



Foliage

You Can Bank On It

Banker plants can be used to rear natural enemies to help control greenhouse pests.



By **Lance S. Osborne**
(lso@ifas.ufl.edu)
and **J.E. Barrett**

Biological control is only one tool in our pest-management arsenal. Its success depends on the other tools that will be used and the availability of beneficial organisms. Whitefly control using any of the available natural enemies will only work if the foundation of the program has been established. The foundation consists of methods to prevent, detect, and manage the other major pests. In certain notable cases, there are good and effective natural enemies for secondary pests. However, experience has shown reliance on too many natural enemies can be complicated and slowly adapted.

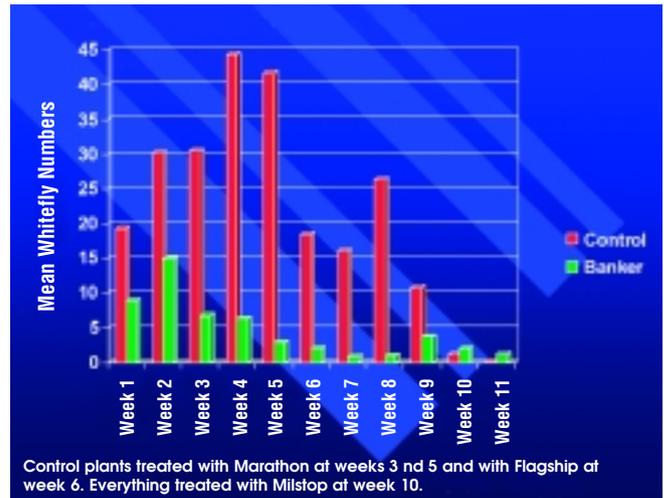
Growers move to biological controls for many reasons, but a crisis is often the motivation for many of those that have been successful. The crisis is often the loss of effective chemical controls for a primary pest, such as mites, whiteflies, or leaf miners. As a result, the biological control agents are often forced into existing pest-management programs. In the past, many of the pesticides used precluded integration of these tactics. New chemistry and, in some cases, new natural enemies make this less of an obstacle. With the introduction of the whitefly referred to as the

Bankers And Biologicals

The number of pesticide tools available for managing this new whitefly is so limited that biological tools will be one of the only methods by which we can preserve the effectiveness of pesticides.

Because the establishment phase of a biological control program is the most critical and often the most difficult, we have concentrated on the development of techniques that will help in this phase. One tool that significantly increases the potential for establishing natural enemies is called a banker plant. The benefits of banker plants are that they:

- Provide natural enemies not commercially available.
- Provide growers with methods they can use to evaluate the quality of purchased beneficials.
- Increase the probability of establishment.
- Make the use of biological control more economical and reliable.



Control plants treated with Marathon at weeks 3 and 5 and with Flagship at week 6. Everything treated with Milstop at week 10.

The amount of healthy immature whiteflies on poinsettia stock plants was substantially less with the use of banker plants.

There are two types of banker plant systems. One system uses the same pest species or crop pest as the one that is to be managed. This system, obviously, poses a significant risk. The second system uses a fictitious, surrogate, or alternate host or prey. This host is reared on plants that aren't grown as a crop in the greenhouse where they will be used. They should have a limited host range that does not include the plants being grown commercially.

How The System Works

The crops are the plants to be protected, such as ornamentals or herbs. The crop pest is the organism that is the focus of the management program. Examples include two-spotted spider mite, melon aphid, and silver-leaf whitefly.

The alternate host is an organism that will not feed on the crop, but on another easily grown plant that is of no economic value and would otherwise not be found in proximity to the crop. The alternate host is also an organism on which natural enemies will feed and reproduce. Examples of alternate hosts are bird-cherry aphid



At left is a healthy whitefly pupa, and on the right is one that has been killed by *Encarsia transvena*. The black color indicates that the adult parasite has not emerged from the dead whitefly yet.

Q-biotype of *Bemisia tabaci* and perceived problems controlling the B-biotype in many crops, the importance of biological control in a resistance management program can't be overemphasized.

enemies on it. This terminology is restrictive and does not allow for the sachets used to produce *Neoseiulus cucumeris* or the bucket-rearing system used to produce parasitoids and predators of mealybugs.

Two Types

A banker plant (also known as an open-rearing system) is a plant that has a population of reproducing natural

(*Rhopalosiphum padi*), greenbug (*Schizaphis graminum*), corn-leaf aphid (*R. maidis*), Papaya whitefly (*Trialeurodes variabilis*), and banks grass mite (*Oligonychus pratensis*).

Banker plants are the plants on which the alternate host will be reared. Examples are winter barley or wheat, sorghum, corn, and papaya.

The natural enemy or organism feeds on both the crop pest and the alternate host. Natural enemies include *Encarsia transvena*, *Aphidius*

colemani, *Stethorus* spp., *Feltiella acarisuga*, *Scolothrips sexmaculatus*, *Galendromus occidentalis*, *Neoseiulus californicus*, and *Phytoseiulus persimilis*.

Using Banker Plants Properly

We don't recommend the use of banker plants as the only control method. Pesticides can be



Adult silverleaf whitefly (*Bemisia tabaci* B-biotype)

used as spot treatments to manage hot spots or they can be used toward the end of the crop prior to shipping. The use of effective materials sparingly during the production phase and toward the end of the crop significantly reduces the potential for the development of resistance and allows for the shipment of clean plants.

Papaya banker plants are currently being sold by the Seminole County Jail, making them economically available to the public. This system is only available in Florida.

As part of a grant from the National Foliage Foundation, we conducted a demonstration trial in the University of Florida Department of Environmental Horticulture greenhouses on poinsettia stock plants (see graph on page 26). The importance of this study is that whiteflies are much more difficult to manage on poinsettia than almost any foliage plant. We felt that if we could manage whiteflies on this crop using banker plants, we could manage them on most foliage plants. The results exceeded our expectations. We will perform this study again in commercial foliage greenhouses on other host plants as soon as issues surrounding the Q-biotype are resolved.

In summary, banker plants provide growers with more options for biological control of pests in greenhouses. They can offer a means for rearing natural enemies that aren't commercially available, while providing growers with a method to evaluate the quality of purchased beneficials. Banker plants increase the probability that beneficials will become established and they are an economical method of providing a reproducing population of natural enemies. They also reduce reliance on pesticides, thus reducing insect resistance to applied chemical controls. We are currently evaluating banker plant systems for mites, aphids, and mealybugs.

Additional banker plant photos and information are available at www.mrec.ifas.ufl.edu/lso/banker/banker.htm. ■

Lance S. Osborne is a professor of entomology at the University of Florida/Institute of Food and Agricultural Sciences Mid-Florida Research and Education Center in Apopka, FL. J.E. Barrett is a professor of floriculture in the Department of Environmental Horticulture at the University of Florida in Gainesville.