Mites on Tree Fruits and Brambles in Indiana and Neighboring States

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Mites have long been known as important pests of tree fruits and brambles. In the last ten years they have appeared in threatening or damaging numbers much more generally and regularly than previously. Their increase in importance occurred coincidentally with the use of DDT and certain other insecticides. The circumstantial evidence placing at least some of the blame on the new insecticides has been confirmed by studies showing that many of them are extremely toxic to the natural enemies of mites. This is illustrated by the number of beneficial insects collected at the Vincennes laboratory under trees sprayed with DDT in 1945. The numbers of specimens per tree collected on tables 5 feet square were as follows:

Triphleps insidiosus	1225
Chrysopidae	475
Syrphidae	50
Pselaphidae	50
Stethorus punctum	175
Coccinellidae (other than *S. punctum*)	150

It is likely that many more predators were killed than these figures indicate. Some may not have fallen from the leaves or may have been blown away. Still others are so small that they may have been overlooked; these predators include predacious thrips, Mantispidae, and *Typhlodromus, Mediolata,* and *Pronematus* mites. In some areas the *Typhlodromus* mites are considered the most important predators of the injurious species. They are readily killed by DDT and other organic insecticides.

Mites reproduce rapidly under favorable condition. Populations can develop to injurious proportions almost before one realizes his fruit trees or berry bushes are infested. This is especially true following the application of sprays that destroy their natural enemies.

Mites have been known at least since the days of Linnaeus, but few scientists gave attention to their description and classification until recently. The result has been confusion and uncertainty concerning the identity of species. The situation is now greatly improved. More accurate descriptions and clearer keys have been prepared, which enable field workers to identify the more common species and the specialists to give accurate determinations. Misconceptions concerning genera and species are being rapidly cleared up and order is replacing confusion. The following publications have contributed greatly to the improved understanding of mite taxonomy during the last five years:

Mites of the Family Tetranychidae. E. A. McGregor. American Midland Naturalist 44 (2): 257-420, 1950.

A Guide to the Spider Mites of Deciduous Fruit Trees. A. Earl Pritchard and Edward W. Baker. Hilgardia 21 (9): 253-287, 1952.

A Guide to the Predatory Phytoseiid Mites of the United States. Frederick Cunliffe and Edward W. Baker. Pinellas Biological Laboratory, Inc., Publication No. 1, 28 pp., 1953.

A Revision of the Spider Mite Family Tetranychidae. A. Earl Pritchard and Edward W. Baker. San Francisco Pacific Coast Entomological Society Memoirs, Series 2, 472 pp., 1955.

The species of mites occurring in orchards and berry plantings in Indiana and surrounding states are only now becoming known. For many years injury by mites in this area was sporadic and light; in fact, the injury was often attributed to dry weather, lack of nutrition, or other devitalizing factors. The European red mite was the species most commonly found until recently. In 1945 L. F. Steiner encountered the two-spotted spider mite, and in 1948 he recorded a third species near Omaha, Ill., identified as *Septanychus* sp. at the time, but now believed to have been *Tetranychus canadensis* (McG). *Septanychus* is now a synonym of *Tetranychus*.

In 1952 surveys were initiated to determine the species of mites present on fruit crops in an area extending 486 miles from Benton Harbor, Mich., south to Jackson, Tenn., and 324 miles from Muncie, Ind., west to Louisiana, Mo. Although emphasis was placed on apples and peaches, other fruit crops, particularly those in the vicinity of orchards, were included. These surveys, which have continued to date, have provided valuable information on the distribution and abundance of the species occurring in that area.

The species collected have been divided into three groups for this report: plant feeders or injurious species, predacious or beneficial species, and those of undermined habits, thought to feed on mosses or lichens rather than on the tree itself. Collections and identifications of predacious mites were incidental to those of the plant feeding species. The identifications were made by E. W. Baker, of the Entomology Research Branch.

Plant Feeders or Injurious Species

Bryobia praetiosa Koch. It is known commonly as the clover or brown mite. The type specimens are from shrubbery in Germany. The only collection on fruit was from pears at Vincennes, Ind. This species is a pest of apples in other areas, and is a common nuisance in homes, especially in new developments around cities.

Eotetranychus frosti McGregor. The type specimens are from rose in Tempe, Arizona. The species was not described until 1952. It was collected on black raspberries near Louisiana, Mo., in 1952 and Vincennes, Ind., in 1953. These are the first known collections of this species in this area.

Metatetranychus ulmi Koch. Ih is known commonly as the European red mite. This species was described in 1836 from specimens collected near Regensburg, Germany. It was found throughout the area surveyed and on all kinds of deciduous fruits, but was not nearly as prevalent in Tennessee and southern Kentucky as farther north. It was generally present in southern Indiana, and north of Indianapolis was commonly the predominant species on apples. It is not a spinning mite and does not form a web.

Tetranychus atlanticus McGregor. The type specimens are from strawberry in Chadbourn, N. C. It was collected only on clover in an apple orchard at Louisiana, Mo. It most commonly occurs on low-growing plants, but has been reported to feed on apples and peaches.

Tetranychus canadensis McGregor. The type specimens are from apple in Ontario, Canada. It was collected on apples near Sodus, Mich.; Bristol, La Porte, Wabash, and Vincennes, Ind.; Cobden, Ill.; Henderson, Sturgis, Paducah, and Mayfield, Ky.; and Greenfield and Jackson, Tenn. This species was not collected on peaches or brambles. Although it was described originally from specimens collected in Canada, the heaviest infestations were found in Tennessee and southern Illinois, where it was often the dominant species.

Tetranychus mcdanieli McGregor. It is known commonly as the McDaniel mite. The type specimens are from raspberry at Bridgman, Mich. This species was collected on red raspberries near Stevensville, Mich. It is a serious pest of apples in the State of Washington and is know to infest apples and plums in that area. However, it is not generally of economic importance in the Midwest except on raspberry.

Tetranychus schoenei McGregor. It is known commonly as the Schoene or yellow mite. The type specimens are from apple at Winchester, Va. This species was collected on apples near Covington, Ind.; Belleville, Ill.; and Louisiana, Mo.; on peaches near Belleville, Ill.; and on black raspberry near Vincennes, Ind. In a large orchard near Belleville, Ill., this was the only mite present, and it was causing severe damage to both apples and peaches.

Tetranychus telarius L (= *bimaculatus* Harvey), commonly called the two-spotted spider mite. The type specimens are from Sweden. This species was collected on numerous occasions on apples, peaches, and plums throughout the area surveyed. It was more abundant in the southern half of Indiana than in the northern half. In the southern half it was often the predominant species on apples and peaches.

Predacious or Beneficial Species

Hemisarcoptes malus Shimer. It has been commonly taken on apples at Vincennes, Ind. This mite is also an important predator of scale insects. Like the typhlodromids, it is readily killed by DDT.

Typhlodromus fallacis Garman. This species was taken on apples at Covington, Mooresville, Linton, and Vincennes, Ind., and at Louisiana, Mo. It was also taken on red raspberry at Stevensville, Mich. It seems to be the most common typhlodromid mite found on apple in this area. Plant-feeding mites present at the same places include *Tetranychus telarius, schoenei, mcdanieli, canadensis*, and *Metatetranychus ulmi.*

Typhlodromus longipilis Nesbitt. This species has been taken on apple at Covington, Linton, and Vincennes, Ind. Plant-feeding mites present were *M. ulmi, T. canadensis, telarius*, and *schoenei.*

Mites of Undetermined Habits

Tarsonemids are often found on apple trees. In the investigations at Vincennes it was not determined that they were either injurious or beneficial, but it is believed that they are fungus feeders and not of economic importance. Like the typhlodromids, they are readily killed with DDT.