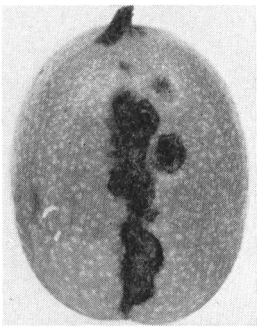


Blight lesions on a walnut husk.

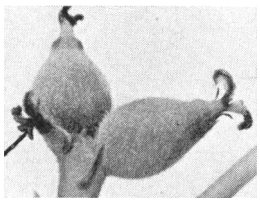
Walnut Blight

three compounds found effective in prebloom-postbloom spray program

Peter A. Ark and C. Emlen Scott

Walnut blight causes up to 60% loss of nuts—in some sections of California.

Walnut blight is primarily a disease of wet seasons. Rains shortly before or during the spring development of the walnut greatly increases the chances of widespread infection and severity of the disease. Blight is aggravated in irrigated orchards and by the presence of heavy cover crops. Since the bacteria prefer young growing tissues, trees heavily fertilized with nitrogenous fertilizers and having much rank growth may develop the disease more readily.



Young blighted nut *arrow* and two healthy nuts on a twig.

The disease is caused by a bacterium, *Xanthomonas juglandis*, which oversummers and overwinters in blighted leaf and catkin buds, and occasionally in twig cankers.

From these reservoirs the blight spreads when water transfers the bacteria to the leaves and stigmatic surfaces of the flowers.

The disease also can be air-borne when catkins open and the staminate flowers discharge the pollen. Contaminated pollen may be carried by air currents and deposited on any young growing parts of the tree.

Control

The degree of walnut blight control is in direct proportion to the knowledge of conditions leading to an epidemic, familiarity with effective spray materials, timing and thoroughness of spray applications.

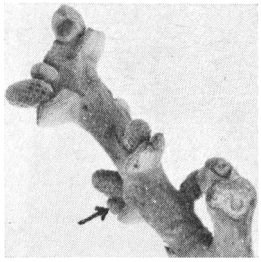
To prevent the blight bacteria from reaching the nuts it is necessary to spray the trees before the flowers begin to show the plume-like stigma for reception of the pollen. This prebloom spray is the most important spray. Its purpose is to kill live bacteria on the surface of the trees and to deposit enough slowly soluble bactericide—fungicide—to take care of bacteria which may ooze to the surface during the next few weeks. The prebloom spray can be put on without serious interference with pollination when about 5% of the pistillate flowers are open.

When the stigmas on the pistillate flowers are browned and dried, it is advisable to apply a second spray. This postbloom spray usually is applied three weeks to a month after the prebloom spray. Its purpose is to deposit enough chemical to cover the enlarging nut and protect it until the summer season when it is beyond the threat of infection.

Orchards which keep up consistent spraying have less blight. If the disease is reduced to an insignificant amount it is sometimes possible to provide insurance against the return of the blight with only the prebloom spray.

A number of chemicals were tested to find a substitute for Bordeaux mixture because this mixture, while effective in controlling the disease, sometimes causes severe injury on the leaves, and favors the build-up of aphids.

So far, no substitute for copper compounds has been found but certain satisfactory materials can be recommended in place of the Bordeaux. Practical control can be obtained by a thorough application of one of the following materials:



Dormant healthy and diseased *at arrow* catkins.

1. Yellow cuprocide, at the rate of two pounds to 100 gallons of water.

2. Copper A—tetra-copper-calcium oxychloride—at the rate of three pounds per 100 gallons of water.

3. Ammoniacal copper 3% at the rate of 2½ gallons per 100 gallons of water.

No injury or undesirable result has been observed from the use of these materials. In using ammoniacal copper it must be remembered that it is very caustic to copper fittings but not to monel fittings.

Walnut blight is primarily a disease of young, rapidly growing tissues. Young walnut shoots attacked by the organism are seldom killed outright. As the shoot matures and tissues harden the disease slows down and finally is checked, forming cankers.

The blight never kills walnut trees but attacks catkins, leaf buds, leaves, twigs, and nuts.

In very early spring diseased catkins can be detected by their considerably smaller than normal size, and by a brownish to black discoloration. They resemble an imperfect pine cone in miniature. Catkins which were killed and still harbor blight bacteria show a marked degree of deformity and, on slight pressure, juice containing numerous bacteria can be squeezed out.

Tests in Contra Costa County showed that 2% to 15% of the infected leaf buds may carry the blight organism until the next season.

Leaves are spotted by the blight in very early spring, when humidity is high, even before the catkins are opened. The leaf lesions first appear as minute angular black spots with a slight yellow halo. The spots may run together and form larger areas which often show an angular pattern. They are shiny black, and greasy in appearance. Sometimes minute yellow beads of exudate can be seen. These contain living bacteria which may be transported in rain or heavy dew and cause more leaf lesions and black sunken spots on the nuts.

Twig cankers are often the result of the blighting of terminal leaves or nuts and invasion of the twig via the leaf stem or fruit stem. The lesion is at first water-soaked and dark brown changing to black. The more succulent the twig the larger is the lesion.

The survival of the organism in the cankers depends on climatic conditions. Hot, dry summers may kill the bacteria

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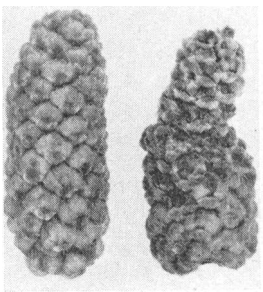

Enlarged healthy *left* catkin and diseased *right* catkin.

SPIDER MITE

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bark or on the ground and moves out on the tender foliage in early summer, though it usually does not become serious until July.

It has been noted that the mite species predominant one season may not be the predominant species the following season in any one orchard. For example, Bryobia may have been the principal mite species present in 1949, while in 1950, European red mite may have assumed the dominant role.

The Brown almond mite and the European red mite may be controlled by destroying the overwintering eggs during the dormant period. Dormant oil emulsions have been recommended for this purpose. The past winter field tests of a new spray compound—DN-289 and Elgetol 318—when applied as a delayed dormant spray gave very satisfactory results in destroying the overwintering eggs. These materials are water soluble and should not be applied during rainy periods. If control is not obtained during the delayed dormant period a selection of an acaricide—listed as *Good* in the table—which will control both species should be made and the application made early in the season after full bloom.

Infestations of European red and two-spotted mite usually build up with the first warm weather in June. It is important to not permit a large population of mites to occur before the mite control spray is applied. Due to the long residual value of some of the newer acaricides control can be obtained for several weeks after a thorough application. A selection of a proper acaricide for these two mites should be made and the material applied with the first signs of increase in population on the foliage.

In some fruit areas populations of two-spotted mite and the Pacific mite become serious in July. Control may be obtained by the selection and proper application of a *Good* acaricide which is effective against these mites.

Spray Injury

In the selection of a spray chemical for the control of spider mites consideration must also be given to the possibility of spray injury to the fruit or foliage. High temperatures at the time or immediately following the application may cause injury with some chemicals. Varietal susceptibility to spray injury in some cases may be a factor.

Injury to apples and pears have been noted from:

Sulphur which may burn fruit and foliage of apples with high temperatures. In the coastal areas the trees have to be preconditioned by the use of lime sulphur in the early season before sulphur may be applied to the foliage.

Oil sprays. Certain varieties of apples have shown oil spray injury about the calyx end by the use of too frequent oil sprays. Oil sprays applied to pear trees may cause defoliation if high temperature prevails after the application. Oil sprays may reduce the fruit size on Hardy and Winter Nelis pears when applied during the period of rapid growth. Oil sprays may cause fireblight to spread in Bartlett pear orchards where fireblight is present.

TEPP. There is a danger of burn to foliage and fruit from too concentrate sprays or over wetting of the foliage.

Parathion. There is a possibility of varietal susceptibility to certain varieties of apples in the coastal counties.

Aramite. Leaf burn on pears in the early season.

K-6451. Leaf burn on pears in the early season and occasional russeting.

DN-111. Will burn fruit of both pears and apples under high temperatures.

No injury has been noted on apples or pears up to the present time from the applications of Karathane, EPN, 923, R-242 or DMC.

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WALNUTS

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but large trees with heavy foliage may afford a certain amount of protection, and under such circumstances the chances for the organisms to survive are enhanced.

Infection on young twigs, not coming via leaf stem or fruit stem, is in the form of small, water-soaked rather irregular spots, sometimes a few millimeters in diameter. The affected areas usually enlarge more rapidly parallel to the long axis of the stem than to the width. Under conditions of high humidity yellowish brown exudate may occur on the surface of the lesion, heavily charged with bacteria.

The nut is susceptible from its first appearance to the end of the season. At or soon after the time of pollination the nuts predominantly are infected at the apical end through the stigma. The stigma turns black, and a black streak can be seen either from the outside or by a longitudinal cut. This results in a larger lesion on the nut around the base of the stigma so typical of blight. Apical infection of the nuts is the most serious phase of the blight since it leads to the shedding of enormous numbers of nuts in severe blight years.

When more mature nuts are infected they may show black sunken spots on the sides and assume irregular shapes. In the late summer this is not considered of economic importance unless the blight penetrates into the kernel.

Other methods of controlling walnut blight are under investigation. Attention is being paid to the effect of changing the timing of sprays on the effectiveness in control. Removal of catkins and artificial pollination with clean pollen needs to be tried experimentally with the view of ultimate elimination of the disease.

A small scale test performed recently points to the possibility of using the latter method of control if a satisfactory selective spray to remove the catkins can be found. In a Payne tree pollinated with clean black walnut pollen the blight was reduced from 85% to 1% and the crop was heavy.

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The above progress report is based on Research Project No. 974.

PLANTER

Continued from page 12

were deposited. Even under this condition, stands were obtained.

In spite of the very unfavorable weather during the falls and winters of 1947–48 and 1948–49 it was demonstrated that stands can be obtained on the range with this type of seeding. Many stands were lost during those two winters because of heavy frosts and heaving of the soil.

The successful establishment and maintenance of stands of the better forage species through the use of this method of seeding, depend on soil fertility and grazing management. Only poor results—if any—will be obtained on soils which will support only a poor growth of resident annuals. Improper grazing practices can destroy—easily and completely—established stands. As the annuals start maturing and become unpalatable, stock will persistently graze upon the convenient rows of green perennials until the plants are literally eaten out of the ground.

Use of a range planter on productive land located in areas unsuited to cultivation will permit the establishment of bands or strips of the better annual and perennial grasses and legumes over the grazing land. Proper rotational grazing practices can encourage the established strips to reseed and spread.

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