EFFECT OF DIFFERENT RELEASE RATES OF \textit{PHYTOSEIULUS PERSIMILIS} [\textit{ACARINA: PHYTOSEIIDAE}] ON THE TWOSPOTTED SPIDER MITE ON STRAWBERRY IN SOUTHERN CALIFORNIA

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The effect of different release rates of a predaceous mite, \textit{Phytoseiulus persimilis} \textsc{athias-henriot}, on the twospotted spider mite, \textit{Tetranychus urticae} \textsc{koch}, on strawberry was investigated in southern California in 1970-71. The spider mite population reached a peak of 206.3 active stages/leaflet in the low-rate (5/plant) release plot on May 4 and 169.1/leaflet in the high-rate (10/plant) release plot on May 18, compared to a peak of 433.4/leaflet in the control (no release) plot on May 11. The mean numbers of spider mites in the low-, and high-rate release plots were significantly different from the control from April 6 through June 15, but were never significantly different from each other. The predator population reached a peak of 13.1 and 23.8 active stages/leaflet in the low-, and high-rate release plots, respectively, on May 25 which was 3 weeks and 1 week after the spider mite population reached its peak in these plots. The seasonal mean numbers of spider mite active stages in the low-, and high-rate release plots were significantly different (P = 0.05) from the control, but were not significantly different from each other. There were no significant differences in fruit yield (g/plant) or fruit size between the low-, and high-rate release and control plots.

Mass releases of a predaceous mite, \textit{Phytoseiulus persimilis} \textsc{athias-henriot}, at rates equivalent to 320,000/acre effectively controlled the twospotted spider mite, \textit{Tetranychus urticae} \textsc{koch}, on strawberry (summer plantings) in southern California (OATMAN & MCMURTRY, 1966; OATMAN \textit{et al}., 1968). Although effective, this high rate of release is economically unfeasible because of the cost of mass producing large numbers of the predator.

An experiment to control the spider mite on a winter planting by releasing \textit{P. persimilis} at a rate equivalent to 86,250 active stages/acre was nullified by a flash flood which destroyed most of the planting (OATMAN & VOTH, 1972). Further experiments to determine a more economical, effective release rate of the predator are reported here.

MATERIALS AND METHODS

Approximately 7.5 ares of “Tufts” variety strawberry was planted on the University of California’s South Coast Field Station in Orange County on Aug. 25, 1970, at the rate of 22,400 plants/0.4 ha, using the double-row/bed planting method. The
planting consisted of 15 beds ca. 63 m long with 10 cm centers. Each bed consisted of 25 sub-beds of 10 plants each. Two unplanted spaces separated each sub-bed. Prior to planting, the soil was treated with 113 kg/0.4 ha of a 2:1 mixture of methylbromide and chloropicrin and then covered with a polyethylene tarp for 72 hr, according to the standard commercial procedure for control of soil microorganisms.

On Jan. 18, 1971, the plants were pruned (older, nonfunctioning leaves removed) and the beds mulched with polyethylene plastic. All pruned leaves were removed from the field as soon as possible. After mulching, the planting was divided into fifteen 90-plant plots, each 3 beds wide and 3 sub-beds long. To help reduce contamination of adjacent plots by *P. persimilis*, plots lengthwise of the field were separated by 3 beds of 2 sub-beds each; those crosswise by 2 beds of 3 sub-beds each. Three treatments (2 release rates and a non-release control) were established in a randomized complete block design and replicated 5 times.

Active stages of *P. persimilis* were released at 5 weekly intervals in the release plots, starting Feb. 2, 1971. The predator was released in one release plot at a rate equivalent to 5/plant (low-rate) and in the other at 10/plant (high-rate), the equivalent of 125,000 and 250,000/0.4 ha, respectively. Releases were made just after taking the weekly leaflet sample.

The predator was collected from an insectary culture into tubes made from plastic drinking straws and released by cutting the tubes in halves with scissors. The halves were laid ca. 1 m apart on the polyethylene mulch sheet, permitting the predators to disperse naturally.

The twospotted spider mite and *P. persimilis* populations were sampled at weekly intervals from Feb. 9 through June 22, 1971. A leaflet was taken from a lower, older, compound leaf from each of 20 random plants per each replicate through April 6, and from each of 15 plants thereafter. The leaflets were carried to the laboratory in a cold chest and refrigerated at 7°C until examined within 24 hr. Active stages of the spider mite and all stages of *P. persimilis* were counted directly by examining each leaflet under a dissecting microscope. The number of leaflets infested by prey and predator also were recorded.

Fruit yields (g/plant) were recorded by harvesting all ripe stawberries from the center bed of each plot at weekly intervals from mid-March through June.

**RESULTS AND DISCUSSION**

The twospotted spider mite population reached a peak of 206.3 active stages/leaflet in the low-rate (5/plant) release plot on May 4 and 169.1/leaflet in the high-rate (10/plant) release plot on May 18, compared to a peak of 433.4/leaflet in the control (no release) plot on May 11. Besides being more than twice as high at its peak, the spider mite population remained at a higher level for a longer period of time in the control plot than in the release plots. The mean numbers of spider mites in the low-, and high-rate release plots were significantly different from the control from April 6 through June 15 but were never significantly different from each other (table 1). The percentage of leaflets infested by spider mites increased more slowly in the release plots (especially in the high-rate release) and declined sooner than in the control plot. The infestation reached 100% in the low-, and high-rate release plots on April 27 and May 4, respectively, and remained at that level through May 25. In the control plot, all leaflets were infested by April 20, remaining so through June 1. By June 22, the mean numbers of spider mites in all plots were less than 0.5/leaflet and the infestation was less than 18% (table 1).

The *P. persimilis* population reached a peak of 13.1 and 23.8 active stages/leaflet in the low-, and high-rate release plots, respectively, on May 25 which was 3 weeks