EPIDEMIOLOGY OF PIERCE'S DISEASE IN THE COACHELLA VALLEY

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INTRODUCTION

The table grape industry in the Coachella Valley is represented by 14,400 acres of producing vines (California Department of Food and Agriculture 1999), which generated grapes valued at $131 million in 1998 (Jose Aguiar, Riverside County Farm Advisor, personal communication). In the past, Pierce's disease (PD), a disease caused by the xylem-limited bacteria, *Xylella fastidiosa* Wells et al., has occurred in the Valley, but incidence has been limited to fields bordering weedy areas. *X. fastidiosa* is transmitted from infected to healthy plants by sharpshooters, a group of insects in the family Cicadellidae.

In 1997, PD was documented in the wine grape-growing region of the Temecula Valley in southern California. Unlike the Coachella Valley and other areas in the state where PD is known to exist, the Temecula growers suffered devastating losses. A survey of 8 Temecula vineyards, conducted in September 2000 found plant decline or death due to PD ranging from 51%-87% (Perring et al. 2001). The most plausible explanation for the swiftness and severity of the PD epidemic in Temecula is the unique epidemiology created when the glassy-winged sharpshooter (GWSS), *Homalodisca coagulata* (Say) is introduced into an area with endemic PD sources (Purcell and Saunders 1999). When this occurred in Temecula, the epidemic mimicked the southeastern US, where GWSS-transmitted PD is the major factor limiting grape production.

The glassy-winged sharpshooter was identified in the Coachella Valley in the early 1990's (Blua et al. 1999). There are no apparent biological or climatological factors that will limit the spread of PD in grapes in the Coachella Valley. Our work reported here was designed to document the current levels of PD in the Coachella Valley and to describe the seasonal cycle of the GWSS. This will allow us to identify characteristics of vineyards with high and low disease incidence for the purpose of designing strategies to minimize PD spread.

OBJECTIVES

During the first year of our project, we focused on two objectives.

1. Determine the incidence and distribution of Pierce's disease (PD) in the Coachella Valley.
2. Describe the spatial and temporal abundance of GWSS in the Coachella Valley and determine site characteristics that may be contributing to GWSS abundance.

RESULTS AND CONCLUSIONS

PD Incidence*:* Sampling for PD was done in two ways. Growers and their field workers were invited to attend one of a series of workshops where they were exposed to PD symptomatology. Each attendee was given a PD booklet (Varela et al. 2001) to take to their vineyards to help further train their workers. As suspect plants were found, growers contacted us and we traveled to the vineyard, confirmed their visual detection, and collected tissue for ELISA analyses. No PD was detected in any of the samples.

The second sampling method involved the selection of 25 vineyards distributed throughout the Coachella Valley. At each vineyard, we intensively sampled 3 blocks of approximately 100 vines per block. Trained researchers conducted the visual surveys of these approximately 7,500 plants, and tissue was collected from plants suspected of having the disease. Approximately 180 samples were collected and subjected to ELISA and bacterial plating. None of the samples were positive with both techniques.

GWSS Abundance: For this study, we placed traps every square mile throughout the Coachella Valley. These 163 traps were changed each week and the numbers of GWSS and the related smoke-tree sharpshooter (STSS), *Homalodisca lacerta* (Fowler) were counted. Sampling started on May 14, 2001 (Julian date 134). Counts showed that average numbers of GWSS were low throughout the Valley and over the time period that we have sampled. The average number/trap/day ranged between 0.01 and 0.16, and as expected, count data were quite variable (Figure 1). This reflects the fact that many of the traps had no sharpshooters on them. Also, there was no difference between sharpshooter numbers found on the north versus the south sides of traps, therefore a wind-driven component to sharpshooter flight is not suspected at this time (data not shown).

There were substantially more GWSS than STSS on most dates (Figure 1). An interesting decline occurred in GWSS numbers between dates 197 - 204 (July 16 - 23), and we are looking at weather patterns to determine if GWSS was responding to any particular condition. When we looked at vegetation and ecological types surrounding the traps, we found some interesting relationships. Three are described here. We determined that traps next to urban landscapes (residences, edge of communities, etc.) had similar numbers of sharpshooters as did traps not adjacent to these areas. Second, we found that traps adjacent to grapes had no more sharpshooters than did traps not adjacent to grapes, thus it does not appear that vineyards are contributing to sharpshooter numbers at this time. Third, we found that traps adjacent to citrus caught significantly higher numbers of sharpshooters than traps not adjacent to citrus (Figure 2). This suggests that citrus contributed to the sharpshooter abundance in the Coachella Valley. Recent work has determined a relationship between citrus and PD incidence in the Temecula Valley (Perring et al. 2001), and there are aggressive campaigns to treat large areas of citrus elsewhere in the state. Our data do not support such action in the Coachella Valley. In our trapping studies, we found that only 33% of the traps adjacent to citrus caught GWSS while the other 64% of the traps next to citrus did not catch any GWSS (Figure 3). Thus our recommendation at this time is to monitor citrus carefully, and implement management strategies only where sharpshooters reach high numbers.

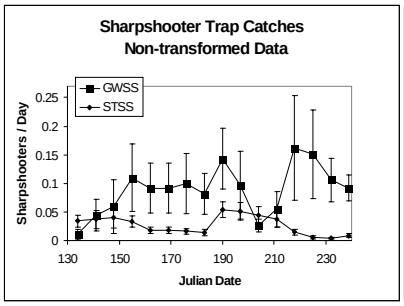

Figure 1

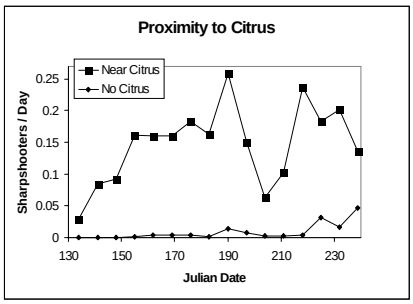

Figure 2

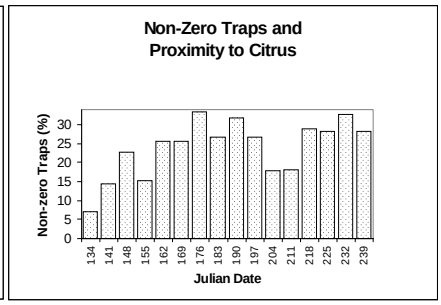

Figure 3

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