



Department of
Primary Industries and
Regional Development

Journal of the Department of Agriculture, Western Australia, Series 3

Volume 7
Number 1 *January-February, 1958*

Article 16

1-1958

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PLANT DISEASES

BACTERIAL CANKER OF STONE FRUITS

By OLGA M. GOSS, B.Sc. (Hons.), Plant Pathologist

DURING recent years, bacterial canker, a very serious disease of stone fruit, particularly plums, has become more widespread and caused concern to orchardists. It has now been recorded from many stone fruit districts in this State, especially in trees up to ten years old, but it seems to be most damaging in the Karragullen-Pickering Brook district, where a number of young plum plantings have been almost wiped out.

The most obvious symptoms to the orchardist are the occurrence of split-like cankers, from which gum exudes, and a progressive death of the limbs of infected trees. Once established, the disease is very difficult to control and results in death of the tree so that introduction of the disease should be avoided. One of the main objects of this article is to acquaint growers with the symptoms so that planting of diseased stocks and subsequent spread by pruning, can be avoided.

GENERAL SYMPTOMS

To the orchardist, the first indication of this disease is usually the sudden death of a limb of a young tree—the limb either failing to shoot (Figs. 1 and 2) or dying while in full leaf (Fig. 3). If this limb is examined closely, split-like cankers will be seen, usually exuding gum (Fig. 4). The stem in this region appears flattened (see Fig. 5). The flattening is caused by the tissue beneath the canker failing to grow and develop as does the surrounding healthy wood. Callus tissue develops



Fig. 1.—Bacterial canker infection in a young plum tree. Note—dead branch on left and cankers on trunk region

around the diseased area, marking it off more distinctly. Such cankers and flattening often occur on the main trunk (Fig. 6). If the bark on these areas is shaved off, it will be seen that the bark in the canker

region is dark orange to brown in colour and the wood beneath, brown; whereas in the healthy region, the bark is green and the wood creamy white. There is a distinct line of demarcation between diseased and healthy tissue (Fig. 7). Sometimes a sour fermented smell can be detected in the diseased bark.

When a branch is completely girdled by the cankers it fails to shoot and soon dies. If it is only partially girdled however, any of the following effects may occur depending on the amount of healthy wood remaining—

- (i) The branch may develop blossom only, which soon becomes blighted (see Fig. 8).
- (ii) The branch may shoot normally but the growth soon withers.
- (iii) The unthrifty growth may survive till the end of the season, in which case the foliage first assumes a pinkish colour and is rather sparse and rolled (see Fig. 9).

In all the above cases, dieback of the limb occurs when it is finally girdled. As the branches are usually infected in succession, the tree is gradually killed progressively limb by limb.

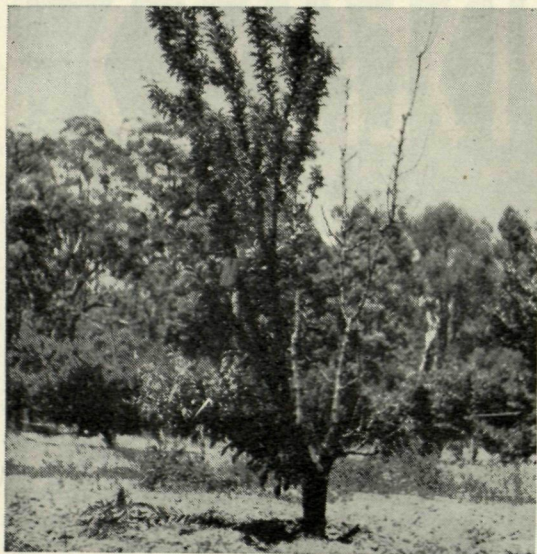


Fig. 2.—Seven-year-old plum tree showing typical symptoms of bacterial canker. Note.—A dead branch has been removed (see cut end in fork of tree). A second branch has failed to shoot this season and a third branch (at back) is unthrifty



Fig. 3.—Seven-year-old plum tree showing typical symptoms of bacterial canker. Note.—Branch at left of the picture had come into leaf and subsequently died. The dead leaves still hang on the tree for some time



Fig. 4.—Small branch showing cankers from which gum is exuding

When infection has been introduced by pruning cuts, small slit-like cankers exuding gum, develop just below the cut. The terminal buds usually shoot and then wilt and the shoots develop a brown to black colour on one side and exude drops of gum (see Fig. 10). The wilting shoot dries off rapidly, but with the advent of warm weather (which is unfavourable for the disease) new shoots may appear (Fig. 11). In the nursery, if infected buds are used,

wilting of growth similar to that just described, occurs and is the most obvious sign of diseased nursery stock.

In some countries the disease causes shothole lesions on stone fruit leaves, but in Western Australia, this leaf attack has not yet been noticed, and the common



Fig. 5.—Close-up of portion of a branch showing flattening in relation to split-like cankers

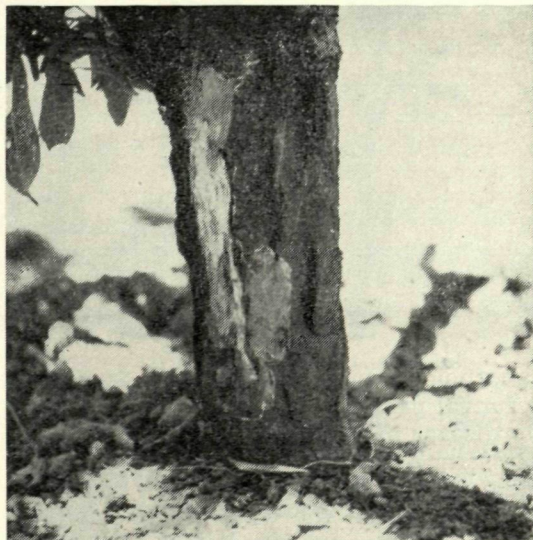


Fig. 7.—Trunk of tree shown in Fig. 6 with bark partially shaved off to show distinct line of demarcation between healthy and diseased tissue and discolouration of diseased wood



Fig. 6.—Trunk of an infected plum tree showing cankers and flattening of trunk

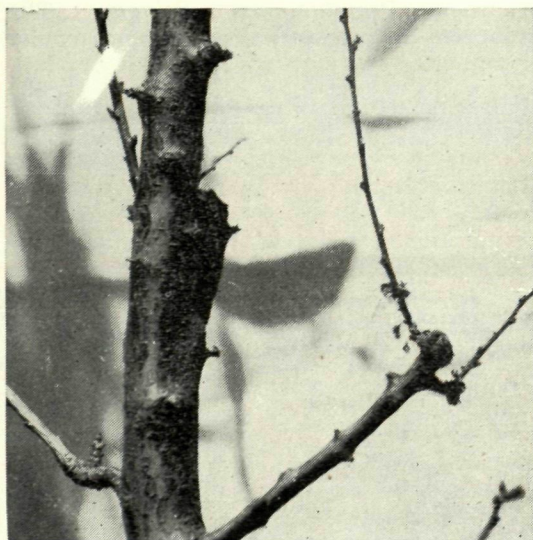


Fig. 8.—Close-up of an infected branch where blossom has appeared but has subsequently been blighted and withered. This photograph was taken when the remainder of the tree was in full leaf



Fig. 9.—Appearance of unthrifty foliage (left) compared with healthy foliage (right) to show stunting and malformation

“shothole” which occurs here, is due to a fungal parasite. No fruit symptoms, and no disease of the roots has been found in Western Australia. In most cases Myrobalan plum has been used as a rootstock, and even when the whole scion has been killed by the canker disease, the roots remain vigorous and send up vigorous healthy suckers (see Fig. 12).

CAUSE

The disease is caused by a bacterial organism *Pseudomonas syringae*. The organism is most active in the cooler

weather, i.e., autumn, winter and early spring, and ceases its activity as the weather warms up. However, the effects of this winter activity (i.e., canker formation, etc.) may not be obvious until the summer, when the branches suddenly collapse, due to the cutting off of the sap supply.

HOST RANGE

Bacterial canker may attack all kinds of stone fruits but in Western Australia, it has so far caused most damage to plums.

Fig. 10.—Typical appearance of terminal shoots on a recently infected branch. Note discolouration of stem and withering of terminal leaves



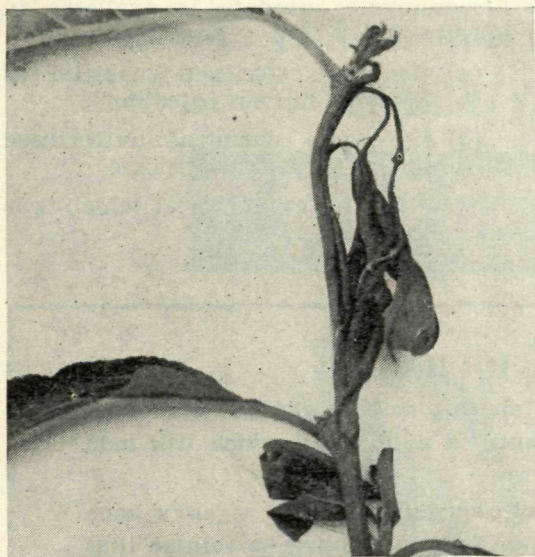


Fig. 11.—Typical appearance of infected tip growth as weather becomes warmer. The infected tip has withered and new shoot growth is developing. Note—discolouration and gumming on one side of stem

The disease has also been recorded here on apricots.

SPREAD OF THE DISEASE

Primary infection centres result from planting diseased nursery stock. Secondary spread from these trees in Western Australia is mainly by pruning, but also occurs naturally during leaf fall. In the former case, an orchardist may prune an infected tree, when sap containing the disease organisms will be left on the secateurs. If he then passes on to a healthy tree, some organisms will be introduced at each cut, so infecting the previously healthy tree.

In the latter case, i.e., during leaf fall, tiny openings are left on the leaf scar which allow entry of the organisms which are spread by wind and rain. Any other injuries, e.g., mechanical, insect, etc., can serve as entry points for the disease.

CONTROL ASPECTS

1. The disease is generally introduced by planting diseased nursery stock. For this reason nurserymen or others engaged in propagation should ensure that only buds from healthy vigorous older trees are

used in propagation. If subsequently however, any wilting of top growth occurs, as described above (Figs. 10 and 11), the "worked" trees should be pulled up and destroyed.

2. During pruning, take precautions to avoid spreading the disease by disinfecting the secateurs in a 2 per cent. formalin solution (made by mixing 1 part of commercial formalin with 49 parts of water) after pruning each tree. (If practicable, use two pairs of secateurs, alternating their use). As a further precaution, it is advisable to leave any trees showing symptoms of disease until all apparently healthy trees have been pruned.

3. If it is necessary to remove whole dead limbs or large sections of wood, do so during the warm months, when the disease is not active. Any large cuts should be smeared over with a paste of streptomycin in Lanolin—made by mixing streptomycin sulphate powder (approximately 2 grammes) into a large tube of Lanolin.

4. Spray experiments on the control of this disease are not yet concluded, but they have progressed sufficiently for the

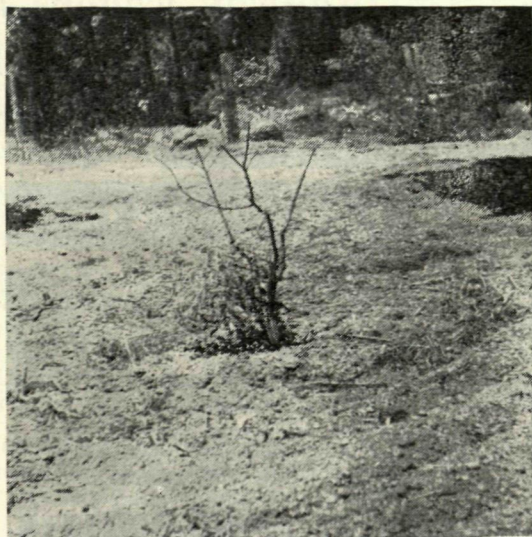


Fig. 12.—Typical appearance of a young tree killed by bacterial canker. Note—proliferation of growth from the root stock—the scion having been completely killed

following tentative recommendation to be made.

During leaf fall, give two to three sprays, at approximately weekly intervals, of streptomycin sulphate plus glycerine at the rate of $\frac{3}{4}$ oz. of streptomycin, $\frac{1}{2}$ gallon of glycerine in 50 gallons of water. Cuprox for the control of shothole may be mixed with this spray.

Streptomycin sulphate is available in two forms—

- (a) the pure sterilised material as used for human injection;
- (b) the same chemical unsterilised for horticultural purposes.

It was the latter material which was used in these experiments.

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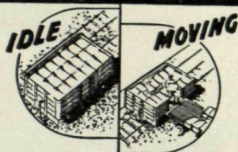
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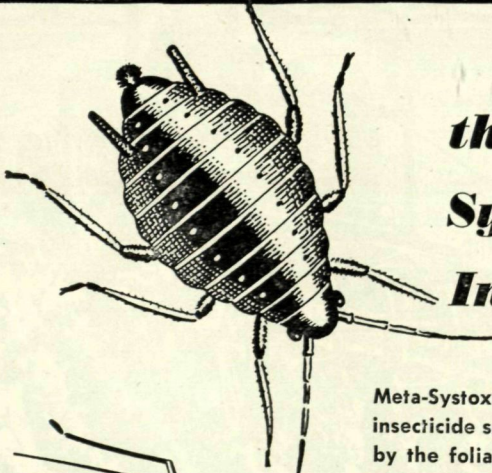
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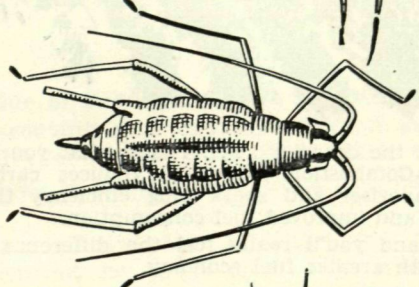
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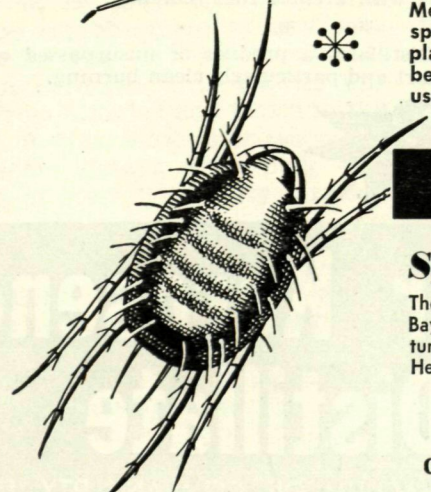
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