# IMPACT OF LAYERING CONTROL TACTICS ON THE SPREAD OF PIERCE'S DISEASE BY THE GLASSY-WINGED SHARPSHOOTER

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## ABSTRACT
A variety of plant and insect treatment combinations were evaluated as to their ability to prevent/limit Pierce's disease of grapes. A combination of neonicotinoids (imidacloprid plus acetamiprid) and kaolin film provided the best protection against glassy-winged sharpshooter, reducing densities by approximately 90%. The same treatment combination reduced sharpshooter oviposition by 75%. Egg parasitism was unaffected by any of the treatments. The layering of neonicotinoids and kaolin limited the incidence of PD to 30% after 18 months, but PD incidence climbed to above 70% in all treatments after 30 months. Antibiotic therapy (metalosate), alone or in combination, did not affect PD incidence.

## INTRODUCTION
Solutions to managing and controlling Pierce's disease of grapes are often conceptualized as ways of breaking at least one two-way interaction among the insect, plant, and bacteria components that are required for successful disease spread and propagation. Hypothetical solutions may also involve altering the abiotic and biotic environment within which these interactions take place. On the basis of our understanding of Pierce's disease epidemics, as well as other insect transmitted plant pathogen systems, one single control tactic (especially focused upon the insect) will not be sufficient to substantially reduce vector populations such that the incidence of disease is below an economically acceptable level. One management and control strategy that potentially may be utilized to limit the damage brought about by Pierce's disease involves layering separate vector and disease management tactics together such that vector population densities are reduced, their interactions with grapevines are inhibited or disrupted, and the interface between grapevines and the disease organism, *X. fastidiosa*, is disrupted. Here we report on our efforts to simultaneously implement (i.e. "layer") various control strategies currently available to limit the spread of Pierce's disease transmitted by the glassy-winged sharpshooter, *Homalodisca coagula.*

## OBJECTIVES
Our specific objectives are to determine the ability of a variety of treatment and treatment combinations on 1) their ability to reduce glassy-winged sharpshooter density and feeding and 2) their ability to reduce the rate of spread of Pierce's disease in newly planted vineyards. The research site was established in April of 2001 at the Agricultural Operations facility located on the campus of the University of California, Riverside. One thousand grape vines were acquired from SunRidge Nursery in early may and planted on May 16, 2001. The variety utilized in this study is Chardonnay 04 on S04 rootstock. Vines were planted with 6 ft spacing between plants and 12 ft spacing between rows and watered with drip irrigation. At total of 10 rows of 100 vines per row was planted. Treatment and treatment combinations evaluated are 1) imidacloprid at full rate, 2) imidacloprid at 1/2 rate, 3) a combination of imidacloprid plus acetamiprid, 4) metalosate, 5) kaolin, 6) imidacloprid-acetamiprid combination plus kaolin, 7) imidacloprid-acetamiprid combination plus metalosate, 8) metalosate + kaolin, 9) imidacloprid-acetamiprid combination plus kaolin plus metalosate, and 10) control (water only). Treatments involving acetamiprid could not be evaluated until Fall of 2002.

## RESULTS
Results indicated that there was a significant difference among treatments with respect to the number of sharpshooters found on experimental plants for 2001, 2002 and 200 (Figure 1). As expected plants treated only with metalosate (a potential prophylactic treatment for Pierce's disease) supported similar numbers of sharpshooters as untreated control plants. Overall plants treated with kaolin demonstrated reduced numbers of sharpshooters relative to the untreated controls during 2001and 2002. Plants treated with imidacloprid exhibited the lowest numbers of sharpshooters. For 2001 and 2002, there were no significant differences in the numbers of sharpshooters found on plants treated with kaolin as compared to the numbers found on insecticide treated plants. Kaolin failed to lower sharpshooter numbers in 2003. No experimental treatment has yet resulted in complete protection from sharpshooters; consequently, all treated plants remain at risk of exposure to *X. fastidiosa*. With the exception of metalosate, all treatments were reasonably effective in reducing sharpshooter numbers throughout the fall season. Within each year, differences among treatments were lost as sharpshooter numbers naturally declined at the end of fall. In all three years, a combination of imidacloprid, acetamiprid and kaolin was most effective at reducing overall sharpshooter numbers; however, it should be noted that a significant number of sharpshooters was found on all treated plants throughout the growing season.

Experimental treatments were also evaluated as to their impacts on sharpshooter oviposition (relative number of egg masses deposited per plant) and sharpshooter egg parasitism by Mymarid parasites. Plants treated with a combination of imidacloprid