EVALUATION OF BLUE-GREEN SHARPSHOOTER FLIGHT HEIGHT

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Reporting period: The results reported here are from work conducted February 2004 to September 2006.

ABSTRACT

Flight heights of blue-green sharpshooters (BGSS) were monitored in Napa Valley vineyards from March through September for three seasons (2004-2006) using pole towers to position yellow sticky panel traps at heights up to 24 feet. Towers were located adjacent to vineyards at the edge of a riparian zone. Eleven towers were monitored in 2004 and 2006; twelve were monitored in 2005. Trap catches in 2004 were considerably greater than in 2005 and 2006. For the March-May period, 76-99% of the catches were made at 15 feet or lower. These data support the possible use of screen or natural barriers to reduce the number of BGSS entering vineyards in the spring.

INTRODUCTION

Where the blue-green sharpshooter, *Graphocephala atropunctata,* (BGSS) is the primary vector of Pierce's disease (PD), control measures should be aimed at reducing the number of BGSS entering vineyards (Goodwin and Purcell 1992), especially early in the growing season. Early-season infections (March-May) are responsible for most chronic cases of PD vectored by BGSS (Purcell 1975, 1981). Infections resulting from BGSS feeding later in the growing season are not likely to result in PD because most will be eliminated with normal pruning. This is unlike the situation with PD caused by glassy-winged sharpshooter (GWSS) feeding, where chronic infections may occur nearly year-round (Almeida and Purcell 2003).

Vector control measures in the North Coast include the use of insecticides (Goodwin and Purcell 1992) as well as management of riparian plant communities to reduce the number of favorable BGSS breeding host plants (Insley, E., et al. 2000).

Another method of reducing vector numbers is to block their flight into vineyards through the use of physical barriers. This could include the use of tall fences made with insect screening materials, as well as natural barriers created by planting dense stands of conifers or other non-host tree species. Both of these approaches are already being employed in a few vineyards in the North Coast, although there are currently no data to show their impacts. The use of barriers has also been suggested as a management tactic to keep GWSS out of vineyards (Blua and Morgan 2003).

For barriers to be effective, they would need to block the majority of BGSS from entering vineyards, since small numbers of insects can still lead to significant disease development (Purcell 1979). Unfortunately, little is known about the overwintering behavior of BGSS and its preferred winter plant hosts (Purcell 1976). Therefore, it is not clear how tall a barrier would need to be in order to be effective. Most trapping by both researchers and growers has been done from the ground at the 5-6 foot level.

This project addresses the question of BGSS flight height by installing and monitoring pole towers that can accommodate yellow sticky panel trapping up to a height of approximately 24 feet.

OBJECTIVES

1. Evaluate the predominant flight height of BGSS entering vineyards from adjacent riparian habitats through the use of yellow sticky panel traps positioned at heights from 5 to 24 feet.

RESULTS

Eleven pole towers were installed and monitored in the Napa Valley in 2004 and 2006; twelve towers were monitored in 2005. Two of the towers monitored in 2004 were not used in 2005 due to the low number of BGSS trapped at those locations. Three additional towers were installed in 2005. One tower used in 2004 and 2005 was not used in 2006 due to low trap counts. Eight towers were monitored in the same locations in all three seasons. Tower locations covered a distance of approximately 25 miles from the Carneros region in southern Napa County to the outskirts of Calistoga at the north end of Napa Valley. Towers were positioned along riparian zones adjacent to vineyards that had a history of PD.

A diagram of a pole tower is shown in Figure 1. Towers were 25 feet in height, constructed from Schedule 40 PVC pipe with a pulley at the top and a rope running through it. Yellow sticky panel traps were attached to clips on the rope at the following heights: 24 feet, 20 feet, 15 feet and 10 feet. An additional trap at 5 feet was clipped to a metal stake mounted in the ground.

Towers were installed prior to March 9 in 2004 and 2005. In 2006, several towers were damaged by flooding and were not functional until early April. Traps were monitored on a weekly basis through September and numbers of BGSS were recorded. Traps were replaced every two weeks or as needed.

Figure 2 shows the percentage of BGSS trapped at various heights at all towers during the early season period of March-May. This is the critical time period in which most infections leading to chronic cases of PD are likely to occur (Purcell 1975, 1981).

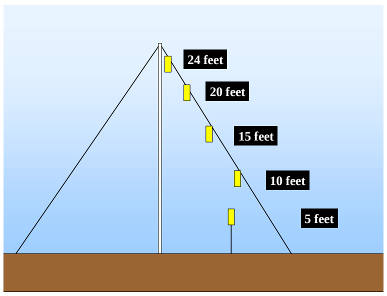

Figure 1: Pole tower diagram.

From March to May, 99% and 86% of BGSS were caught at 15 feet and lower in 2005 and 2006 respectively. During this same time period in 2004, 76% of BGSS were caught in traps 15 feet and lower. With the exclusion of unusual trap catch data from Tower 10 prior to budbreak in March 2004, this figure rises to 88% (Weber 2005). Tower 10 was installed adjacent to a Coast Live Oak tree (*Quercus agrifolia*), an evergreen species that was apparently a preferred host plant prior to budbreak of nearby deciduous species. A record heat wave in early March 2004 (70-85°F) led to significant BGSS flight activity in the vicinity of this tree as evidenced by larger numbers of BGSS caught in the upper traps. This was the only case of greater numbers of BGSS in the upper traps compared to the lower traps during the three years of this study at all towers.

Figure 3 shows the percentage of BGSS trapped at various heights at all towers during the entire trapping period March-September. The data in Figures 2 and 3 show similar trends with most BGSS being caught in traps at 15 feet and lower. In 2004, 83% of BGSS were trapped at 15 feet or below. In 2005 and 2006, 94% and 90% were trapped at 15 feet or below, respectively.

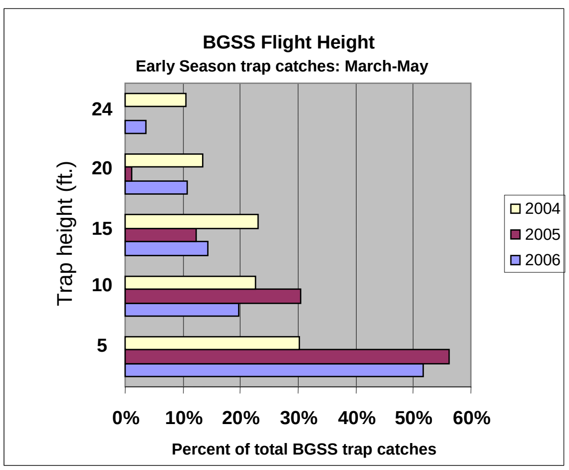

Figure 2. March-May BGSS trap catches by trap height as a percent of total.

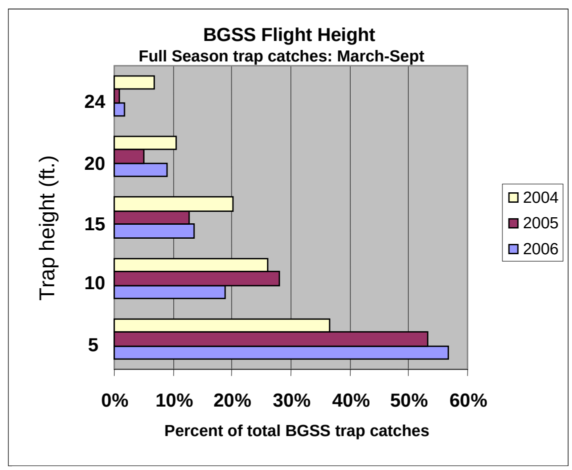

Figure 3. Full season BGSS trap catches by trap height as a percent of total.

Figures 4 and 5 show the total trap catches for the March-May and March-September periods respectively. The data included in these figures are from the eight towers that were monitored at the same locations in all three years. The average cumulative trap catches per tower were 47.6 BGSS in 2004, 11.9 in 2005, and 4.6 in 2006.

The results from this project suggest that a 15-18 foot high barrier could be effective at greatly reducing the number of BGSS entering vineyards. However, previous work with insecticides showed that even with 70-90% reductions in BGSS trap counts, the incidence of PD was not significantly reduced in vineyards planted with highly sensitive varieties (Purcell 1979). Even with a 10-18 foot screen barrier, the number of BGSS flying over the top could still result in significant amounts of PD in an adjacent vineyard.

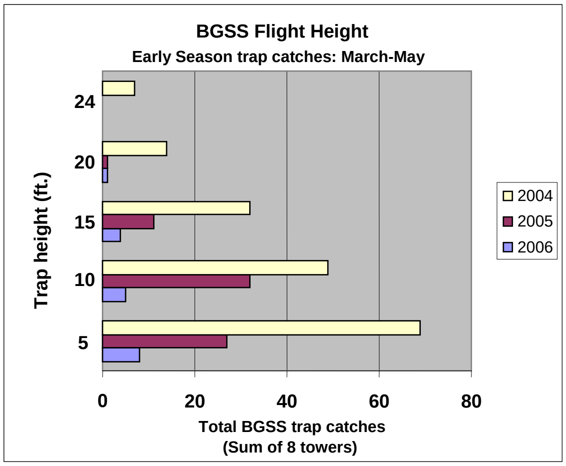

Figure 4. March-May BGSS trap catches. Total counts 2004-2006 from the eight towers used all three years.

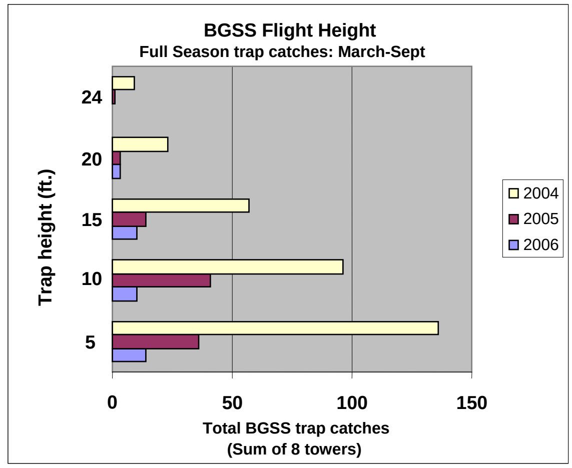

Figure 5. Full season BGSS traps. Total counts 2004-2006 from the eight towers used all there years.

CONCLUSIONS

Nearly 90% of the BGSS trapped in this study were caught on traps at 15 feet or lower. This suggests that barriers could have a significant impact on reducing the numbers of BGSS entering vineyards. However, this may not be enough to have a major impact on reducing the incidence of PD. In addition, results from one tower indicated that BGSS may reside in some trees early in the season. This could allow for higher than normal flight activity, allowing more BGSS to enter vineyards by flying over a barrier. The effectiveness of barriers at reducing the incidence of PD will likely depend upon the nature of the adjacent riparian plant community, its mix of host plant species and the number of tall host trees.

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FUNDING AGENCIES

Funding for this project was provided by the CDFA Pierce's Disease and Glassy-winged Sharpshooter Board.

THE ROLE OF OLFACTORY CUES IN HOST-PLANT SELECTION BY THE GLASSY-WINGED SHARPSHOOTER

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ABSTRACT

The glassy-winged sharpshooter (GWSS) is a highly polyphagous and mobile vector of Pierce's disease of grapes. Trap captures in a multi-crop agricultural landscape under constant deficit irrigation suggest that adult GWSS movement is tied to irrigation schedules. To understand the observed patterns of movement, we explored the orientation and feeding responses of adult GWSS toward citrus and avocado plants undergoing various levels of water-deficit and nutritional treatments. Choice and no-choice cage studies indicate that GWSS distinguishes water-stress in hosts and prefers to settle on and feed more on well-hydrated plants. GWSS showed no significant response to a choice of citrus fertilized with ammonium or nitrate forms of nitrogen.