

Biology and control of SPIDER MITES on COTTON in ALABAMA

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SPIDER MITES, sometimes called red spiders, attack a variety of wild, agricultural, and ornamental plants. These tiny arthropods, barely visible to the naked eye, vary in color from green to red. They live on the underside of the leaves and suck juices from the plants, causing loss of vigor and discoloration of foliage. A fine web is spun on the infested areas of the leaves.

These mites are becoming an increasingly important cotton pest in Alabama. For several years, they have caused damage in the Tennessee Valley and Sand Mountain areas of northern Alabama and are now becoming economic pests in central and southern Alabama. Until recent years, spider mites were not considered a major cotton pest because only sporadic and localized outbreaks occurred.

The increased damage from spider mites has developed concurrently with the advent and subsequent widespread use of synthetic organic insecticides on cotton. Most of the insecticides destroy the predators and other beneficial insects without controlling the mites. Thus, the mites, free of biological control, often multiply to damaging population levels. Other factors, such as climatic conditions and plant physiology, appear to affect establishment and buildup of spider mite populations, but the change in the biological balance appears to be the predominant one.

FIGURE 1. (Title picture) Adult female spider mite (carmine), about 70X enlargement at left, and spider mite eggs, 30X enlargement, are shown at right.

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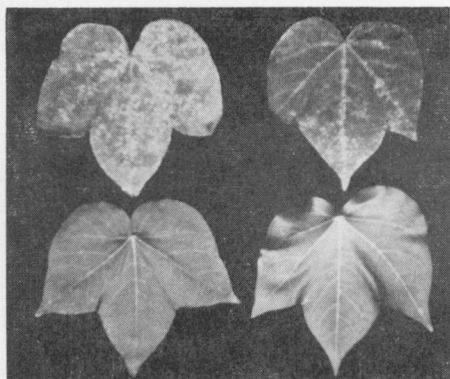


FIGURE 2. Cotton leaves with varying degrees of spider mite damage are shown here.

Spider mites usually become more numerous during periods of hot, dry weather. Under favorable conditions, an incipient population can develop into tremendous numbers in a relatively short time. Damaging populations normally occur during July and August. However, if conditions are favorable, early infestations may occur in sufficient numbers to kill or drastically reduce stands.

DESCRIPTION of STAGES

Spider mites are small arthropods closely related to insects. They have eight legs in the adult stage. Adult females are about 1/50 of an inch long and about half as wide, Figure 1. Males are smaller, paler, and more slender than the broad elliptical females. The predominant species of spider mites that attack cotton in Alabama are the two-spotted spider mite, *Tetranychus telarius* (Linnaeus); the carmine mite, *T. cinnabarinus* (Boisduval); and the strawberry mite, *T. atlanticus*, McGregor.¹ Other species known to attack cotton in this State are the desert spider mite, *T. desertorum* (Banks); the schoene spider

mite, *T. schoenei* (McGregor); and the lobed spider mite, *T. lobosus*, Boudreaux. Only one of the three species common on cotton is reddish in color. This species is the carmine spider mite. The other two, strawberry and two-spotted mites, are greenish or straw-colored with a dark spot on each side of the body.

Eggs are extremely small and vary somewhat in color, depending on the age of the egg and species of the mite. Generally, newly laid eggs are translucent or slightly reddish. They become darker prior to hatching. Eggs are laid singly on the lower surfaces of the cotton leaves, Figure 1.

Young mites (larvae) have six legs immediately after hatching, but soon develop into eight-legged nymphs that resemble adults except for size.

BIOLOGY

Spider mites are active throughout the year in the southern United States, and reproduction may occur during the winter months under favorable weather conditions. The life cycle of the various species is quite similar, although optimum environments may vary.

The stages occurring during the life cycle of spider mites are egg, larva, protonymph, deutonymph, and adult. Mated females produce eggs that develop into either males or females, but unmated females produce only male offspring. During summer months the eggs hatch in 3 to 4 days to produce minute, six-legged larvae. Immediately after hatching, the larvae begin to feed on plant juices. After feeding for 1½ to 2 days, they become inactive, moult, and emerge as eight-legged protonymphs. Two additional periods of feeding occur, each followed by inactivity and moulting, which completes the life cycle in 10 to 12 days under favorable conditions. Generally, the adult males emerge a few hours before the females. Upon emerging the male assumes a position near an inactive female. As soon as the female emerges, mating is accomplished.

¹Dr. H. B. Boudreaux, Professor of Zoology, Louisiana State University, has proposed (paper in press) that *T. telarius* be used for the red species now called *T. cinnabarinus* and *T. urticae* for the green one now known as *T. telarius*.

The newly emerged female feeds for approximately 1 day before laying begins. Once begun, egg laying may continue for 1 to 1½ months, and a total of over 300 eggs may be deposited during the female adult life. The average number per female is approximately 200 and some individuals deposit only 25 or 30. The rate of laying starts at a low level, continues to rise sharply, and peaks during the second week. During this peak period of laying, a female may lay as many as 20 eggs in one day. Following the peak there is a slow, gradual decline in the rate of laying.

DAMAGE

Spider mites feed on the lower surface of leaves; thus their presence in a field is often unnoticed until visible damage to the leaves occurs. Injury to the leaves occurs when feeding mites rupture the cells and siphon the plant juices. The removal of this cellular material results in the destruction of chlorophyll and reduction in vigor of the plant. Under heavy infestations, the entire photosynthetic process of the infested leaf is impaired or destroyed. Each incision of the mouthparts into the leaf tissue causes a blackened spot.

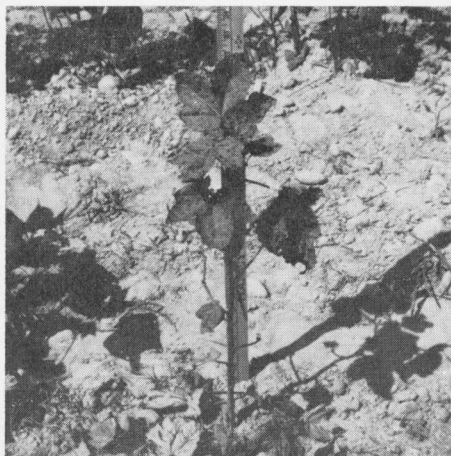


FIGURE 3. This is a cotton plant showing damage from a heavy spider mite infestation.



FIGURE 4. Shown here is a field of cotton extensively damaged by spider mites.

Spider mites enter cotton fields from plants such as vetches, clovers, calcey peas, or wild plants growing nearby. The presence of mites is usually noticed first along the margins but occasionally isolated spot-infestations may be found in any part of a field. Localized infestations may be spread to uninfested areas by machinery, man, animals, or wind.

The various species of spider mites that attack cotton differ somewhat in their effect on the plant. In general, the first signs of spider mite damage that appear on the upper surface of the leaf are small, pale-green to reddish-brown spots or lesions that correspond to the location of the mites feeding on the lower surface. As the number of feeding mites increases, the entire leaf usually becomes affected. Figure 2 shows different degrees of spider mite damage. Under heavy infestations, the leaf becomes bronzed, rusty, or reddish in appearance and often curls upward. Continued feeding causes the leaf to become brown and dry in appearance and to drop from the plant. If heavy populations are allowed to persist, premature shedding of all foliage, squares, and immature bolls may occur. Death of the plant may follow. Figure 3 shows the results of a heavy spider mite infestation.

Damage from this pest alone has resulted in yield reductions up to 30 per cent and heavy mite infestations may cause a reduction in fiber quality.

CONTROL

The various species of spider mites that attack cotton differ somewhat in their reaction to miticides. Positive species identification can be made only by specialists with the aid of a microscope; therefore, it is advisable to use a miticide that is known to be effective against all species. The following miticides have been found to effectively control all species of spider mites that attack cotton in Alabama and are currently recommended at the rates indicated: 2% Trithion dust at the rate of 25 to 50 pounds per acre, or 1 to 2 pints of 4 pounds per gallon of emulsifiable concentrate Trithion spray; 3% Ethion dust at the rate of 20 to 30 pounds per acre or 1 to 2 pints of 4 pounds per gallon of emulsifiable concentrate Ethion spray; or Demeton (Systox) spray at the rate of 1 to 1½ pints of 2 pounds per gallon of emulsifiable concentrate per acre.

Each cotton field should be examined weekly, and control measures started as soon as leaves begin to show damage or when mites are found in large numbers. Treatment along field margins when spider mites first appear may prevent spreading over the entire field. It is advisable to treat the entire field when damage and/or mites are found through-

out the field or when several areas within a field are infested.

If spider mites are a problem during most years in a field, one application of a recommended miticide to the vegetation around the field about planting time or early in the growing season may prevent spider mites from becoming a problem later in the season.

In many fields effective cultural practices may reduce the need for chemical control of spider mites. The likelihood of spider mites occurring in cotton fields may be reduced by: (1) clearing weeds and other host plants from areas adjacent to cotton fields before planting; and (2) maintaining a barrier of broken soil about 10 feet wide around fields during the growing season. These precautions will reduce the possibility of spider mite introduction by machinery. However, weeds and brush should not be cleared from around fields during the growing season, since removal of the food supply forces these pests into the cotton field.

PRECAUTIONS

Miticides are poisonous to man and animals and should be handled with care. Apply these miticides at the recommended rates. Follow directions and heed all precautions on container labels.