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Plant disease - spotted wilt of tomatoes

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PLANT DISEASES

SPOTTED WILT OF TOMATOES

By W. P. CASS-SMITH, B.Sc. (Agric.), Government Plant Pathologist.

SPOTTED wilt is a serious virus disease which attacks a wide range of plants. It is best known as a disease of tomatoes and on this host it occurs in all the main tomato-growing areas. In commercial crops, losses vary considerably from year to year and from district to district, but generally they are greatest in crops planted in late winter and spring. As spotted wilt also attacks many common weeds, ornamental plants, and some vegetables, it is often prevalent in home gardens. Although losses from tomato spotted wilt cannot be entirely prevented, they can now be materially reduced by routine applications of D.D.T.

Typically, tomatoes attacked by spotted wilt show a rather sudden wilting of the young top-most leaves, on which shining bronze or copper-coloured spots also appear (Fig. 2). Within a few days, the spotted leaves shrivel and die, and the growth of the plant is arrested. Young plants may be killed outright, whereas older plants may struggle along unthrifty for months, and on these a mosaic-like mottle of the foliage often develops subsequently.

Fruit which is nearly mature prior to infection may ripen normally, but any later-formed fruit usually becomes marked with prominent yellowish rings, and is watery and poor in quality (Fig. 1).

CAUSE

Spotted wilt is caused by an infective principle or virus which permeates the sap of affected plants. The virus is not transmitted by either seed or soil, but originates from other spotted wilt affected plants growing in the vicinity. From these it is carried to adjacent healthy plants by two minute sap-sucking insects—the onion thrips, and the black carnation thrips during their feeding activities. After infection the virus multiplies rapidly and spreads throughout the new host plant, but disease symptoms do not appear until about a fortnight later by which time the plant is fully invaded. It will therefore be apparent that spotted wilt cannot be controlled by cutting off tomato branches which first show the disease.

It is now known that the spotted wilt virus is a complex of different strains which range from

mild to very virulent in the effects they produce. The component strains may vary in different localities and their proportions may also be influenced by the type of plant infected. This partly explains the variable severity and symptoms exhibited by the disease.

HOST RANGE

In addition to tomatoes, spotted wilt also attacks many other types of plant, including

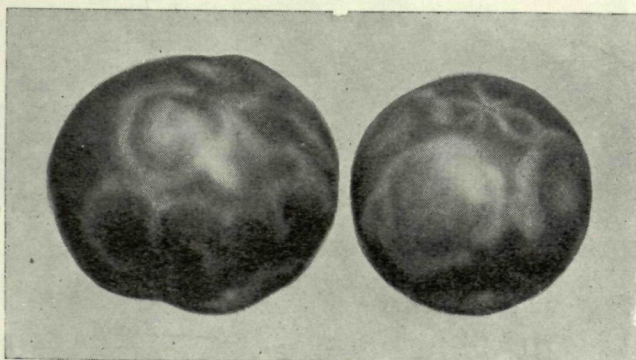


Fig. 1.—Yellowish concentric markings on ripe tomatoes affected with spotted wilt.

flowers, common weeds, and some vegetables.

According to one authority, the disease has been recorded on more than 100 species of plants belonging to 19 different botanical families, and this number is continually being increased by new recordings.

Susceptible plants include:—

Ornamentals.—Petunia, delphinium, Iceland poppy, begonia, lupin, aster, nasturtium, dahlia, zinnia, chrysanthemum, anemone, ranunculus, salpiglossis, camellia.

Common Weeds.—Plantain, black nightshade, dock, sorrel, milk thistle, arum-lily, capeweed.

Vegetables.—Peas, broad beans, lettuce, capsicum, celery and potato.

Spotted wilt has been noted locally on many of the above-mentioned plants. However, on these alternate hosts, the symptoms of spotted wilt may differ so much from the well-known tomato spotted wilt symptoms that they may easily be overlooked or attributed to some other cause (Figs. 3 and 4). Common symptoms, often indicative of spotted wilt, include distortion, spotting or partial killing of leaves and floral parts, together with a general stunting of growth.

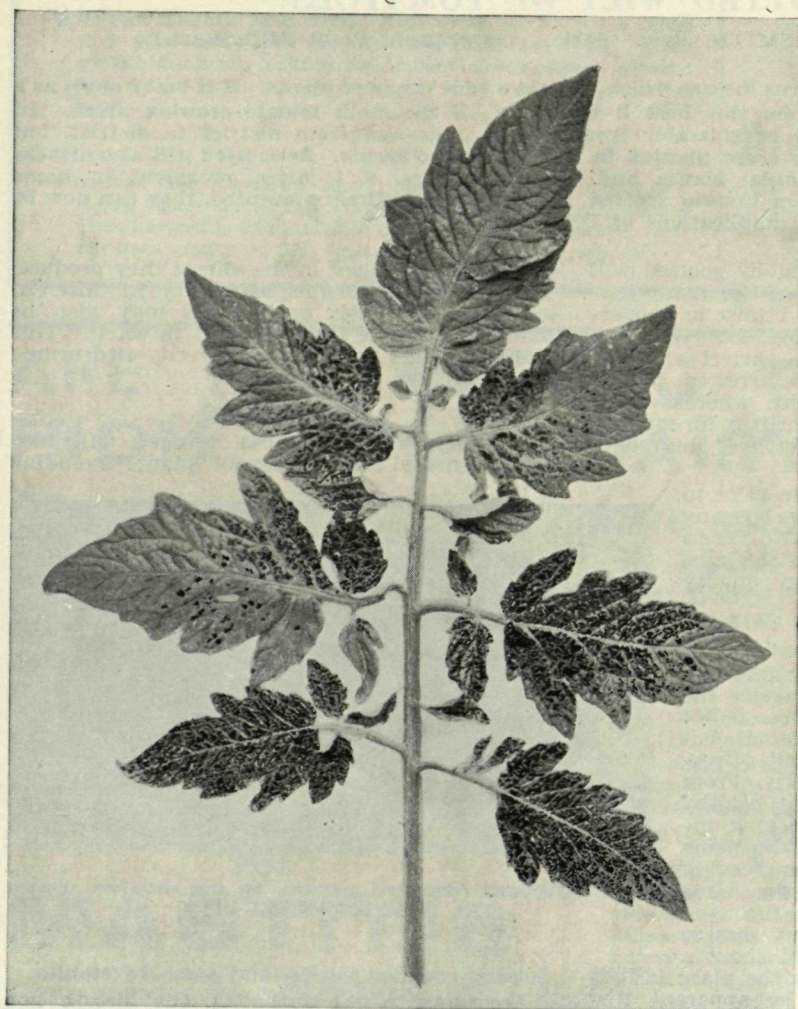


Fig. 2.—Tomato leaf showing symptoms of the spotted or bronzy wilt virus. The disease first becomes evident on the upper surfaces of the youngest foliage where shining bronze or copper-coloured spots appear. The spots may be so numerous that a characteristic sheen is imparted to affected leaflets.

SPOTTED WILT RESISTANT VARIETIES

For many years the possibility of producing commercial tomato varieties resistant to spotted wilt appeared to be remote owing to the lack of suitable resistant parental material. Fortunately several sources of resistance have now been discovered including certain strains of the red currant tomato (*Lycopersicon pimpinellifolium*); two Argentinian varieties, Rey de los Tempranos and Manzana; and a wild Peruvian tomato species (*L. peruvianum*).

Pearl Harbour, bred in Hawaii, from a strain of red currant tomato was the first commercial resistant variety to be developed. However while highly resistant to tomato spotted wilt in Hawaii, Pearl Harbour proved susceptible in America probably owing to differences in the component strains of the virus.

Extensive tests locally with Manzana and Rey de los Tempranos have shown that the resistance

of the former variety is not of a very high order. Rey de los Tempranos on the other has proved vigorous and high yielding in our trials and appears to possess considerable resistance to spotted wilt. Unfortunately this variety is not a satisfactory commercial type, as the fruit is small and crinkly and rather acid in flavour. However it has yielded an abundance of fruit where other varieties fail through spotted wilt attack. Attempts are now being made to combine the resistance of Manzana and Rey de los Tempranos in crosses with local tomato varieties. At the present time there are no satisfactory spotted wilt resistant commercial tomato varieties available in Australia, and so called "wilt proof" varieties are only resistant to the fungal disease *Fusarium* wilt.

CONTROL MEASURES

Until resistant varieties are available, the control of tomato spotted wilt largely depends on the elimination of the thrips insect carriers. Many common weeds harbour the virus, and when they commence to "hay off" in spring and early summer, virus-carrying thrips migrate from them, and may cause heavy disease losses in adjacent tomato crops. The elimination of thrips is particularly important therefore at this time of year.

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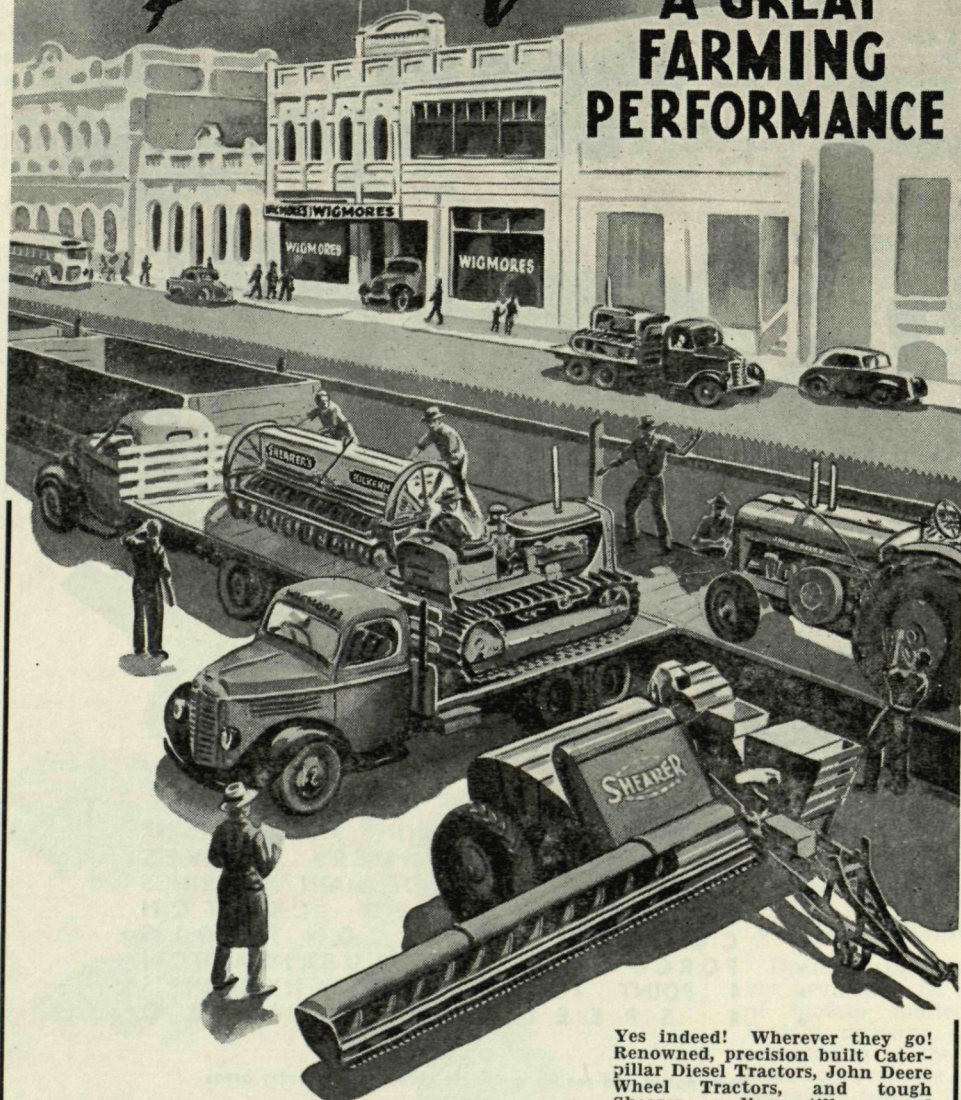
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Losses from spotted wilt can be materially reduced by adopting the following measures:—

1. In country districts where the disease has not yet been noticed, always grow tomatoes and common garden-flowers from seed. Tomato or ornamental seedlings obtained from the metropolitan area or elsewhere where the disease exists may introduce spotted wilt.

2. Locate seed-beds in well cultivated ground well away from headlands or other places harbouring weeds. If both early and main crops are to be grown select well separated sites for each seed-bed.

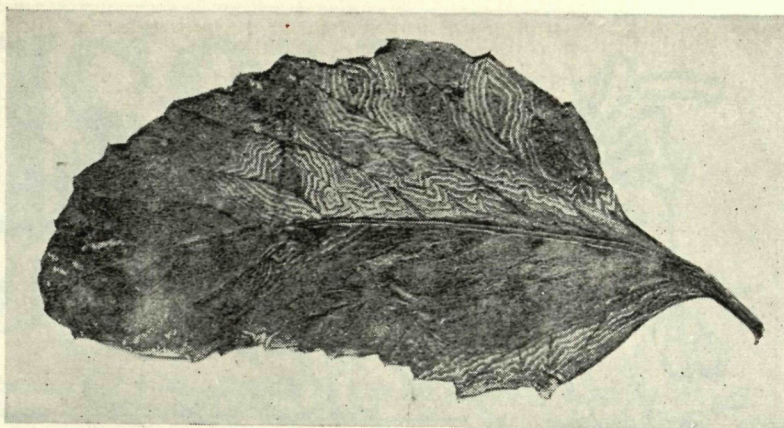


Fig. 3.—Dahlia leaf showing spider-web-like, concentric markings of spotted wilt. Dahlias are very commonly affected with the disease, and are an important host, for through the medium of infected tubers the disease is perpetuated year after year, and transported to new areas.

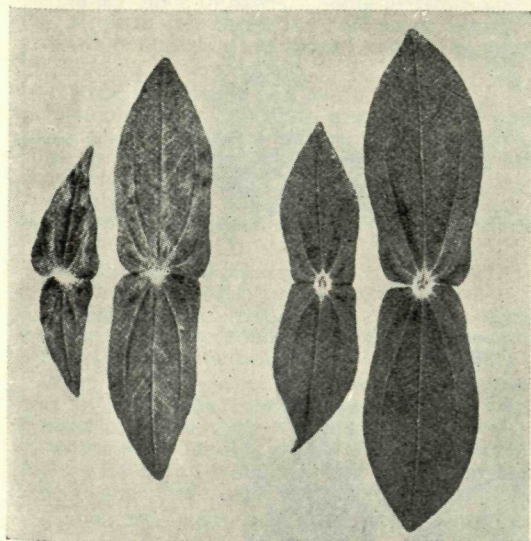


Fig. 4.—On left, two zinnia leaves showing symptoms of spotted wilt, produced by mechanical inoculation. On right, healthy (control) leaves.
(After Bald and Samuel, C.S.I.R. Bull. 54)

3. Plant out on to land which has been well worked to destroy weeds and endeavour to keep down weed growth during the growing season.

4. Both in the seed-bed and after planting out, spray the plants once or twice weekly with 0.1% D.D.T. According to the Government Entomologist this is the most effective insecticide for thrips control, and on young plants is preferable to D.D.T. dusts as the latter may cause injury.

As an alternative to the above, tartar emetic foliage bait may be used, consisting of tartar emetic 2 ozs., brown sugar 4 ozs., water 4 gallons. The bait is applied twice a week to the plants in seed-beds, and once or twice a week, later, when planted out; for seed-bed purposes the amount of tartar emetic may be reduced by half in the above formula.

5. According to reports, losses from spotted wilt can also be lessened by growing tall barrier crops, e.g., maize, around the tomato patch, to entangle migratory winged thrips. The barrier crops should be planted early and thickly, and sprayed frequently with D.D.T.

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