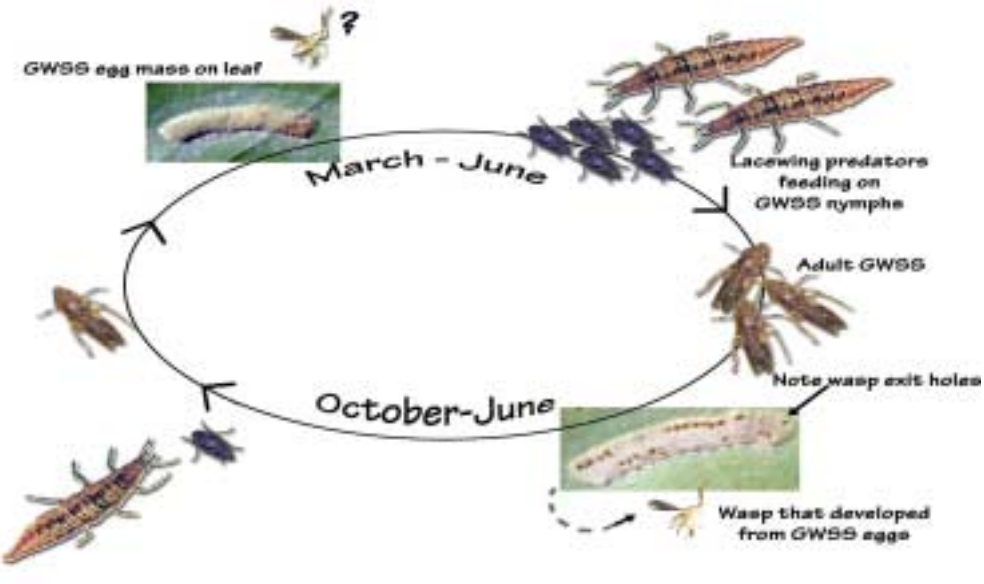
Biological Control

One of the most promising long-term solutions for controlling the glassy-winged sharpshooter may be biological control. Biological control serves to identify and introduce natural enemies to minimize the glassy-winged sharpshooter population.

Currently, localized outbreaks of the sharpshooter found outside the known infested areas are being suppressed with selective applications of carbaryl and other materials. However, restricting this pest with natural enemies is a more sustainable approach.

The California Department of Food and Agriculture has had a strong commitment to biological control since 1977. Traditional biological control involves collecting natural enemies that can be found in the pest's native range, rearing large numbers of these natural enemies and releasing them so they can begin to exert control over the unwanted pest populations. Before the insects are released, they are rigorously evaluated in a controlled laboratory environment to make sure that there will be no unwanted impacts on non-target plants or animals. The U.S. Department of Agriculture will only issue a permit for release of new biocontrol agents after this evaluation is completed.

A key objective of the program's biological control component is to locate a full complement of parasites and predators that can attack multiple life stages of the sharpshooter. These natural enemies will also have to have the ability to survive the extremes of California's environment, including dry summers, winter freezes and urban settings. Releasing large numbers of parasites or predators at the right time in the season will reduce the need for insecticides.



A complement of natural enemies is needed to control various stages of the glassy-winged sharpshooter throughout the season.

The CDFA has budgeted approximately $2 million in Fiscal Year 2000/2001 to develop the biological control program. Ten scientists from the CDFA, the University of California and the USDA are currently engaged in foreign exploration, establishing rearing facilities, evaluating possible natural enemies for pilot field releases prior to broad scale releases of suitable natural enemies.

Sharpshooter in California

The glassy-winged sharpshooter is native to the southeastern United States and northeastern Mexico where naturally occurring parasitoids drive populations down, making sharpshooters difficult to find. Currently, the most effective natural enemies appear to be stingless parasitoid wasps that attack sharpshooter eggs. In some areas of California, up to 85% of the glassy-winged sharpshooter egg masses are attacked by a native parasitoid in late summer. Although this stingless wasp readily attacks the sharpshooter eggs in late summer and early fall, new imported wasps are needed to attack the pest in the spring. Other predators are also needed to attack the immature stages of the sharpshooter.

Natural enemies are imported from the native range of glassy-winged sharpshooter. The wasp is about three times its actual size relative to the sharpshooter.

Accomplishments

Discovered new parasitoids
Working with University of California researchers, the CDFA scientists have made two exploratory trips to Mexico and the southeastern U.S. to find and collect natural enemies of the sharpshooter in its native range. As a result, two new stingless wasp parasitoids known to attack and kill glassy-winged sharpshooter eggs have been collected, imported, and released into California.

Assessed environmental impacts
An important phase in assessing the suitability of a new parasite is determining whether it will attack non-pest organisms, such as valuable native insects. The parasitic wasp imported from Mexico received rigorous screening at a quarantine facility at the University of California in Riverside. Other natural enemies will also be evaluated as required by the USDA.

Established rearing protocols
In order to increase the chances that a new natural enemy will become established and have an impact on the pest organism, large numbers of the new insect must be reared and released. The process for rearing the sharpshooter parasitoid is complex. Host plants must be raised to serve as food for a colony of sharpshooters. The eggs produced by these lab-reared sharpshooters are then used to

rear the wasp parasitoids. Over the last year, staff members from UC Riverside and the CDFA have been developing a rearing protocol for the sharpshooter and associated parasitoids.

Coordinated multi-agency effort
The program's biological control component has developed partnerships with the USDA, the University of California and county agricultural commissioners. The CDFA has taken the lead in importing new biocontrol agents, with the USDA providing funding and personnel, the University of California providing research and expertise in support of these efforts and the agricultural commissioners providing local support. Traditional biological control follows several steps as shown in the table below. The roles for each of the cooperating agencies in this project are based on their expertise and resources.

Roles of Cooperating Agencies

Activity	Agencies
Collect new parasitoids in U.S. & Mexico	UC Riverside & CDFA
Collect new parasitoids in South America	USDA
Screening & host testing	UC Riverside
Rearing & field testing	CDFA & UC Riverside
Mass rearing & regional releases	CDFA & USDA
Evaluation	CDFA

Trial Releases of Parasitoids
University of California researchers have released 1,200 parasitoid wasps in Riverside, Kern and Ventura Counties. Scientists from the University and the CDFA are monitoring these release sites to determine if the parasitoid survives and has an impact on glassy-winged sharpshooter populations.

Help from private industry
In a continuing effort to foster public/private partnerships, the CDFA has contracted with a private biocontrol rearing operation to produce glassy-winged sharpshooter eggs. These eggs, produced in an area that is already infested, will be used to increase populations of the wasp parasitoid.

The **Future**

While the biological control component has made significant progress, considerable work remains in the following areas:

Additional foreign exploration
USDA staff has made arrangements for exploration in South America to search for additional parasitoids that will attack either the egg or immature stage of the glassy-winged sharpshooter.

The CDFA will resume foreign exploration for new natural enemies of the glassy-winged sharpshooter next spring. New agents will be screened initially under controlled laboratory conditions to determine their effectiveness and suitability for release in California.

Improved rearing protocols
UC Riverside and CDFA staff members are testing new rearing techniques for the glassy-winged sharpshooter. Studies include:

(1) Determining the best mix of plants to rear the sharpshooter;

(2) Improving artificial diets;

(3) Testing hydroponics for rearing the hosts of the sharpshooter; and

(4) Developing ways to induce the insect to lay eggs during the winter (which they don't normally do).

New rearing facilities
A former USDA field station in Riverside is being retrofitted for rearing insects. Host plants will be grown and insects reared under controlled environmental conditions to protect them from summer and winter extremes. The facility will be secured to prevent parasitic wasps from invading the sharpshooter rearing area. Negotiations are underway to secure greenhouse space at the UC Riverside campus and Kern County is being considered for an additional rearing facility.

Colonizing new natural enemies
To increase the chances of successful establishment, new natural enemies must be released in an environment that will support their survival. In search of the optimal habitat for parasitoids, CDFA will be evaluating a number of sites throughout infested areas of the state. Once new natural enemies are released in the field, their impact on sharpshooter populations will be measured carefully to determine if the new predator or parasite significantly reduces the pest populations.