

Newly Observed Diseases of Blueberries in the Pacific Northwest

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Introduction

Blueberry production increasingly contributes to the agricultural viability of Oregon and Washington, and together the states provide 25% of the total US crop. The wholesale value of the berries brought growers more than \$225 million in 2014. Northern highbush (*Vaccinium corymbosum*) is the primary species grown, and the fruit is used for both fresh eating and processing. Recently, growers have been confronted with several new diseases for the region, caused by *Verticillium dahliae*, *Lasiodiplodia* spp., and *Chondrostereum purpureum*.

Methods and Results

All plants were submitted to the Oregon State University Plant Clinic for diagnosis and were not the result of a survey. Symptomatic tissues were surface disinfected and plated to PDA and water agar; additional tissue was incubated under moist conditions. Cultures derived from a single spore or hyphal tip were used for identification. Identifications were based on morphology and sequencing of various gene regions: ITS1/ITS4 (*Verticillium*, *Chondrostereum*); and ITS1/ITS4, and EF526F/EF1567R, the latter primers being specific for a region of the translation elongation factor 1-alpha gene (*Lasiodiplodia*).

Verticillium dahliae

Symptoms: Poor vigor, localized cankers due to opportunistic fungi, reddening or chlorosis of leaves, and numerous dead buds and twigs (Fig 1); there was no internal discoloration of the xylem. *V. dahliae* was recovered from branch or crown tissue of two different 'Bluetta' plants received two years apart. Plants were 2-4 years old.



Figure 1. Branch and leaves of a 'Bluetta' blueberry plant infected with *Verticillium dahliae*.

Plants had been grown where previous crops were potatoes and peppermint, both of which are hosts of *V. dahliae*. Field observations were that disease was worse on soils where soil pH was above 5.5, which is higher than optimum for blueberry. We have successfully completed Koch's postulates with young highbush blueberry plants and *V. dahliae*.

Lasiodiplodia spp.

Symptoms: Overall plant failure; stem dieback in the absence of cankers; secondary cankers on smaller branches; marginal leaf necrosis and drop; necrosis of the cambium and wood, progressing from the surface to the interior; necrosis extending into the root crown from basal stem infection. Pycnidia formed in necrotic wood after 10 d in a moist chamber (Fig 2).



Figure 2. A 'Duke' blueberry stem infected with *Lasiodiplodia*. Similar symptoms were observed on the cv. Draper. The plants had been in the field for two years. Erumpant pycnidia are visible in the lower image.

We have recovered two species of *Lasiodiplodia* from diseased blueberry plants from Washington: *L. mediterranea* and *L. missouriana*. Neither species has been documented in Oregon or Washington on blueberry. Pathogenicity trials have yet to be performed.

Chondrostereum purpureum

Symptoms: Leaves have a silvery appearance (Fig 3), hence the common name of silver leaf; extensive necrosis of the wood; basidiocarps were present in the field in October.

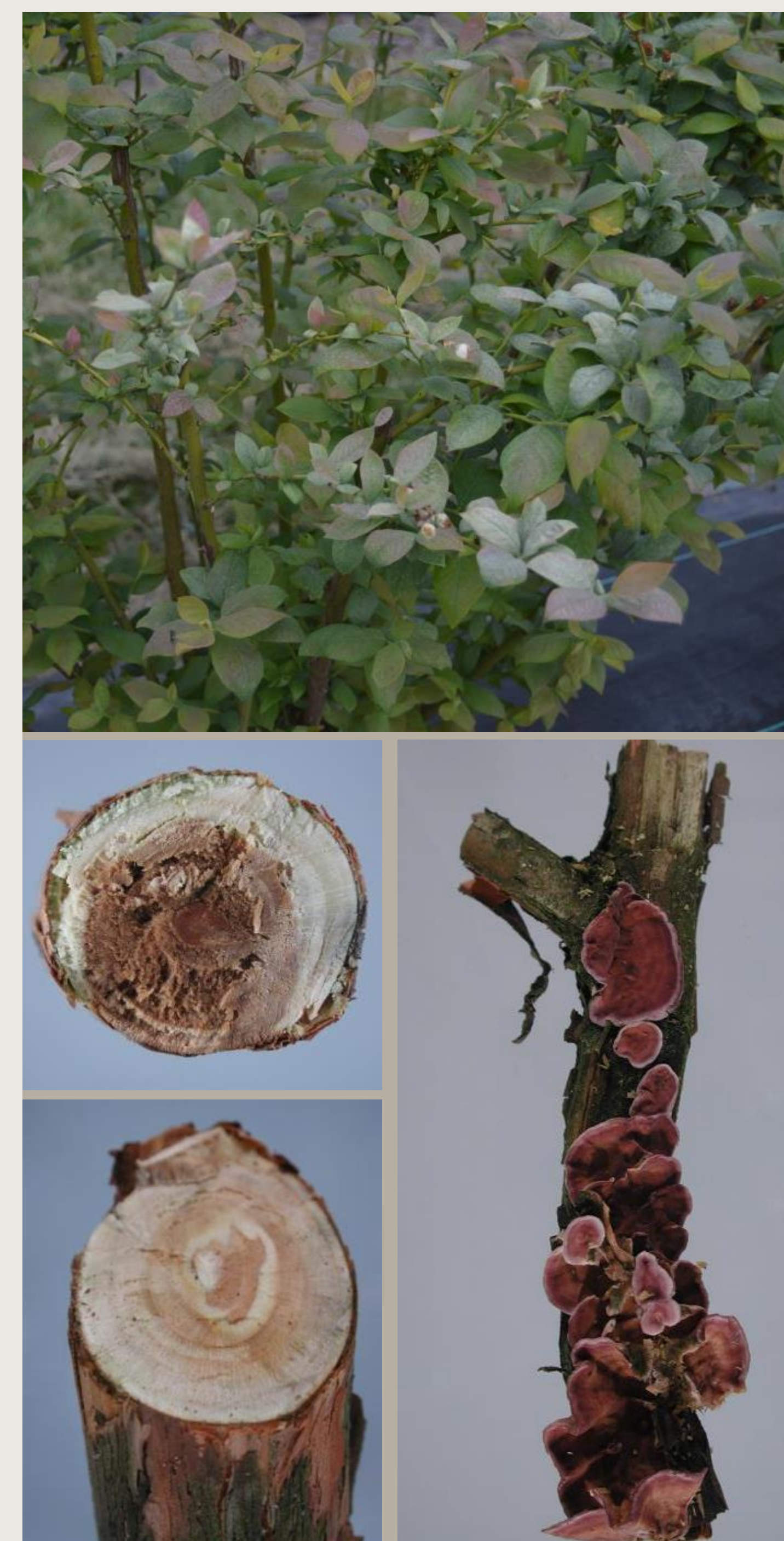


Figure 3. 'Draper' blueberry stems infected with *C. purpureum*. Top image shows silvering of leaves on an infected branch (photo: Lisa Jones). Photos at left show variations in internal discoloration of diseased material. Basidiocarps on a diseased stem are shown at right.

C. purpureum-infected plants were received from multiple fields in Marion Co., Oregon. We have reliable reports of infected plants observed in northwest Washington and southwest British Columbia, Canada. The cultivar 'Liberty' was also affected; diseased plants were 6-8 years old.

Discussion

Highbush blueberry production has grown in recent years, with 9,300 acres planted in Oregon and 9,100 acres in Washington. Expansion into areas east of the Cascade Mountains, where blueberries have traditionally not been grown to any great extent, has resulted in diseases not seen in the western region, where production had been centered. Climate and soil types differ between the east and west sides, which could contribute to these emerging diseases.

Verticillium dahliae was recovered from diseased plants near Yakima, WA. This disease has not, to our knowledge, been previously reported in highbush blueberry, although there is one report of the fungus in *V. angustifolium* (lowbush blueberry) [1].

Lasiodiplodia spp. were recovered from diseased blueberry plants grown in Yakima Co., Washington, and eastern Washington. Initial identification of the fungi was based on sequencing the ITS region, but later analyses that included part of the translation elongation factor 1-alpha gene showed closer identity to *L. mediterranea*. This fungus has been recently discovered in association with cankers of *Vitis vinifera*, *Citrus sinensis*, and *Quercus ilex* [2]. The second species appears to be *L. missouriana*, also a pathogen of grape [3].

Chondrostereum purpureum is not a new pathogen for the region, and has been found previously on stone fruit trees. However to the best of our knowledge, this is the first US report of *C. purpureum* in blueberry. The disease was documented in Chile in 2008 [4], where death of plants occurred three years after infection. In Oregon, 300 mature plants from one field were destroyed because of infection by this fungus.

These diseases all affect the main stems, and hence present the potential to severely reduce the productive life of a blueberry field.

References

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