

Eretmocerus eremicus

Biological Control Agent of Whiteflies

Eretmocerus eremicus (formerly *E. sp. nr. californicus*) is a parasitoid of the greenhouse whitefly, *Trialeurodes vaporariorum*, and the sweetpotato whitefly, *Bemisia tabaci*.

Eretmocerus eremicus can be released into greenhouse production systems to manage whitefly populations on ornamental and vegetable crops. This publication discusses biology and behavior, commercial availability, and quality assessment associated with *E. eremicus*.

Biology and Behavior

Eretmocerus eremicus adults are $\frac{1}{50}$ to $\frac{1}{32}$ of an inch (0.5 to 0.75 millimeters) long. Females are lemon-yellow with clubbed antennae and have two blue-green compound eyes and three red spots on the head (Figure 1). Males are yellow-brown and have elbowed antennae. The female-to-male ratio is almost 1:1 (60% females and 40% males).

The female uses her antennae to probe a whitefly nymph (larva) to assess suitability for development of a larva before laying a single egg between the underside of a whitefly nymph and leaf surface. Females can lay eggs more easily underneath whitefly nymphs on plant leaves with hairs (trichomes) than whitefly nymphs on smooth plant leaves. In addition, females prefer laying eggs underneath second- and third-instar whitefly nymphs.

A single female can lay between 50 and 200 eggs during her lifespan. A larva emerges (ecloses) from an egg after approximately four days. The larva attaches to the underside of a whitefly nymph and creates a hole that allows the larva to enter the body cavity. The larva is inactive until the whitefly pupates. When the whitefly reaches the pupa or fourth nymphal stage, the larva releases digestive enzymes that liquefy the body contents of the whitefly. There are three larval instars (stages between each molt). Whitefly



Figure 1. *Eretmocerus eremicus* adult female (Photo: Raymond Cloyd).

pupae parasitized by *E. eremicus* are light-gray (Figure 2) to yellow-brown, whereas nonparasitized whitefly pupae are white or yellow.

The adult parasitoid is visible through the cuticle (skin) of the dead whitefly pupa before emergence. The adult parasitoid emerges by chewing a circular opening through the top portion of a dead whitefly pupa.

The time required to complete the life cycle, from egg to adult, varies depending on temperature. For example, the life cycle takes 17 to 18 days at 74 degrees Fahrenheit (23 degrees Celsius) and 48 days at 63 degrees Fahrenheit (17 degrees Celsius) to complete. The optimal temperatures for development and egg production are between 77 and 84 degrees Fahrenheit (25 and 29 degrees Celsius). *Eretmocerus eremicus* adults can tolerate temperatures >104 degrees Fahrenheit (40 degrees Celsius).

Adult females live about 14 days at 68 degrees Fahrenheit (20 degrees Celsius) and 20 days at 75 degrees Fahrenheit (24 degrees Celsius); however, adult longevity depends not only on temperature but also on food availability. Adults feed on honeydew, a clear sticky liquid produced by whiteflies, as a food source. In addition, *E. eremicus* females feed on whitefly nymphs to obtain nutrients for egg production. A single female can kill up to 30 whitefly nymphs per day by probing them repeatedly with her ovipositor (egg-laying device), and then feeding on the blood (hemolymph) that exudes from the wounds.

Commercial Availability

Eretmocerus eremicus is commercially available from distributors and suppliers of biological control agents as release cards (Figure 3) containing parasitized whiteflies in which



Figure 2. Whitefly pupae parasitized by *Eretmocerus eremicus* (Photo: Raymond Cloyd).

adults will emerge. Before placing release cards among a crop, be sure to remove yellow sticky cards so *E. eremicus* adults are not captured. Yellow sticky cards are used to monitor whitefly adult populations. Two weeks after placing release cards among a crop, replace yellow sticky cards. Place release cards on the lower leaves of plants to reduce exposure to sunlight. Also, do not get the release cards wet when watering plants.

Quality Assessment

Follow the procedures below to ensure *E. eremicus* adults are emerging from the release cards.

1. Place a single release card into a Mason jar. Attach a 1.0 × 1.0 inch (2.5 × 2.5 centimeter) yellow sticky square onto the underside of the lid using double-sided sticky foam (Figure 4).



Figure 3: Release card containing *Eretmocerus eremicus* inside parasitized whiteflies (Photo: Raymond Cloyd).



Figure 4: Release card containing *Eretmocerus eremicus* inside Mason jar and yellow sticky square attached to underside of the lid (Photo: Raymond Cloyd).

2. Record the number of *E. eremicus* adults captured on the yellow sticky square (Figure 5) after four, seven, and 10 days.
3. Record the number of parasitized whitefly pupae per release card. Divide the number of *E. eremicus* adults captured on the yellow sticky square by the total number of parasitized whitefly pupae per release card. Multiply by 100 to obtain percent emergence of adult parasitoids.

Eretmocerus eremicus can be effective in managing whitefly populations in various vegetable or ornamental cropping systems. For example, greenhouse producers can use *E. eremicus* to manage whitefly populations on poinsettia, *Euphorbia pulcherrima*, crops (Figure 6) with minimal inputs from insecticide applications.



Figure 5: *Eretmocerus eremicus* adults captured on yellow sticky square (Photo: Raymond Cloyd).



Figure 6: Release card containing *Eretmocerus eremicus* placed among a poinsettia crop (Photo: Raymond Cloyd).

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