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EENY-359

Predatory Mite, *Neoseiulus californicus* (McGregor) (Arachnida: Acari: Phytoseiidae)[1]

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Introduction

The predatory mite *Neoseiulus californicus* (McGregor) has characteristics of both type II specialist predatory mites and type III generalist predatory mites. *N. californicus* prefers Tetranychid mites as food, but will also consume other mite species, small insects, such as thrips, and even pollen when the primary prey is unavailable.

N. californicus is often used to control the twospotted spider mite, *Tetranychus urticae* Koch, and other phytophagous mites on various crops in temperate and subtropical regions around the world.

Synonymy

N. californicus has a very complex taxonomic history. It was first described by McGregor in 1954 from lemon in California as *Typhlodromus californicus*. After 1954, it was moved to the genus *Amblyseius* and later to the genus *Neoseiulus* or *Cydnodromus*, and now *Neoseiulus chilenensis* (Dosse) is considered a synonym of *N. californicus*.

Figure 1. Adult *Neoseiulus californicus* (McGregor) feeding on a twospotted spider mite, *Tetranychus urticae* Koch. Credits: Lyle Buss, University of Florida

Distribution

Natural populations of *N. californicus*, are found in Argentina, California, Chile, Florida, Japan, South Africa, Texas, parts of southern Europe, and all along the border of the Mediterranean Sea. *N. californicus* has been found on many crops including avocado, citrus and other fruit trees. They are also found on cassava, corn, grapes, strawberries, and several vegetable crops and ornamental plants. They prefer warm 10 - 33°C (50 - 91°F) temperatures, but they

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can tolerate much colder temperatures for short periods of time. For example, they can survive the winters in north Florida where temperatures can fall below freezing at night. They can tolerate a wide range of humidity (40 - 80% relative humidity), but prefer humidity at the upper end of this range.

Description

N. californicus eggs are football shaped, approximately 0.04 mm (0.00016 in) in length, and are pale whitish in color. Larvae have only six legs and are translucent in color. Both nymphal stages, the protonymph and the deutonymph, resemble the adults except that they are smaller and cannot reproduce. Adult females are approximately 0.1 mm (0.00039 in) in length and oval in shape. Males are slightly smaller than females. Both males and females are translucent and can be pale orange, peach, or pink in color.

Figure 2. Two eggs of *Neoseiulus californicus* (McGregor) attached to leaf hairs on a strawberry leaf. Credits: Elena M. Rhodes, University of Florida

Life Cycle

N. californicus females can lay up to four eggs a day. However, two eggs per day is the average. Eggs take from 1.5 to 4.0 days to hatch depending on the temperature. Eggs hatch into six-legged larvae, which can progress to the protonymphal stage without feeding. The larval stage can last from 0.5 to 1.0 day. *N. californicus* then passes through two nymphal stages: protonymph and deutonymph. Both stages (protonymph and deutonymph) are active feeders. Each nymphal stage can last from 1.0 to 3.0 days. Total developmental time can be as short as 4.0 days

Figure 3. Dorsal view of a *Neoseiulus californicus* (McGregor) larva indicated by pointer. An adult *N. californicus* and a cluster of spider mite eggs are shown for size comparison. Credits: Jack Kelly Clark, University of California

Figure 4. Dorsal view of adult female *Neoseiulus californicus* (McGregor) on a strawberry leaf. Credits: Elena M. Rhodes, University of Florida

or as long as 12.0 days depending on the temperature. *N. californicus* develops more quickly at higher temperatures. Adults live for approximately 20 days.

N. californicus develops faster when consuming the twospotted spider mite, *Tetranychus urticae* Kotch, than when consuming other prey sources. However, it will also successfully develop and reproduce when consuming other mite species including: *Aculus schlenchtendali* (Nalepa), *Oligonychus pratensis* (Banks), *O. perseae* Tuttle, *O. ilicis* (McGregor), *Panonychus ulmi* (Koch), *Phytonemus pallidus* (Banks), *Polyphagotarsonemus* (*Stenotarsonemus*) *latus* Banks (the broad mite), and *Phytonemus pallidus* L. (the cyclamen mite). Many

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of these mites are crop pests. It can also survive and reproduce by consuming thrips and other small insects, but reproduction is very low. *N. californicus* can even survive for a short period of time by consuming only pollen.

Figure 5. A strawberry leaf infested with twospotted spider mite, *Tetranychus urticae* Koch, adults and their eggs. Credits: Lyle Buss, University of Florida

Economic Importance

N. californicus is used commercially around the world to control the twospotted spider mite and several other economically important mites on avocado, citrus, dwarf hops, grapes, raspberries, roses and other ornamentals, strawberries, and several vegetable crops. It has been shown to effectively control the twospotted spider mite and *P. pallidus* on strawberries in glasshouses in the UK and in greenhouses in Argentina. In the U.S., *N. californicus* has been used successfully to control twospotted spider mites on field grown strawberries in southern California and Florida. *N. californicus* has also been used to control the twospotted spider mite on dwarf hops and to control *O. perseae* on avocado, to mention a few examples.

The recommended release rate depends on pest species, pest density, and crop. In strawberry, a release rate of one female *N. californicus* per plant will maintain twospotted spider mite populations below the threshold level (5% of leaves infested). *N. californicus* can also tolerate applications of certain miticides, which are sometimes used to knock down a high population of twospotted spider mites before predatory mites are released.

Figure 6. Commercial presentation of *Neoseiulus californicus* (McGregor) to be released on the field (courtesy of Koppert Biological Supply Co.). Credits: Elena Rhodes, University of Florida

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