



Reduced-Risk Pest Control Factsheet

Kaolin Clay for Management of Glassy-winged Sharpshooter in Grapes

California vineyards are facing the combination of an old threat and a new vector—Pierce's disease, a xylem-clogging bacterial disease which was first identified over 100 years ago, now has a new and efficient vector, the glassy-winged sharpshooter (GWSS) *Homalodisca coagulata*. Pierce's disease is incurable and will generally kill a vine within two years of infection. It has a very wide host range (over 170 hosts), and it's feared that it may already be present in most areas of California, representing a potential time bomb that may explode with the appearance of an efficient vector, such as the GWSS.

A native of the southeast U.S. and first found in Ventura County in 1990, the GWSS is a strong flier, able to travel distances of a quarter mile or more.

Other crop diseases caused by the Pierce's disease bacterium (*Xylella fastidiosa*) include: almond leaf scorch, phoney peach disease, alfalfa dwarf, oleander leaf scorch and citrus variegated chlorosis.

Other vectors of Pierce's disease include the blue-green, smoke tree, green, and red-headed sharpshooters. Compared to the GWSS, the blue-green sharpshooter is a poor flier and a much less efficient disease vector. Because of its voracious feeding behavior and high mobility, management of the



Kaolin particle film barrier as it appears on blueberry. Adequate coverage of all leaf and fruit surfaces is crucial.



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Homalodisca coagulata. Its transparent wings give the glassy-winged sharpshooter its common name.

GWSS will depend on the integration of several tactics, including biological control, vegetation management, monitoring, and other strategies.

What is kaolin and how does it work?

A relatively new technology, kaolin sprays are currently available under the tradename Surround WP Crop Protectant. Please note that Surround is, at this point in time, the *only* kaolin product suitable and registered for horticultural use. The kaolin in Surround is processed to a specific particle size range, and combined with a sticker-spreader. *Non-processed kaolin clay may be phytotoxic.* We have heard of one apple grower who bought a traincar load of "generic" kaolin clay, and killed most of his apple trees!

Surround presents a unique form of pest control: a non-toxic particle film that places a barrier between the pest and its host plant. The active ingredient is kaolin clay, an edible mineral long used as an anti-caking agent in processed foods, and in such products as toothpaste and Kaopectate. There appears to be no mammalian toxicity or any danger to the environment posed by the use of kaolin in pest control.

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Surround is sprayed on as a liquid, which evaporates, leaving a protective powdery film on the surfaces of leaves, stems, and fruit. Conventional spray equipment can be used, and full coverage is important. The film works to deter insects in several ways. Tiny particles of the clay attach to the insects when they contact the plant, agitating and repelling them. Even if particles don't attach to their bodies, the insects may find the coated plant or fruit unsuitable for feeding and egg-laying. In addition, the highly reflective white coating makes the plant less recognizable as a host.

Modes of Action

Repellency

- White color visually repels some insects, or acts to disguise the plant
- Unfamiliar touch cues
- Difficulty gripping surface

Irritation

- Particles stick to insect parts
- Confusion and excessive grooming
- Obstacle to feeding and egg-laying

Surround has proved to be a very effective management tool for most species of leafhoppers, including the sharpshooters. Results from research conducted in California on GWSS control in lemon are very promising. In grapes, the combined effect of “disguising” vines and interfering with feeding and probing behavior should make transmission of the Pierce’s disease bacterium less likely on Surround-treated surfaces, but this needs to be confirmed by ongoing research in California.

The particle spray was developed by Drs. Michael Glenn and Gary Puterka of the USDA/ARS at Kearneysville, WV, in cooperation with the



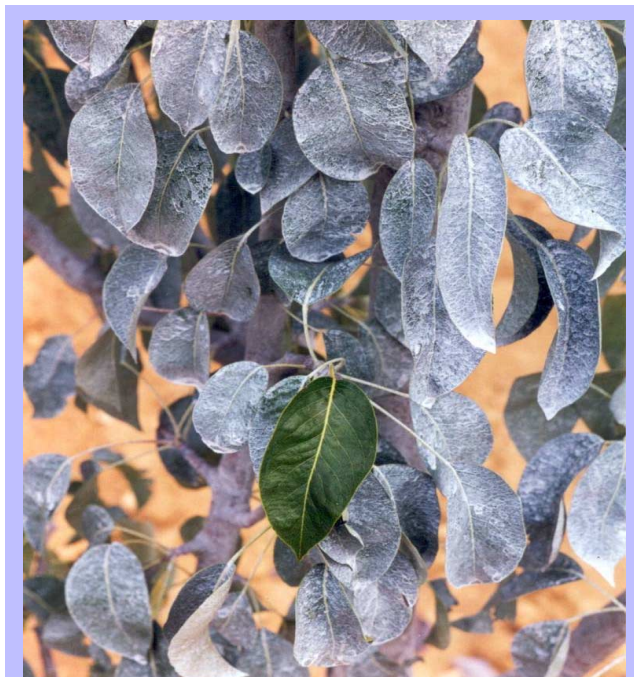
Inadequate coverage on pear leaves.



The glassy-winged sharpshooter is shown next to the smaller blue-green sharpshooter.

Engelhard Corporation, which began marketing the product in 1999 on a limited basis, after several years of trials with grower-collaborators. Surround is now available across the U.S., and is listed by the Organic Materials Review Institute (OMRI) for use in organic production.

Although at first glance the film may appear to block light, Surround actually increases net photosynthesis, and can provide secondary benefits to the plants’ overall health. Surround keeps the plants cool so that photosynthesis can continue longer into the afternoon on hot days, after untreated plants have already shut down because of heat stress. Grapes treated with Surround show improved vigor and studies have shown positive effects on juice flavor.



Wiped leaf...excellent coverage.

Surround has proved effective in suppressing the following grape pests:
several types of leafhoppers, including glassy-winged, redheaded, and bluegreen sharpshooters, and grape leafhopper; leafrollers, Japanese beetles, thrips, grape leaf skeletonizer, and June beetle.

Spraying recommendations

- Thorough coverage is key for protection.
- Sprays *before* expected infestation are much more effective.
- Normal air-blast and hand-held sprayers (but *not* backpack sprayers) are preferred.
- Re-apply to cover new growth and after heavy rains.
- Re-sprays most important on young fruit.
- **Wine grapes** sprayed up to veraison will have minimal adherence to berries. Applications after veraison will adhere better to grape berries. Applications may be made up to two weeks before harvest, then continued post harvest. If you are uncertain about Surround residues on grapes, it is recommended to spray only up to veraison.
- **Table and raisin grapes**—A supplemental label enables applications up to 5 mm berry size; then sprays may be continued post harvest. Applications are not recommended between 5 mm and harvest in order to avoid unsightly residues on harvested fruit.
- For targeted control of **glassy-winged sharpshooter**: apply during the dormant period up to 5 mm berry size to prevent sharpshooter movement into vines.



Glassy-winged sharpshooters lay eggs on the undersides of leaves, usually in groups of 10 to 12. The egg masses appear as small, greenish blisters. These blisters are more easily observed after the eggs hatch, when they appear as tan to brown scars on the leaves.

A Systems Approach

Surround will be most effective when used within a well-managed agro-ecological *system* combining the most appropriate cultural and chemical methods for the specific vineyard situation, pest complex, and local climate. Such a system will integrate soil building, habitat for beneficial organisms, and well-tuned nutrient and water management.

Soil building and nutrient/water management are two sides of the same coin and could be considered preventative pest management. A healthy soil high in organic matter will have better water and nutrient holding capacity. Plants receiving too much or too little of either water or nutrients, particularly nitrogen, are more attractive *and* more susceptible to damage by insects and diseases. Good water management, through water-stress monitoring, conserves valuable (and expensive) soil nutrients, reduces contaminated runoff, and conserves water.

Providing habitat for beneficial organisms is like hiring millions of helpers whose sole aim in life is to eat pests. Nitrogen-fixing cover crops can do double duty as habitat for beneficial organisms if managed correctly.

Recommended ATTRA Publications:

- ❖ *Farmscaping to Enhance Biological Control*
- ❖ *Overview of Cover Crops and Green Manures*
- ❖ *Farm-Scale Composting Resource List*
- ❖ *Sustainable Soil Management*
- ❖ *Sustainable Management of Soilborne PlantDiseases*
- ❖ *Drought Resistant Soils*

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Parasitized egg masses are tan to brown in color with small, circular holes at one end of the eggs.

Further Resources

Surround® WP manufacturer:

Engelhard Corporation

101 Wood Avenue
P.O. Box 770
Iselin, NJ 08830-0770
Phone: (732) 205-5000
Toll-free: (877) 240-0421
Fax: (732) 321-1598

Several researchers are examining different facets of GWSS management. Many of them may be contacted through information listed at:

<http://www.ucr.edu/news/gwss/>

Following is contact information for a few of the researchers working on GWSS and Pierce's disease.

Gary Puterka, 304-725-3451,
GPuterka@afrs.ars.usda.gov

Gary has researched kaolin clay particle film barriers for control of leafhoppers on pears and is a member of the Kern County GWSS Task Force.

Beth Grafton-Cardwell at (559) 646-6591,
bethgc@uckac.edu.

Beth is researching tactics for managing GWSS in citrus in the context of slowing movement from citrus into grapes. The GWSS is not considered a pest of citrus.

Matthew Blua, (909) 787-6301,
matthew.blua@ucr.edu.

Matthew is also researching tactics to prevent or slow movement of GWSS into vineyards. He has found that 95% of GWSS fly at 5 meters or lower. He is investigating effects of physical barriers combined with pesticide treatments on the transmission of Pierce's disease to vineyards.

Alexander Purcell at (510) 642-7285,
purcell@nature.berkeley.edu.

Alexander is looking at vegetation management as a strategy for managing the blue-green sharpshooter, the primary vector of Pierce's disease along coastal areas. This strategy revolves around removing the five or six plant species in any given riparian habitat that the sharpshooter is attracted to during its egg-laying period. This strategy can potentially increase biodiversity and reduce the need for insecticide use.

Bruce Kirkpatrick at (530) 752-2831,
bekirkpatrick@ucdavis.edu.

Bruce is knowledgeable about host range of Pierce's disease, as well as diseases and symptoms caused by the bacterium in other hosts.

Mark Hoddle, (909) 787-4714

mark.hoddle@ucr.edu or

Dave Morgan, (909) 787-4360,

dmorgan@citrus.ucr.edu

*The wasp *Gonatocerus triguttatus* is successfully reducing populations of the sharpshooter in Mexico and Texas. The wasp parasitizes the sharpshooter by laying its eggs inside those of the larger insect. Once hatched, the wasps eat their way out.*

Pierce's Disease is a concise and authoritative handbook on the disease, its spread, and strategies for containing it. The publication is written by UC scientists on the forefront of the battle. The 20-page publication, produced by the UC Division of Agriculture and Natural Resources (ANR Publication 21600), is priced at \$6 a copy, plus tax and shipping, with discounts available for purchases of 10 or more. **Pierce's Disease** is available at local UC Cooperative Extension offices, directly from ANR Communication Services (6701 San Pablo Avenue, 2nd Floor, Oakland, CA 94608-1239), or by phone (800-994-8849), fax (510-643-5470), and online at <http://anrcatalog.ucdavis.edu>.

Glassy-winged Sharpshooter images source: "Glassy-Winged Sharpshooter Online Media Kit," University of California Division of Agriculture and Natural Resources, Communication Services website, <http://danr.ucop.edu/news/MediaKit/photos/default.shtml>. Copyright 1999 by the Regents of the University of California. Reprinted with permission. Other images courtesy of Engelhard, Inc.

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