2014 Empire Producers EXPO Berry Session Presentation Summaries

Berry Session
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Currant Production in the Northeastern US: Is This the Beginning of the End - *Kerik D. Cox, Associate Professor, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell University, NYSAES, Geneva, NY 14456*

History of White Pine Blister Rust in NY

White pine blister rust (WPBR), caused by the fungus *Cronartium ribicola*, is a disease of white pine that greatly impacted the white pine industry in the United States. Like other macrocyclic rust diseases (cedar apple rust, wheat stem rust), WPBR needs two hosts in order to complete its life cycle. The hosts in the life cycle of WPBR are pine and members of the *Ribes* genus (currants, gooseberries, etc.). The most common strategy for eliminating this type of rust disease is to eradicate one of the two hosts. In the case of WPBR, it was decided that the Pine industry was more valuable than *Ribes* production and as early as April 1917, *Ribes* quarantine and eradication legislation was beginning to be put into effect. From 1961 to 1967, there was a more extensive *Ribes* eradication effort in the US (2, 6). This effort was quite successful in the eastern United States to the point where it was believed that wild *Ribes* posed little danger to the pine industry (2). Eventually, the federal ban on currant production was removed due to the development of rust resistant pines (1, 3). However, individual states still impose severe regulations or bans on currant production. Despite the availability of new scientific data and management practices to mitigate dangers to the pine industry, no revisions to state restrictions on were made for some time (2). In New York, planting restrictions on currant production were first discussed in 1998 (7, 8) and restrictions were slightly revised recently in 2003. Rust resistant and immune *Ribes* varieties do exist, but are often less horticulturally desirable than highly susceptible black currant varieties such as Ben Alder (1). Because of these varietal concerns, the New York State Department of Environmental Conservation has established both currant fruiting and currant quarantine districts (www.dec.state.ny.us/website/regs/part192.html) to allow some currant production in New York.

Currants produce extremely high levels of antioxidants and vitamin C (4, 5), and are becoming increasingly popular according to a report from the New York Farm Viability Institute (10) (http://www.nyfarmviability.org/press-07-26-06.htm). Previously, the crop profile for currants in New York State in 2000 (www.ipmcenters.org/cropprofiles/docs/nycurrants.html) listed total bearing acreage for currants as approximately 9 acres (9). Currently, growers such as Greg Quinn of the Currant Company LLC (http://www.thecurrantcompany.com/) and Curt Rhodes of R.H. Rhodes and Sons Inc. are reported to have more than 20 Acres each planted to black currants (9, 10), and are continually expanding.

Breakdown of White Pine Blister Rust Immunity in Ribes in New England

Despite the fact that only white pine blister rust (WPBR) resistant cultivars can be legally planted in NY and the fruit pathology extension program has been promoting integrated pest management (IPM) programs developed based on research at the New York Agricultural Experiment Station NYSAES. Since source of WPBR resistance it's monogenic, it's only a matter of time before a virulent strain is selected that overcomes the resistance.

I was alerted to the problem to a breakdown of WPBR immunity as early as 2010 in Preston CT at a farm that produced Christmas trees and currants in neighboring fields. My program subsequently conducted a series of molecular characterization and pathogenicity studies using the field and greenhouse facilities of the NYSAES to prove the pathogenicity of the CT strain on certified immune breeding stock in controlled conditions (11).

Not unlike the NY small fruit stakeholders, New England stakeholders were also interested in capitalizing on *Ribes* the specialty small fruit niche market. However, the white pine industry is incredibly important in the New England states and concerns over our research findings in CT have generated a lot of caution regarding planting restrictions of *Ribes* on the part of regulatory agencies at the Federal and State level.

Soon after publication of the occurrence in RI, we were contacted in 2012 by the US forest service to examine some samples from *Ribes* operations in NH. We made some initial confirmation of WPBR on immune currant varieties, and members of the Canadian Forest Service performed pathogenicity tests in controlled conditions. We subsequently joined with members of the US forest service, the NH Division of Forests and Lands, and the Canadian Forest Service to form a regional/international taskforce to assess the breakdown of WPBR immunity in *Ribes* and assess the threat to the white pine industry. We applied and received federal funding to investigate the phenomena in NH in 2103. Our combined research efforts have resulted in the realization that the immunity has broken down in several commercially-popular resistant *Ribes* cultivars throughout the state of NH. In 2013, we surveyed 42 *Ribes* production operations, and using molecular markers confirmed WBPR infection on immune and resistant *Ribes*

varieties at 30 of the locations. Cultivars affected included: 'Titania' 'Jonkheer Van Tets', 'Clark' gooseberry, 'Blanca', 'Jahn's Prairie' gooseberry, 'Consort', Jostaberry, 'Randall Red', and 'Coronet'.

To date, the major NY *Ribes* producers, which I visit regularly during my extension travel, don't seem to have the virulent strain of WPBR that breaks resistance. I have never seen any WPBR on commercial *Ribes* plantings in NY, but the strain could be or could have been present at one time. Most of the *Ribes* growers in NY implement a robust integrated pest management program for diseases that includes site-specific fungicides. By implementing management programs as part of their standard production practices, NY growers appear to have eliminated emerging virulent strains able to overcome the immunity in commercial *Ribes* cultivars.

Practical Epidemiology of White Pine Blister Rust

Understanding the life cycle and the epidemiology of WPBR and the two hosts needed for its survival is important to develop effective management practices for controlling the disease. Several important considerations for the protection of the two hosts and management of the disease are listed below:

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- Temperatures over 85ºF in the summer months can suppress infection of *Ribes* leaves preventing the further spread and development of the disease. Along these lines, WPBR infections require cool temperatures in the range of 60-70 ºF, which is why many of the secondary infection are not present until the late summer months when the plants are beginning to undergo senescence. Continuous moisture for 14 days is need for the development of telial horns, which produce the basidiospores that establish infections of pine.
- Pines are typically planted in planting zones 1 and 4. The conditions that favor the infection of young pines in the fall are most likely to occur in zone 4. Therefore it is fairly safe to establish *Ribes* plantings in zone 1, even if there are pines in the region.
- The basidiospores produced from infected *Ribes* leaves in the fall are typically deposited within 1000 ft of the *Ribes* host. Hence it's important to have a minimum border of 1000 ft. between *Ribes* planting and pines. Such borders may not be possible in the New England states where pines are fairly pervasive.
- The majority of infections (>95%) on pines take place small branches produced on the lower 10 feet of the trunk. Infections that occur more than 1ft from the trunk will usually not progress to the trunk and kill the tree.

White Pine Blister Rust Management Trials in Geneva

Now that currants are a mainstay of the NY small fruit industry and WPBR has overcome immune varieties in New England states, we should continue a proactive management plan to preserve the longevity of both hosts. For over seven years, the Geneva experiment station has conducted WPBR management trials on currants and gooseberries across a range of cultivar susceptibility to WPBR. Early work focused on conventional pesticide programs and timing while more recent work focused on the management potential of organic and biopesticide programs. A bulleted results summary of our trials follows:

Highly rust susceptible currant varieties:

- Can be successfully managed using 4-5 applications of DMI or QoI fungicides. Rally 40WSP (DMI) is one of the few fungicides that is labeled for WPBR, and it's one of the best. The fungicides Pristine and Cabrio EG are also exceptionally effective against WPBR, but are no longer labeled for the disease in NY.
- Can be managed to low level of infection using a 4-5 application program biopesticides and organic fungicides including materials such as JMS Organic Stylet oil (check current labels).

Rust resistant to less susceptible currant and gooseberry varieties:

- Can be rust free using a 4-application program of DMI or QoI fungicides (Rally 40WSP - see above).
- Can be rust free using a 4-5 application program biopesticides and organic fungicides including materials such as JMS Organic Stylet oil (check current labels).

Several other site-specific, biopesticides, and organic fungicides work really well, and are labeled on the crop, but are not labeled for WPBR.

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