

Our Most Troublesome Orchard Insects and Diseases.

Paper by L. Caesar, given at the Convention of Fruit Growers in Toronto.

INSECTS.

Our chief orchard insects in the order I intend to discuss them, but not the order of relative importance, are—oyster-shell scale, San Jose scale, blister mite, aphids, bud moth, codling moth and plum curculio. From time to time other insects in limited areas will do more damage for a season or two than any of these mentioned above; for instance tent caterpillars did great havoc to unsprayed orchards this year in Eastern Ontario, and canker worms in the neighborhood of Dundas and Stoney Creek destroyed almost every leaf in June in some neglected orchards. But such outbreaks as these soon pass away, and can usually be easily controlled by careful spraying.

OYSTER-SHELL SCALE.

In color this scale closely resembles the bark. The winter is passed in the egg stage, beneath the scale, there being an average of about 40 eggs under each scale. About June 1st, when the blossoms are falling the young scales hatch out into tiny cream-colored lice that run around a day or two, then settle down and cover themselves with a scale. The females remain here the rest of their lives, and lay their eggs under the scale in September. There is only one brood, so that one scale on an average cannot produce more than 40 offspring. Hence the increase is not very rapid, and though some orchards are being severely injured to-day such orchards once freed of this scale cannot become badly infested again for years.

Means of control.—The simplest method is to scrape the rough bark off the trees, prune them well and spray very thoroughly with lime-sulphur, specific gravity reading 1.030 which is equivalent to commercial diluted 1 gal. to 10, i. e., 9 gals. of water added to 1 gal. of lime-sulphur. If weaker lime-sulphur is used instead of Bordeaux just after the blossoms fall it will help to destroy the young lice. Usually it requires about two seasons to free an orchard of this pest. The scales though long dead will often remain on the trees about two years before falling off, and in that way sometimes make the owner think his spraying was ineffectual.

SAN JOSE SCALE.

Wherever it occurs this is by far the most destructive insect pest that we have. It is spreading every year, and already a large portion of the south-western part of the Province is infested. This scale attacks all kinds of fruit trees except sour cherry. It is also found on currants and rosebushes, and on mountain ash, hawthorn and other trees of the Rosacea family. Once it gets into an orchard it will, sooner or later, unless kept under control by spraying, kill every tree, though sometimes it will take many years to do so. Trunk, branches, leaves and fruit are all attacked. On the fruit red discolored areas usually are seen around the scale, caused apparently by some poison that is secreted by the insect. The scale is very small, not larger in diameter than the head of a pin, almost flat, circular and of a grayish-brown appearance, the centre being lighter. The winter stage is black with a distinct nipple in the centre, and a little ring or groove around it, and is much smaller than the adult scale. Its powers of reproduction are enormous. Each female scale gives birth to about 400 living offspring (no 'eggs are laid), and, as there are about three generations in a season in Ontario, several million scales can be produced from one female before the end of the year. Breeding continues into October.

Means of control.—Careful pruning is always very important, but especially so in the case of large trees. These will often have to be headed back to make the spraying easier. The pruning is chiefly to open up the trees so that the spray can be thoroughly applied. Rough bark must also be removed so that this may not protect any insects from the spraying. The trees should then be sprayed with lime-sulphur of about 1.032 specific gravity or stronger, that is commercial diluted about 1 gal. to 9. If any tree is badly infested, it should receive two applications, either one in the fall after the leaves are all or nearly all off, and the other in spring before or as the buds are bursting; or both may be given in the spring, the one any time in March or April, and the other shortly before the buds burst. To get good results every twig and part of the tree must be thoroughly covered from both sides, because as we have said, from a single scale more than a million offspring may come in a season.

BLISTER MITE.

Blister mites are very tiny wormlike creatures not more than one-hundredth of an inch long, in fact so small that a single one is almost invisible to the naked eye. These mites attack the leaves of apple and pear, and cause small blisters or swellings where they feed and lay eggs. The blisters are on the underside of the leaves

and are at first whitish, later they turn reddish-brown on the apple, and almost black on the pear. Trees badly infested often lose many of their leaves, especially in dry seasons, when they can least afford the loss. I have seen leaves dropping from this cause as early as July. Even apart from the dropping of leaves the tree is weakened greatly because the part of the leaf where the blister is cannot perform its function of manufacturing food. (Most food of plants is manufactured in the leaves.) Blister mite is now found in almost every county. It is, like San Jose scale and oyster-shell scale distributed originally on nursery stock, and then locally on birds or flying insects. (It is wingless). There are several broods in a season and the increase is rapid.

Means of control.—This pest is very easily controlled by a single, very thorough spraying of the branches and twigs with lime-sulphur in the spring before or as the buds are bursting. It passes the winter under the bud scales, and therefore every bud should be thoroughly covered. The strength mentioned for oyster-shell scale is plenty strong enough for this purpose. Thorough work will almost free an orchard in one season.

It will be noted that the spraying with lime-sulphur for San Jose scale will kill also the oyster-shell scale and blister mite, three birds with one stone.

APHIDS.

Aphids are among the most prolific of insects and because of this fact are capable of doing great damage. Fortunately, if we have a fairly dry and warm May and June the enemies of the aphids will usually hold them under such good control that we need not spray for them. If, however, the weather is wet or cold the aphids increase, but their foes do not, and consequently much damage is done.

Our most common aphids are—first, the green aphids of the apple, of which there are two species, one remaining all season in the tree and the other (the most common here) migrating from it in July to grass, and other closely allied plants; second, the rosy apple aphid, so-called from a rosy tint showing through its powdery covering. This aphid also migrates to other plants in July. This was the most destructive apple aphid in Niagara district this year; third, the black aphid of the cherry which usually disappears almost entirely about July, but whether it migrates or is merely destroyed by foes like ladybird beetles and their larvae is not certain.

Aphids usually feed on the undersides of the leaves, and cause these to curl, and later turn yellow and after a time drop off. If there are apples on the branch they are feeding on they cause these to become deformed, stunted and woody in tissue, and to hang in clusters. Young trees are often badly weakened and dwarfed by this attack.

Means of control.—Many seasons, as mentioned, the natural enemies of the aphids control them sufficiently, but wherever an orchardist does not like to leave the work to these, there is no better known method than to add Black Leaf 40 to lime-sulphur, and spray the trees a day or two before the buds burst. At this time the aphid eggs have all hatched, but there is no place where the aphids can hide from the spray. We got excellent results from this at the College this year. Instead of this combination, kerosene emulsion or whale oil soap may be used at this date, but the kerosene if made with soap, cannot be combined with lime-sulphur. (Lime-sulphur alone is not a remedy for aphids). After the leaves are opened kerosene emulsion or whale oil may be used, but we must not forget that the spray will not kill unless it covers the insects, and the more forcibly it is done the better. An excellent mixture is Black Leaf 40, to every 40-gallon barrel of which about 3 lbs. of common soap or whale oil soap has been added, the soap being first dissolved in boiling water. This is better than Black Leaf 40 alone. Once the leaves are badly curled it is too late to spray with any hope of success. One should remember that most aphids on fruit trees will disappear of their own accord early in July. It will pay well to spray currant bushes with one of these mixtures just before the buds burst.

BUD MOTH.

This is the little reddish-brown caterpillar with a black head that is often found attacking the buds in spring as they are opening and later feeding upon the leaves, though almost always concealed in a little nest made from the curled edge of the leaf itself, or of partly opened leaves fastened together. The most damage it does is by destroying the ovary or fruit-forming part of the buds. Sometimes serious loss is caused. There is only one brood in a season. The winter is passed as a partly grown larva in a little dark case in the branches and twigs.

Means of control.—Thorough spraying with about 3 lbs. of arsenate of lead to 40 gallons of diluted lime-sulphur or Bordeaux mixture just before the apple blossoms burst will gradually bring this insect under control. Some claim

that adding poison to the spring applications and applying it just as the buds are bursting, helps greatly.

CODLING MOTH.

The life history and habits of this, our most common and destructive apple insect, have been so fully described in bulletin 187 that I shall pass on at once to control measures.

Means of Control.—A single thorough spraying with 2 lbs. of arsenate of lead added to commercial lime-sulphur diluted 1 gal. to 40 (specific gravity 1.008) will, if promptly done, satisfactorily control this insect. The spraying must take place immediately after nearly all the bloom has fallen, and must be finished before the calyxes have closed. A 10-foot bamboo pole with an aluminum rod inside and a large angle disc nozzle or two on the end is very satisfactory. The nozzles should be held close to the blossoms, and directed straight into the open calyx. Every calyx should be thoroughly wet. If there have been many blossoms on the tree this cannot be done without drenching it.

If the trees are high build a tower on the spray waggon to get at the calyxes better.

In districts like Niagara where the second brood is usually very destructive a second application about three weeks later will help. Arsenate of lead alone (2 or 3 lbs. to 40 gals. of water) should be used, the lime-sulphur not being added unless specially required for apple scab on account of wet weather.

Thoroughness, and doing the work at the right time are the secrets to successful control of codling moth. Many growers in every district are to-day showing that this pest can be mastered if we really try. Half-way measures are no good.

PLUM CURCULIO.

As shown in the figure this is a small beetle less than one-quarter of an inch long, blackish in color, rough-backed and having a long snout. The larva is whitish, usually curled, with a brown head and no legs, thus being easily distinguished from the codling worm and most other fruit-infesting larvae. Apples, plums, peaches, pears and cherries are all attacked. The simplest indications of attacking the early part of the season is the crescent-shaped scar made by the female around where the egg is laid. If the eggs hatch out, the feeding of the larvae inside usually causes the apples, pears, plums and peaches to drop while cherries hang on but soon rot. Frequently, even though the eggs fail to hatch or the larva dies soon after hatching, punctured apples and pears are badly deformed as a result of the part around the puncture being retarded in its growth compared with the remaining parts. Late in the season in August and September apples, especially those of the rough or medium-rough-skinned varieties, are often badly injured by the feeding habits of the new beetles before they seek hiding quarters for winter. These injuries take the form of small brown circular areas about a quarter of an inch in diameter, usually with a hole in the centre where the insect's beak was pushed through to feed beneath the skin all round as far as it could reach. Sometimes the insects enlarge these holes and get bodily into them. Orchards of any kind that are allowed to remain in sod or that have rubbish in or around them, or that neighbor on woods are regularly worst attacked because these conditions are very favorable to the beetles, especially for winter quarters.

Means of control.—The ordinary thorough spraying of apple and pear orchards with 2 or 3 lbs. of arsenate of lead just before and again immediately after the blossoms, will do a great deal to control this pest, but should be supplemented by the removal of all rubbish and by careful, moderately deep cultivation as long as is safe for the district. Plums, cherries and peaches should be sprayed with the arsenate of lead as soon as the fruit has set and the calyx fallen off. Usually one spraying suffices for peaches as the pubescence holds the poison, but cherries and plums should get at least a second application about 10 or 12 days later. Lime-sulphur or Bordeaux mixture may be combined with the arsenate of lead for everything but peaches, the foliage of which is likely to be burned by these washes.

DISEASES OF THE ORCHARD.

The chief diseases of apple and pear orchards are black-rot canker, apple and pear scab and blight often known as pear blight, twig blight or fire, blight, all being the same.

BLACK ROT CANKER.

Black rot canker is a fungous disease that is very destructive, especially along the north shore of Lake Ontario. The more I study this disease the more convinced I am that it follows injuries to the bark, especially those caused by winter on trees that are somewhat too tender for the district. Those who will contrast the relative immunity of Snow, McIntosh and Welfe River compared with such varieties as Baldwin, Greening and Ben Davis will be inclined to agree with