Saving Your TREES *from Damage by the* BUGS

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ALMOST any individual with ordinary eyesight can see caterpillars and "worms" chewing the foliage of trees and shrubs, and can observe the extent of injury, but there is another group of "bugs" that seriously harm trees and shrubs without waving a flag before us. Of these tiny pests, known as "scale insects," I wish to write and "kodak." With the illustrations at hand, identification of the common species should be easy.

Fortunately in the United States we have only a few of the more than 2,000 species known in the world, but these few are sufficient to cause much damage, trouble and expense to golf courses, park departments, orchardists, and ornamental growers.

Scale insects are usually very small and inconspicuous, although some are quite noticeable when occurring in numbers. There are both hard and soft scales. Some kinds attack only one kind of tree; some of them can feed with equal relish on a hundred kinds.

The young "scales" hatch in the late spring, first appearing like tiny mites, crawl about a few hours and then attach themselves to leaves, twigs, trunk or fruit. When they once have "set," they begin to secrete their "armor" and generally become fixed permanently to the plant, continually drawing upon the plant juices through their long tube-like mouth parts.

Scale insects have one or more generations a year, depending on the species involved and the latitude. Certain species like San Jose Scale may vary from one generation in the extreme north of the United States to three and four generations in the south, thereby constituting a graver menace in the latter region. Do not allow these scales to gain a foothold, but make it a rule to apply one dormant spray each year. Young, newly planted trees are often most seriously attacked by scales.

Injury by scale insects is in indirect proportion to their size and direct proportion to their numbers.

Chewing and Sucking Insects

While chewing insects can be controlled generally by sprays of arsenate of lead, paris green or arsenate of lime (stomach poisons); only by "contact" sprays which surround their bodies with a corrosive or smothering chemical can scales be killed, because they live only on the plant juices sucked from beneath the surface.

"Contact" insecticides include such materials as miscible oils, lime-sulphur solution, nicotine and strong soap compounds. Miscible oils diluted with water in varying proportions are chiefly used now in place of lime-sulphur, formerly the accepted control. Lime-sulphur has a most disagreeable odor, is very corrosive on the operator and his clothing; also it blackens paint on buildings, fences, and trellises wherever it touches.

Miscible Oils Best Scale Killers

Miscible oils of good quality are easy and pleasant to handle and apply; cover the bark surfaces and crevices more completely, and are perfectly safe while the trees are in dormant condition. They can be applied any time in late autumn or early spring before the leaves appear.

Maple Leaf Woolly Scale

Many of the better known golf courses, large city park departments, orchardists and nurserymen are protecting their trees with good miscible oils, and secure excellent results with a minimum inconvenience to passing vehicles and pedestrains.

Some kinds of scale require stronger mixtures than others; hence the varying recommendations to be noted

San Jose Scale

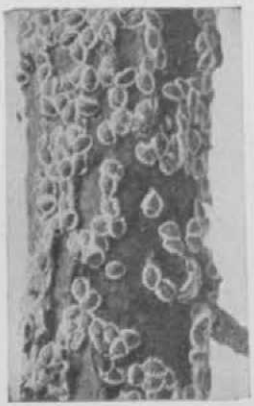
Oyster-Shell Scale

Apple Scurfy Scale

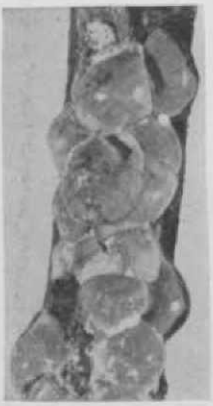
Dogwood Scurfy Scale

Rose Scale

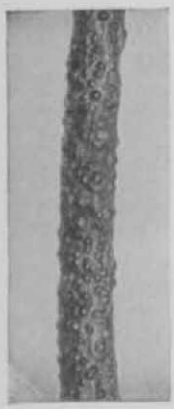
Cottony Maple Scale



European Elm Scale



Tulip Scale



Pit-making Oak Scale

Oak Lecanium

Terrapin Scale

Euonymus Scale

Pine Leaf Scale

—Photographs Courtesy Sun Oil Research Laboratories

below. (*See illustrations on page* 24.)

San Jose Scale. A small, round, dark grey or blackish, flat scale closely appressed to the bark of its host plant. It is a native of central China, having been accidentally introduced on trees from the orient and first brought to scientific and public attention at San José, California. The species is known to attack over 200 different kinds of trees and shrubs and is one of our most dangerous tree pests. A thorough application of 4 per cent miscible oil gives practically 100 per cent control.

Oyster-Shell Scale. This scale derived its name from its likeness in form to an elongated oyster shell. Its scale covering is dark brown, rather heavy and thick, affording excellent protection to the many tiny white eggs crowded beneath throughout the winter. Apple, lilac, poplar, willow, ash and ornamental dogwoods are especially favored hosts of oyster-shell scale. Use miscible oil one part to 15 parts of water as dormant spray. Apply thoroughly and abundantly; very hard to control.

Scurfy Scales. There are several species of these white elongated scales which attack apple, pear, currant, mountain ash, elm, dogwood, euonymus, etc., and often become injurious unless checked. Use miscible oil one to 15 or 20 parts of water.

Rose Scale. The white scaly growth on rose stems, particularly rugosa roses, is due to the rose scale. It also attacks raspberry, blackberry and dewberry canes, particularly those growing in shaded places. It is easily eradicated by a dormant application of miscible oil 5 to 6 per cent strength.

Cottony Maple Scale. A soft, white, fluffy scale. Entire towns in the Great Lakes region have lost their shade trees during the past 20 years through the attacks of this species. Soft maple and box elder are particularly damaged by this scale, although it occurs on many species of trees, shrubs and vines. A dormant application of a good miscible oil one to 15 to kill the over-wintering young is more effective than waiting until the trees are in foliage and in danger of injury by strong sprays.

European Elm Scale. Small, dark brown, sac-like insects surrounded with a white edge of wax unmistakably mark this imported pest of elm trees. It is harmful and when very abundant kills elm trees; also the honey-dew secreted is objectionable. Thorough spraying while dormant is necessary to control this increasingly serious pest which hibernates in the crevices of the rough bark. Use miscible oil one to 15.

Tulip and Magnolia Scales. These are very large, nearly hemispherical scales classed with the soft scales, but nevertheless with an effective waxy armor. They often cause much damage to tulip, poplar and magnolias. The tulip scale secretes an abundance of foul-odored honey-dew, attractive to bees and wasps. Use miscible oil one to 15 on trees when dormant.

Pit-making Oak Scale. The Pit-making scale is a serious pest in the northeastern states, especially on English species of oaks, which are frequently killed by it. Easily distinguished because of the little pit in which each scale rests and by the bright yellowish golden color of the scale's protective covering. Abundant from Massachusetts to Michigan, south to North Carolina and in California. Use miscible oil one to 15 parts of water.

Oak Lecanium Scale. The Oak Lecanium is a distinct pest on oaks in the southern states, frequently completely encrusting the branches and twigs. Use one to 15 miscible oil.

Terrapin Scale. A dreaded pest, as it hibernates on the branches in the half-grown stage, and is unaffected by lime-sulphur sprays. It seriously attacks plum, sycamore and maple, as well as peach. It is conquered by a one to 15 miscible oil spray without any injury to the trees, as extensive orchard and city spraying has proved. Very thorough applications necessary.

Euonymus Scale. Apply miscible oil one to 30 in dormant season and again in summer when young scales have hatched, using one to 50 dilution. Both applications are needed to clean up the bushes when badly infested.

Pine Leaf Scale. Narrow, snow-white scales are frequently so abundant on the leaves of pines and spruces that they give the tree a whitish appearance. Disfigured foliage and frequently seriously injured trees result. One thorough application of miscible oil diluted one part to 30 parts of water before growth starts, controls the pest.

Gloomy Scale. Maples from Maryland southward are subject to attack of gloomy scale, so severe that at times limbs or whole trees may be killed by it. In addition to the red and silver maples, this pest also attacks camperdown elm and

willow. It does not attack hard maple. Gloomy scale multiplies very rapidly. A dormant application of miscible oil one to 15 parts of water, applied thoroughly, prevents damage.

Maple Leaf Wooly Scale. White cottony patches in midsummer on the under side of maple leaves affords protection for the females of this pest. The males migrate to the trunks and when abundant give it a chalk appearance, over-wintering young in the crevices of the rough bark of the trunk and larger limbs. In addition to infesting maples it is sometimes found on hornbean, linden and horse chestnut. A dormant application of miscible oil one to 15 is efficient.

The species of scale insects discussed above are the more common ones which are likely to be found infesting shade and ornamental trees in this country. However, in the far west and in the extreme southern portion of the country several additional species may be encountered, but as a rule they are all amenable to the same type of control.

What Percentages in Your Maintenance Costs?

By GUY C. WEST
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HOW many times we hear it said that greens are the most important part of golf course maintenance, that good greens make a good course, and similar statements! To hear some golfers talk one could very easily get the impression that at least half of the money spent on golf courses was spent on greens. This may be true on some courses, but I have yet to hear where they are!

How many of us do know how much we do spend on the maintenance of greens as compared with the expenditures for other portions of the course? What *percentage* of our money expended for maintenance actually is expended on greens, and what percentage on the fairways, the tees, the rough, and the traps? How do these percentages compare from year to year?

To the greenkeeper who has a cost analysis of his course expenditures, percentages of expenditures for the various divisions of the course can be very easily figured.

The following figures, gathered by me at the Fall River Country club over the past six years may be of especial interest to the large number who have never seen such percentages. To all those who have cost figures for their own courses, these figures may be of interest as to how they compare. It must be remembered, however, that percentages, like unit costs, can only be compared rightly when all factors which enter in to the costs of mainenance are also examined. For example, two courses with the same total expenditures, and one with average size greens, and the other with very large greens, show a marked difference in the percentages for the item of greens.

Cost Percentages

As taken from my cost analysis figures for the past six years, the largest percentage, as might be expected, was for greens, and the percentages for greens were 33.1% in 1923; 35.8% in 1924, 33.1% in 1925, 30.3% in 1926, 26.7% in 1927, and 30.8% in 1928. It may thus be seen that the average would run a little under a third of the total cost.

Fairways ran 29.9% in 1923; 18.3% in 1924; 11.6% in 1925; 14.9% in 1926; 11.8% in 1927, and 11.6% in 1928. Tees showed for the same years, 9.4%, 12.4%, 12.5%, 8.5%, 9.3%, and 11.4%. Rough varied but little; 9.7%, 9.6%, 8.6%, 7.8%, 9.3%, 11.4%. Traps (including water hazards) showed a marked increase due to the building of new traps yearly; 5.5%, 6.7%, 14.3%, 17.8%, 17.6%, 16.9%.

Of the smaller items, the cost of preparing compost is perhaps of interest; for the same years, 3.0%, 5.5%, 2.4%, 4.3%, 5.9%, 3.8%. Turf nursery percentages, showing more use of nursery the past three years, were 1.1%, 0.5%, 1.8%, 2.6%, 5.2%, 3.6%.

Percentages can be studied for any course over a period of years in the same manner as unit costs. It must be remembered that if the standard of maintenance for any part of the course is raised, the cost per unit will be increased, and also the percentage cost will be greater, if the total expenditure is to remain the same.

Figure the percentage costs for your course, study them, compare them for your own amusement with others if you will, but compare and contrast them from year to year, item by item, and you will find much of interest.