Verticillium Wilt of Stone Fruit

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VERTICILLIUM wilt is a fungous disease which has become fairly widespread in New Zealand. It attacks a wide range of plants and has recently become serious in some districts where it has been found to affect stone fruit trees of various kinds.

VERTICILLIUM wilt (*Verticillium dahliae*) is a soil-borne fungous disease which was first recorded in New Zealand on stone fruit in the Alexandra district, where it had attacked apricots. The Plant Diseases Division of the Department of Scientific and Industrial Research first recorded the outbreak in 1945. The symptoms were clearly described by L. R. Renouf in the September, 1948, issue of the "Journal". Since then it has been recorded in Hawkes Bay on peaches, apricots, and plums. The infected plum trees were found in July, 1949, and this was the first time the disease had been isolated on this type of fruit tree in New Zealand.

Host Plants

Tomatoes and potatoes are hosts for verticillium wilt, and it is undoubtedly the interplanting of these crops during the establishment of stone fruit orchards which has caused the spread of the disease more than any other factor. Tomatoes are grown extensively in districts where there are canneries demanding the production of large areas of this crop.

The symptoms of verticillium wilt on tomatoes and potatoes are very easily overlooked in a field crop where it has not been of a particularly severe nature. Therefore many crops are harvested with the disease present and undetected.

There are various common weeds which are also hosts to this fungus. Fat-hen and black nightshade are two of them. It is also common in garden flowers such as asters, zinnias, stocks, etc. The official recorded lists of the Plant Diseases Division of the Department of Scientific and Industrial Research also include tobacco, egg plant, cucumber, raspberry, gooseberry, maple (*Acer palinatum*), and deadly nightshade (*Atropa belladonna*). It has also been recorded in other countries as having affected cherries, strawberries, black currants, quinces, and hops.

As the disease organism can remain in the soil for many years and in land that is free of infected crops or weeds, there is danger in planting out susceptible crops for at least 3 or 4 years.

Incidence of Disease

Affected trees, particularly peach trees, are found in widely spread areas throughout the Hawkes Bay district. Younger trees from 1 to 8 years old are the most seriously affected. In some trees it may show only in a lateral branch or two and in others in one or more main branches; in some instances whole trees have succumbed. It is not often that an established tree is killed outright by the disease, but it appears to be the cause of many newly planted trees failing to live through the first year. Growers would be well advised to make sure that nursery stock has not come from an infected area of land.

Trees quite seriously affected in the 1948 season made good spring growth in 1949, but were showing large areas of bare wood. It would appear that trees, once affected, will always be weak and may collapse later if growing conditions become adverse. It is known that the disease may live in the tree almost indefinitely, but may show only the symptoms of wilting and leaf drop in very dry seasons. The most seriously affected area of peach trees in the Hawkes Bay district is in a young orchard planted on an area of land that had been used for tomato growing for many years before planting.

In all cases where the disease has been evident the trees either have been planted on land previously used for tomato or potato growing or have had these crops interplanted during the establishment period before economic crops of fruit were produced.

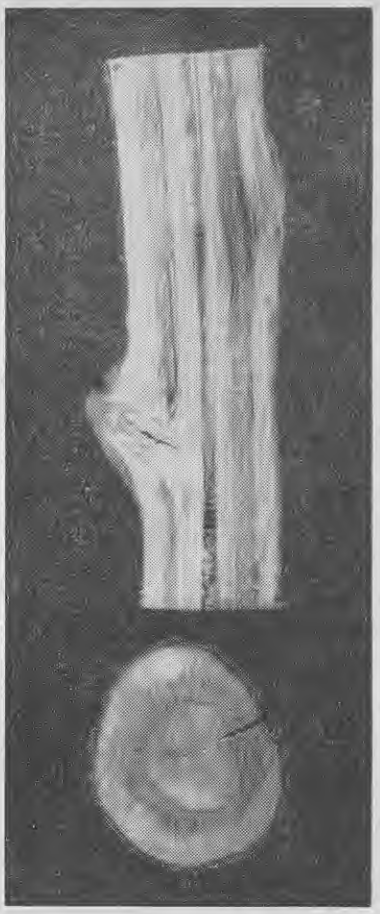
Symptoms

Verticillium wilt may first be detected on stone fruit by the wilting and yellowing of the lower leaves of young wood. These leaves soon drop, but those at the growing tip remain green and apparently unaffected unless it is a very severe attack. In a severe attack the whole length of young wood will die back and leaders or whole trees will collapse. It is in the stage when the tips are still green but wood below is bare that the trouble is very noticeable.

In Australia the disease is known by the descriptive term black heart disease. When the wood is cut a dark-brown discoloration is observed. In some cases, in young wood particularly, this may show as a ring just beneath the bark. Usually, however, dark areas may be found in patches or rings through the wood as deep as the core (see the illustration above). This discoloration is often noticed during pruning operations where the disease was not severe enough to be seen during the growing season. The bark on diseased branches is dark, dry looking, and slightly withered.

Cause and Control

The fungi of the wilt gain access to the roots of the tree from the soil in which they are borne. They attack the woody tissue, poisoning the flow of life-giving sap, which causes the foliage to wilt. The fungus is left in the soil by diseased plants and may be further spread by cultivation or very easily by the run-off of rain or irrigation water. An area of apricots has been noticed which was badly infected by run-off from an irrigated crop of tomatoes. Only the trees in the vicinity of the run-off were affected.



[*R. W. Orr photo.*
Peach wood discoloured as the result of an attack of verticillium wilt.

Control measures are difficult. The fungi can be eliminated by soil sterilisation such as is practised in glasshouses, but of course this would not be economical on areas as extensive as an orchard. Where only parts of the tree are badly affected they should be cut well back and the cuttings burnt. The cuts should be sealed with a bituminous dressing. The tree may or may not recover, as the wood in the base of the tree may be affected. Where a tree is seriously affected all over it is advisable to remove the whole tree.

As trees of a susceptible kind will become infected when used as replacements for those removed, soil sterilisation may then be economical. Chloropicrin at the rate of 4 c.c. per square foot will give complete control, providing the soil is in a reasonably