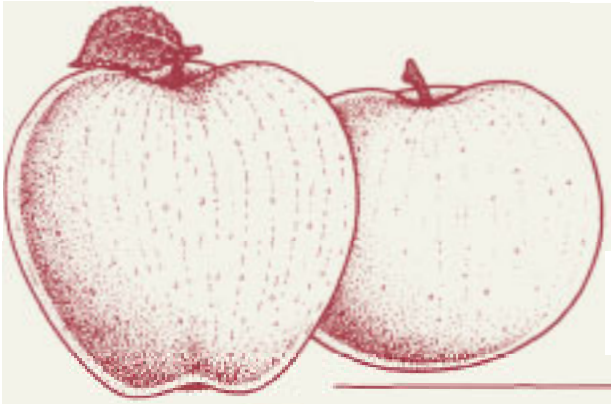

Biological Control of Mites on Apples in North Carolina

In North Carolina, the European red mite, *Panonychus ulmi* (Koch), and the twospotted spider mite, *Tetranychus urticae* (Koch), are two major indirect apple pests. When populations are large, leaves become bronzed. If the infestation becomes intense, trees may be defoliated. Although the fruit is not attacked directly, mite injury can decrease the size and number of fruit, reduce bud set the following season, and decrease fruit set, fruit firmness, soluble solids content, and fruit color. Damage severity depends on a number of factors, including crop load, cultivar, timing of mite injury, tree moisture stress, and the intensity of foliar diseases and insect pests. Healthy, properly thinned trees can tolerate mite injury better than stressed trees.

Sole reliance on chemicals for control of mites on apples is expensive and risky in view of rising miticide costs, the need for multiple applications if the infestation is intense, and the potential for mites to become resistant to the few miticides currently available. A preferred alternative is biological control. Conservation of natural mite predators has been an important component of the integrated mite-management program for more than 20 years.

Taking advantage of the mites' natural enemies requires an understanding of pest mites and their natural enemies, as well as the biotic and abiotic factors that affect these populations. This publication describes how to enhance the activity of mite predators in North Carolina apple systems, and how to determine if natural enemies alone can maintain pest mites below damaging levels, or if miticides also will be needed.

Identification and Biology

Plant-Feeding Mites

European red mite. This mite is the most common and destructive mite in North Carolina orchards, whereas the twospotted spider mite is occasionally a problem later in the season. The European red mite overwinters in the form of bright red eggs that are laid by females in the autumn on twigs and small branches, frequently near bud bases (Figure 1). Immature mites hatch when Delicious varieties begin to bloom. Adult female mites are red and oval with white spots at the base of dark bristles. Immature stages and adult males vary in color and may appear as

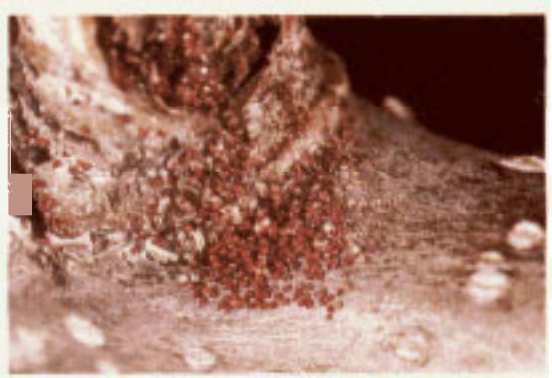

Figure 1.Overwintering European red mite eggs.

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