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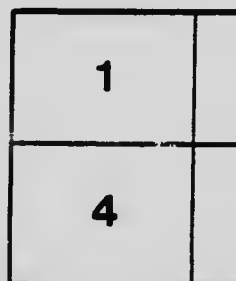
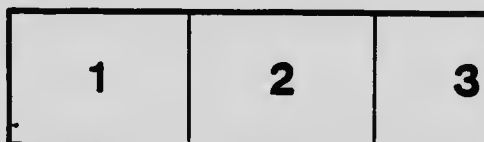
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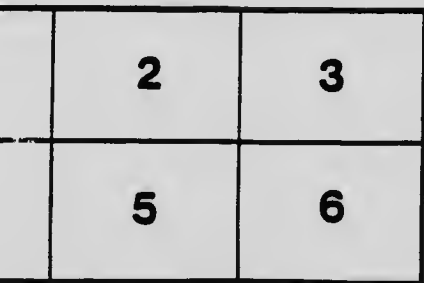
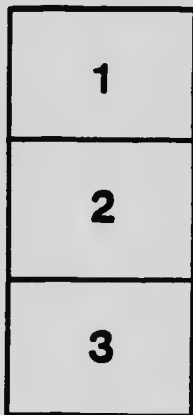
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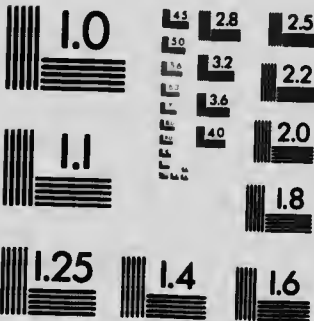
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PROVINCE OF BRITISH COLUMBIA.

DEPARTMENT OF AGRICULTURE (HORTICULTURAL BRANCH).

FIRE BLIGHT
(BACILLUS AMYLOVORUS—BURRILL.)

BY W. H. BRITAIN, B.S.A., PATHOLOGIST AND ENTOMOLOGIST.

THE fire or pear blight has been known for many years as a serious disease of apples, pears, and occasionally quinces. Lately the disease has been reported as attacking plums and apricots. In some districts the disease has wiped out whole pear-orchards and caused more loss to the fruit-growers than all other factors combined. In British Columbia it has proved a very serious disease of the apple. Besides the trees mentioned, the hawthorn (*Crataegus*), the June berry (*Amelanchier*), and the mountain-ash (*Pyrus*) may also be attacked.

CAUSE OF THE DISEASE.

The fire-blight is of bacterial origin. The organism causing it is a small rod-shaped body, measuring about 1-16,000 of an inch long and about 1-45,000 of an inch wide. This germ commonly enters the plant by way of the blossoms, where it multiplies in the nectaries of the flowers and finally extends into the near-by twigs and leaves. It may enter growing shoots, limbs, or trunk through the agency of various insect pests. Having once gained admittance to the plant, the bacillus, if conditions are favourable, multiplies rapidly, feeding upon and destroying the cells of the inner bark and cambium. It winters over in the form of "hold-over" cankers on the limbs or trunk of affected trees.

SIGNS OF THE DISEASE.

As a rule, the disease makes its first appearance in the form of "blossom-blight." The tips, blossoms, and leaves will be seen to wilt, becoming dark brown or black, and finally shrivel up, presenting a scorched appearance. The bark at first has a dark water-soaked look, but later it becomes hard and dry.

In the twigs and smaller branches the disease is known as "twig-blight." Water-sprouts and other young rapidly growing shoots are particularly liable to attack. Where the disease is active, blisters will appear on the bark, through which will ooze a thick gummy substance, light yellow in colour at

first, but hardening in the air it becomes dark red or brown. The leaves borne on such shoots have the characteristic scorched appearance. In many cases the disease is confined to the twig form and spreads no farther.

Frequently, however, it enters the main limbs or trunk by passing down twigs or water-sprouts. The bark will take on the water-soaked appearance and the gummy exudate ooze from the affected part in large drops. Sometimes a canker of limited extent is formed around the base of the shoot down which the disease has passed. As the organism gradually dies out the bark loses its water-soaked appearance, and, becoming hard and tough, shrinks away from healthy portion, frequently forming a crack or fissure between. In the apparently sound tissue outside this area a few germs may lurk to carry over the disease until another year. A further spread of the disease down the limbs or trunk, however, may sometimes occur. Extensive cankered areas will be developed, and from cracks in the diseased tissue the yellow gum will drip abundantly. Sometimes a canker will appear considerably farther down on the limb than any other, while the bark between is, to all external appearances, perfectly healthy. Upon cutting away the bark, however, a fine line of diseased tissue will be found connecting the two. The form of the disease that affects main limbs and trunk is called "body-blight."

In most of the fruit-growing regions of the East body-blight of the apple rarely occurs, and then only in the form of cankers around the base of a shoot. In some districts it is not considered worth while to cut out the disease in apple-trees during the growing season, so rarely does it extend beyond the current season's growth. In these same districts the body-blight may be a serious menace to pear-orchards; so that while twig-blight may be found in pears and body-blight in apples, the reverse is the rule. In some parts of the Western States and in British Columbia, however, body-blight is commonly found upon all apple-trees. Certain varieties have suffered most severely from this form of the disease. Some cases have come under our observation in which the disease spread so rapidly down the trunk that the tree was soon girdled and its death accomplished in a single season.

A rot of the immature and occasionally of the mature fruit is also caused by the pear-blight organism, the disease entering by way of the stem or through an insect puncture. Fruit so affected turns brown or black as if bruised, and a whitish, slimy substance exudes from the skin.

SUSCEPTIBILITY OF VARIETIES.

It is a fact of common observation that a considerable variation exists in the degree of susceptibility of the different varieties to the blight. In the Summerland district during the past season the Spitzenberg showed the highest percentage of infection—about 50 per cent.* The disease was most severe in this variety, rapidly passing down from the smaller shoots into the main limbs and trunk. Following close upon the Spitzenbergs came Wageners and Transcendent crabs, which were attacked in much the same manner. Jonathans showed about 25 per cent. infection, but the disease in this variety was, for the most part, confined to the twigs and smaller branches, very few being so badly attacked as to call for removal. Practically all varieties were attacked more or less. Those showing a degree of resistance nearest approaching immunity were McIntosh Red, Grimes Golden, and Yellow Newtown.

In the pears the disease was confined almost entirely to Bartletts. Quince-trees were practically all attacked, but twig-infection only was found.

* Figures secured from Mr. Simms, Fruit Inspector.

HOW THE DISEASE IS SPREAD.

Among the foremost agents in the spread of the blight are bees, wasps, and other insects, which carry the disease from flower to flower during the blossoming period. More important than the bees, for it seems impossible to exercise any control over their work, is the green apple-aphid. Aside from the great harm this insect undoubtedly does by sucking the juices of the plant, it is one of the most fruitful sources for the spread of the blight. A large proportion of the twig-infection can be traced directly to its agency. The apple-leaf hopper and the woolly apple-aphid doubtless bear a share in this work as well. The gummy exudate that oozes from diseased bark is swarming with the germs of the blight; and insects, becoming contaminated from this source, carry the disease to other trees, which in turn become infected. In Ontario the fruit-bark beetle (*Scalptus rugulosus*) has been shown to be an important agent in introducing the blight into the trunks of pear-trees.

The use of infected pruning-tools has more than once been responsible for spreading the blight over a whole orchard.

CONTROL.

The work of various investigators has shown that fire-blight is a controllable disease. If the following directions are faithfully followed from the start, no alarm need be occasioned by its appearance in any district.

Immediately the disease appears the affected limb should be removed, the distance to cut out being governed by the rapidity with which the disease is progressing. At least a foot below the visible signs of disease is none too much, and even more may be necessary. Immediate cutting out is essential, for once the disease has gained entrance to the trunk or main limbs, it is often next to impossible to save the tree. Where the disease has formed a canker around the base of a shoot, the bark should be cut away for at least 4 or 5 inches below the diseased area. All cutting-tools used should be thoroughly disinfected after each cut by dipping or swabbing with some good disinfectant. Corrosive sublimate, 1-1,000, is excellent for this purpose, and formalin, 1 pint diluted to 3 gallons with water, is also most satisfactory. The cut surfaces of the wood should also be swabbed with the disinfectant and large wounds painted over with a mixture of oil and lead, to prevent the entrance of wound-parasites. All prunings from diseased trees should be gathered and burned at the time of cutting.

As new infections may be continually taking place, it is not possible to control the disease entirely by this treatment. It is necessary to go carefully over the trees for at least three times after the leaves have fallen, and cut away all blighted parts. To detect all cases of the disease where it is no longer active is not always easy. The darker colour and withered condition of diseased bark is usually a good indication. Where a "hold-over" canker has been formed, this can be detected by the colour and by the crack that usually forms around it. As the suckers, which are often found at the base of a tree, are favourable channels for the entrance of the disease into the trunk, they should, as a measure of precaution, be removed in those districts where the disease occurs. A war of extermination should be carried on against aphides and leaf-hoppers, which should never be allowed to become numerous. Spray with Black Leaf 40 or Black Leaf 66 as often as is necessary to hold them well in control.

Clean cultivation and irrigation are often practised to excess in our orchards. This tends to produce an abnormally large and sappy growth of

the tree, a condition that favours the rapid development of the pear-blight germ. If the disease is carried to such trees it finds ideal conditions to grow and multiply, and naturally proves more serious than would otherwise be the case. Something that will check the growth of the tree will therefore be of service in hindering the growth of the organism. Where the blight is present in an orchard, it is well to lessen the amount of cultivation and irrigation, as far as possible without hurting the trees. Cover crops should be planted, and the grower, if other conditions permit, may even find it advisable to put his orchard in sod for a time. This will not of course, prevent his trees from being attacked, nor will it kill out the disease. It will only check its rapid development in the trees. The other remedies must not be neglected, however, but religiously followed if the disease is to be stamped out.

SUMMARY OF CONTROL MEASURES.

- (1.) Cut out disease as it appears.
- (2.) Carefully examine trees and cut out cankers after the leaves have fallen.
- (3.) Gather and burn all prunings from diseased trees.
- (4.) Disinfect tools and cut surfaces of wood.
- (5.) Keep aphides and other insects in control.
- (6.) Endeavour to check a too rapid and sappy growth of the trees.

Victoria, B.C., December, 1912.

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