



*Neoseiulus (Amblyseius) cucumeris* is a predatory mite that feeds on a broad range of insect and mite pests, including whiteflies, thrips, and mites. *Neoseiulus cucumeris* can be released into greenhouse production systems to manage western flower thrips, *Frankliniella occidentalis*, populations on ornamental and vegetable crops. This publication discusses the biology, behavior, commercial availability, use in greenhouses, and quality assessment of *N. cucumeris*.

## Biology and Behavior

*Neoseiulus cucumeris* adults are  $\frac{1}{64}$  to  $\frac{1}{32}$  of an inch (0.4 to 0.8 millimeters) long, pear-shaped, and light brown (Figure 1A). The life cycle consists of an egg, larva, two nymphal stages, and an adult. The life cycle, from egg to adult, can be completed in six to 12 days at 77 degrees Fahrenheit (25 degrees Celsius). Adults can live up to 35 days.

An adult female can lay up to 35 eggs during her lifespan. Eggs are  $\frac{1}{100}$  of an inch (0.14 millimeter) in diameter and white (Figure 1B). Females lay eggs along the midrib on leaf undersides. Nonfeeding, six-legged larvae emerge (eclose) from eggs in two to three days at 68 degrees Fahrenheit (20 degrees Celsius). Two nymphal stages (deutonymph and protonymph) are present for seven to

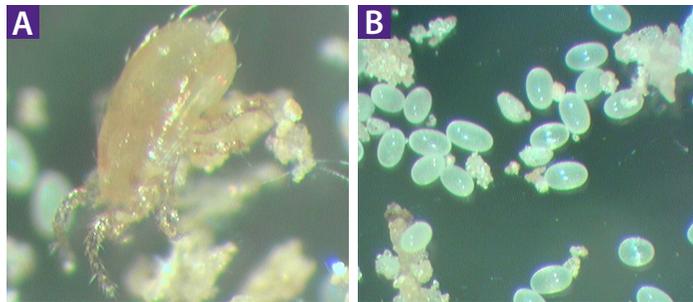


Figure 1A. *Neoseiulus cucumeris* adult.  
Figure 1B. Eggs associated with *Neoseiulus cucumeris* (Photos: Raymond Cloyd).



Figure 2A. Sachet or slow-release bag containing *Neoseiulus cucumeris* adults, nymphs, and eggs.  
Figure 2B. Sachets containing *Neoseiulus cucumeris* placed among a greenhouse-grown crop (Photos: Raymond Cloyd).

10 days before becoming adults. The nymphal stages and adults have eight legs.

Development of the life cycle, from egg to adult, varies with temperature. The life cycle takes 11 days at 68 degrees Fahrenheit (20 degrees Celsius), eight days at 77 degrees Fahrenheit (25 degrees Celsius), and six days at 86 degrees Fahrenheit (30 degrees Celsius). The nymphal stages and adults are mobile and actively search for prey. *Neoseiulus cucumeris* is most active at temperatures between 68 and 81 degrees Fahrenheit (20 to 27 degrees Celsius) and a relative humidity between 65% and 80%.

*Neoseiulus cucumeris* is generally located on leaf undersides, along leaf veins, and in flowers. *Neoseiulus cucumeris* feeds on the immature stages of insect and mite pests including sweet-potato whitefly, *Bemisia tabaci*; western flower thrips, broad mite, *Polyphagotarsonemus latus*; cyclamen mite, *Phytonemus pallidus*; and tomato russet mite, *Aculops lycopersici*. *Neoseiulus cucumeris* larvae and adults feed on the first instar (stage between each molt) larvae of western flower thrips.

*Neoseiulus cucumeris* use their mouthparts to pierce the first-instar larva of the western flower thrips and withdraw body fluids. Western flower thrips second-instar larvae and adults defend themselves by striking *N. cucumeris* with their abdomens, which is why *N. cucumeris* prefers to feed on western flower thrips first-instar larvae. In addition, western flower thrips adults produce a liquid substance that covers the body of *N. cucumeris*. Consequently, *N. cucumeris* will not attack western flower thrips but instead spend time cleaning (grooming) themselves.

*Neoseiulus cucumeris* feeds on pollen as an alternative food source, which sustains *N. cucumeris* populations when western flower thrips populations are low or when western flower thrips are not in a susceptible life stage (first-instar



Figure 3A. Label on container of *Neoseiulus cucumeris*.  
Figure 3B. Applying *Neoseiulus cucumeris* manually to plant leaves (Photos: Raymond Cloyd).

larvae). Temperature can affect the number of western flower thrips killed by *N. cucumeris*, with feeding reduced when temperatures are lower than 68 degrees Fahrenheit (20 degrees Celsius). Adult predatory mites can inhibit western flower thrips larvae from feeding, which may reduce plant damage. Plants with hairs (trichomes) such as cucumber, *Cucumis sativus*, can reduce the ability of *N. cucumeris* to manage western flower thrips populations.

## Commercial Availability and Use in Greenhouses

*Neoseiulus cucumeris* is available from most suppliers of biological control agents as sachets or slow-release bags (Figure 2A) that contain eggs, immatures (larvae and nymphs), and adults of *N. cucumeris* mixed with a bran carrier. The sachets also contain bran mites, *Tyrophagus putrescentiae*, as a temporary food source. Sachets are placed within greenhouse-grown crops (Figure 2B). *Neoseiulus cucumeris* emerges over a four- to six-week period. Most *N. cucumeris* emerge from the sachets in the first week. Adults emerge from the sachets through small holes and then disperse among greenhouse crops when plant leaves are touching. Sachets need to be in contact with plant leaves and stems, and protected from direct sunlight.

*Neoseiulus cucumeris* is available in containers of 20,000 predatory mites mixed with vermiculite (Figure 3A). The predatory mites are distributed onto crops by placing them on plant leaves (Figure 3B) or using a blower (Figure 4). Lightly mist plants with water before releasing *N. cucumeris* so the predatory mites do not fall off plants. *Neoseiulus cucumeris* takes three to four weeks to establish within a



**Figure 4.** Mechanical blower used to distribute *Neoseiulus cucumeris* in a greenhouse (Photo: Raymond Cloyd).

crop, so releases should be made early in the crop production cycle when western flower thrips populations are low.

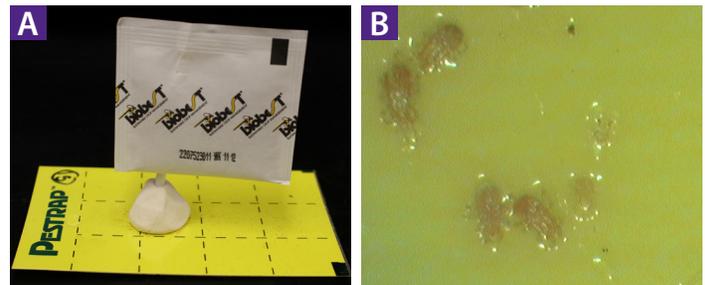
The ability of *N. cucumeris* to manage populations of the western flower thrips depends on the length of the crop production cycle. For example, a short production cycle (two to three months), such as for bedding plants, may not allow enough time for populations of *N. cucumeris* to establish and increase in time to manage western flower thrips populations. Consequently, *N. cucumeris* may be more effective in managing western flower thrips populations on long-production cycle (greater than three months) crops such as vegetables.

## Quality Assessment

Follow the procedure below to verify that *N. cucumeris* is emerging from the sachets. Sample five sachets from each shipment received from the supplier.

- Insert a single sachet into a mold of clay placed on a yellow sticky card (Figure 5A).
- Record the number of predatory mites that emerge from the sachet and are captured on the yellow sticky card (Figure 5B) after one, two, and three weeks.
- Refer to biological control supplier information regarding the number of *N. cucumeris* that should emerge from each sachet.

*Neoseiulus cucumeris* is a predatory mite that can be used to manage western flower thrips populations in vegetable and ornamental cropping systems with minimal usage of insecticides.



**Figure 5A.** Sachet containing *Neoseiulus cucumeris* inserted into clay placed on a yellow sticky card.

**Figure 5B.** Close-up of *Neoseiulus cucumeris* adults captured on yellow sticky card (Photos: Raymond Cloyd).

**Raymond A. Cloyd**

*Horticultural Entomology and Plant Protection Specialist*

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