PEST MANAGEMENT UPDATE: DISEASES

Kerik D. Cox
Assistant Professor
Dept. of Plant Pathology and Plant-Microbe Biology
Cornell University, NYSAES
Geneva, NY 14456

Update on root diseases of brambles and strawberry in NY

Root diseases are particularly devastating and frustrating to manage in small fruit production operations. This is especially the case for established operations because the most effective management practices must be implemented prior to planting. The pathogens causing root diseases are all soilborne and remain protected within the soil. In addition, the most diagnostic symptoms are also below ground, which prevents one from recognizing the problem during time when action could be taken to save the planting.

In NY, the most common root diseases and disorders affect both raspberry and strawberry. Indentifying the characteristics of these problems will help one understand their role in seasonal plant decline. These root diseases and disorders include:

1. *Phytophthora* root rots (raspberry & strawberry-red stele): *Phytophthora* is an aquatic pathogen that prefers cool weather and free moisture (e.g. wet spots in the field). During *Phytophthora* infections, fine/lateral roots will decay first leaving only large primary roots, resulting in a rattail appearance. When the roots and crown are sectioned longitudinally, the vascular tissues will be reddish brown. As infection progresses and the plant dies, secondary decay fungi will rot the cortex of roots and the crown. Following plant death, infective propagules remain in dead plant tissue and the soil. These are capable of causing infections in later seasons after replanting. In both strawberries and raspberries there are resistant varieties to *Phytophthora* root rot.

2. Black root rot (strawberry): Black root rot of strawberry is a root disease caused by a complex of several pathogens. One of the pathogens, *Pythium*, is another aquatic organism similar to *Phytophthora*. Because of the similarities, the management practices for *Phytophthora* root rot are often effective for managing black root rot as well. Decline from black root rot usually occurs during the year of establishment, and like *Phytophthora* root rot, this disease primarily occurs in wet spots or in compacted soils with poor drainage. By harvest, infected plants will have decreased vigor, are stunted, and lack productivity. However, severely infected plants may be killed prior to harvest. Below the soil, the lateral/feeder roots will have decayed (similar to *Phytophthora* root rot), and the large primary roots will have dark lesions that expand overtime. Initially, the vascular tissue of infected roots appears white and healthy, but ultimately turns black as infection progresses. It is important not to confuse the black root rot with the natural blackening of strawberry roots that occurs with age. Older roots will have a black epidermal covering, but the cortex and vascular tissue will be firm and white instead of having dark lesions.

The role of root diseases in plant decline during the 2011 season

The flooding at the beginning of the 2011 season resulted in serve epidemics of *Phytophthora* root rot in raspberries and strawberries, and black root rot in strawberries. Due to the flooding, pressure for these two diseases was extreme, and losses were unmanageable in many situations. There were many reports of small fruit plant decline, especially in strawberries. Unfortunately, the majority of the samples diagnosed by this program had progressed to a stage of decline where it was impossible to confirm root disease as the cause. Later in the season, the drought conditions in July resulted in additional plant decline in raspberries that were confused with root diseases. With the early season flooding, growers weren't prepared to irrigate during the July drought, causing plants to decline and cause somewhat benign herbicides and fertilizers to result in light levels of damage, which added to the confusion. From August to October, there was considerable rainfall again, and grower begin to experience increase root disease likely exacerbated by plants compromised by chemical and drought stress.

Preparing for root diseases and decline in 2012

Given the overall high disease pressure and favorable environmental conditions for disease in 2011, there could be considerable root disease inoculum present in small fruit plantings in 2012. In plantings with severe plant decline in low-lying wet areas, a phosphorous fungicide program may be warranted to prevent additional loss to *Phytophthora* or black root rot. In addition to diseases, winter injury could be more severe in 2012. Plants with high levels of disease (even foliar diseases like leaf spot) at harvest may be stressed or weakened as they enter dormancy and would be more susceptible to winter injury. In order to avoid plant decline in 2012, producers would be best served by ensuring plant insulation during winter and scouting during spring and early summer for the first signs of plant decline (e.g. wilting). If recognized early, the extent of losses could be mitigated.

Literature

1. Maas, J.L. 1998. Compendium of Strawberry Diseases. APS Press. 98 p.
2. Pritts, M. and Handley, D. 1998. Strawberry Production Guide for the Northeast, Midwest, and Eastern Canada. NRAES-88. Cornell cooperative Extension, Ithaca, NY, 162 p.
3. Pritts, M. and Handley, D. 1989. Bramble Production Guide. NRAES-35. Cornell cooperative Extension, Ithaca, NY, 200 p.
4. Ellis, M.A., Converse, R.H., Williams, R.N., and Williamson, B. 1991. Compendium of Raspberry and Blackberry Diseases and Insects. APS Press. 100 p.

Update on Blueberry Viruses in New York

In recent years, there have been several outbreaks of berry virus diseases in NY occurring as far north as Oswego County to as far south as Tioga County. Moreover, our program at NYSAES has received more suspected berry virus samples in 2008 than any of the previous seasons. The majority of suspected berry virus disease samples were for blueberries and raspberries, which is understandable since they are both perennial crops. Fortunately, the majority of the samples received were clearly not viruses diseases and represented miscellaneous isolated horticultural anomalies. At the same, such samples and producer concern provided a clear impetus for providing more extension education on virus problems. At the same time, there have been two severe berry virus outbreaks that we will use as the basis for this education.

Since 2006, the majority of the outbreaks in NY blueberries have been tobacco and tomato ringspot virus (ToRSV) epidemics restricted to the field in which they occurred. When contracted these viruses are quite devastating to the planting. These viruses compromise fruit production considerably and lead to plant death as the infection becomes systemic. The disease spreads fairly slowly as the vector is a ($1/16^{th}$ inch long) soilborne roundworm that migrates best in sandier soils with large pore sizes. However, it's not uncommon to the find the nematode already distributed across a mature planting due to the fact that numerous weeds can also host the nematode.

In NY raspberries we have only observed two virus outbreaks in recent years: one outbreak of crumbly berry and one of raspberry bushy dwarf virus (RBDV). Crumbly berry is also caused by ToRSV and transmitted by the same nematode vectored in blueberries. Infected raspberries can range from slightly stunted to completely healthy looking. The most striking and diagnostic symptom of the virus is the production of small fruit, which crumble apart when touched. ToRSV infection prevents the maturation of fruit druplets, which is the reason for druplet disassociation on contact. Recently, an outbreak of RBDV was reported and confirmed in NY. This disease typically causes stunting and shoot proliferation in red raspberries, hence the name bushy dwarf. Virus infection can cause aborted druplets and a crumbly berry symptom in some varieties, but will not hinder pollen production. What makes this disease exceptionally dangerous is the fact that RBDV is pollen born and seed transmitted, meaning that nearby healthy plants can become infected during pollination. Because of this mode of transmission, this virus can spread much more rapidly than ToRSV in raspberry plantings.

How can NYSAES help berry producers?

NYSAES has the infrastructure and equipment to conduct virus testing for any number of berry crops and viruses. Given the prevalence of ToRVS in NY in recent years, it would be pertinent to develop a testing service in cooperation with stakeholders for this virus and potentially others in the near future. With the equipment and infrastructure on hand, the only necessary support would consist of a summer survey and processing crew and the reagents for the test.

Literature

5. F. L. Caruso and D. C. Ramsdell. 1995. Compendium of Blueberry and Cranberry Diseases. APS Press. 87 p.
6. Pritts, M. and Hancock, J. 1992. Highbush Blueberry Production Guide. NRAES-55. Cornell cooperative Extension, Ithaca, NY, 200p.
7. Pritts, M. and Handley, D. 1989..Bramble Production Guide. NRAES-35. Cornell cooperative Extension, Ithaca, NY, 200p.
8. M.A. Ellis, R.H. Converse, R.N. Williams and B. Williamson. 1991. Compendium of Raspberry and Blackberry Diseases and Insects. APS Press. 100 p.
9. Schilder, A., Isaacs, R., Hanson, E. and Cline, B. 2004. A pocket guide to IPM scouting in highbush blueberries. Michigan State University Extension Bulletin E-2928. 127 p.