Pests of
ORNAMENTALS
Reports on control experiments

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SCALES AND MEALYBUGS

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Foreword

Infestations of insects on ornamental plants offend people interested in the beauty of their surroundings. The gypsy moth and canker worms are spectacular in their infestations, but the scales and mealybugs are a much greater menace to the health of trees and shrubs. Moreover, scales and mealybugs are small and difficult to find, especially when the infestations are starting. Scales can be controlled rather easily soon after the eggs hatch, and fortunately this is a well-defined period. On the other hand, mealybugs do not have such convenient habits, and control is much more difficult.

In this Circular the results of tests are brought up to date. Part of the problem is the diversity of materials needed for most effective control of the various types of pests. This makes it profitable to test a large number of new materials on a wide variety of pests of ornamentals in the hope that one material may be found to replace two or three, thus simplifying control.

The sections on magnolia scale and tuliptree scale are reprinted from Circular 201, now out of print.

A NOTE TO THE READER: The 13 per cent emulsion of Sevin, referred to on pages 7, 8, and 10 of this Circular, is no longer manufactured. Sevin as a 50 per cent wettable powder is on the market.

SCALES AND MEALYBUGS

John C. Schread

Magnolia Scale

The *Neolecanium cornuparvum* (Thro.) scale attacks a variety of magnolias. Badly infested trees are weakened and produce stunted twigs and undersize leaves. When infestation is allowed to continue for several years twigs and branches deteriorate and small trees may die.

The scale is among the largest occurring in the United States. At maturity the conspicuous females are soft and about one-half inch long (Figure 1). They are dark shining brown, convex, smooth, and covered

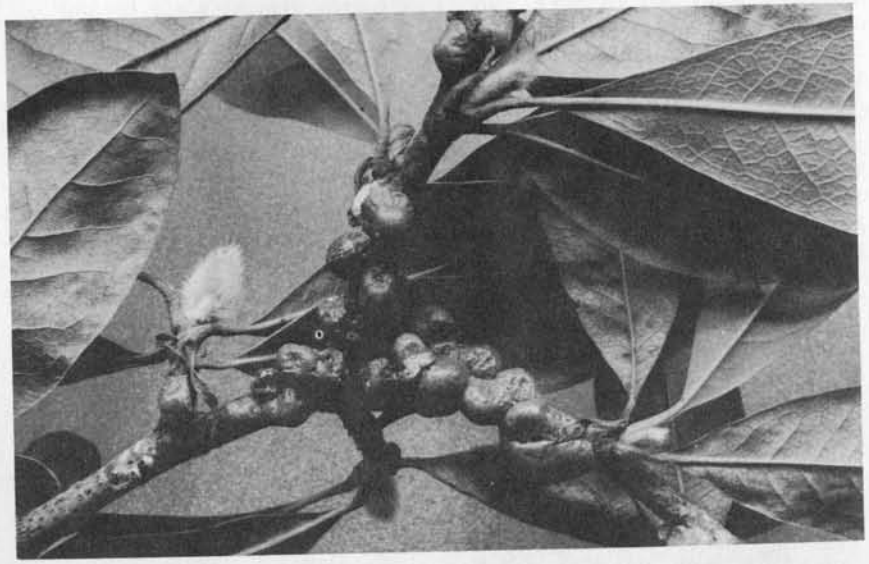

Figure 1. Mature scales on magnolia in late summer.

with a white waxy bloom. Badly infested twigs and branches appear to be coated with cotton. The scale leaves an elliptical scar when removed from the bark. The nymphs are blackish with a waxy bloom. They occur mainly on the underside of the twigs and branches. Occasionally a few are found on the upper side but they make up a relatively small proportion of the population.

Scales reach maturity during August and early September. A new generation arises as live young (eggs are not produced) and overwinters as first instar nymphs on the newer twigs. Growth is resumed during the next April. There is but one generation a year.

Control. The following experiment in control of the magnolia scale was undertaken on a 10- to 12-foot *Magnolia stelatta* tree. Several of the principal branches were conveniently situated so that they could be sprayed without interference from one another. Sucker growth at the base of the tree provided another area for treatment. Counts of young scales were made before treatments were applied. There was a total of 650 first instar nymphs on five twigs (average 7 inches in length) taken at random from the tree in early April.

On April 11, 30 per cent Thimet and 50 per cent malathion emulsions were applied to the tree at dilutions of 1 and 2 pints in 100 gallons of water. Repetition of treatments could not be made. An average of 1 gallon of each diluted spray was applied with a 12-quart wheelbarrow mist blower.

Results of the tests taken on May 10 showed that all the scales were dead. A total of 2,154 scales on 20 twigs (averaging 6 inches in length) were examined. The treatments did not injure the tree. Reexamination of the tree in June confirmed the examinations made a month earlier.

Tuliptree Scale

Tuliptrees may be killed by heavy infestations of *Toumeyella liriodendri* Gmel. scale. The large, dark brown, wrinkled, hemispherical scale (one-third inch in diameter when mature) is only a little smaller than the magnolia scale. The lower branches of tuliptrees are usually the first to become infested and may be completely covered with crowded masses of female scales (Figure 2). Unless the insect is controlled, twigs and branches and ultimately the entire tree may die.

The scale hibernates as first instar nymphs, mostly on the underside

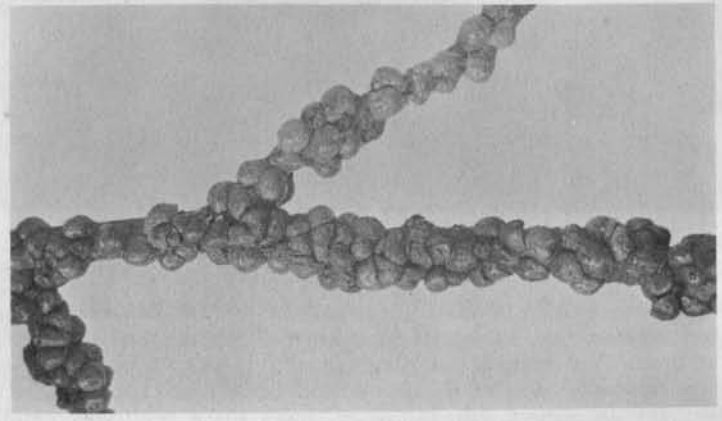

FIGURE 2. Mature female scales on tuliptree.

of the branches. They are small, blackish, flat, and oval in outline. Scales begin to grow in April and reach maturity during July. Young are produced viviparously during August. There is one generation annually. The leaves of infested trees may turn yellow. Honeydew secreted by the pest serves as a medium for the growth of a sooty mold. Hence all parts of an infested tree, including the foliage, may be coated with a disagreeable, sticky blackness.

Control. Two 7- to 9-foot trees were used in the following experiment. No others were available. Scale counts made in early April before treatments were applied indicated 558 nymphs on five twigs (averaging 4 inches in length). Malathion 50 per cent emulsion was sprayed on the trees on April 11 at dilutions of 1 and 2 pints in 100 gallons of water. One to two quarts of spray material for each treatment was applied with a 12-quart wheelbarrow mist blower. Triton B1956 was added to the sprays to enhance spreading and sticking. Results of the treatments taken on May 19 showed that all of the scales were dead. More than 3,138 scales on 10 twigs (average 6½ inches in length) were examined. Malathion caused no apparent injury to the tree.

Holly Scale

Several scale insects may infest holly. One of the most injurious is a species of Lecanium. It is not widely distributed, but when it does occur and is not controlled serious injury to new growth may develop (Figure 3). In addition its abundant excretion of honeydew supports the development of a black sooty fungus which makes infested plants unsightly.

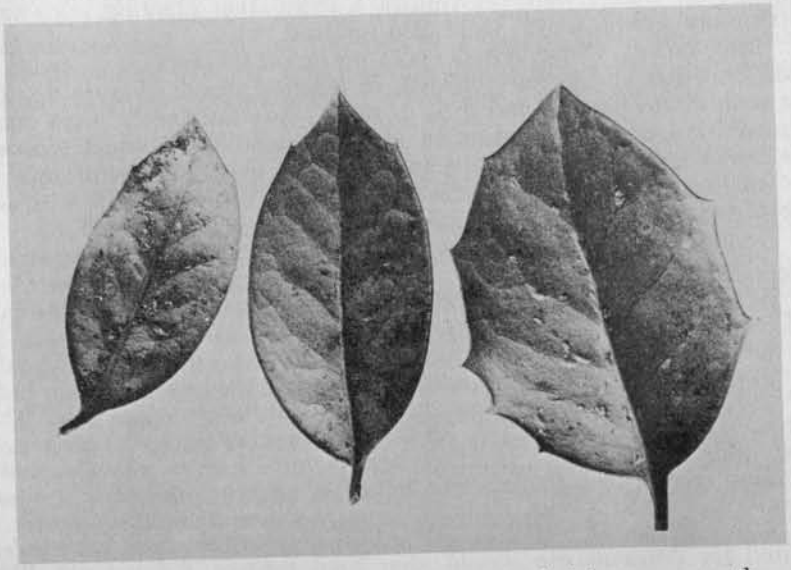

FIGURE 3. Lecanium scale on holly may seriously injure new growth.

The adult female scale is about one-eighth of an inch long and half as wide. It is convex in outline and amber to dark reddish-brown in color. At first the young are light yellow, but soon change to light brown or chestnut color.

Female scales reach maturity in late spring at which time eggs begin to appear. The eggs hatch during late June and early July. The young crawlers feed at first on the foliage, but soon crawl to the twigs and branches where they settle down permanently. Overwintering occurs as partly grown nymphs, and there is only one generation a year.

Control. The Lecanium scale on holly may be controlled with a delayed dormant oil spray or with a summer oil spray applied during July when the crawlers are active.

Sprays were applied on June 3, 1957 to test the effectiveness of four insecticides used in emulsion form for the control of this scale. Twenty 1- to 2-foot holly plants growing in 4-inch pots were used in the test.

The dilution of one-half pint of 55 per cent malathion emulsifiable liquid in 100 gallons of water killed 62 per cent of the scales. All scales were killed when 1 pint in 100 gallons was used.

Azalea Bark Scale

The azalea bark scale (*Eriococcus azaleae*) was first reported from Connecticut by Britton (1917), who later (1925) indicated that it occurred on shrubs of the heath family, Ericaceae, and sometimes on hawthorn. More recently the newer varieties of azalea and rhododendron are often infested by the pest. The Japanese andromeda (*Pieris japonica*) was added to the list of host plants in Connecticut in 1960. In this instance the plants were growing in a foundation planting with azalea and rhododendron which were also infested.

Many small, white, felted scales occur on the surface of twigs and main branches and in bark crevices of infested plants (Figure 4). They are somewhat elongate and oval in shape. Infestation is always accompanied by a dense accumulation of sooty mold fungi which grows in the honeydew secreted by the insects. This may also result in rough and malformed bark. Badly infested plants are often stunted, with some loss of twigs and branches. Small azaleas are sometimes killed.

Overwintering scales mature in the spring at which time eggs are laid. There may be an average of 140 pinkish colored eggs per female scale, with a range of 40 to 350. These start hatching during the latter part of June (June 18, 1957, and June 27, 1959). Hatching may continue until the end of the third week in July. The pinkish young crawl upward over the twigs and sometimes onto the leaves for a while before settling down permanently on the twigs and in bark crevices. Those remaining on the leaves drop off or die. Counts made of young scales soon after all eggs had hatched, and again of mature scales before hatching commenced in June of the following year, indicated a natural mortality of 30 to 35 per cent. There is only one generation a year.

Control. During the dormant season a spray of white oil emulsion diluted for dormant use should give good control of the scale. Plants may be sprayed with this material after the blossom period while the young are crawling and settling down.

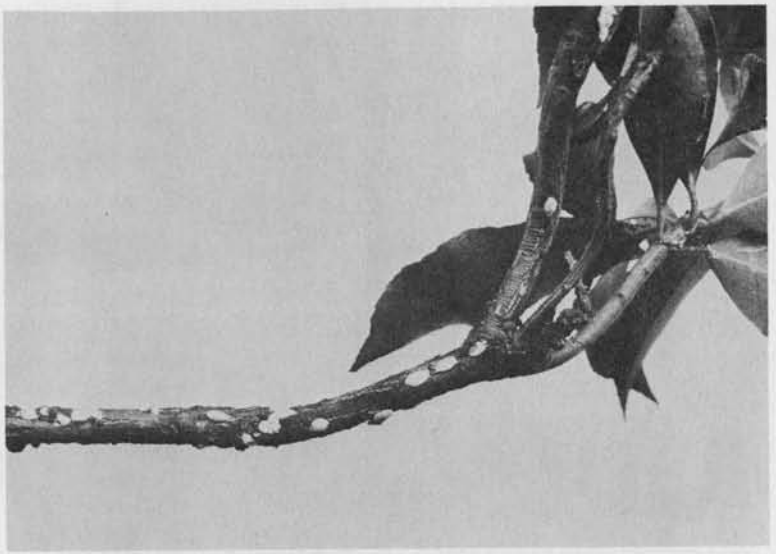

FIGURE 4. Azalea bark scale on Andromeda shows characteristic placement on twigs and branches.

Malathion 56 per cent emulsion was tested on July 15, 1957, on five varieties of small azalea plants. All crawlers were killed when the dilution was 1 or 2 pints in 100 gallons of water, with 92 per cent mortality at the ½-pint level.

A similar test made July 20, 1959, showed that 45 per cent Trithion and 48 per cent ethion at the rate of 1 pint in 100 gallons killed all crawlers. Sevin (13 per cent) at the 2-pint rate killed all the scales, but was not completely effective when only 1 pint was used.

European Fruit Lecanium on Blueberry

The European fruit Lecanium (*Lecanium corni*) attacks highbush blueberry and occurs throughout the State.

Adult female scales are dark brown or chestnut color, hemispherical and oval in shape and one-eighth to three-sixteenths of an inch long (Figure 5). They may be slightly wrinkled and polished in appearance. The male scale is smaller, light colored, and transparent. Several hundred eggs may be laid by one female. Eggs hatch during late June and July. The young crawl upward onto the new twigs where they feed until fall. Overwintering occurs as very small, slightly convex, reddish-brown nymphs. The scales resume feeding in the spring, reaching maturity by late May or early June. There is only one annual generation.

Control. Dormant oil sprays will control the pest. Treatment should be applied in late March or early April when danger of freezing at night has passed.

A control experiment was undertaken on April 11, 1960. A 3-gallon

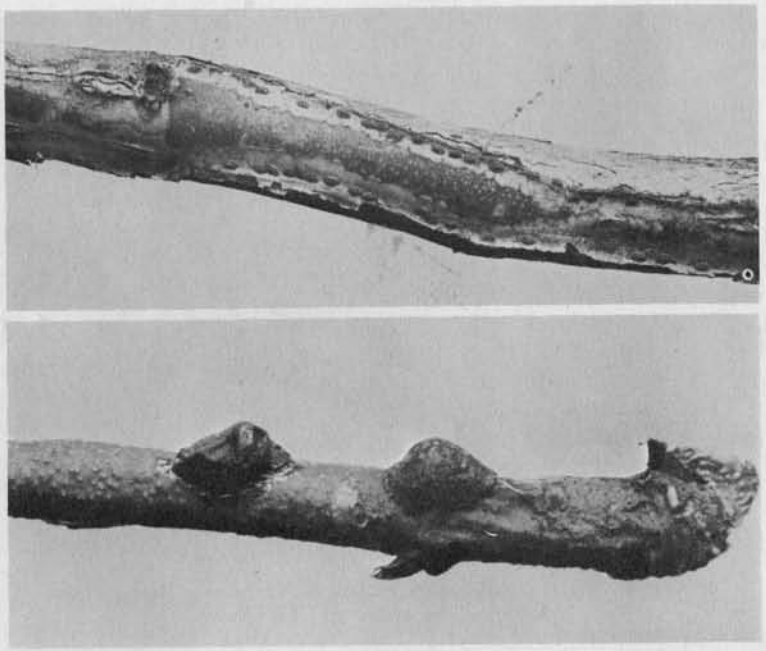

FIGURE 5. Young of the *Lecanium corni* scale on highbush blueberry (top) and adult scales (lower).

wheelbarrow mistblower was used to apply about 1½ pints of spray per plant. Control data were taken from an average of 10 twigs per treatment and untreated plants.

Complete control resulted from one spray of 25 per cent Sevin at the rate of ½ pint in 100 gallons of water.

Juniper Scale

I have described the life history and habits of the juniper scale (*Diaspis carueli*) in Bulletin 588 of this Station (1955). In tests at that time malathion was very effective in control. This report will discuss the results of tests with other insecticides used to control young scales in July.

One large juniper plant more than 20 feet in circumference was used in the 1958 tests. None of the materials listed in Table 1 was as effective as malathion used in previous tests (Schread, 1955). Pretreatment counts of young scales in 1958 indicated an average of 641 on an average 2- to 3-inch twig.

The plant was divided into six equal areas. The insecticides, rates, dates of treatments, and results are given in Table 1. Treatments were applied by means of a 3-gallon hand pressure sprayer using 1 gallon of spray per dilution. Wetting agent Triton B1956 was used at 10 ounces in 100 gallons of water. Data were taken from five twigs per rate of treatment.

TABLE 1. Control of juniper scale

Insecticide	Pints per 100 gallons	Scales Dead	Scales Alive	Per cent control
Applied July 16, 1958		*Control as of July 25*		
13% Sevin	1	646	99	87
	2	668	96	87
25% Diazinon	1	253	124	67
	2	505	234	68
43% Trithion	1	553	91	86
	2	738	122	86

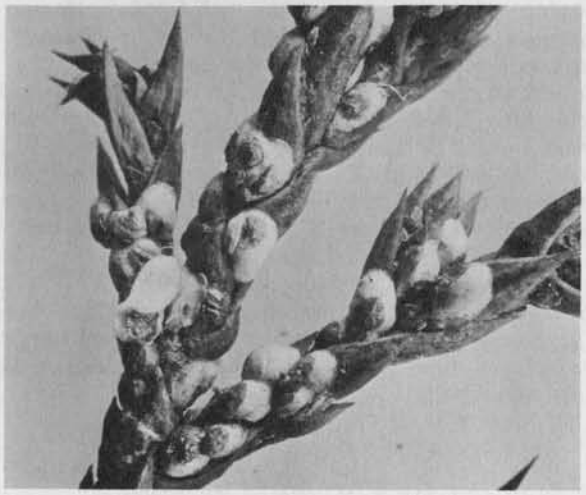

FIGURE 6. Juniper scale may also attack red cedar, arborvitae, and cypress.

Taxus Mealybug

The long-tailed Taxus mealybug *Pseudococcus cuspidatae* disfigures Taxus plants both by the appearance of the insect and by the enormous quantities of honeydew excreted (Hamilton, 1942). Sooty fungus usually grows abundantly on the honeydew. Occasionally the feeding of mealybugs on the bark may cause loss of color of the needles or wilting of branches.

These mealybugs occur singly or in small groups on the main stems and underneath the branches of Taxus plants (cover photo). They overwinter as very small immature nymphs hidden under bark scales, in crevices and in crotches formed at the union of twigs and branches. They begin to crawl again in April of the following year. Feeding is accomplished by inserting their long, slender mouth parts into the bark tissue and sucking the sap. As they grow a waxy excretion accumulates

unevenly over the upper surface of their bodies, becoming more dense as the mealybugs grow to adult size. With the exception of size there is very little noticeable difference between the nymphs and the adults.

The mealybugs reach maturity after the middle of June. A study made on June 18, 1959, indicated an average of 68 adults in a range of 5 to 171 on ten twigs. It was also seen at this time, by an examination of five adult females, that they contained an average of 114 eggs, ranging from 105 to 141. Hatching of young within the parent mealybug's body commenced on June 29. Only two nymphs emerged from 21 adults examined on this date. One month later, July 28, examinations indicated completed emergence of nymphs from 85 per cent. The remaining 15 per cent were still producing eggs and young. The young are flat, oval, yellowish in color and without waxy excretion. Male mealybugs are small, light colored, and winged. There is only one generation a year.

Control. Control of mealybugs has not been easy in the past. Nicotine sulfate and white-oil sprays have been helpful in reducing infestation. In some instances control of ants that protect mealybugs have aided materially in keeping plants free from the pests.

Experiments in the use of recently developed insecticides for the control of the long-tailed mealybug on Taxus have been carried on during the past 5 years. A summary of these tests follows. In all instances infested *Taxus hicksii* and *T. cuspidatae* were the plants sprayed. A 12-quart wheelbarrow mistblower and a trombone sprayer were used to apply the treatments. Triton B1956 wetting agent was used at the rate of 1 pint in 100 gallons of water. Each dilution was applied to two plots using about one quart of spray per plant. Insecticides, rates and dates of treatment and results are given in Table 2. Control data were taken by counting the insects on 10 twigs per rate of treatment and untreated plants. Thus malathion, Sevin, and Dibrom were effective in killing these mealybugs.

TABLE 2. Control of mealybugs

Insecticide	Pints per 100 gallons	Dead	Alive	Per cent control
Applied June 25, 1956		*Control as of June 27*		
50% Malathion	2	77	1	99
	4	47	1	98
Untreated	....	....	141	....
Applied May 9, 1958		*Control as of May 21*		
13% Sevin	2	235	6	98
	4	178	0	100
65% Dibrom	2	89	28	76
	4	84	0	100
48% Trithion	2	212	59	78
	4	129	41	76
Untreated	....	....	369	....

Discussion and Summary

These tests showed that malathion was a very effective material for controlling crawlers of several scale insects on ornamental plants. The time when crawlers are present is indicated by the spray dates in the discussion of the pests.

Information was also obtained on several other insecticides. Of these Sevin was the most promising for use by home gardeners.

The other materials are still in the experimental stage, obviously not ready for general use.

Acknowledgments

Acknowledgment is made to B. W. McFarland for the photos used in this Circular and to R. E. Gosselin for his assistance in obtaining results of experiments.

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