

Expansion of the Range of Pierce's Disease in Virginia

Anna K. Wallingford, Department of Entomology, Virginia Tech, Blacksburg 24061; **Sue A. Toln**, Department of Plant Pathology, Physiology and Weed Science, Virginia Tech, Blacksburg 24061; **Ashley L. Myers** and **Tony K. Wolf**, and Alson H. Smith Jr. Agricultural Research and Extension Center, Virginia Tech, Winchester 22602; **Douglas G. Pfeiffer**, Department of Entomology, Virginia Tech, Blacksburg 24061

Corresponding author: Anna K. Wallingford. awalling@vt.edu

Wallingford, A. K., Toln, S. A., Myers, A. L., Wolf, T. K., and Pfeiffer, D. G. 2007. Expansion of the Range of Pierce's Disease in Virginia. Online. Plant Health Progress doi:10.1094/PHP-2007-1004-01-BR.

Pierce's disease (PD) is a vascular disease of grapes caused by the bacterium *Xylella fastidiosa* Wells et al. and vectored by xylem-feeding sharpshooters (1). Symptoms of PD occur when bacteria proliferate the xylem; both the bacteria (2) and host responses to infection (3) block the flow of xylem fluid to the shoots. Affected grapevines show interveinal chlorosis, marginal necrosis with marginal yellow or red line (Figs. 1 and 2), green islands on shoot bark after normal tissue turns brown, and leaf abscission from the distal end of petioles, leaving characteristic "matchstick petioles" with necrotic tips (Fig. 3). Infection leads to vine decline, yield loss, and, within two to three years, vine death. Although the northern distribution of *X. fastidiosa* [* see Erratum] extends at least into New Jersey, observations of PD have been limited to vineyards on the Delmarva Peninsula and extreme southeastern Virginia; interior Virginia was considered at low risk of PD because of its low winter temperatures (lethal to the bacteria), based on the results of past research that showed lower pathogen populations in plants grown at low temperatures in a growth chamber (4). Recent warm winters have, however, increased our concerns about vulnerability of other Virginia vineyards to PD. Our objective was to conduct a state-wide survey of Virginia's vineyards for presence of *X. fastidiosa*.



Fig. 1. Marginal necrosis with accompanying yellow line.



Fig. 2. Marginal necrosis with accompanying red line.



Fig. 3. "Matchstick petiole" symptom of *Xylella fastidiosa*-infected vine.

Thirty-one vineyards in twenty counties were sampled for *X. fastidiosa* in late fall, 2006 (Fig. 4). Most vineyards contained *Vitis vinifera* L. vines, and in most cases, *vinifera* varieties, primarily 'Chardonnay,' were sampled. Exceptions were vineyard 13 with *Vitis labrusca* 'Concord' and 'Niagara'; vineyard 19 where one of two samples was the interspecific hybrid, 'Vidal'; and vineyard 20, in which hybrids 'Foch' and 'Seyval' were sampled. Ten symptomatic vines were selected from edge rows of vineyards 1 to 14. Four vines were sampled in vineyards 26 and 28 to 31, and two in vineyards 15 to 25 and 27. Sampled vines displayed at least one of the characteristic aforementioned PD symptoms. In vineyards 1 to 14, two samples were taken from each vine, petioles closest to the cordon and from petioles most distal. Petioles were collected from the most symptomatic leaves in vineyards 15 to 31. Each sample, comprised of three petioles cut and weighed to be 0.3 to 0.5 g (average total length ~2 cm), was ground in a mesh grinding bag with 3 ml of general extract buffer (Agdia Inc., Elkhart, IN.). Each sample was placed into two testwells (100 µl each) and tested for *X. fastidiosa* using Agdia's DAS-ELISA PathoScreen kit (Agdia Inc.). Absorbance at 650 nm was recorded with a Spectramax Plus (Molecular Devices, Sunnyvale, CA). Samples giving values greater than the mean absorbance of known negatives plus three times the standard deviation of known negatives were considered positive.

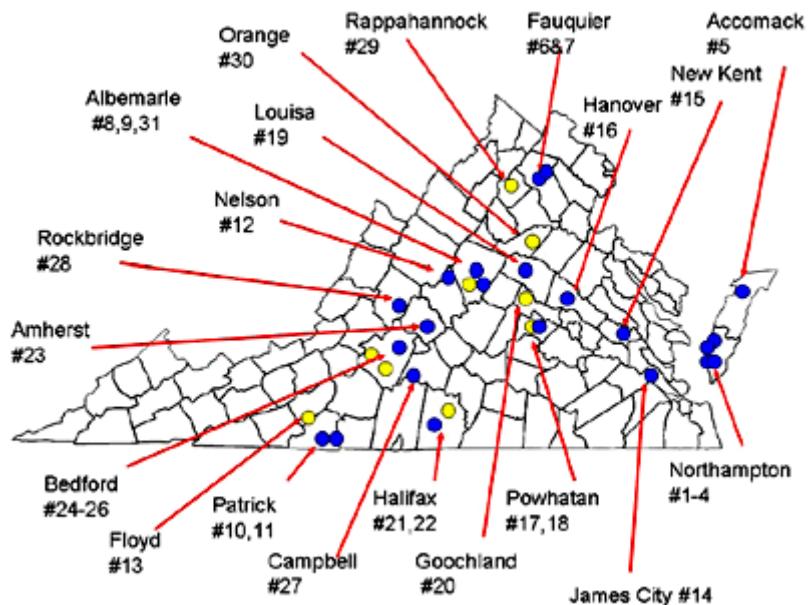


Fig. 4. Locations of vineyards surveyed for *Xylella fastidiosa* (blue indicates *Xylella* positive, yellow indicates negative).

Symptoms of PD were found in all 31 sites observed and sampled. Overall, *X. fastidiosa* was confirmed by ELISA at 22 sites (71%) in 16 counties. For the 14 sites in which the sample size was 10 vines, *X. fastidiosa* was confirmed in 13 (93%). The one negative, vineyard 13, contained American varieties and was at the highest elevation. For the 17 vineyards in which 2 to 4 vines were sampled, *X. fastidiosa* was detected in only 9 (53%). One of these (vineyard 20) contained hybrid vines. Five were in counties also having a vineyard with confirmed PD. Larger sample sizes at these locations might have increased the probability of detecting the pathogen. Our survey confirms *X. fastidiosa* in the northernmost vineyards sampled, and in some of the westernmost vineyards in Virginia. It is likely that all vineyards throughout the sampled area are at risk of PD.

Literature Cited

1. Davis, M. J., Purcell, A. H., and Thomson, S. V. 1978. Pierce's disease of grapevines: Isolation of the causal bacterium. *Science* 199:75-77.
2. Newman, K. L., Almeida, R. P. P., Purcell, A. H., and Lindow, S. E. 2003. Use of a green fluorescent strain for analysis of *Xylella fastidiosa* colonization of *Vitis vinifera*. *Appl. Environ. Microbiol.* 69:7319-7327.
3. Stevenson, J. F., Matthews, M. A., and Rost, T. L. 2004. Grapevine susceptibility to Pierce's disease II: Progression of anatomical symptoms. *Amer. J. Enol. Vitic.* 55:238-245.
4. Feil, H., and Purcell, A. H. 2001. Temperature-dependent growth and survival of *Xylella fastidiosa* in vitro and in potted grape vines. *Plant Dis.* 85:1230-1234.

*Erratum

An editing error was corrected on 25 February 2008. Previously, *X. fastidiosa* had been misspelled throughout the article.