Mites on Cotton

control of spider mites varies with species attacking the plants

Gordon L. Smith and Douglas E. Bryan

Spider mites on cotton—the Atlantic mite, *Tetranychus atlanticus* McG.; the Pacific mite, *T. pacificus* McG.; the two-spotted mite, *T. bimaculatus* Harvey should be controlled by killing the mites in their overwintering stages on winter and spring host plants and on the ground.

Weed killing chemicals such as oils—and sprays containing oils, dinitro compounds and some others—will kill the mites they contact on the ground as well as on the weed hosts. Many of the sprays used on dormant fruit trees are effective in killing mites throughout the orchard. The hormone types of weed killing chemicals such as 2,4-D will probably not kill any mites but will result only in destroying the host plants.

Atlantic Spider Mite

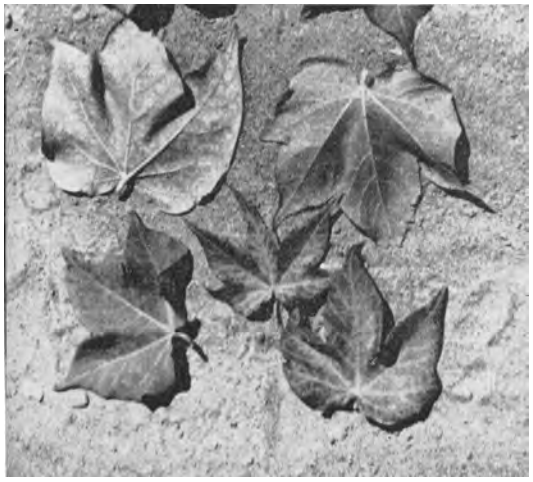
The Atlantic spider mite is the most important spider mite pest of cotton in the San Joaquin Valley because of the effect it has on the quantity and quality of cotton fiber and because it is a pest throughout the growing season.

This species of mite has been given the common name of strawberry spider mite, but in California it has been a more serious pest of alfalfa, ladino clover, cotton, beans, and melons than of strawberry.

There is a predominance of straw color in these mites. The dark spots, which develop within the body during feeding, darken the color and some are of a slightly pink cast, but there is not the green color that predominates in the Pacific and two-spotted mites.

It does not show the toxic effect of stunting the terminal growth of branches as the Pacific and the two-spotted mites do. The toxic effect, if it is that, is shown by the rapid defoliation of plants. This species tends to colonize strongly and the injured leaves show the blotches of first whitened and subsequently very red areas of the green leaf. The injured leaves readily fall leaving bare stalks beneath the bright green terminal leaves. The mites migrate up the stalks and it is on the stalks that most of the webbing occurs. The foliage and terminals are not covered with dense webbing as they are in the case of the Pacific mite. With the loss of foliage there is a corresponding loss of buds, squares, small bolls and the premature opening of larger bolls.

Pacific mite injury and webbing are uniformly spread on cotton leaves.



Pacific Spider Mite

The Pacific spider mite, *Tetranychus pacificus* McG. was a very serious pest in Kern County in 1949 and occurred in lighter infestations throughout most of the southern half of the valley.

In 1950 it reoccurred only in central-western Fresno County. Previous to the 1950 season, it was believed that this mite was carried by winds from infested deciduous fruits and more especially from vineyards into cotton fields. The area of west Fresno County infested in 1950 is not near deciduous fruits and winds were not so great a factor as they were during the preceding few years.

The Pacific spider mite infestations of cotton start later in the season than those of the Atlantic spider mite. Some of the late infestations reduce the production of the crop very little.

The Pacific spider mite migrates in from infested weeds and crops. The harvesting of infested crops with the added effect of wind increases the rate of spread, but concentrations of them in field borders are quite pronounced.

The dense webbing and stunting of terminal growth produced by the Pacific mite give the areas a distinctly dull, gray appearance. The mites scatter out rapidly over the entire under surface of the leaf so that both the white stippling effect and the subsequent reddening are quite uniformly spread over the leaf. The injured

Typical defoliation caused by the Atlantic mite.

leaves do not readily fall from plants. The most serious phase of the injury done by this species is the stunting of growth which may be due to both a toxic effect and the concentration of feeding in the new growth, thus reducing the late crop.

Two-spotted Spider Mite

The injury of cotton foliage by the two-spotted spider mite—*Tetranychus bimaculatus* Harvey—is similar to that of the Pacific spider mite but there is not as much webbing or scattering over the entire under leaf surface. The mites are more active throughout the loose webbing than the Pacific mites. The stunting of terminal growth and a slow rate of

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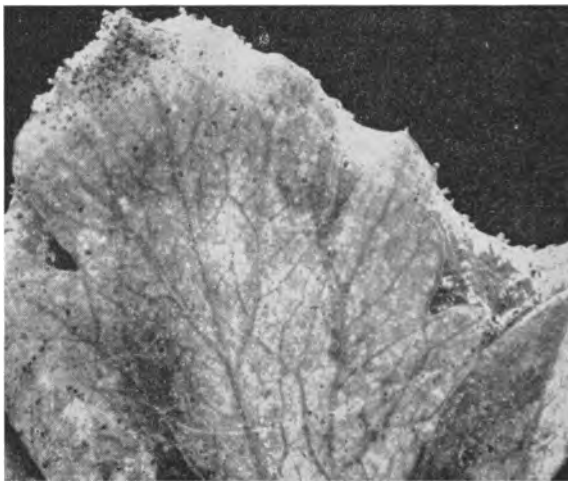
Colonies and webbing of the two-spotted mite.



COTTON

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defoliation are also typical of the two-spotted mite.

The spots in the body of two-spotted mites are considered by some entomologists to have characteristics that distinguish this from other species; others say these are not dependable characters. During the investigations in the 1949 and 1950 seasons it was found that adult females very rarely had spots close to the caudal tip even though the body spots are variously broken into sections. It is believed—in looking at many mites of a large population—that the character of no-tail-end spots is of considerable value in field identifications of this spider mite.

In some recent life history studies of the two-spotted mite in Virginia it was found that the life cycle was greatly shortened by high temperatures. The males and females molted three times, although some previous studies had shown the male molted only twice. At constant temperatures of 75° F the males developed to adults in six days, the females in seven days. Oviposition occurred any month of the year when temperatures rose to about 50° F and even though the temperature fell to 0° F and there was snow, the overwintering adults, eggs and larvae were found on new growth of weeds in the fields in late February and early March. Incubation of mite eggs varied from three days at a constant temperature of 75° F to 21 days at 52° F. The time of larval, nymphal and molting stages was similarly affected by the temperature.

The greatest color variations of the two-spotted mites occur between host plants, although there are color variations on any one host. On cotton in the San Joaquin Valley there is a predominance of shades of green with some amber and slightly pink color. Late in the season the overwintering mites are mostly orange.

The two-spotted mite attacks about 200 known host plants including weeds, truck, field, and orchard crops as well as ornamentals, native annuals and perennials.

Control Methods

The districts in which spider mites have been pests of cotton and other crops should be thoroughly cleaned of weeds and well cultivated before cotton is planted. Fence rows, ditches, orchards, vineyards and weedy areas of unfarmed land nearby are some of the most important sources of these infestations in crops.

The two-spotted spider mite has been the most difficult to control on California cotton. None of the dusts or sprays has given more than an occasional satisfactory control when applied by aircraft. Sulfur has given good control of the Atlantic mite but not of the others and nothing has been found to replace the sulfur or to be a near substitute for it.

In 1949 the serious infestations of the Pacific mite were controlled with dusts containing 1% parathion. It was found then that if the maximum temperature reached 95° F or above, the residual effect of parathion was not sufficient to control mites hatching three to four days after it was applied. Therefore, two applications with an interval of four days is required when temperatures are high. This treatment of two applications of 1% parathion dust was found to control the two-spotted mite if thorough coverage was obained with row-crop equipment.

Dusts containing 3% and 4% Aramite—88R—were effective in but one application per treatment. Both of these gave mostly poor control of two-spotted mites when applied by aircraft.

Physical properties close to those of a good grade of dusting sulfur are most desirable in cotton dust formulations.

Findings indicate that if the diluents used produce a dust of greater or less density and dustability than dusting sulfur—95% of which will pass through a 325 mesh screen—good underleaf coverage will not be obtained with the usual applicants by aircraft.

Results with several other new acaricides are inconclusive.

Some of the other injuries of cotton foliage resemble that of spider mites. The term, rust-of-cotton, is frequently used for this reddening of foliage but it should be used only for the potash deficiency disease of cotton.

Cotton foliage injured by bean thrips is discolored but the color is a metallic silvering changing to bronze in the advanced stage and with shiny black specks of excrement throughout the injured leaf areas. There is none of the webbing which spider mites produce. Cotton growing on excessively alkaline soils shows a marginal reddening of the leaves.

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FIRE

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the brush crowns are the fine fuels needed to do the job.

Fuel volume and distribution deals with quantity as well as horizontal and vertical distribution of fuels. When fuel particles are too sparse horizontally, fire will not spread and in many cases will go out and leave areas unburned. Vertical distribution is just as important as horizontal distribution in creating a fuel bed structure which will support fire. There must be fine, dead fuels both on the ground and in the crowns to generate enough heat to keep a crown fire going.

Caution

There is no ideal burn, and selection and preparation of any area to be control-burned involves a great deal of judgment. Controlled burning involves a calculated risk.

The skill and judgment which an individual uses to balance the effects of width of fire line, slope, vegetation type, anticipated wind and other climatic factors must come from experience. State or county fire control organizations—from which a landowner obtains his burning permit will advise with him.

It is impossible to set down by rule or law specifications for control lines applicable to all conditions in the state or for all types of burning weather; circumstances alter cases and there is no substitute for on-site study of selection and preparation problems.

(To be continued)

Part III, "Planning and Organizing for the Fire" will be published in May. Sections on "Managing the Fire: Ignition" and "Managing the Fire: Control, Patrol and Mop-up" will be published in subsequent months.

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CORRECTION

In the article, *Olive Tree Spacing*, published on page 13 of the March, 1951 issue of CALIFORNIA AGRICULTURE the figures for the yields should read as shown in the reduced table below.

	Yield per tree		Yield per acre	
	Close spacing (30 x 30)	Wide spacing (44 x 44)	Close spacing (30 x 30)	Wide spacing (44 x 44)
Average of 5 years	32 lbs	137 lbs.	1,496 lbs.	3,132 lbs.
Annual increase in yields due to wide spacing		105 lbs.		1,636 lbs.
Per cent increase in yields		328%		109%