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BERRY CROPS

Cornell University

Integrated Pest Management

Blueberry Shock Disease

Blueberry shock virus (BlShV)

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Introduction

Blueberry shock disease, caused by *Blueberry shock virus* (BlShV), threatens profitable and sustainable blueberry (*Vaccinium* spp.) production. The disease has recently emerged in New York, having been confirmed in 2011. Because it is transmitted by pollen and readily dispersed by bees and other pollinators, it is difficult to control. Blueberry shock gets its name because plants are 'shocked' by the initial infection and suffer flower and leaf blight and dieback (Fig. 1). But the affected shoots regrow, leaving plants barren of fruit. After one to two years, infected plants may recover and regain fruit production, but their pollen will continue to spread the virus to other blueberries which confounds efforts to rogue and remove infected plants to control the disease.

Causal Agent

Blueberry shock virus (BlShV) belongs to the genus *Ilarvirus* in the family *Bromoviridae*. Virus particles are icosahedral and 30 nm in diameter. In a nursery setting, the virus may be transmitted by vegetative propagation. Cuttings taken from an infected mother plant will propagate the infection in the new plants. This virus is unusual in that it is not transmitted by insects such as thrips, aphids or whiteflies, but solely by pollen. When bees or other pollinating insects carry BlShV-infected pollen to other blueberry bushes, the plants become infected. In addition to New York, the virus is present in Washington, Oregon, British Columbia, Michigan and Pennsylvania.

Host Range, Impact, and Symptoms

Blueberries are the only known host of BlShV. All blueberries are thought to be susceptible to the virus, though no extensive cultivar trial has been undertaken. Some blueberry cultivars may exhibit tolerance, which means plants become infected but do not suffer loss of fruit production; however, such plants can still transmit the virus to other blueberries in the planting.

Typically BlShV symptoms occur at the onset of infection and are severe. Initial symptoms of shock disease include tip dieback shortly before bloom with the flowers becoming necrotic (Fig. 2), greatly reducing the amount of fruit on shock-infected bushes. BlShV-infected bushes often show defoliation,

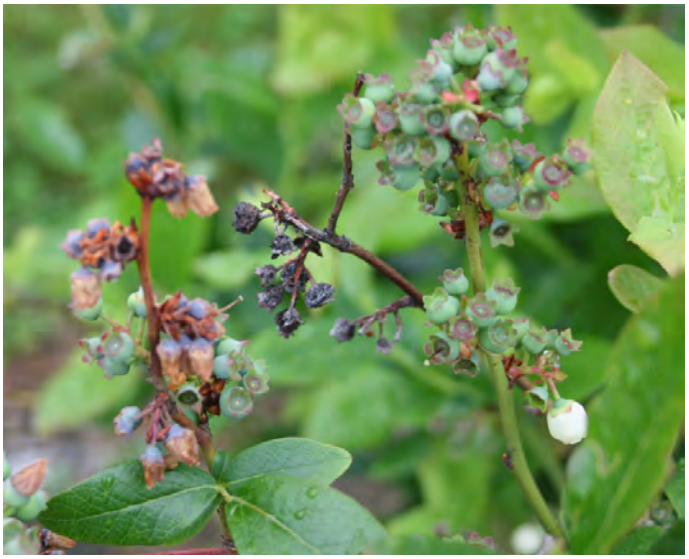

Photo: K. Cox

Figure 1. Blight of flowers and leaves associated with dieback caused by BlShV.

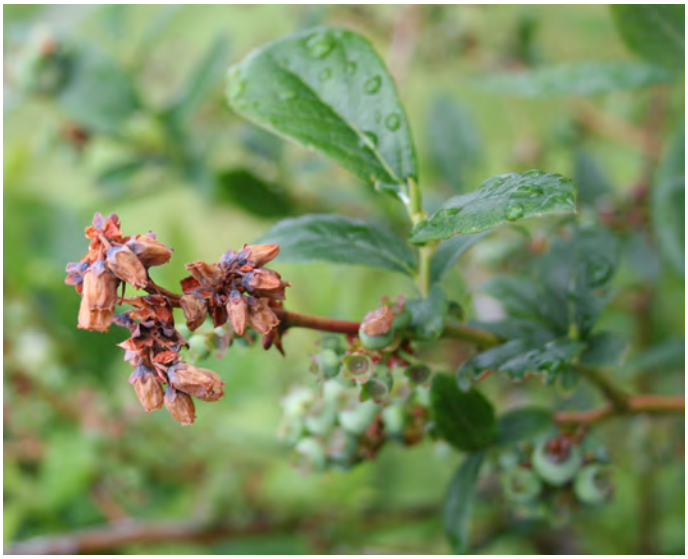

Photo: K. Cox

Figure 2. Tip dieback and blighted flower clusters on a shock-infected high-bush blueberry.

dieback and reduced yields for three to four years (Fig. 3). Heavily infected plantings may have yields reduced by 75%.

After three to four years, infected plants recover normal bloom and fruit production. Infected plants regrow foliage, but curved tips of dead shoots often remain (Fig. 4), and sometimes show branching near the growing point. Plant recovery is characterized by lack of symptoms, but, even after recovering a healthy appearance, plants remain a source of the virus.

Virus symptoms are influenced by many factors including the cultivar, time of year, and weather. Some infected plants may show only dieback and flower necrosis on some branches, while others show a 'shock' reaction that includes defoliation.

Transmission and Spread

Blueberry shock virus can be introduced into a planting in infected nursery stock, though nearby blueberry fields containing infected plants and visited by a common set of bees may also be a source. The virus is found on the surface of and inside pollen grains, and likely infects during pollination. The virus moves from the developing fruit to the plant where it establishes infection. Bees are known to transmit the virus and the virus can survive on pollen in hives between one and two weeks. Other insects that visit blueberry flowers may also carry infected pollen and transmit the virus.

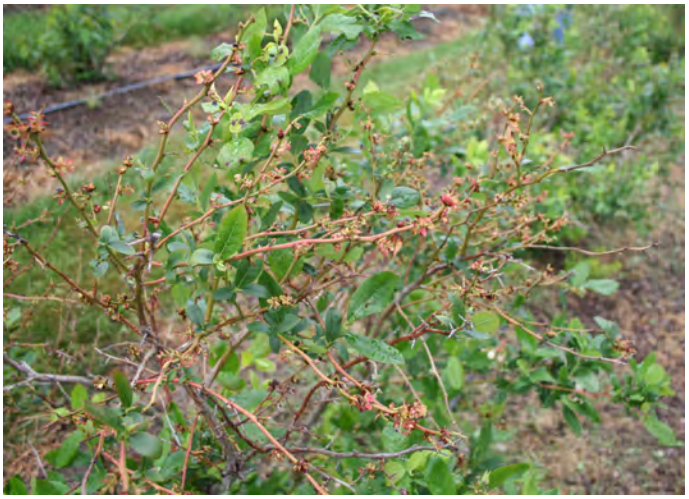

Photo: K. Cox

Figure 3. Defoliation and lack of fruit on a highbush blueberry infected with BlShV.

Management

Effective management of BlShV relies on planting material derived from certified, virus-tested stocks that are established in plantings away from production fields that may contain BlShV, monitoring at bloom for shock symptoms, and testing symptomatic plants and those nearby for virus.

The best way to manage BlShV in a blueberry planting is to prevent its introduction. Obtaining clean plants or plants produced from certified virus-tested stocks is paramount for establishing new plantings or replacing dead bushes. Identifying and thoroughly roguing BlShV-infected blueberries and infected plantings nearby is equally important. New plants should not be placed near old plantings suspected of having BlShV.

When shock symptoms are observed, it is critical to rogue symptomatic plants to reduce disease incidence and spread. However, because recovered-shock-infected plants may be in the vicinity of symptomatic ones, roguing will fall short of eliminating BlShV from a field. When a symptomatic plant is discovered, the plant should be rogued and nearby plants should be tested by a reputable diagnostic laboratory for presence of the virus in order to make an informed decision regarding removal of asymptomatic bushes that may be infected. Because the virus is not evenly distributed within a plant, thorough tests should consist of buds taken from several axes on the plant. If the virus is present in at least 20% of the planting, all of the plants should be destroyed. If a few plants are infected, laboratory testing, regular scouting, and roguing prior to bloom can maintain low levels of the virus or potentially eradicate blueberry shock from the planting.

Photo: K. Cox

Figure 4. Recovery of a BlShV-infected highbush blueberry showing new leaf growth.

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