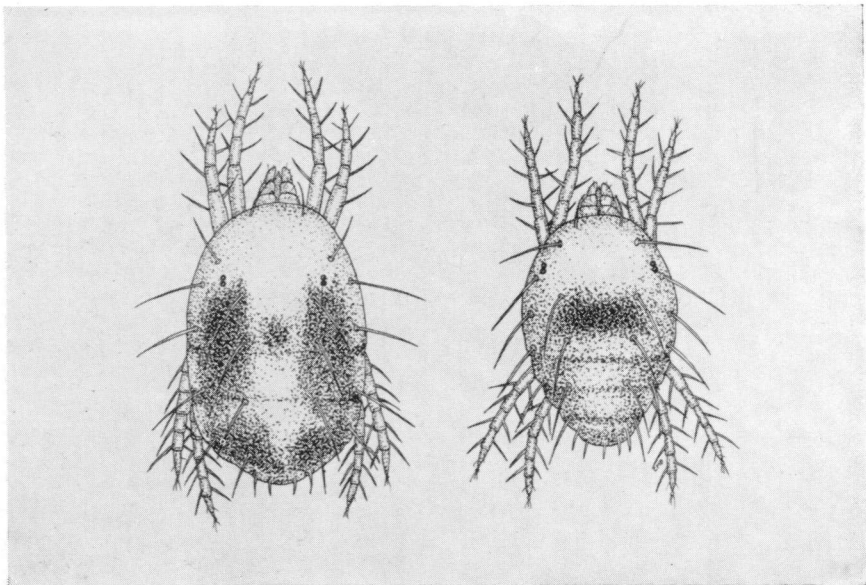


FIGURE 9.—Yellow Mite *Tetranychus* sp. (Greatly enlarged).

This mite, like the red mite, is a pest in cool weather and does the greatest damage in the early spring months. Infestations dwindle with the advent of hot, summer weather.

Control.—The control for this pest is the same as that for the red mite.

Leaf Eating Insects

There are very few leaf-eating insects that are of major importance to azaleas. Occasionally, however, plants may be damaged by a green beetle, *Colaspis favosa* Say, about 1/4 of an inch long, which eats holes in the leaves. Control may be obtained by the application of derris or other rotenone dusts.

CAMELLIA INSECTS

Tea Scale

Importance and Type of Injury.—The tea scale, *Fiorinia theae* Green, (Fig. 10) is the most important pest of camellias. The infestation occurs on the leaves, and for the most part is confined to the underside. The most conspicuous characteristic of an infested plant is the yellow splotches on the upper leaf surface produced by the feeding of the insects beneath. Almost the entire leaf may



FIGURE 10.—Tea Scale (X13).

become discolored and drop prematurely. The vitality of the plant and the production of blooms are impaired; thus the sale value of the plant is greatly reduced. Infested cuttings often die before roots develop.

Appearance, Life History, and Habits.—An infestation of tea scale is characterized by a cottony mass on the underside of the leaves. The female scale covering is at first thin and light yellow in color, becoming hard and dark brown with age. The shell of the scale is somewhat oval in shape, is about $1/20$ of an inch long, and has the residue from the first molt attached at one end. The yellow eggs and female are under the shell of the scale. The male is covered with a soft white skin, with a ridge down the middle.

Each female deposits from 10 to 16 eggs under the shell of the scale. The eggs hatch in 7 to 21 days, depending on the weather.

The flat, yellow crawlers emerge, migrate to the newer growth of the plant, and in 2 or 3 days attach themselves. At first they secrete thin white coverings and shortly afterwards great quantities of white threads. When the population of nymphs is dense the underside of the leaves may be covered with this cottony secretion. The nymphs molt in 18 to 36 days after birth. A second molt occurs about a week later. The female scales begin to lay eggs in 41 to 65 days after birth. The life-cycle is usually completed in 60 to 70 days.

The hatching of tea scale nymphs occurs throughout the year, although to a much less extent in cold than in warm weather. There are many overlapping broods, so that emergence of crawlers is a continuous process from March to November. This scale is not controlled to any great extent by natural enemies.

Control.—The tea scale may be controlled by thoroughly spraying with a white-oil emulsion, such as *Florida Volck*, diluted at the rate of 2 gallons to 100 gallons of water. The spray should be directed with considerable force to the underside of leaves. Two or more applications may be necessary to clean up heavily infested plants, depending on the thoroughness of spraying. The best time to spray is in the spring, after the plants have finished blooming and when the danger of cold weather is past.

Camellia Scale

Importance and Type of Injury.—The camellia scale, *Lepidos-*

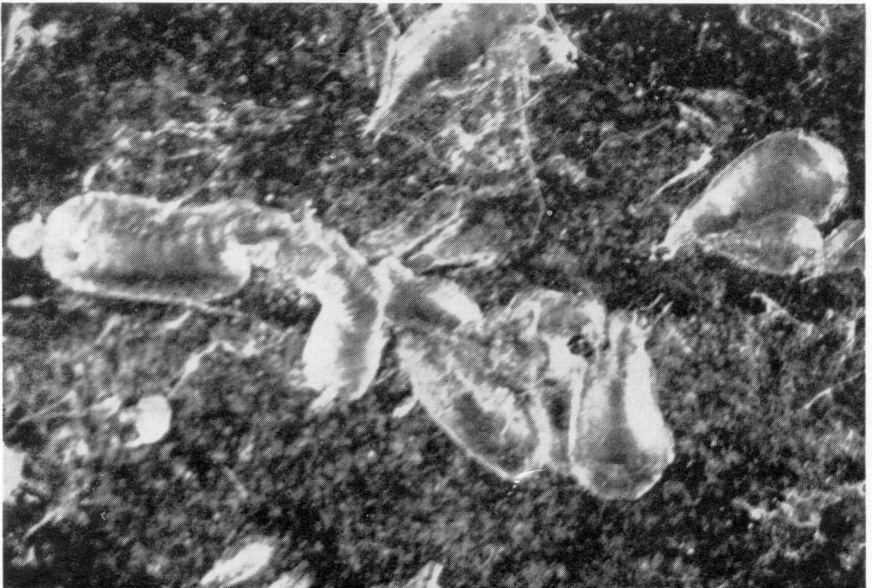


FIGURE 11.—Camellia Scale (X13).

phes camelliae Hoke, (Fig. 11) is not as important as tea scale but it may severely damage young plants and cuttings in nurseries. Although it does not discolor the leaves from which it draws nourishment, the foliage is devitalized and drops prematurely. The camellia scale often occurs mixed with tea scale. The sale value of infested plants is reduced.

Appearance, Life History, and Habits.—The shell of the female scale varies from light to dark brown in color and resembles an oyster shell in form. It is nearly 1/10 of an inch in length. The shell covers the white to purplish sac-like body of the female and her eggs. The immature male scale lives under a shell which is smaller and narrower than that of the female.

Females deposit from 25 to 55 eggs which hatch in 11 to 24 days. Young larvae or crawlers move from the shell and migrate to fresh leaves or they may settle on old leaves near the parent. As soon as they settle they begin to secrete the protective covering. In 12 to 27 days after birth they molt. The second molt occurs 6 to 10 days later, after which the shell is gradually enlarged to accommodate the growing insect. Eggs are deposited 38 to 54 days after birth and the life cycle is usually completed in 60 to 70 days.

The camellia scale is not as active as tea scale in the winter. Few crawlers emerge from October to March on plants grown out-of-doors, but hatching may continue in greenhouses and cold frames. Because of the overlapping of broods all stages of the scales are present in the summer months.

Control.—Camellia scale may be controlled by applying the sprays recommended for tea scale.

Camellia scale is often heavily parasitized by a hymenopterous parasite which makes a tiny hole in the shell when the wasp emerges. Lady beetles also feed rather extensively on this scale.

Other Insects of Camellia

Additional scale insects which have been found on camellias are the chaff scale (*Parlatoria pergandii* Comst.), Florida red scale (*Chrysomphalus aonidum* Linn.) (Fig. 12), soft-brown scale (*Coccus hesperidum* Linn.) (Fig. 13), and peony scale (*Pseudaonidia paeoniae* Ckll.). Chaff scale and Florida red scale are pests of foliage. Soft-brown scale infests both foliage and tender branches. Peony scale infests branches, twigs, and even the trunks of camellia.

All of these pests may be controlled by the proper application of oil sprays as recommended for tea scale.

Sometimes the cotton aphid, *Aphis gossypii* Glover, attacks the tender new growth of camellias. It feeds in colonies on the underside of leaves causing them to curl and to be blackened with a sooty mold. These small, sluggish insects may vary from yellow to black in color; some have wings and others are wingless.

Aphids may be controlled by using a dust containing 3 per cent nicotine or by spraying with a mixture containing 4 to 6 pounds of soap and 1 pint of *Black Leaf 40* in 100 gallons of water.

Mites

The red mite, *Paratetranychus ilicis* McG., which infests azaleas, is also a major pest of camellias. The brown rusty discoloration produced by the mites on the leaves greatly impairs the sale value of the plants. Control measures are the same as for mites on azaleas.

A microscopic mite belonging to the genus *Eriophyes* causes russeting of the foliage of camellias. This appears to be a pest during warm weather which may be readily controlled by dusting with sulphur.



FIGURE 12.—Florida Red Scale on Camellia Leaf (X10).

SPRAYERS

A good hand sprayer or power sprayer with suitable agitators to keep the materials well mixed and ample spray hose to allow the operator free movement should be used in the application of sprays for the control of azalea and camellia insects. A piece of 1/4 inch pipe about 5 feet long should be fitted to the end of the hose to serve as a spray rod. The end

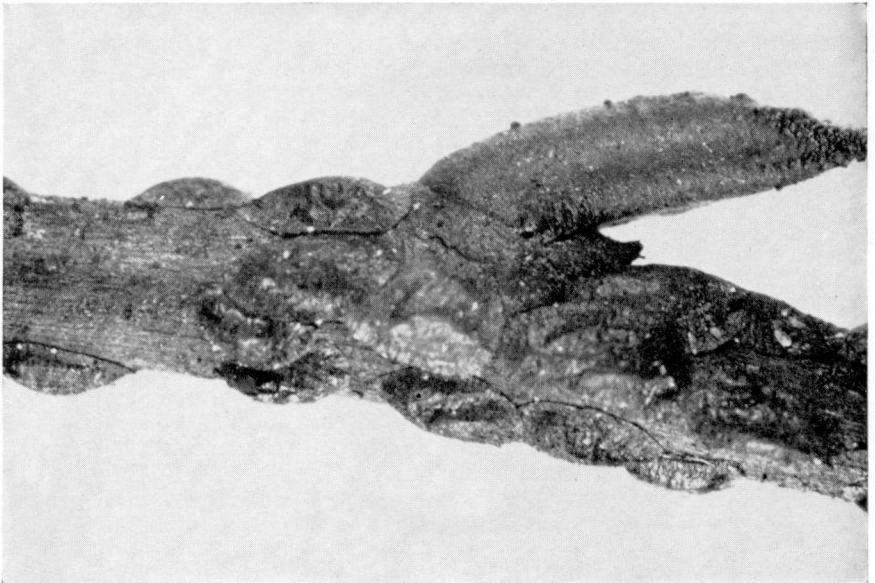


FIGURE 13.—Soft-Brown Scale on Camellia Twig (X10).

of the pipe should carry at least one angle nozzle. For large plants and extensive plantings a power sprayer with double angle nozzles should be used. The opening in the nozzle should be about 1/16 inch in diameter so that the liquid is discharged with sufficient force to agitate the foliage of the plants.

SPRAYING

Each plant should be sprayed systematically and thoroughly. Most of the spraying should be done with the nozzle directed upward so that the underside of the leaves will be covered. After this is accomplished the tops of the leaves can be quickly sprayed with a few sweeps of the nozzle. Plants should not be drenched.

Azaleas and camellias should not be sprayed in winter, nor in summer when the temperature is likely to go above 95°F. Plants suffering from lack of moisture or lack of cultivation should not be sprayed.

SPRAY SCHEDULE FOR AZALEAS

Time	Spray	Pests
1. In spring just after blooming	White-oil emulsion* 1 gal.	Lacebug
	Pwd. derris 1½ lbs.	Thrips
	<i>Black Leaf 40</i> 1 pt.	Mites
	Water 100 gal.	
2. Last of May or first of June	ditto	Mealybug
		Lacebug
		Thrips
		Mites
		Peony scale
3. Last of Sept.	ditto	ditto

SPRAY SCHEDULE FOR CAMELLIAS

Time	Spray	Pests
1. First of April	White-oil emulsion* 2 gal.	Scale insects
	Water 100 gal.	Mites
2. Last of Sept.	White-oil emulsion* 1½ gal.	Scale insects
	Water 100 gal.	Mites

* Such as Florida Volck

PROPORTIONS FOR MIXING AZALEA SPRAYS

Water	White-oil emulsion	Pwd. derris	Black Leaf 40
1 gal.	3 level tablespoons	2 level tablespoons	1 teaspoon
6 gal.	½ pint	1½ oz.	6 teaspoons
12 gal.	1 pint	3 oz.	2 oz.
50 gal.	½ gal.	¾ lb.	½ pint
100 gal.	1 gal.	1½ lbs.	1 pint

PROPORTIONS FOR MIXING CAMELLIA SPRAYS

Water	White-oil Emulsion		
	1-100	1½-100	2-100
1 gal.	3 level tablespoons	4½ level tablespoons	6 level tablespoons
6 gal.	½ pint	¾ pint	1 pint
12 gal.	1 pint	1½ pints	1 quart
50 gal.	½ gal.	3 quarts	1 gal.
100 gal.	1 gal.	1½ gal.	2 gal.