

BOSTON IVY (*Parthenocissus tricuspidata*)
GRAPE (*Vitis vinifera*)
Downy mildew; *Plasmopara viticola*
Powdery Mildew; *Uncinula necator*

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Downy Mildew of Boston Ivy and Grape in Oregon, 2002-2004.

The fungal disease known as downy mildew can infect grape (*Vitis vinifera*) and other plants such as Boston (Grape) Ivy. Grape downy mildew has never been found or confirmed in the Pacific Northwest. Downy mildew was found on Boston Ivy plants (*Parthenocissus tricuspidata*) produced and sold in major wholesale and retail nurseries throughout Oregon during the summer of 2002.

Materials and Methods

Major wholesale and retail nurseries in Oregon that carry Boston Ivy were surveyed for downy mildew during the summer of 2002. Survey techniques included visual assessment of downy mildew symptoms on Boston Ivy (*Parthenocissus tricuspidata*), Virginia creeper, porcelain berry (*Ampelopsis sp*) and any grapes in the vicinity. If symptoms were observed or suspected then leaf samples were collected and returned to the laboratory. All leaf samples were placed in moist chambers for 24 hr incubation at ambient temperature then examined for the presence of sporangiophores and sporangia typical of this downy mildew. One wholesale nursery with symptoms of downy mildew in its production yard was asked to provide shipment information of Boston Ivy within Oregon. Landscapes with Boston Ivy located throughout the Willamette Valley, and southern and central Oregon were sampled during the summer of 2002-2004. Some sites were examined and sampled repeatedly to verify when symptoms were first found during the growing season. Leaf samples were processed as described above. Viticulturists around the region have repeatedly been asked to send in samples they suspect might be due to downy mildew. (A free dinner for 2 offer for the first confirmed downy mildew sample on grape was also initiated.)

Boston Ivy leaves with symptoms of downy mildew were collected from both landscape and wholesale nursery sites. Leaves were incubated in a moist chamber to induce sporulation. Sporangia were harvested and inoculated onto greenhouse grown, potted Boston Ivy plants and Cabernet Sauvignon grapes. Potted plants were placed in plastic bags (tents) for 24 hours to maintain high humidity conditions. Two weeks later plants were inspected for symptoms of downy mildew. This experiment was repeated 3 times during the summer and fall of 2002. Detached leaves from boston ivy, Cabernet Sauvignon and Swenson red table grapes were placed face-down on wet filter paper in large petri dishes, and dotted with 50 ul of a sporangial suspension. Plates were sealed with parafilm and incubated at 20 C with >12 hr light for about 7 days. Detached leaves were examined every 2 days for sporulation for a 4 wk period. This experiment was repeated once.

Dormant canes of Pinot Noir, Cabernet Sauvignon, Chardonnay and White Riesling were pruned from field grown plants, cut into 3 node sections in early 2003. Cuttings, 100 of each cultivar, were buried up to the second node in perlite and placed in a greenhouse. Actively growing, rooted cuttings were transplanted on 16 May 03 into a nursery field site (on Sauvie Island) where Boston Ivy plants heavily infected with downy mildew had been harvested the year before. Cultivar cuttings were planted in 4 rows spaced 3 feet apart at a spacing of 6 inches between plants. Each row consisted of 25 cuttings of each cultivar grouped together and cultivars were alternated to different positions in each row. Plants were fertilized, weeded and irrigated regularly by the nursery. In Apr 04, young Boston Ivy plants were planted in between each of the 4 groups of cultivars in each row and at either row end. Grapes and Ivy plants were regularly inspected for symptoms and signs of downy mildew throughout the 2003 and 2004 growing seasons.

Results

Eleven wholesale and retail nurseries were surveyed for downy mildew in Oregon. Nine of these nurseries were positive for symptoms and signs of downy mildew on Boston Ivy plants (Figure 1). Most plants did not have obvious sporulation in the nursery, however, heavy sporulation was observed at two nursery locations. Overhead irrigation was common at these nurseries. One set of variegated Virginia Creeper was also found to have symptoms and signs of downy mildew. Porcelain berry plants and grape plants found in these same nurseries and near infected Boston Ivy plants did not have any symptoms or signs of downy mildew.

Extensive survey efforts of many retail nurseries were suspended after encountering infected Boston Ivy plants from the same few wholesale nurseries. One of these nurseries was asked to supply us with shipment locations of plants (infected or not). They did provide us with cities in Oregon that plants had been shipped to during the 2002 shipping season (Figure 2). Based on this information, it is possible that Boston Ivy plants infected with downy mildew have been shipped throughout Oregon and into all major grape production areas of the state.

Several Boston Ivy plantings in landscapes were surveyed for downy mildew. Only 2 landscapes out of 19 sampled were found with symptoms and signs of downy mildew (Figure 3). Many of these landscape sites had been planted in the last few years and were on drip irrigation systems. Survey efforts were initiated 2 weeks after a primary infection period was identified on 27 May 02. Symptoms of downy mildew were not observed in a known infected landscape location until 18 July 02 and then again 18 Jun 03. The spring of 02 was considered abnormally dry, however, this landscape had irrigation that wetted many leaves. The other landscape with downy mildew on Boston Ivy plants did not have any irrigation. These plants, however, were located between several bodies of water (lakes and river) in the general vicinity. This location indicates that this downy mildew is capable of surviving and producing symptoms under natural weather conditions.

No reports of downy mildew have ever been confirmed in Oregon vineyards. All reports of downy mildew have turned out to be due to the grape erineum mite.

Inoculation of Boston Ivy with sporangia of downy mildew collected from landscape or nursery grown Boston Ivy plants was not successful in 3 out of 4 trials. Boston Ivy plants inoculated in the 4th trial did produce symptoms and signs of downy mildew. All grape plants similarly inoculated did not produce symptoms of downy mildew. Detached leaf assays resulted in downy mildew infection on Boston Ivy leaves only. Sporulation of this pathogen occurred between 10-12 days after inoculation in both assays.

Due to poor care and heavy sunburn, grape cuttings did not establish in the field until late Aug 02. No symptoms or signs of downy mildew developed on any grape cuttings, however, some symptoms and signs of powdery mildew were observed. Grape plants and transplanted Boston Ivy plants grew well during the 2004 growing season. A heavy canopy close to the ground developed during the summer keeping all plants moist for extended periods. Typical symptoms and signs of downy mildew were observed on Boston Ivy plants growing within and through the grape canopy. No symptoms or signs of downy mildew were observed on grape foliage or fruit during the entire growing season. Typical symptoms and signs of powdery mildew were observed on grape leaves but not on Boston Ivy leaves.

Conclusions

It would appear that based on observations in nursery production yards and fields, greenhouse inoculation trials and the detached leaf assays that downy mildew of Boston Ivy found in our nursery industry will not infect grapes. Although this is good news for the PNW grape industry, we should maintain efforts to watch for this disease coming in from other areas. The PNW nursery industry has been alerted and is taking steps to control this newly recognized disease.

Figure 1. Location of wholesale and retail nurseries surveyed for downy mildew in Oregon. Square symbol indicates infected plants were found while triangles indicate no infected plants found.

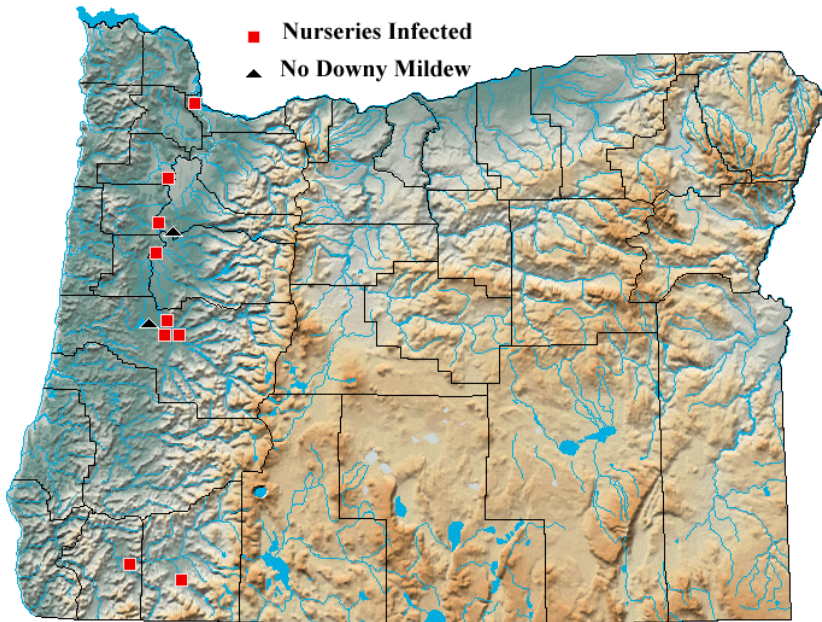


Figure 2. Cities in Oregon where Boston Ivy plants (some potentially infected with downy mildew) had been shipped during the 2002 shipping season.

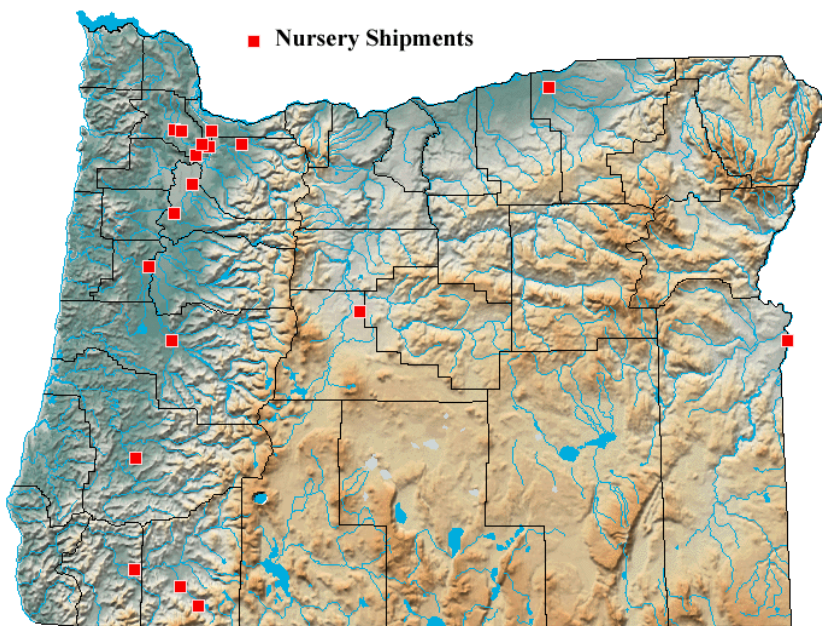
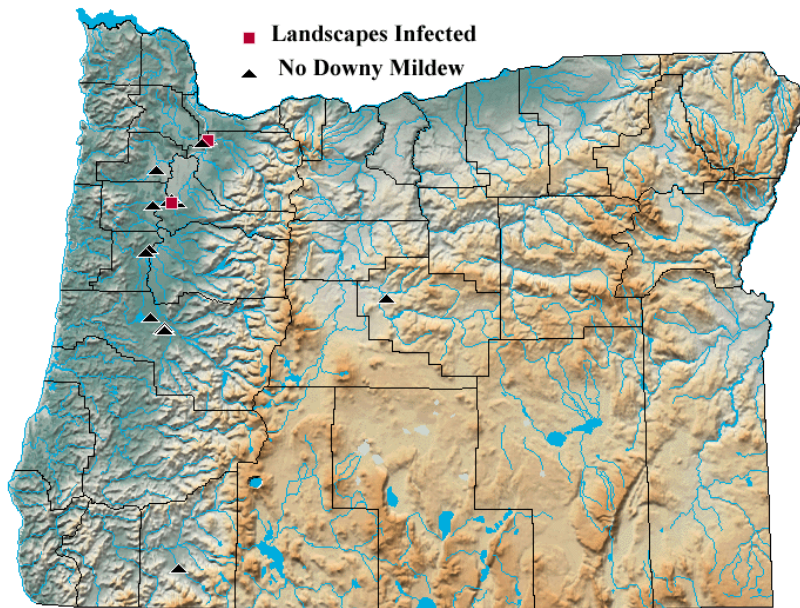


Figure 3. Location of Boston Ivy plantings in landscapes surveyed for downy mildew. Square symbol indicates infected plants were found while triangles indicate no infected plants found.



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