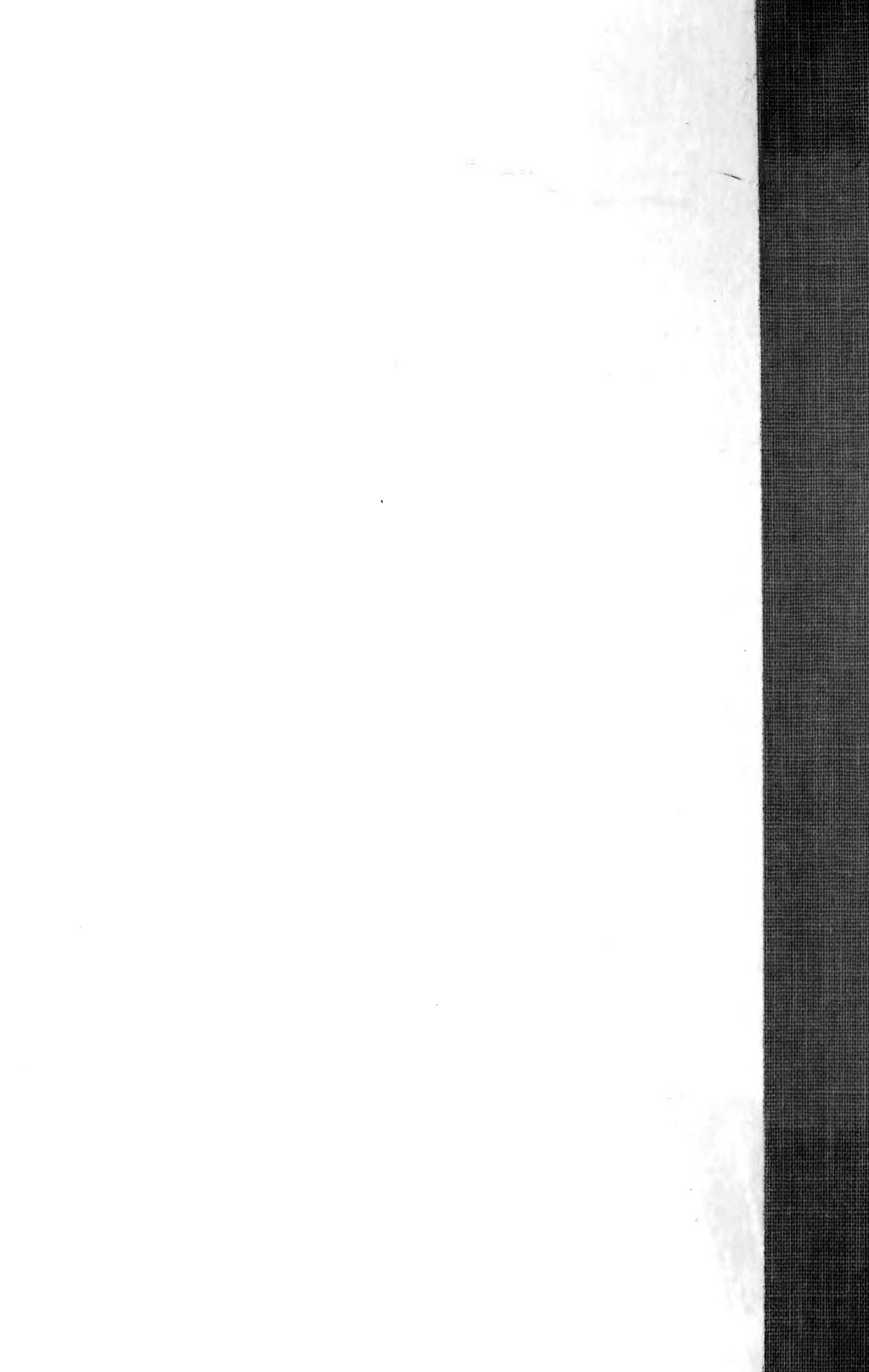


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SPIDER MITES AFFECTING ORCHARD AND GARDEN FRUITS

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Spider mites are minute eight-legged spider-like creatures which have sucking mouth-parts and feed on the juices of plants. Three species of importance occur in Idaho, namely, the two-spotted mite, the brown mite and the European red mite.

With the aid of a small magnifier the three species may be identified by the following characters:

Two-spotted spider mite: Color usually pale green, pale lemon, or whitish with two dark spots and several bristles on the back, but not uncommonly the predominating color in late summer and autumn is orange or light red. It is the only one of the three species that spins webs.

Brown spider mite: Decidedly larger than the above species. The predominating color is brown altho the legs and anterior end of the body are often pale reddish. The back is flat and without bristles. The front legs are nearly as long as the body and commonly are held close together in a straight line in front of the head.

European red mite: Slightly larger than the first species. The body is deep red. The back is strongly convex and set with a number of rather prominent long bristles. The larger bristles arise from small tubercles.

The Two-spotted Spider Mite or "Red Spider."¹

This is the commonest and the most destructive of the spider mites in Idaho. It commonly has been called the "Red Spider" but the predominating color usually is not red. The common name two-spotted mite is based upon the presence of two dark spots usually readily distinguishable on the back of the full grown mite. Aside from attacking all kinds of orchard and garden fruits, it is an important pest of many garden, truck, and field crops. It also is a common pest of nearly all kinds of cultivated flowers, shrubs and shade trees.

¹ *Tetranychus telarius* Linn.

Character of Injury

The first indication of injury is the appearance of minute whitish flecks and fine webs on the leaves of affected plants. With continued infestation the leaves usually turn grayish or yellow and the lower surfaces become covered with numerous fine webs under which the mites live. The webs collect particles of dust from the air and excrement from the mites, which gives the plants a dusty appearance. Eventually the foliage of infested plants becomes brittle and drops off.

Life History

Mature mites pass the winter on vegetation and in trash surrounding the plants which they infest during the summer. They become active on the first warm days in early spring. Migration onto the fruit trees begins soon after the blossom buds commence to open but it continues over a long period. Probably the greater number of mites go from surrounding vegetation to the fruit trees during May and the early part of June. Multiplication on the trees during the spring is very slow and studies show that serious infestations are not likely to develop before the first of July. During the latter part of August and in September the mites commonly collect in depressions on the fruit of prunes and plums. Later they migrate to the bases of the trees where they frequently make conspicuous web tents from which they gradually disperse to nearby vegetation.

Control Measures

The destruction of fallen leaves and other vegetation, and subsequent cultivation of the soil in berry patches are effective measures for destroying the overwintering mites. Experiments in treating the surface soil about currant bushes with kerosene emulsion, miscible oils, and lime-sulphur gave no better results than was obtained by spading the surface soil. In clean cultivated orchards, surface cultivation in late fall and early spring as well as light cultivation during the summer months, apparently has retarded the development of infestations. Furthermore, orchards having neglected cover crops have been observed to be worse affected by the two-spotted mite than clean cultivated orchards or orchards having thrifty cover crops.

When trees become seriously infested during the summer, the liberal use of irrigation water tends to reduce the injury. Direct control in orchards consists in spraying as soon as infestations become apparent, using commercial lime-sulphur 1 to 50. The lime-sulphur may be advantageously combined with one of the codling moth cover sprays. Atomic sulphur, soluble sulphur, and wettable sulphur also have given good control. The sulphur sprays have given good results on small fruits. For small fruits which are soon to be picked the most satisfactory control has been to forcefully spray the plants with soapy water. In cities or wher-

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ever water pressure is available, thoro drenching of infested plants with the garden hose is an effective method of control. In spraying to control this mite it is essential that all surfaces of infested plants be entirely wet by the spray. Calcium caseinate spreader adds very materially to the effectiveness of the sulfur sprays.

The Brown Spider Mite²

This mite, known also as the clover mite, has been observed in Idaho chiefly as a pest of orchard trees but in some parts of the United States it is particularly a pest of clover. It is generally distributed thruout the state and causes limited injury in most orchards each year. Occasional instances of serious injury have been reported. Unlike the two-spotted mite, the brown spider mite does not spin webs.

Character of Injury

Injury usually becomes apparent soon after the blossoming period of apples and consists at first of white flecking of the leaves on short branches and fruit spurs borne directly on the primary brances of the trees. Under prolonged attack infested leaves become ashy-green and brittle. Instances have been observed where the younger foliage of pear trees turned brown and died completely.

Life History

In autumn the mites which have spent the summer on the foliage of the trees and others which migrate to the trees from nearby vegetation, deposit minute red eggs on the bark. The eggs are placed in slight crev-

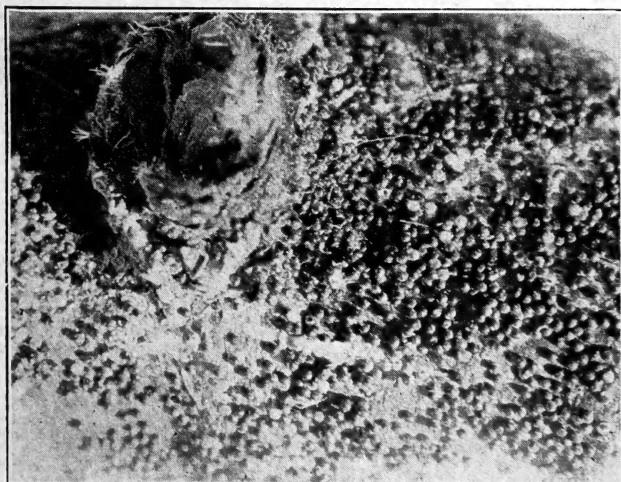


Fig. I.—Winter eggs of the brown mite. Photograph taken April 10, 1921.

² *Bryobia pratensis* Garman; Recently resolved by Ewing into three distinct species.

ices but frequently they are laid in such numbers as to cover large areas of bark and give a decidedly red appearance to the trees. The eggs hatch during a long period, beginning about the first of April and continuing until after the apple trees have bloomed. In 1921 a few newly hatched mites were observed on March 31 at Twin Falls but many eggs were yet hatching during the first half of May. A relatively small number of mites have been observed to hibernate about houses during the winter. These become active during warm days in February and March and attack grasses, flowers and such other green vegetation as they are able to find. Multiplication of the mites on fruit trees during the summer is comparatively slow.

Control Measures

Partial control has been obtained with the usual dormant application of lime-sulphur. It has been found advisable in case of apples to delay the dormant application of lime-sulphur until just before the blossom clusters open, when many of the mites ordinarily will have hatched. Should the mites become injurious later in the season, spraying with sulphur as recommended for the two-spotted mite has given effective control.

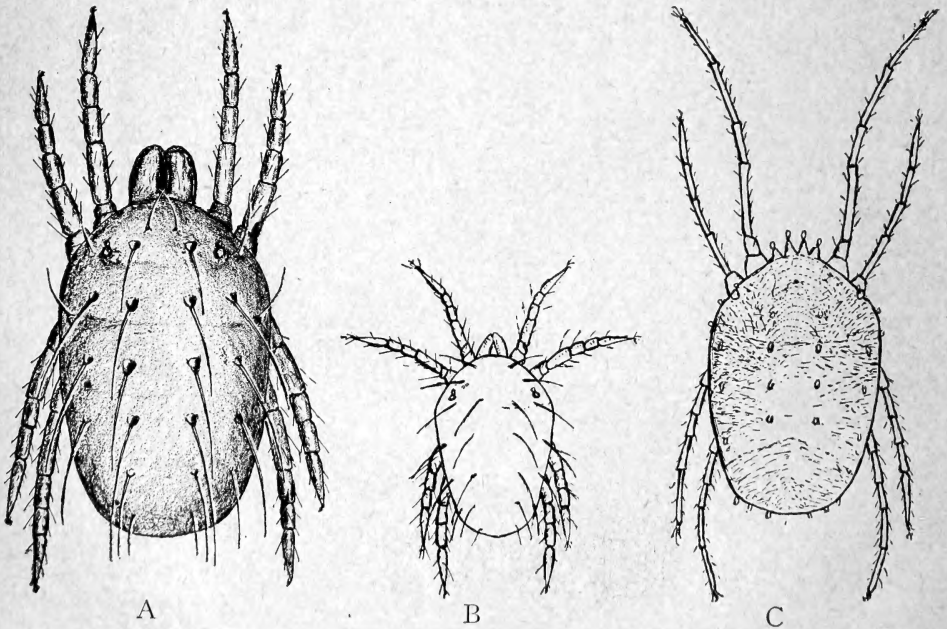


Fig II.—(A) *European red mite.* (B) *Two spotted mite.* (C) *Brown mite.* All greatly enlarged.

European Red Mite³

The European red mite is strictly an orchard pest in Idaho, spending the entire year on fruit trees. It is generally distributed in southern Idaho and probably also occurs in the northern sections of the state. It has been observed to have several natural enemies which are potent factors in holding it in check. Two cases have come to the attention of Idaho Experiment Station officials in the past two years where orchards were remarkably heavily infested and the resultant injury was serious. The mites apparently favor apple trees on which to lay their winter eggs but during summer other orchard trees including pear, peach, apricot, nectarine, plum, prune and cherry have been observed to be injuriously attacked. It is believed that injury by this mite probably will be confined to local outbreaks occurring more or less periodically.

Character of Injury

The injury caused by the European red mite corresponds closely to that of the brown mite and consists chiefly in the minute flecking of the leaves. In instances of heavy infestation the leaves of plums and prunes have become ashy-gray and almost entirely devoid of green color. Unlike the injury caused by the two-spotted mite, there is not much tendency for injured leaves to turn yellow.

Life History

Beginning about the first of September and continuing until the foliage of trees has been killed by freezing, bright red eggs are deposited on the bark in much the same manner as are those of the brown mite. The egg of the European mite has a small filament on the top which distinguishes it from the egg of the brown mite. Sometimes the eggs are deposited in such large numbers as to form solid red patches on the bark of trees. Hatching begins about the time cluster buds appear on apple trees and is completed about a week after the petals have fallen from the blossoms. During the past two years the greatest number of eggs hatched just as the trees were in full bloom. The newly hatched mites occur chiefly on protected surfaces of leaves near the larger branches. In summer eggs are deposited on the leaves.

³ *Paratetranychus pilosus* Can. and Franz. Determined by H. E. Ewing

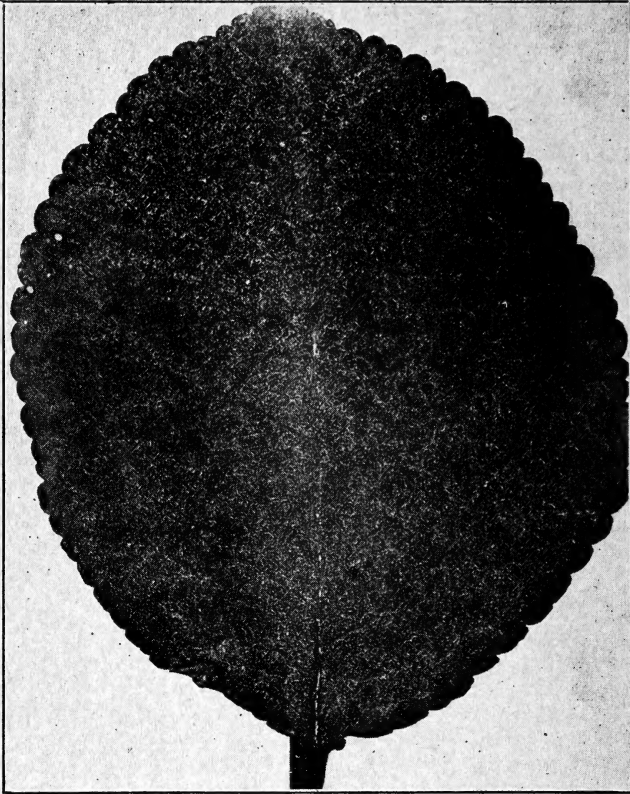


Fig. III.—The numerous white flecks which give this prune leaf a gray appearance are characteristic of the injury of the European red mite.

Control Measures

Several experiments were made for the purpose of determining a method of destroying the winter eggs with dormant sprays. On April 1, 1921 a few days before eggs began hatching, different branches of trees bearing large numbers of eggs were sprayed as follows:

- No. 1 Scalecide 1:15.
- No. 2 Scalecide 1:20.
- No. 3 Scalecide 1:25.
- No. 4 Dormant Soluble Oil, G. C. Co. 7:100.
- No. 5 Commercial liquid lime-sulphur, 5 degrees Baume.
- No. 6 Commercial liquid lime-sulphur, 4 degrees Baume.
- No. 7 Check.

No. 8 Commercial liquid lime-sulphur, 3 degrees Baume.

No. 9 Distillate oil emulsion, G. C. Co. 6:100.

No. 10 Kerosene emulsion 1:10.

The four days following the application of the sprays, were bright with direct sunlight. Summary of all observations showed that Nos. 4, 9 and 10 gave decidedly better control than any of the other sprays, but even with these the control was not in any case above 70 per cent.

On April 8 when the eggs were beginning to hatch in small numbers, different branches were sprayed as follows:

No. 11 Concentrated washing lye 4 lbs. to 100 gallons.

No. 12. Concentrated washing lye 8 lbs. to 100 gallons.

No. 13 Spray-emulsion 8:100.

No. 14 Dry lime-sulphur, S-W, 15:50.

No. 15 Dry lime-sulphur, S-W, 30:50.

No. 16 Dormoil 8:100.

Summary of observations up to May 5, showed that No. 12 gave slight control. No. 13 poor, No. 14 fairly good, No. 15 from 50 to 65 per cent control, and No. 16 was about equal to No. 15.

On April 17 when the eggs were hatching only in small numbers, different branches of trees on which large numbers of eggs were deposited were sprayed as follows:

No. 1b Check.

No. 2b Soluble sulphur, Niagara, 1 lb. to 4 gallons.

No. 3b Commercial liquid lime-sulphur, 5 degrees Baume.

No. 4b Miscible Oil No. 1, G. C. Co. 6:100.

No. 5b Dormant soluble oil, G. C. Co. 7:100.

No. 6b Scalecide 1:15.

No. 7b Scalecide 1:20.

No. 8b Scalecide 1:25.

No. 9b Check.

No. 10b Distillate oil emulsion, G. C. Co. 6:100.

No. 11b Kerosene emulsion 1:10.

No. 12b Concentrated washing lye 8:100.

No. 13b Spray-emulsion 8:100.

No. 14b Dry lime-sulphur S-W 15:50.

No. 15b Dormoil 8:100.

No. 16b Formaldehyde 1:50.

No. 17b Formaldehyde 2:50.

Observations continuing until May 5 showed that the oil sprays gave better control than the sulphur sprays.

One commercial orchard in which enormous numbers of eggs were deposited was sprayed on April 1 and 2, with commercial liquid lime-sulphur testing 5 degrees and 6 degrees Baume. The spraying was done with unusual care but the treatment apparently had little effect on the hatching of the eggs.

In experiments to destroy the mites after the trees had leafed out, several spray substances were used, including commercial liquid lime-sulphur 1 to 50, soluble sulphur (Niagara) 1 to 20, flowers of sulphur 1 to 10 with dissolved laundry soap at the rate of three pounds to one hundred gallons of spray added as a spreader, nicotine sulfate with laundry soap as a spreader and water alone. Commercial liquid lime-sulphur 1 to 50 with caseinate spreader also was added to the first codling moth cover spray. The results showed that spraying with water and with nicotine sulfate was of very little value in destroying the mites. Each of the sulphur sprays gave good control. The most satisfactory method of control was that of adding liquid lime-sulphur to the first codling moth cover spray at the rate of 1 to 50 and using caseinate as a spreader.

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