



## Monitoring and Control of Mummy Berry in Blueberries

Annemiek Schilder, Dept. Plant Pathology, Michigan State University  
Becky Grube, University of New Hampshire Cooperative Extension

### Symptoms

Mummy berry is a disease of blueberries caused by the fungus *Monilinia vaccinii-corymbosi*. The first symptom that becomes visible is [a blight of young developing shoots in spring](#). Occasionally, flower clusters also become blighted. The next symptom becomes visible as the berries start to ripen, at which time they become [light brown to pink](#) and start to shrivel up, turning into fruit “mummies”. Most of the berries fall to the ground, but some end up being harvested. There is a zero tolerance for mummy berries in processed fruit. The mummy berry fungus overwinters in mummified fruits on the ground, and in early spring produces spores that start the disease cycle anew. Mummy berry is more common in wet fields and poorly drained areas, therefore scouting should target those sites. Dry, sandy sites may not have any mummies at all. However, wild or escaped blueberries in nearby wooded areas can also be a source of infection.

### What to look for

Mummy berries can be found on the ground below blueberry bushes anytime after harvest and look shriveled and are purplish white in color. They can be distinguished from regular rotten berries by squeezing them between thumb and forefinger. Mummy berries tend to be pretty tough and resilient and won't crumble quickly. After the fruit skin has worn off, they start to look more like tiny black pumpkins. Mummies will start germinating in early spring and will show small brown, finger-like projections (stipes). Only a portion of the mummies germinate in any one year. The wetter the site, the higher the germination percentage will be. However, if the site becomes flooded for extended periods, the mummies will drown and rot away. There can be anywhere from one to seven stipes on a mummy. The stipes have a hole in the tip that develops into a small mushroom cup, 1/16 to 1/3 of an inch in diameter.

The mushrooms start shooting spores when the cup is about 1/8 inch in diameter. Over a million spores can be released per day by a fully functioning mushroom. When the mushrooms are disturbed or the air pressure changes, many spores get released at once, appearing like a little wisp of smoke and an audible puff. These spores get picked up by the wind and carried to susceptible green tissue. The ascospores are windborne and can travel fairly long distances within fields and even between fields, possibly up to several miles. Ascospore release continues until the cup collapses. Cups may last 1 week at room temperature to up to 4 weeks at lower temperatures. A severe freeze may damage the cups, but they can partially recover their ability to shoot ascospores.

### Stages of infection

There are two stages of infection. First the developing shoots are infected by the ascospores from the mummy berry cups. Prolonged cool, wet weather is conducive to infection. Frost may also predispose the shoots to infection. Shoot strike symptoms appear approximately 2 weeks after infection. Blueberry cultivars are susceptible from bud break until shoots are about 3 inches long. Occasionally flower clusters also become blighted; these are called flower strikes. Secondary spores (conidia) develop in a grayish layer on blighted shoots and flower clusters and are rain splash- or insect-dispersed to the flowers. Bees are attracted to the infected shoots by their UV-light pattern and unwittingly pick up the spores, which then hitch a ride to the flowers. The conidia infect the flower stigma followed by growth of the fungus into developing fruit, which eventually mummifies and drops to the ground. Flowers are most susceptible on the day they open and then become progressively less susceptible over the next 3-4 days.

## Controlling the disease

### *Resistant Varieties*

Cultivars such as Berkeley, Bluetta, Blueray, Earliblue, Jersey, Nelson, Patriot, and Weymouth are susceptible whereas Bluecrop, Duke and Elliott are moderately resistant to the disease. Some cultivars are more susceptible to shoot strikes and less susceptible to fruit infection, whereas others are just the opposite.

### *Removal or inactivation of mummies*

Removing mummified berries by raking in the fall is ideal but not very practical on a large scale. Burying mummies with about 2 inches of mulch in the fall will reduce the number that can effectively germinate the next spring. Additionally, cultivating or raking in the early spring can inactivate mummies. The [mushroom-like stipes that germinate from the mummies](#) are vulnerable to disturbance and won't release spores if they are broken or buried. This should be done as early as possible in the spring, and repeated after each hard rain until after bloom. Early spring applications of urea fertilizer can also physically damage the mummy berry cups by 'burning' them. One drawback is that mummies typically germinate over an extended period of time and one application will not get them all.

### *Fungicide options*

If mummy berry has been a problem for you in the past, a fungicide spray program may be necessary. An effective fungicide spray program involves applying fungicides regularly (every 7-10 days) throughout the period when bushes are susceptible - from bud break (or when mummy berry cups are first observed) through the end of bloom. If frost (28-30°F) occurs between sprays, re-applying fungicides immediately after the frost event has been shown to improve disease control.

Several fungicides are labeled for use against mummy berry. Labeled materials and state registrations change annually! This is particularly true for emergency exemption (Section 18) labels, such as the one New Hampshire has had for Indar for the 2004 and 2005 growing seasons. Check with your local extension educator or specialist for current recommendations.

Indar consistently has outperformed other currently registered and experimental fungicides for both the primary and secondary phases of the disease in trials in Michigan and has given good control in commercial plantings in New Hampshire. Indar is a sterol inhibitor fungicide and therefore prone to resistance development in target fungi. It is best to limit the number of sprays of Indar to two or three per season (five are allowed per the label) **and** alternate with fungicides in other chemical classes. Options are Bravo (fair to moderate efficacy), Captevate (moderate efficacy) Topsin M with Captan or Ziram (moderate to good efficacy), and Serenade (good efficacy). Use Bravo or Serenade (both protectants) for pre-bloom applications, since systemic fungicides such as Indar and Topsin will likely provide better coverage of the flower parts (the stigma specifically). While Pristine has shown promising results against mummy berry in other states, it did not appear as effective in Michigan, at least for the shoot strike phase. Cabrio and Abound have shown poor to fair efficacy in past trials in Michigan. In 2005 in Michigan, dormant sprays (at bud swell) with Cuprofix (copper sulfate) at 3 lb/acre showed promising results for mummy berry control.

### *Organic fungicide options*

Of the above options, Serenade is a biological fungicide that is listed by OMRI and is approved for use in organic production. Lime sulfur is also approved for organic production, but is applied differently, when plants are dormant. Lime sulfur is sprayed on the soil surface very early in the spring to destroy the apothecia (as the first mummy berry cups appear) with lime sulfur (29%) at 16-24 gal/acre in 200-300 gal water. There is also an indication that lime sulfur and copper applied to the bushes at bud swell can reduce shoot infection, but more work needs to be done to confirm this. Both of these options would probably be approved for organic production, depending on the formulation of the product. Some fixed copper formulations are currently registered for control of bacterial diseases in blueberries.

A combined approach of planting resistant varieties, using cultural techniques such as raking and mulching, and applying fungicides at the appropriate times are the most effective way to manage mummy berry disease of blueberries.