

Spraying Directions by a Practical Orchardist.

While "The Farmer's Advocate" does not make a practice of reporting local meetings, the timeliness of some of the points discussed at the Fruit Institute, at Lambeth, and the fact that this gathering was held under its own auspices, warrant publication of a few points gleaned from the addresses.

"So far as returns are concerned," said Mr. Johnson, "there is no comparison between fruit-growing and general farming. As instances of exceptional results, let me mention a few cases that have come to my notice. Two years ago I met a friend in Toronto, who said he had sold \$1,600 worth of fruit from an acre of cherry orchard. In one of our orchards at home, from which we used to get about 200, 300 and, sometimes, 400 barrels of apples a year, we have, since spraying, secured crops of 2,800 barrels in 1908, and 2,300 in 1909. The trees used to bloom, but the fruit would drop off; what remained, was mostly defective. Now it is clean, and nets us several thousand dollars a year. Another man in Lambton County, who belongs to our co-operative association, since he started taking care of his orchard, has, in five years, made \$3,000 from 3½ acres of orchard. Cultivation, pruning and spraying are essential for good returns in orchard practice. What would you think of a man who would grow a crop of potatoes, and let the bugs eat them? The man who grows fruit and does not spray is doing something just like that. All kinds of insects, sucking and eating, are preying on the crops.

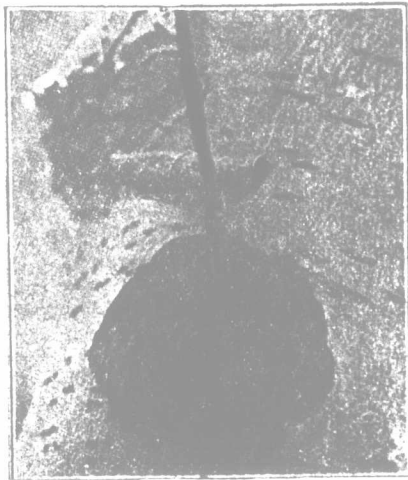
"Our practice in spraying was, in the past, to put on three applications, the first just before the buds opened, with Bordeaux, the second just as the blossoms fall, and the other one two or three weeks later. We have been using the Bordeaux mixture in the past, and have had excellent results with it, but this year we are going to use lime-sulphur mixture right through, home-boiled for the first application, and commercial lime-sulphur for the other two. For a man with a small orchard, or for a beginner, the commercial lime-sulphur is to be recommended for all the spraying, instead of home-boiled. For the first application, just as the leaf-buds are ready to burst, no poison will be needed, and if the commercial lime-sulphur mixture is used, it should be applied in the strength of one to eleven parts of water. The second application should be made just immediately after the blossoms fall, while the apple is standing upright on its stem, with the calyx cup spread wide open. Practically all the first brood of the codling-moth larvae or worms enter here, and eat out the blossom end of the apple first, and enter into the fruit. If this calyx cup is filled with poison, the worm is destroyed before it can do any harm. Any one of several poisons may be used for this spraying (along with the lime-sulphur, which is applied in the strength of one to thirty-five). We are using arsenite of lime, but for a beginner I would recommend lead arsenate, two pounds to the barrel. Paris green is not considered safe to use with the lime-sulphur mixture, but is all right to apply with Bordeaux. Drench the trees thoroughly at this spraying. One man, who started to spray, came to me once, complaining that he could get no results from spraying. He said he had sprayed thoroughly, putting three barrels on his orchard. On inquiry, I found out that his orchard was about the same size as one of ours on which we used 30 barrels. One barrel should be expected to cover about 8 to 10 ordinary-sized trees. Use good pressure, and drench the trees thoroughly. For the third application, made two or three weeks after the blossoms fall, the same material should be used as for the second."

Readers will note that these instructions differ slightly from those given by Mr. Caesar in our Spray Calendar, but either may be followed with confidence. In regard to the question why he was discarding the Bordeaux-and-Paris-green mixture, which had given such good results, in favor of the lime-sulphur, Mr. Johnson explained that it was chiefly to avoid russetting, which the Bordeaux mixture is liable to cause, thus preventing the perfect coloring of the fruit. Bordeaux will insure quantity and quality of fruit, but not as good a color as lime-sulphur will. The lime-sulphur has also an insecticidal virtue, destroying some of the sucking insects which Bordeaux and poison will not touch.

AN EXPERIMENT IN SPRAYING.

Last year, for experiment, we took a Snow-apple tree; one part of it was sprayed four times with the usual formulas; one part was sprayed only once, with Bordeaux, before the leaves came out; the remainder of the tree was not sprayed at all. This unsprayed portion produced a crop of practically no value; the part sprayed once had little scab, but any number of worms; the part sprayed four times bore fine fruit, with practically no worms, but all the apples were quite russety. This russet is not always present on apples sprayed with Bordeaux mixture, but it quite often is, and no modification of the mixture has been

found to certainly prevent it. In applying the spray, spray with the wind, and stop at least six times at every tree, better eight times; that is, four times on each side. When you approach the tree and spray it quite thoroughly from one angle, until it looks all wet, you will find, upon going a little farther, and viewing the tree from a different angle, it will look as though it had hardly been sprayed at all. Be sure that the whole tree is well covered with the spray.



Bacterial Blight.

Typical blight canker at the base of a water sprout on the main limb of an apple tree, O. A. C. orchard. The water sprout had been inoculated by aphids coming to it from a diseased tree.

Bacterial Blight.

Fire Blight, Twig Blight, Pear Blight, are different names of one disease which attacks pear, apple and quince trees in nearly all parts of Canada and the United States, where these fruits are cultivated. Many of our older readers will remember the time when it was first observed in their particular districts. The suddenness of its



Bacterial Blight.

Apple twig with two blighted spurs. These inoculated through the blossom. The disease had passed from the spurs to the twig, and when photographed the twig was girdled by the disease near the spurs, and the apples and leaves at the tip had ceased developing and would soon wither.

appearing, the rapidity with which it spread, and the wholesale destruction of pear trees which it wrought were particularly marked, when first, like a fire, it swept through a fruit section. The mysterious character of the disease, and the futility of the efforts put forth to check it, tended to produce a feeling of helplessness, as if in the presence of some special visitation of Providence, which had simply to be endured. Many theories have been advanced as to the specific cause of the disease. Among these may

be mentioned electrical influence, sunstroke, bark freezing, too high culture, insects, fungi, and epidemic transmitted from place to place by air. Some of these theories may be held still by some fruit-growers, but the better-informed are now aware that investigation has established the fact that the disease is caused and spread by a minute bacterial organism, by name, *Bacillus amylovorus*. This bacillus is always present in tissues; where Fire Blight is spreading; a culture of it can be made, and, by inoculation with this culture, the disease can be transmitted.

The extent of the damage resulting from blight is realized more in the case of pear trees than in the apple or other fruit trees. It has come to be almost a proverb that, on account of its ravages, no man ever plants a second pear orchard. But the effects of the disease in apple trees of certain varieties are very serious indeed. So many inquiries from fruit-growers in various parts of Ontario, regarding the cause of and remedy for the blighting of their apple and pear trees, had been sent in to the Ontario Agricultural College, Guelph, that it was decided, in the spring of 1909, that D. H. Jones, Lecturer, Bacteriological Department, should devote as much time as possible to investigation in connection with the disease. The result of his inquiries are published in O. A. C. Bulletin 176, entitled "Bacterial Blight," and one conclusion reached may be quoted here: That this disease, in "apple, pear and quince trees, causes more loss to the pome-fruiter of Ontario than any other agent of loss."

In carrying out his instructions, Mr. Jones has had under constant surveillance the O. A. C. orchard, has visited orchards in the Niagara, Grimsby, St. Catharines and Winona districts three times, some in the neighborhood of Belleville and Pickering once, and has conducted numerous experiments in the laboratory and College orchard.

GENERAL APPEARANCE.

"The disease may occur in the bark of the twig, of the branch or the trunk of a tree, and also in the fruit. The disease is found on the apple tree more often in the form of twig blight, and on the pear tree in the form of body blight. The disease develops and spreads in the main limbs and trunks of pear trees in much the same manner as in the twigs. The germ lives in the tissue cells of the bark, feeding on the cell contents. The exterior of the bark becomes discolored, and it often blisters and cracks, and amber-colored, gummy exudate emerges where the disease is most active." The activity of the disease depends somewhat on climatic and soil conditions, which regulate the flow of sap. The more sap, the more disease, if the germ is present. That is why pear orchards in sod do not suffer so much as when cultivated. A pear tree may be destroyed by blight in one season, and it does not usually live more than three years, if disease is unchecked.

The phase of the disease known as twig blight, or fire blight, is so called because a tree so affected looks as if it had been scorched by fire. "It may occur in blossom twigs, foliage twigs, water sprouts, and suckers. The discoloration and death of the leaves and blossoms occurs comparatively suddenly," though the disease has actually been present for several days or a week, and only in its later stages does it show itself in the parts affected. If twigs that bear the discolored leaves and blossoms be examined, the bark, as in the larger limbs of pear trees, will be found discolored and sometimes blistered, and on blistered areas may often be seen somewhat dried remains of a gummy exudate. "This exudate is literally crowded with the germs of the disease, and if by any means it finds entrance to the bark of a healthy tree, there the disease will develop." In the apple tree, infection from a water sprout or twig may extend to a main limb or the trunk, but there, unlike the pear tree, it is usually confined to a limited area, somewhat circular, and known as Blight Canker.

DISSEMINATION.

The inoculation of blossom twigs is due to bees, wasps and other insects visiting the blossoms, and conveying the germs from flower to flower. But, in the case of twigs which have had no blossom, and yet have become infected, Mr. Jones believes that the disease has been carried usually by aphides or plant lice. "Hitherto it has been thought that the extent of the damage caused by these insects was confined to the direct injury done to the plant by depriving it of sap, etc., but our observations have proven conclusively that the great majority of the new infections of twigs by the blight, after the blossom season has closed, are due to aphides."

On the pear tree the aphid is not found to any extent, but another insect, the fruit-bark boring-beetle (*Scolytus rugulosus*) is believed by Mr. Jones to be one means of spreading blight infection in both apple and pear trees.

Other means of spreading the disease are the pruning knife, saw, chisel, shears, or other tool used in the orchard, after having come in con-