CONTROL OF SOME SCALE INSECTS INFESTING COLORADO TREES AND SHRUBS

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CONTROL OF SOME SCALE INSECTS INFESTING COLORADO TREES AND SHRUBS.

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This circular is issued for the special benefit of nurserymen and those who have trees and shrubbery to protect against a few of the more common scale insects that are found in this State.

**OYSTER-SHELL SCALE**

(_Lepidosaphes ulmi_ Linnaeus)

The oyster-shell scale or bark louse is one of the most widespread and destructive of the scale insects infesting shade and fruit trees. It is a very general feeder, having been recorded as occurring upon about one hundred different plants. We have found it in Colorado in large numbers on ash, poplar, cottonwood, willow, lilac, elm, buckeye and walnut trees, peonies and, in smaller numbers, on other plants.

![Image of Oyster-shell Scale](image)

**Fig. 1. Oyster-shell Scale, _Lepidosaphes ulmi_ L., on ash, slightly enlarged. From 15th Annual Report of State Entomologist of Colorado, 1923.**

**Description.**—This scale (Fig. 1) is very easily distinguished from other scale insects by its peculiar resemblance to a tiny
The scale covering of the body of the female is about one-eighth of an inch long when mature, while the female beneath is sack-like and has no appendages. The mature male is much smaller than the female and is winged.

The eggs are deposited late in the season and are found under the old scale at any time during the fall and winter. They have an oval shape and are pearly white in color.

**Life History and Habits.**—Winter is passed in the egg stage under the old scale. In the spring, the time depending on weather conditions, the eggs hatch into very minute, pale yellow, six-legged insects. At Fort Collins the eggs hatched between June 15 and 20 in 1923.* The young lice wander about for a few hours then settle down, insert their beaks into the bark, and begin to suck the sap from the host. After feeding a few days, they shed their skins and lose their legs and antennae. At this stage in the development, no apparent difference in the sexes can be noticed. However, after the second molt, the male insects can be seen developing under some of the scales. In a few days after this second molt or skin shedding, the delicate two-winged male insects, without mouth parts, emerge and fertilize the females. The females continue to grow until they reach maturity, becoming fully grown in late summer or early fall. At this time egg laying begins. Each female lays from 30 to 100 eggs, all of which occupy the space beneath the scale.

**Damage Caused.**—Where there is a heavy infestation the trees may be killed outright or certain twigs or limbs may die due to the loss of sap and the injuries from the punctures of thousands of small sucking insects.

**Control.**—The eggs of the oyster-shell scale are very hard to kill during the dormant period, due to the heavy protective scale covering them, therefore it is very essential that measures be taken at the time of hatching to prevent a heavy infestation.

Spraying with any good miscible oil during the dormant period is the best known remedy but it may take as many as three or four years of spraying to clean up a bad infestation. The miscible oils should be used at the rate of about one part of oil to 10 parts of water and the spraying must be thoroughly done.

Two summer applications of nicotine sulphate, three days apart, at the rate of one pint to 100 gallons of water, plus five pounds of fish-oil soap, at the time the eggs are hatching, have been recommended. It is probably not advisable to use this spray due to the expense and according to the notes of George

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*From notes of J. L. Hoerner.
M. List and J. L. Hoerner this material does not give satisfactory results.

For nurseries where there is only a light infestation it is probably better to remove and burn infested stock. Such stock as lilacs may be cut off and the infested portion burned without a great loss to the grower, due to the fact that new shoots will grow out again in a short time. Small trees, when only a few are infested, may be cleaned by going over them with a stiff bristled brush which has been dipped in a 10 percent mixture of one of the miscible oils. This, of course, is a very tedious process and can hardly be employed on a large scale.

**EUROPEAN ELM SCALE**

(*Gossyparia spuria* Modeer)

The European elm scale, as the name indicates, is a native of Europe, introduced into this country on nursery stock. It is classed as one of the more destructive scale insects.

**Description.**—The scales are so characteristic in appearance that a description is almost unnecessary. Professor George M. List, of this office, in Circular No. 29, entitled, "The European Elm Scale," has well described the female scale as follows:

"The female scale, to some extent has a mealy protection while it is active, but later, when it is almost mature and becomes fixed upon the bark, the secretion forms a white, waxy mass upon which the body of the insect rests, and which curls up about the body enough to form a circular fringe entirely around it. This is known as the semi-cocoon and is so characteristic that there is little trouble in identification. The females of the elm scale are wingless, which is true of all scale insects. When mature they are reddish brown in color, sack-like and about one-eighth inch in length. Their appearance at this time within their semi-cocoon has been likened by one writer to a bird within its nest."

The male is a small two-winged insect when mature.

**Life History.**—This scale insect passes the winter in an immature stage. The following spring the young scales continue their growth, reach maturity, mate, and the females lay their eggs for a new generation. The young appear the latter part of June. The newly-hatched young are very small, active, yellowish, six-legged insects which, soon after they begin feeding, lose their legs and other appendages by shedding their skins.

**Damage Caused.**—Besides the injury caused to the host plant this insect secretes a discharge commonly known as honey dew which supports the growth of a sooty fungus on the foliage of the trees, side-walks and fences beneath them, causing an unsightly appearance. This scale is especially abundant in and near Denver.

The European elm scale is known to attack the American, Scotch, cork, English, slippery, and Camperdown elms. In Col-
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orado, its attack has been confined mostly to the American elm.

Control.—A thorough spraying with one of the miscible oils, one part of oil to 15 parts of water, applied during the dormant period, will give excellent control. A summer application of nicotine sulphate (40 percent nicotine), using one pint to 100 gallons of water, just as the young are emerging from the eggs, will reduce the number considerably but will not take the place of the dormant spray.

Fig. 2. (1) Mature females of elm scale engorged with eggs, clustered on underside of limb. This is the characteristic stage of the insect most easily seen. (2) Mature females and the white, rice-like cocoons of the males. Specimens taken in Denver during June. (After List, State Entomologist Circular 29.)
THE COTTONY MAPLE SCALE
(*Pulvinaria vitis* Linn.)

Cottony maple scale is quite commonly found on maples and is especially destructive to soft maple, black locust and basswood. It has also been reported on Norway maple, sugar maple, willow, lilac, poplar, boxelder, elm, grape, and some other trees and plants.

**Description.**—The cottony maple scale is very conspicuous when nearly grown, due to the large, grayish-white, waxy secretion protruding from beneath the scale. In the spring, the scale is small and because of its close resemblance to the bark of the host, is often unnoticed. The yellowish-white eggs are laid in the waxy material towards the end of June. Each female is capable of depositing about 3000 oval eggs. The mature male is a small two-winged insect.

**Life History.**—The winter is passed as a small scale on the twigs of the host and the insects are easily overlooked at this time. The cottony mass is secreted and the eggs laid chiefly during the latter half of June. The eggs hatch in early July, the young establish themselves and feed on the underside along the midribs of the leaves and on tender bark. The males mature and fertilize the females in September. The females then migrate to the twigs just before the leaves fall, where they pass the winter.

**Control.**—A dormant spray with one of the miscible oils, one part of oil to 15 parts of water, is quite sufficient. Oils should be used with caution on maples, especially hard maple.

THE COTTONWOOD SCALE
(*Chionaspis ortholobis* Comstock)

The cottonwood scale is quite typical of the scurfy or white scales. It is found commonly infesting cottonwoods, willows and poplars, and occasionally aspen and honey locust. This scale
attacks principally the trunk and larger branches of the trees. It is commonly found in nurseries and thrives best on young trees that are grown under crowded conditions.

The winter is passed in the egg stage under the scales.

Control.—Like the other members of this group, the cottonwood scale can be controlled by thoroughly spraying with a miscible oil, one part to 15 parts of water, while the trees are dormant.

Fig. 4. Cottonwood scale, Chionaspis ortholobis Comstock (Original)

SAN JOSE SCALE
(Aspidiotus perniciosus Comst.)

San Jose scale is probably one of the most widely distributed scale insects in the United States and Canada. It is an imported pest, first found in this country at San Jose, California, hence its name. This scale is listed as attacking over 100 different trees and shrubs. All parts of the plant above ground are attacked. In case of fruit trees, the fruit and leaves are usually infested.

The mature scale covering the delicate body of the insect is about the size of a pinhead, circular in outline, grayish to black in color, and with a small gray or yellowish nipple-like protrusion in the center. Probably the best characteristics by which to distinguish this scale are the black color and circular shape of the half-grown females.

Winter is passed as an immature insect. In the spring the small two-winged males emerge and fertilize the females. After about a month of further development and growth, the females begin to give birth to living young.

Control.—San Jose scale can be controlled with miscible oils as recommended for cottonwood scale or by a thorough application of lime-sulphur, one part in nine parts of water, applied while the trees are dormant. The lime-sulphur should be heavy enough to give a reading of 33 degrees Baume.
PUTNAM SCALE

(Aspidiotus ancyclus Putnam.)

Putnam scale is found occurring quite generally over Colorado. Its chief food plants are soft maple, black locust, ash and elm. The mature scale is about 1-12 inch in diameter, dark in color, distinctly oval in outline, with a reddish, nipple-like affair located near the center of the scale. This species resembles San Jose scale and probably would not be distinguished from it by the ordinary observer. It may be distinguished, however, by the brick-red nipple and oval shape and the absence of black, circular, half-grown individuals. Winter is passed in the immature stage. There is only one brood each year.

Control.—Same as for San Jose scale.
HOWARD SCALE

(Aspidiotus howardi Cockerell.)

This is a small scale, circular in outline, which resembles the preceding species very closely externally. It is found thriving on maple, ash, and many fruit trees such as apple, pear, peach and plum. It infests both twigs and fruit and causes considerable damage, due to its pitting effect on the fruit.

Control.—Use lime-sulphur or a miscible oil as recommended for San Jose scale.

THE ROSE SCALE

(Aulacaspis rosae Bouche.)

Rose scale is commonly found infesting the stems of the rose, raspberry and dewberry. The female scale is about 1-10 of an inch in diameter, nearly circular and snow-white in color. The male scales are found intermixed with the females. They may be easily distinguished as they are long, narrow scales with three ridges running lengthwise.

Control.—A dormant application of one of the miscible oils, one part to 15 parts of water, will give control. When found attacking raspberries, blackberries, or dewberries, cut out the infested stems in winter and burn. This will help to prevent the new growth from becoming infested.

THE PINE-LEAF SCALE

(Chionaspis pinifoliae Fitch.)

A close observer will often find the needles of pines and other conifers specked with small, white, elongated objects, about one-eighth of an inch in length, with a small yellow film or skin at one end. This denotes an infestation of pine-leaf scale.

The winter is passed in the egg stage under the old female scale.

Control.—An application of miscible oil, one part to 20 parts of water, is often recommended, although oils should be used with caution on conifers.
SCURFY SCALE
(Chionaspis furfura Fitch.)

The females of scurfy scale are flat, irregular, oval, or pear-shaped in outline, about one-tenth of an inch in diameter, white in color, with a yellow tip or skin at the small end of the scale. The males are smaller, long and narrow, with three ridges running lengthwise of the body.

Winter is passed in the egg stage beneath the female scale. This scale thrives on apple and mountain ash as well as various other trees and plants.

Control.—An application of miscible oil, one part to 15 parts of water, while the trees are dormant.

THE TERRAPIN SCALE
(Lecanium nigrofasciatum Pergande.)

The terrapin scale may be identified by its hemispherical
form and mottled reddish brown color with distinct lines or ridges radiating to the outer edges from the orange red central area. Individual specimens vary in color, some being entirely black, others more or less red or reddish brown. Indeed, this scale resembles a miniature turtle with its shell closed, hence its name. The full grown scale is about one-eighth of an inch long and is slightly narrower than long.

Winter is passed as immature females. The males are small, two-winged individuals and appear in late summer or early fall. The small yellow eggs are deposited under the female about mid-summer.

Terrapin scale is often found in numbers on apple, peach, quince, maple and many other plants.

Control.—Winter applications of a miscible oil give satisfactory control for this and closely related scales.

EUROPEAN FRUIT LECANIUM

*(Lecanium corni Bouche.)*

This is another of the large, soft-bodied scale insects. It was recently taken in Colorado on native oak. Peach, plum, apple, pear, and such shade trees as ash and elm are also host plants.

Another scale insect, *Lecaniodiaspis pruinosa* Hunter, is also found infesting cottonwood trees in Colorado.

Miscible oils as recommended for terrapin scale can be used to advantage against both of these pests.

Preparation of Lubricating-oil Emulsion.—For killing scale insects, lubricating-oil emulsion is an excellent insecticide which can be easily prepared at home at a very small cost. The materials for the emulsion are: red engine oil (may be purchased at any filling station), potash, fish-oil soap, and water in the following proportions:

- Red engine oil .......................... 2 gallons
- Water (soft) ............................. 1 gallon
- Liquid potash fish-oil soap .......... 2 pounds
To prepare, place the three materials in a container and heat to boiling. A brown scum will appear on the surface of the mixture. After the mixture has boiled for several minutes the scum will begin to disappear, leaving the liquid visible at a spot near the center. At this stage, remove from the fire and thoroughly emulsify by pumping the mixture, into itself at least twice, while hot, with a spray pump under pressure of about 60 or 70 pounds. To accomplish this, the material may be pumped from the vat in which it was cooked into another vat and back again. This makes the stock solution.

To use, dilute one gallon of the stock solution to 16 gallons with water and apply. This makes a 4 percent solution.

Besides the lubricating-oil emulsion, there are on the market several commercial brands of miscible oils that may be used with good results. Directions as to their use will be found on the containers. If no directions are given, use one part of oil to 15 parts of water.

For best results when combating scale insects, it should be remembered that spraying must be done at the right time, intelligently and thoroughly.
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