

**Progress Report – Submitted Dec 31, 2006**

**Second Quarterly Report**

**Long term effects of vineyard surroundings of three vineyard pests,  
and short term control**

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**Main areas of accomplishment in 2<sup>nd</sup> Quarter:** Work was continued out on sharpshooters that transmit Pierce's disease, *Xylella fastidiosa*.

**GRAPE ROOT BORER**

**Exploring mating disruption for control of grape root borer in southwestern Virginia - 2006**

**Introduction:** Grape root borer, *Vitacea polistiformis* (Harris) (Lepidoptera: Sesiidae), is a pest of increasing significance in Virginia vineyards (Pfeiffer et al. 1990, Bergh et al. 2005). Control is difficult; there are several approaches available, but none are highly effective or practical. Lorsban applied as a barrier treatment is not highly effective throughout the protracted oviposition and adult emergence period. Soil mounding is often impractical, and is difficult to time to control the entire generation. The use of entomopathogenic nematodes has received some attention. *Heterorhabditis bacteriophora* was one of the most effective species against GRB in a study by Williams et al. (2002). A vineyard in Patrick County has a severe infestation of GRB, and mating disruption was attempted there, as well as a rescue treatment in which a nematode-laden drench was allowed to soak the root zone close to the crown of the vines.

**Materials and Methods:** As reported earlier, mating disruption research was carried out in a vineyard in Patrick County over three seasons. Ropes were placed on 17 Jul 2003, 6 Jul 2004, and 26 Jul 2005. Rope style dispensers were obtained from CBC America, containing a blend designed for mating disruption of the currant clearwing, *Synanthedon tipuliformis* Clerck (Isonet Z): (E,Z)-2,13-octadecadien-1-yl acetate (100) (Z)-13-octadecadien-1-yl acetate (5) (Priesner et al. 1986). The GRB pheromone blend has been described as (E,Z)-2,13-ODDA (99), (Z,Z)-3,13-ODDA (1) (Snow et al. 1986). Ropes were applied to vineyard trellis posts at the rate of 494/ha (200/A). The area treated was 2.4 ha (6 A). The degree of larval feeding in grape roots has been reduced by this technique. Mating disruption has offered great promise to reduce infestation by grape root borer.

A new treatment block was established in this vineyard. Rope dispensers were placed in a 5-acre area on 12 Jul 2006. Results will be presented when data are available. Discussions have taken place with CBC Americas on expanding the number of

pheromone dispensers available in order to increase the number of experimental sites next season.

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## SHARPSHOOTERS AND PIERCE'S DISEASE

### Survey of Pierce's disease vectors in Virginia vineyards: First Season

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### Abstract:

Pierce's disease (PD) is a vascular disease of grapevines caused by the xylem-limited bacteria *Xylella fastidiosa*, and transmitted by insect vectors. This study investigates the seasonal activity of these insect vectors, known as sharpshooters (Hemiptera: Cicadellidae), within 14 vineyards representing six regions of Virginia. Insects were collected on yellow sticky cards from March to October, 2006. *Oncometopia orbona* (F.) and *Graphocephala versuta* (Say), both known to be efficient vectors of the bacterium (Turner and Pollard 1959), are common and the most abundant

of all leafhopper species in Virginia. *O. orbona* appears in lesser abundance than *G. versuta*, but peak activity occurs earlier in the growing season, the principle time of concern for initial infection. Vines at all 14 sites showed symptoms of PD and were tested for *X. fastidiosa*, using DAS-ELISA from Agdia (Elkhart, IN). All 13 of the vineyards growing European varieties tested positive for the bacteria.

### **Introduction:**

Pierce's disease (PD) is a vascular disease of grapes caused by the bacterium *Xylella fastidiosa* and vectored by xylem-feeding Auchenorrhynchan vectors (Davis et al. 1978). Symptoms of PD occur when bacterial colonies proliferate to levels great enough to block flow of xylem fluids to upper portions of plant; this leads to decline, yield loss, and, within two to three years, vine death. Until now, interior Virginia was thought to be within the range of low to moderate risk of PD, as winter pruning and cold winter temperatures (lethal to the bacteria) keep infections from becoming chronic/systemic (Purcell 1980). Recent work has found there is an elevated risk of Pierce's disease (PD) in Virginia vineyards (Sutton 2005), due to an increase in average minimum temperatures.

### **Materials and Methods:**

Fig. 1 shows 14 Virginia vineyards sampled for presence of sharpshooter vectors of PD, the vascular disease caused by *X. fastidiosa*. Six yellow sticky traps (TRECE; 8"x12") were hung in each site and replaced every two weeks. Species of the subfamily Cicadellinae were identified and abundance of each was recorded for each two week time period. Analysis of variance with repeated measures was conducted on weekly counts of *O. orbona* and *G. versuta* using SAS (SAS Institute 2003).

Petiole samples were taken from all sites (Fig. 1) to test for presence of the bacterium *X. fastidiosa* using the DAS-ELISA kit and procedure provided by Agdia (Elkhart, IN). Ten symptomatic vines were selected from edge rows of each vineyard. Symptomatic vines displayed at least one of the characteristic PD symptoms: marginal scorch with accompanying red line (Fig. 2 and 3) and/or abscission of leaf blades from petiole with accompanying burnt tip ("matchsticks;" Fig. 4). We took two samples from each of the ten vines, one from portions closest to cordon and the other from most distal portions. A sample consisted of three petioles, cut and weighed to 0.3-0.5 g (average length of each petiole was about 2 cm), ground in mesh grinding bags with 3 ml of the general extract buffer provided by Agdia. Each sample (100  $\mu$ L delivered to each well) was replicated twice in ELISA plates and read at 780 nm. An absorbance reading of 0.1 or higher was considered positive for presence of *X. fastidiosa*.

### **Results and Discussion:**

*Oncometopia orbona* and *G. versuta*, both efficient vectors of PD, were found in all sites sampled. *O. orbona* was trapped in lesser numbers than *G. versuta* in all 14 sites, and this difference was significant in 11 of 14 sites. However peak activity of *O. orbona* occurs earlier in the growing season (roughly June through early July) than peak flight of *G. versuta* (roughly late June through mid August). Early season infections are of principle concern as a longer period of time in the plant allows for greater proliferation of bacterial colonies.

Symptoms of PD were found in all 14 sites sampled. Presence of *X. fastidiosa* was confirmed by ELISA in all 13 sites growing European species. All vines tested negative in Vineyard M (Fig. 1), the only site growing entirely American species.

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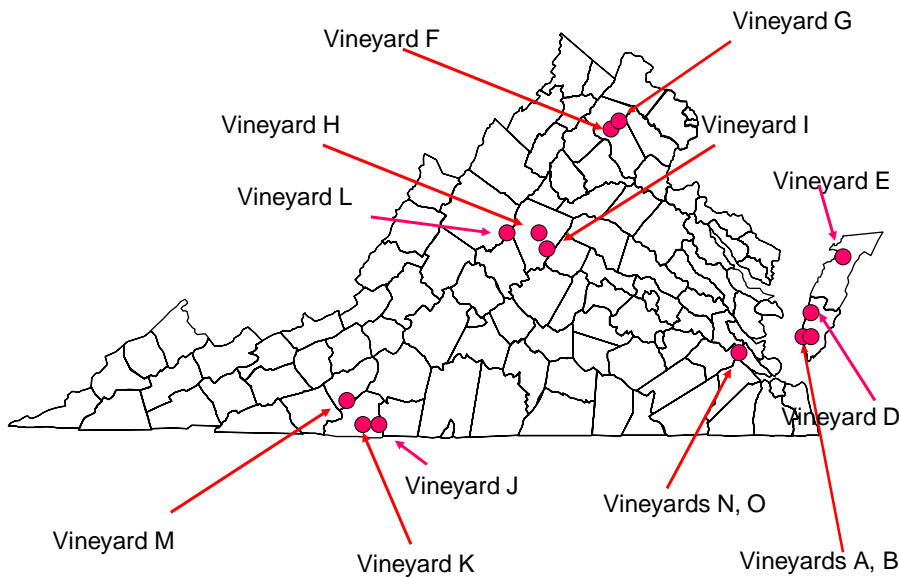


Figure 1: Locations of vineyards sampled, from March until October, 2006.



Figure 2 and 3: Marginal necrosis with accompanying red line.



Figure 4: "Matchstick" symptom of PD infected vine.

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