

White Pine Blister Rust: A New Strain Has Developed

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White pine blister rust (WPBR), caused by the fungus *Cronartium ribicola*, is an aggressive and non-native pathogen that was introduced into eastern North America in 1909. Since its introduction into North America, the pathogen has killed millions of five-needle pines and has nearly eliminated western white pine throughout much of its native range. While New England has only one native five-needle pine, eastern white pine (*Pinus strobus*), this species is abundant and widespread in forested and managed landscapes. While the environmental conditions required for disease development are not as easily satisfied here as they are in western North America, WPBR has killed countless white pines over the past century in New England.



All rust fungi require two botanically unrelated hosts to complete their life cycle. In New England, the WPBR fungus also infects species in the genus *Ribes*, commonly known as gooseberry and currant. *Ribes* are small, woody shrubs that are native to New England forests. However, the introduced European black currant (*R. nigrum*) was widely planted for berry production and is especially susceptible to the disease. As a result, the import, cultivation, sale and planting of black currant was outlawed under a federal quarantine and eradication ban enacted in the 1920s. After an intensive program of manual eradication lasting from the 1920s through the 1950s, the *Ribes* population was significantly reduced in New England. Consequently, the federal ban on *Ribes* cultivation and sale was lifted in the 1960s. Despite the relaxation of the federal ban, state quarantine and eradication laws still exist today in many eastern states, including Mas-





Gooseberry

sachusetts.

In the early 2000s, the pressure to lift the ban on cultivation and sale of *Ribes* intensified, led by commercial berry growers. Numerous varieties of currants and gooseberries with immunity to WPBR had been developed and were marketed as safe for commercial berry production. As a result, Massachusetts law was modified to allow the cultivation and sale of *Ribes* in certain towns after a formal permitting process. Currently, 144/351 cities and towns in the Commonwealth of Massachusetts still prohibit planting of currants and gooseberries (1). Since the modification of the *Ribes* ban in Massachusetts, commercial production of currants and gooseberries continues to increase as berry growers expand into this niche market.

In 2008, researchers in Connecticut observed the WPBR pathogen on black currant bred for immunity to the disease (2). In light of this discovery, researchers in eastern Canada began surveying rust populations in New England and eastern Canada to determine if a new strain of the fungus had been introduced. The researchers determined that it wasn't a newly introduced strain, but a more troubling scenario; a new, virulent strain of the pathogen had naturally developed in northeastern North

America. Through genetic mutation, the new strain of the pathogen is capable of infecting numerous cultivars of black currant that were bred for immunity to the disease. These previously immune *Ribes* cultivars have been widely planted by commercial berry growers. Survey results confirm the new strain has been detected in New York, New Hampshire, Quebec and New Brunswick and Nova Scotia, in addition to Connecticut.

Widespread concern now exists that WPBR will once again become a serious threat for the long-term health of eastern white pine in New England. Young white pines are more susceptible to the disease because the environmental conditions required for disease development occur most often closer to the ground (high humidity and shade with free moisture on plant surfaces). While the majority of our white pine



White pine blister rust on white pine.

population is mature and less susceptible, a considerable number of young white pines exist in our forests and managed landscapes. Symptoms of the disease include top dieback, browning needles and the presence of stem and trunk lesions accompanied by copious resin flow. The lesions may appear as numerous rupturing blisters with oozing and hardened resin. Insect infestation may often be visible near the lesions. The fungus invades the tree through the needles and slowly progresses downward to the twigs and branches before finally girdling the main trunk. No control measures exist for the pathogen on white pine and spores have been documented to travel several miles. However, chemical control of the fungus on *Ribes* is possible if performed properly by commercial growers.

In light of these new findings, the state of New Hampshire imposed a new moratorium in 2012 banning the planting of currants and gooseberries until further surveying for the new strain can be completed (3). To date, the laws managing the cultivation and sale of *Ribes* in Massachusetts have not been changed to reflect the altered dynamics of WPBR. One of the conditions of legalized cultivation and sale of *Ribes* in Massachusetts

and additional northeastern states was that all *Ribes* cultivars would be immune to WPBR. Now that disease immunity has been broken by the fungal pathogen, the law needs to be reexamined before WPBR becomes an epidemic once more.

References

- (1) Currants and Gooseberries: Prohibited Towns in Massachusetts. 2012. [http://extension.umass.edu/landscape/sites/landscape/files/publications/currants_gooseberries_prohibited_towns.pdf]
- (2) Frederick, ZA, et al. 2011. First Report of White Pine Blister Rust Caused by *Cronartium ribicola* on Immune Black Currant *Ribes nigrum* Cv. Titania in Preston, Connecticut. *Plant Disease* 95(12): 1589. [<http://aps-journals.apsnet.org/doi/abs/10.1094/PDIS-07-11-0609>]
- (3) Moratorium on Planting Currants and Gooseberries in New Hampshire. 2012. [<http://www.agriculture.nh.gov/documents/Ribes.pdf>]



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