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BACTERIAL BLIGHT OR BLACK SPOT OF WALNUTS

Bacterial blight is the most important disease of walnuts in Western Australia. In bad seasons it can cause heavy losses in susceptible varieties such as Wilson's Wonder, and in some seedling trees.

Carefully timed sprays greatly reduce the incidence of bacterial blight, and it is also recommended that less susceptible varieties—such as Franquette—should be used for new plantings.

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Bacterial blight is caused by the bacterium Xanthomonas juglandis which can infect leaves, nuts and also young shoots of the current season's growth. The disease has been recorded from such widely separated districts as Manjimup and Bickley Valley.

Survival of the bacteria from one season to the next is mainly in infected dormant buds. Fallen fruit and leaves are also potential sources of disease.

SYMPTOMS

On the Leaves:

Black angular spots, usually surrounded by a lighter halo, appear on the leaves. (See Fig 1.) On leaves just emerging from the overwintering buds, the spots are often restricted to the margins and leaf tips, indicating that infection has occurred in the dormant bud during the previous growing season.

These marginal lesions usually cause considerable leaf distortion as a result of checking of growth in infected areas.

Elongated lesions can occur along the veins, midrib and the leaf stalk.

On the Nuts:

On the nuts, the disease produces variable symptoms depending on the stage of flower or fruit development when infection occurs. In the early flowering

Fig. 1—Walnut leaf affected with blight. Note angular blackened spots surrounded by a lighter halo. This leaf also shows the marginal lesions and distortion resulting from early infections as it emerges from the bud.
stage infection results in black spots, mainly at the blossom end. (See Fig. 2.) As the nut develops, these spots may enlarge, causing an extensive blackening of the tissues. Usually such infected nuts fall off the tree long before they reach maturity, thus considerably reducing yield.

When infection occurs in the early post-blossom stage, bacteria frequently gain access to the developing ovary and cause a blackening and withering of the kernel which may not be visible externally, but renders the nut useless. (See Fig. 3.) Later infections occur mainly on the sides of the developing nut and cause depressed lesions ranging in size from a quarter of an inch to over half the surface area of the nut. (See Fig. 4.)

These infections often only invade the fleshy covering and do no actual damage. In some cases however, they may penetrate to the shell and cause discoloration with consequent reduction in market value. (See Fig. 5.)

On the Twigs and Buds:

Young shoots of the current season, and leaf and catkin buds are also susceptible to attack. On the shoots, depressed lesions develop which may encircle the stem and cause dieback of the distal portions. Diseased buds are frequently completely killed, but sometimes the disease attacks only the outer scales. This gives rise to the emerging diseased leaves referred to above.

CONDITIONS FAVOURING THE DISEASE AND ITS TRANSMISSION

Development of the disease is favoured by cool, moist conditions. The occurrence of rainy periods during November, December or January when the nuts are developing, is likely to give a build-up of the disease and considerable loss of crop. During wet weather, bacteria ooze from the lesions in droplets and are spread by water splash.
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CONTROL

1. Where practicable, remove diseased wood from the trees—this is more important in young trees to avoid building up a source of inoculum.

2. Adopt a routine spray schedule using Bordeaux 5 : 2 : 100 plus 1 1/4 pints of white oil per 100 gallons as follows:
   
   (a) Early pre-bloom when 50 per cent. of the terminal buds have broken.
   
   (b) Late pre-bloom—just before most of the female flowers come into full bloom.
   
   (c) Early post bloom—when the young nuts are about 3/16 in. in diameter.
   
   (d) If later rains occur, one or more further sprays may be necessary to keep the disease in check.

   The sprays should be applied in mist form with high pressure (400 lb. per square inch is desirable) and every effort made to reach the tops of the trees.

3. Fallen fruit and leaves should be raked up and disposed of by either ploughing in or burning, to reduce carryover of the disease.

SPRAY EXPERIMENTS

Departmental trials using various spray schedules, including streptomycin, have been carried out over a number of years. Although all sprays gave some measure of control, they proved inferior to the above recommendation of Bordeaux 5 : 2 : 100 and also to the commonly used 6 : 4 : 40 Bordeaux. This latter spray may give better control, but causes some burning of the foliage.

REFERENCE