THE ORGANIC WAY- PREVENTATIVE DISEASE MANAGEMENT FOR HIGHBUSH BLUEBERRIES

Elsa Sanchez, Assistant Professor, Horticulture Systems Management, and Kathy Demchak, Senior Extension Associate, Small Fruits Penn State University

The first step in preventative management of blueberry diseases is to become familiarized with the diseases that blueberry plants are susceptible to as well as the environmental factors that favor disease development. Management strategies can then be developed specifically for individual farms or fields within a farm. Selecting disease free sites and planting stock are first steps in preventative disease management. The primary symptoms of several diseases caused by fungi are described below along with preventative strategies for disease management.

Phomopsis Twig Blight and Canker (causal agent is *Phomopsis vaccinii*)

Disease Symptoms: Symptoms first appear on 1-year-old twigs with flower buds at bud break. Infected twigs may die back or suddenly wilt. Infected stems may have reddish-brown lesions that are about 1 to 4 inches long. Brownish cankers 4 to 8 inches long may be observed initially during in the summer on 1-, 2- or 3-year-old canes and can result in the death of the entire canes. Reddish-brown, brittle, dead leaves will persist on dead canes. Development of this disease is favored by wet weather, especially in the early part of the growing season. Infective spores are spread by splashing rain.

Preventative Management Strategies: Plant resistant and/or tolerant cultivars. 'Bluetta' is a cultivar with resistance and 'Coville', 'Earliblue', 'Elliott', 'Nelson' and 'Rancocas' have tolerance. Remove infected canes to promote drying of the plant canopy. This also serves to remove possible sources of inoculum and therefore slow spread of the disease. Use irrigation and fertilization management that promote early hardening off (don't irrigate or fertilize too late in season) of the blueberry plants.

Botryosphaeria Stem Canker (causal agent is *Botryosphaeria cortices*)

Disease Symptoms: Early symptoms of this disease include yellowing or reddening then dying of the leaves of one or more canes of 1- to 2-year-old plants. This will be followed by the death of infected branches with reddish-brown, brittle, necrotic leaves persisting. It is common to observe infected canes along side of seemingly healthy canes. Cutting a stem, with healthy and infected tissue, length-wise will reveal brown discoloration of the infected tissue while the healthy portion of the stem will have white or cream colored tissue. Plants can become infected anytime throughout the growing season. Development of this disease is favored by wet weather, especially in late spring. Infective spores are spread by wind.

Preventative Management Strategies: Remove infected plants to eliminate possible sources of inoculum and therefore further spread of the disease. Use good sanitation (clean tools and equipment) to avoid spreading the disease.

Fusicoccum Canker (causal agent is *Fusicoccum putrefaciens*)

Disease Symptoms: In the fall, initial symptoms of this disease are tiny water-soaked lesions, on the lower third of 1- or 2-year-old canes, which turn red by December. The following spring and summer the lesions develop into cankers resembling a target. Each canker is generally centered on a leaf scar. During the summer, generally when fruit are present, leaves on stems with cankers will wilt, die and persist on the stem. Canes can be re-infected throughout the growing season. Disease development is favored by wet conditions.

Preventative Management Strategies: Plant cultivars with tolerance or resistance to this disease. For example, 'Rancocas' has resistance and 'Berkeley', 'Burlington' and 'Rubel' have tolerance. Prune out infected stems to promote good air circulation within the plant canopy and also to remove inoculum for further spread of the disease. Other methods that promote good air circulation within the planting include proper pruning and good weed management.

Phytophthora Root Rot (causal agent is *Phytophthora cinnamomi*)

Disease Symptoms: Leaves of plants diseased with Phytophthora will yellow, turn red-brown, die and persist on the plant. Infected plants will stop producing new growth. Plants can die rapidly when conditions favoring disease development exist. This disease is caused by a soil borne, which requires free water for the spread of infective spores.

Preventative Management Strategies: Select a site with good drainage and avoid planting in low spots in the field to prevent soil water logging and the spread of this disease. Use good moisture management (for example, do not irrigate while it is raining) also to avoid spread of the disease.

Botrytis Blight (causal agent is *Botrytis cinerea*)

Disease Symptoms: Botrytis blight can affect flowers, leaves, twigs and fruit. Generally the flowers are infected first. Infected flowers turn brownish in color and can be covered with gray mycelium that can have black spores. Leaves may become infected next, developing brown necrotic lesions. Ripening fruit can also be diseased with Botrytis Blight and can be identified by gray mycelium and spores growing on the fruit. Cool temperatures and high relative humidity favor disease development.

Preventative Management Strategies: Avoid using excess fertilizer in the spring because it stimulates excess growth of susceptible young tissues. Promote good air circulation within the planting to encourage low relative humidity within the plant canopy. For example, use good pruning techniques, weed management and plant spacing.

Mummy Berry (causal agent is *Monilinia vaccinii-corymbosi*)

Disease Symptoms: In the early spring, leaves and young shoots infected with the fungus causing Mummy Berry droop, turn brown and die. Diseased fruit will shrivel or mummify turning from blue to tan in color. The fruit may also emit an odor similar to fermented dark tea. The berries that are mummified will fall off of the plant. The following spring the fungus causing Mummy Berry will produce cup-like spore-bearing structures called apothecia from the mummified berries on the ground.

Preventative Management Strategies: Plant cultivars having resistance or tolerance. 'Bluejay', 'Burlington', 'Darrow', 'Duke', 'Elliott', 'Lateblue', 'Northblue' and 'Northsky' have resistance to Mummy Berry and 'Bluecrop', 'Bluetta', 'Collins', 'Coville', 'Rancocas' and 'Spartan' have tolerance. Remove old berries from the plant and fallen leaves and berries from the planting because they can be infected and spread infective spores. Another option is to cover old berries on the ground with 2 inches of soil or mulch before flowering to prevent infective spores from being spread.

Alternaria Leaf Spot and Fruit Rot (causal agent is *Alternaria tenuissima*)

Disease Symptoms: Leaves will develop circular to irregular light brown to tan spots with a reddish border. Infection by the fungus that causes Alternaria Fruit Rot begins at the blossom end of the fruit. As the fruit ripen, black spores can be seen and the fruit will become watery or leaky. Disease development is favored by cool, wet weather in the spring.

Preventative Management Strategies: Promote good air circulation within the planting to encourage drying within the plant canopy. For example, use good pruning techniques, weed management and plant spacing. Cool berries immediately after harvesting to preserves fruit

quality. Use good sanitation (clean tools and equipment) to avoid spreading the disease. Adjust harvesting schedules to avoid over ripe fruit on the plants that favors disease development.

Anthracnose (causal agent is *Colletotrichum gloeosporioides*)

Disease Symptoms: Signs and symptoms of Anthracnose are found primarily on the flowers and fruit. Infected flowers turn brownish to blackish in color. As the fruit ripen, sunken spots at the blossom end may develop. White to light pink mycelia may also be present. Disease development is favored by high moisture in the plant canopy.

Preventative Management Strategies: Plant cultivars with resistance, including 'Elliott' and 'Little Giant'. Promote good air circulation within the planting to encourage drying within the plant canopy. For example, use good pruning techniques, weed management and plant spacing.

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