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Kern/Tulare

GWSS Update

A project of the Glassy-winged Sharpshooter Task Force of Kern and Tulare Counties. Participants: Agricultural Commissioner's Offices of Kern and Tulare Counties, California Department of Food and Agriculture, University of California-Cooperative Extension, U.S. Department of Agriculture (APHIS and ARS Divisions).

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Researchers follow *Xylella* pathways

(Editor's note: This is an author-revised version of the article published Aug. 6, 2004 in GWSS Update*.)*

How important are glassy-winged sharpshooter (GWSS) populations in the urban regions as vectors of the bacterial pathogen *Xylella fastidiosa* (*Xf*) in nearby agricultural areas?

First, GWSS population densities have been relatively low in many of the San Joaquin Valley urban centers such as Bakersfield. This is a result of urban pest management practices and biological control by egg parasitoids.

Second, GWSS has a relatively low transmission efficiency of the bacterial pathogen, *Xf*, under greenhouse conditions.

Together, the low density and poor transmission efficiency would suggest few GWSS would have *Xf* in their mouthparts and play any role in the movement of the pathogen in and around ornamental landscaping.

However, recent surveys have found a significant number of adult GWSS, collected on a variety of ornamental plants in Bakersfield, tested positive for *Xf.* This may be of concern if some GWSS move *Xf* strains that cause Pierce's disease (PD) between ornamental plants and vineyards throughout the season, with the non-symptomatic ornamental plants acting as a reservoir for both the insect vector and the pathogen.

Researchers have been screening adult and nymphal GWSS, collected from different ornamental plants, for *Xf* as well as the strain of bacteria present. This information will provide a picture of possible pathways through which *Xf* may be moved between ornamental plantings and vineyards.

Adult GWSS. GWSS have a relatively long lifetime, especially during the cooler months. Moreover, during their lifetime, adults and even nymphs will repeatedly switch host plants and, with each new plant visit, they have the potential to acquire *Xf* from an infected host plant. *Xf* can remain in the mouthparts of an adult GWSS indefinitely and therefore can be spread to any plant that it subsequently feeds on.

Researchers tested adult GWSS collected from ornamental plants in Bakersfield, and found *Xf* in GWSS (mouthparts) collected from oleander, Xylosma, Chinese elm, and riparian plants (e.g., blackberries) (Table 1).

The positive results do not necessarily indicate that the GWSS acquired the *Xf* from the plants that they were found feeding on as the adults move between host plants often. Researchers expected some of the GWSS collected in the riparian area would test positive for *Xf*, since there are numerous host plants typical of riparian zones, including blackberry, elderberry, and coast live oak (*Purcell & Saunders. 1999. Plant Disease. 83: 825-830*). However, it was surprising how many of the tested insects from the urban areas also tested positive.

Nymphal GWSS. How important are GWSS nymphs in the movement of *Xf* among ornamental plants? Nymphs shed the lining of their gut with each molt before adulthood, loosing any *Xf* living there as well as their ability to transmit the bacteria. Because GWSS nymphs have less movement among plants and regions than the adults, researchers will be sampling nymphal populations from specific host plants throughout the San Joaquin Valley to assess levels of *Xf*.

The initial screening of GWSS nymphs used a "presence" or "absence" of groups of nymphs collected and therefore data are presented as such, rather than a percentage (Table 1). In the initial collections, *Xf* was found only in GWSS nymphs collected from oleander (in the Bakersfield region). We did not recover *Xf* from nymphs collected on Xylosma, crape myrtle, Chinese elm, riparian

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"It is important to stress that the *Xf* strain found in GWSS collected on ornamentals and in urban regions has not been the strain that causes Pierce's disease."

— Elaine Shapland, Kent M. Daane, Glenn Y. Yokota, Alexander Purcell and Christina Wistrom – UC Berkeley; Murray Pryor and Jennifer Hashim – UCCE Kern County; Marshall W. Johnson – UC Riverside

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plants, flowering pear, euonymus, pittosporum or abelia.

***Xylella* strain differences.** All GWSS samples testing positive for *Xf* were analyzed for bacterial strain differences. Preliminary analysis shows that the bacteria present are not of the PD type, but could be oleander, almond, oak, peach or plum. Most likely the *Xf* is oleander strain, which does not pose an immediate threat to nearby vineyards because this strain does not cause PD in grapes (and the grape strain does not cause disease in oleander).

Impact on control strategies. To date, oleander is the only known systemic *Xf* host on which positive GWSS have been collected. Researchers will continue to screen GWSS from ornamental plants for *Xf*. Urban centers may be found to provide a "sink" (GWSS move into the regions but do not move out) rather than a "source" (infected GWSS move from urban regions into agricultural regions) for GWSS and *Xf*.

The research, however, has broader implications for use of ornamental landscape and riparian plants within agricultural settings (e.g., landscaping around farm buildings and homes). Plants which act as preferred hosts for both vector and pathogen can be targeted for control. By testing GWSS for the presence of *Xf*, researchers will identify potential sources of the pathogen, thereby preventing potential epidemic spread of PD causing *Xf* throughout a reservoir of ornamental host plants.

Table 1: GWSS collected in urban and riparian areas testing positive for *Xylella fastidiosa*

Plant Host	Location	Adult GWSS	Nymph GWSS
Oleander	Bakersfield	18.2%	Yes
Xylosma	Bakersfield	7.6%	No
Crape myrtle	Bakersfield	5%	No
Flowering pear	Bakersfield	-	No
Pittosporum	Bakersfield	-	No
Abelia	Bakersfield	-	No
Chinese elm	Bakersfield	100% (1 sample)	No
Riparian plants	Bakersfield	100% (1 sample)	No
Euonymus	Bakersfield		No

To see a list of host plants, for both *Xf* and GWSS go to: http://nature.berkeley.edu/xylella.

It is important to stress that the *Xf* strain found in GWSS collected on ornamentals and in urban regions has not been the strain that causes PD. Therefore, the damage caused by these dispersing GWSS is minimized until they reach either the vineyard or host plants with the more economically damaging *Xf* strains.

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