

## Section IV Biological and Cultural Control

### PREDATORY MITE RELEASES IN ORNAMENTAL NURSERIES

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#### OBJECTIVES:

- A. To study the effectiveness of three predatory mite species for two-spotted mite control in 'Greenspire' Linden and 'Autumn Blaze' Maple in nursery situations.
- B. To study establishment of predator mites under different prey density regimes and monitor two-spotted mite and predator mite distribution in plant canopies.
- C. To study the effect of other predators on two-spotted and predator mites.

#### METHODS:

Plots were established in 'Greenspire' and 'Autumn Blaze' plantings at three nurseries in 1996. The plants consisted of current-year whips grown 1 foot apart in rows 5 feet apart. A section of one row containing 150 trees was selected and divided into thirty five-tree plots. Six treatments, consisting of various combinations of predator mites with or without supplementary two-spotted mites as food for initial establishment, were randomly assigned to the plots. Each treatment was replicated five times. The treatments were:

1. *Neoseiulus californicus* released with supplementary two-spotted mites.
2. *N. californicus* released without two-spots.
3. *N. fallacis* released with supplementary two-spotted mites.
4. *Galendromus occidentalis* released with supplementary two-spotted mites.
5. *Galendromus occidentalis* released without two-spots.
6. Control-no predator release.

Plots were monitored once per week prior to, and after the release of predators. Three leaves on each of three trees per plot were sampled and quantified using a headband magnifier for presence of two-spotted and predator mites, and other predators. Releases were made after two-spot numbers reached an average of 2/10 mite per leaf, which occurred on June 27-28. Predators for



treatments 1, 2, 4 and 5 were obtained from a commercial insectary, and were released in their corn grit carrier. The release rate was deliberately high for these treatments, as establishment was one of our main objectives. 500 mites were released into the 25 trees used in all replications of each treatment, which at a 1' by 5' tree spacing, means a release rate of approximately 194,000 mites/acre. The *N. fallacis* were provided to us and had been raised on bean leaves with two-spotted mites as food. Release rates were much lower for this treatment, with approximately 50 mites total released on the 25 trees used in all replications, for a rate of 19,400 mites/acre.

## RESULTS:

Two-spotted mite numbers varied by site, with sites 1 and 2 having fairly low populations, and site 3 much higher average populations. Generally, two-spot numbers increased linearly across all sites throughout the sampling period, from 0.9 per leaf on July 8 to 7.3 per leaf on August 5. Predator numbers were higher in the weeks of July 29 and August 5 than the weeks of July 8, 15 and 22. The site which had the highest two-spot numbers also had the highest predator numbers. Generally, predator numbers were near zero per leaf in early samples, then increased to approximately 0.25 per leaf in later samples. Tree species had no effect on two-spot numbers at sites 1 and 2, but Linden supported a higher population at site 3. Predators generally established much better on Linden than Maple at all sites. There were significant site by treatment interactions, so treatment effects will be discussed for each site individually.

At site 1, there were no treatment effects on two-spot numbers through week 5, and predator establishment was short-lived. By week 3, predators from treatments 1 and 3 were found in highest numbers, but numbers diminished thereafter, with any predators difficult to find by week 5. Maples remained essentially free of two-spots through the sampling period. An increase in two-spot numbers on the Lindens after week 5 necessitated application of a miticide by the grower.

At site 2, there was also no treatment effect on two-spot numbers, but predators from treatment 3 consistently established better than other treatments from weeks 3 through 5. After week 5, an increase in two-spot numbers on basal leaves of Maples necessitated a miticide application. Two-spot numbers on the Lindens remained fairly low throughout the sampling period.

At site 3, treatments 1, 2 and 3 resulted in the lowest two-spot numbers overall from week 3 onward, although all predator treatments resulted in a general decrease in the two-spot population compared to the control. Predator establishment was generally best for treatments 1 through 3.

The complex of other predators varied between the sites. The most abundant arthropod predators generally speaking were the ladybeetles, *Stethorus* spp. and *Hippodamia* spp., which were consistently found throughout the sampling season in egg, larval and adult forms. Other predators found included green lacewings (*Chrysopa* spp.), which were seen later in the season, usually in egg or larval form. Spiders of several species were also found in increasing abundance



as the season progressed.

#### DISCUSSION:

The low establishment rate of *G. occidentalis* were similar to results obtained in 1995. It was expected that a native, arid-adapted mite such as *G. occidentalis* would be well-adapted to the sparse canopy of a young, field-planted shade tree. After the trials in 1995 with these same tree species, we felt that the failure of this mite to establish was a function of a late release date. The release this year was more timely, but *G. occidentalis* still did not establish. Considering that this mite has the ability to overwinter in this climate, our inability to achieve good establishment and two-spotted mite control with *G. occidentalis* are a disappointment.

The results with both *N. californicus* and *N. fallacis* are encouraging by comparison to those with *G. occidentalis*. The ability of *N. fallacis* in particular to establish was something of a surprise since it is thought to prefer a more humid habitat than that which is provided by young shade trees. Another potential advantage with this mite is its apparent ability to overwinter in the Willamette Valley. A release of *N. fallacis* in September of 1995 in field-planted *Viburnum* 'Newport', resulted in adult predators being found in the same plot in summer 1996. Two-spotted mite numbers in the release area were suppressed in comparison to areas of the plot where *N. fallacis* was not present.

Both *N. californicus* and *N. fallacis* exhibited the ability to establish and suppress two-spot numbers. The increase in two-spotted mite numbers that occurred later in the season, particularly at sites 1 and 2, are somewhat deceiving in that this increase was restricted to the very basal part of the trees. Growers are generally more concerned with the upper, and especially terminal, parts of the trees. Control of two-spotted mites in the upper portions of trees by *Neoseiulus* was quite good, although the presence of large numbers of mites in the basal part of the canopy is always cause for concern, particularly because of the difficulty of effective chemical control.

Work in 1997 will concentrate on refining release rates for *N. californicus* and *N. fallacis* and study of their dispersal in both shade trees and container-grown shrubs.