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.

The disease is caused by a bacterium, Xanthomonas juglandis, which overwinters 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 factory materials can be recommended in place of the Bordeaux. Practical control can be obtained by a thorough application of one of the following materials:

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 shoots mature 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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bark or on the ground and moves out on
the tender foliage in early summer, though it
typically 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 species
present in 1949, while in 1950, European
red mite may have assumed the dominant
role.

The Brown almond mite and the Euro-
pean red mite may be controlled by
destroying the overwintering eggs during
the dormant period. Dormant oil emul-
sions have been recommended for this
purpose. The past winter field tests of a
new spray compound—DN-289 and Elge-
tol 318—when applied as a delayed dor-
mant spray gave very satisfactory results
in destroying the overwintering eggs.
These materials are water soluble and
should not be applied during rainy pe-
riods. 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 impor-
tant to note that the population of
mites may 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 popula-
tion 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 considera-
tion must also be given to the possibility
of spray injury to the fruit or foliage.
High temperatures at the time or immedi-
ately following the application may cause
injury with some chemicals. Varietal sus-
ceptibility 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 foli-
age of apples with high temperatures. In
the coastal areas the trees have to be pre-
conditioned 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 tempera-
ture prevails after the application. Oil
sprays may reduce the fruit size on Hardy
and Winter Nelis pears when applied dur-
ing 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 russetting.

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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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 en-
hanced.

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 en-
large 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 bac-
teria.

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 longi-
tudinal 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 artifi-
cial 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 selec-
tive 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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were deposited. Even under this condi-
tion, stands were obtained.

In spite of the very unfavorable wea-
ter 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 main-
tenance 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 resi-
dent annuals. Improper grazing practices
can destroy—easily and completely—es-
tablished stands. As the annuals start
maturing and become unpalatable, stock
will persistently graze upon the conven-
tient 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 cultiva-
tion will permit the establishment of
stands 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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