

Spider Mite Control

acaricides show selectivity on apples and pears in northern California

Arthur D. Borden and Harold F. Madsen

Control of spider mites attacking the foliage of apples and pears is one of the most important pest control problems that confronts the northern California orchardist. Though much attention has been given to this problem by field research men and many new acaricides have been available for field tests, a satisfactory control has not been obtained in many orchards.

Though this lack of control in many cases may be attributed to poor coverage or improper timing of the applications, other factors may be involved.

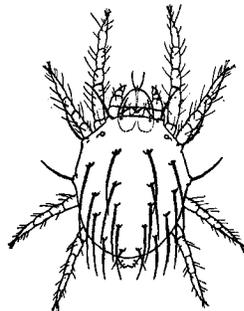
The use of acaricides that do not have adequate residual values, and the selection of an acaricide which is not the most efficient in control of the mite species present may also account for the unsatisfactory results.

In field tests many of the newer acaricides have shown better residual values than the chemicals formerly used and they have been found to vary greatly in their toxicity to different species of mites under varying weather conditions. As shown in the accompanying table the new spray chemicals apparently show a definite selectivity in toxicity to the four species of mites commonly found on apples and pears.

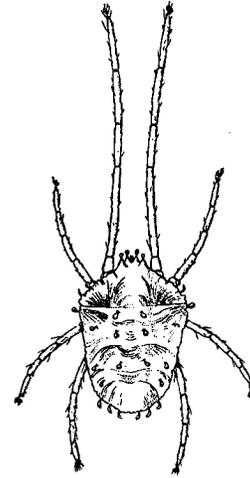
The chemicals which give the best control of the almond mite do not necessarily give good control of the European red mite. An acaricide which gives good control of the two-spotted mite does not necessarily give a satisfactory control of the European red mite. It may be necessary—with the acaricides which do not

have long residual values—to repeat the application as soon as the mite populations show signs of increase. Parathion is apparently more effective in the early season than in the summer whereas R-242 is less effective under cool conditions and more effective when the temperature rises.

Considering the fact that more than one species of spider mite is usually present when control becomes necessary it is important in any control program: 1, to recognize the species present and to make some estimate of the population of each in order to determine which species is predominant; 2, to select a chemical or combination of chemicals that has shown the most promise for the species present under the temperatures occurring at the time of application; 3, to employ a different or more effective spray chemical as the season advances and other species of mites appear.



Female adult of European red mite, greatly enlarged. Infestations usually build up with the first warm weather in June.



Female adult of Brown almond mite, greatly enlarged. Adults appear at blossom time and continue to increase until summer.

Four Species

There are four species of mites which commonly occur on apple and pear in northern California—the Brown almond or clover mite; the European red mite; the two-spotted mite and the Pacific mite.

The Brown almond mite and the European red mite overwinter in the egg stage on the bark of fruit spurs or in roughened areas in the bark of the limbs. The adult Brown almond mite generally appears at blossom time and continues to increase in population until summer.

The European red mite hatches more slowly but the populations increase rapidly as the temperature rises. On pears and apples it is most frequently associated with the two-spotted mite.

The two-spotted mite overwinters as adults under trash on the ground and in some cases on certain weeds. The overwintering forms first attack the cover crop—weeds and legumes—and usually moves up on the lower foliage of the trees with the first warm weather in June. Populations usually increase until the fore part of August when they decline naturally.

The Pacific mite overwinters under the

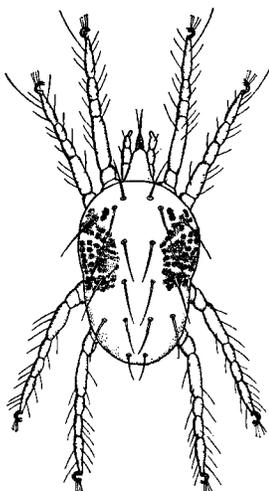
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Comparative Ratings of Single Acaricide Applications on Apples and Pears as Observed in Field Tests in Northern California During the 1950 Spray Season.

Acaricide	Formulations and dosages per 100 gallons	In control of			
		Brown almond mite	European red mite	Two-spotted mite	Pacific mite
Sulphur	4 lbs. wettable	Good	Poor	Poor	Poor
Oil spray	1 gal. light-medium	Good	Fair	Fair	Fair
DN-111	¾ lb. 20% wettable	Good	Fair	Fair	Fair
Karathane	1 lb. 25% wettable	Good	Fair—Good	Poor	Good
TEPP	½ pt. 20% emulsion	Good (1)	Fair (2)	Fair (2)	Fair (2)
Parathion	1 lb. 25% wettable	Poor	Fair	Fair	Fair
EPN	¾ lb. 27% wettable	Poor	Good	Fair	Good
Aramite	1½ lbs. 15% wettable	Poor	Fair	Good	Good
923	1½ pts. 25% emulsifiable	Fair	Fair—Good	Good	Good
K-6451	2 lbs. 50% wettable	Good	Good	Good	Good
R-242	2–3 lbs. 50% wettable	Poor	Fair—Good	Fair—Good	Fair—Good
DMC	1½ pts. 25% emulsifiable	Good	Fair	Good	Good

(1) one application usually sufficient.

(2) two applications at 7–10 day intervals. Materials listed as: Poor, failed to control the mite population; Fair, generally required two applications during the season; Good, generally held the mite populations down until after harvest or until the mite populations began to decrease.



Female adult of two-spotted mite, greatly enlarged. Populations usually increase until August, then decline.

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 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 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 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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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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PLANTER

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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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