



dr. bugs

BY RAYMOND A. CLOYD

Biological Control Agents for Whiteflies



Question: *What commercially available biological control agents can be used to regulate whitefly populations in greenhouse production systems?*



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Answer: Whiteflies are major insect pests of many greenhouse-grown horticultural crops (e.g., vegetables and ornamentals) including: basil, chrysanthemum, cucumber, dahlia, eggplant, fuchsia, geranium, hibiscus, lantana, petunia, poinsettia, salvia, tomato, transvaal daisy and verbena. The two most commonly encountered species are the greenhouse whitefly, *Trialeurodes vaporariorum*, and the sweetpotato whitefly, *Bemisia tabaci*.

Although there are many insecticides that are registered for use against whiteflies, another means of managing whitefly populations is releasing biological control agents (natural enemies).

The release of biological control agents into greenhouses is an effective strategy for regulating whitefly populations. However, it is important to note that biological control agents must be released early or preventively before whiteflies are present. Consequently, you should order biological control agents early in the production cycle and release immediately upon receipt. In addition, you must understand the optimal environmental conditions (e.g., temperature, relative humidity and photoperiod) associated with all biological control agents to ensure their effectiveness in regulating whitefly populations.

The biological control agents commercially available for whiteflies include the parasitoids, *Encarsia formosa* and *Eretmocerus eremicus*; and the predators,



Figure 1. Adult sweetpotato whitefly.



Figure 2. Whitefly adults and nymphs located on leaf underside.

Delphastus catalinae and *Amblyseius swirskii*. Be sure to order these biological control agents early and conduct a quality assessment upon receipt and prior to release to ensure that the biological control agents are alive. Remember that biological control is a preventative plant protection strategy so biological control agents should be released before whitefly populations are present on the crop (e.g., poinsettia). Contact a supplier or distributor of biological control agents for information on the

PARASITOIDS	COMMENTS
<i>Encarsia formosa</i>	A parasitoid used against the greenhouse whitefly. Females prefer to lay eggs into third- and fourth-instar nymphs. Adult females feed on nymphs. Parasitized whitefly pupae are black. Optimum temperatures for regulating whitefly populations are 68 to 77° F. Development, from egg to adult, is completed in 14 days at temperatures greater than 80° F. The parasitoid is less effective in parasitizing whiteflies on plants with trichomes (hairs) such as cucumber.
<i>Eretmocerus eremicus</i>	A parasitoid used against the greenhouse and sweetpotato whitefly. Females prefer laying eggs into second- and third-instar nymphs. Adult females will feed on nymphs. <i>Eretmocerus eremicus</i> tolerates higher temperatures than <i>Encarsia formosa</i> .
PREDATORS	COMMENTS
<i>Delphastus catalinae</i>	A predatory ladybird beetle in which both the larvae and adult feed on whitefly eggs and nymphs. Adults will feed on greenhouse and sweetpotato whitefly but prefer sweetpotato whitefly. Females lay between 200 and 300 eggs during their lifetime. Adults live between 45 and 60 days. A single adult can feed on 160 eggs per day. Adults do not feed on parasitized whiteflies.
<i>Amblyseius swirskii</i>	A predatory mite that feeds on whitefly eggs and nymphs and will feed on pollen as an alternative food source if no whiteflies are present. Optimum temperatures for regulating whitefly populations are 77 to 83° F. The life cycle, from egg to adult, can be completed in less than seven days. <i>Amblyseius swirskii</i> is less effective in regulating whitefly populations on plants with trichomes (hairs) such as tomato.

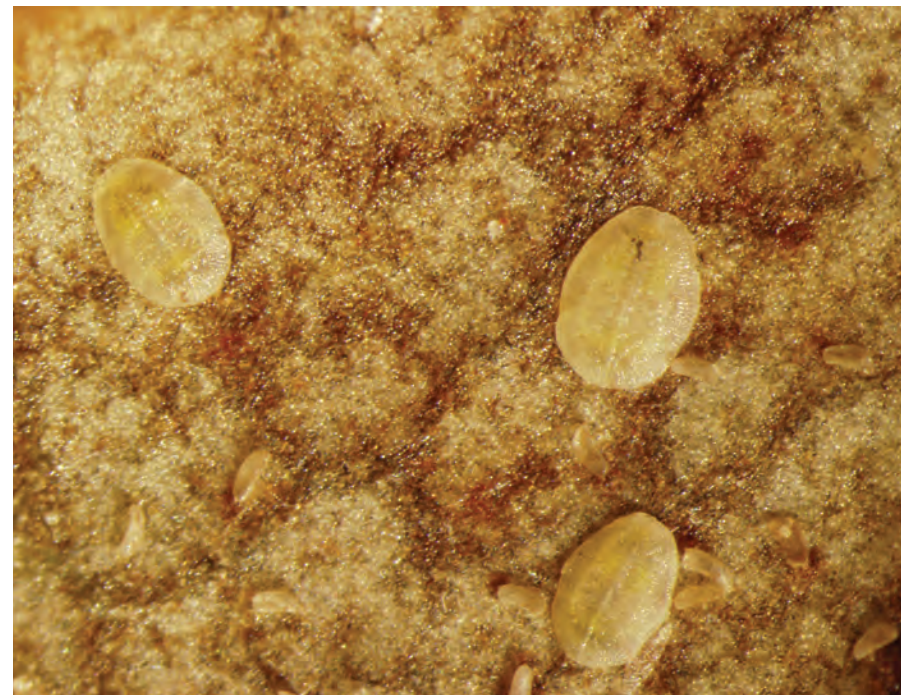



Figure 3. Whitefly nymphs.


release rates that are required to regulate whitefly populations. The biological control agents that are commercially available for use against whiteflies are presented in Table 1.

For more information on the management of whiteflies in greenhouse production systems using biological control agents, and images of the four biological control agents discussed in Table 1, download the following Extension publication: “Whiteflies: Management in Greenhouse Production Systems” available at www.bookstore.ksre.ksu.edu/pubs/MF3532.pdf. gpn

Table 1. Commercially available biological control agents (parasitoids and predators) for use against whiteflies in greenhouse production systems.



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