Climate effects on mummy berry disease in the PNW, 2013-2023

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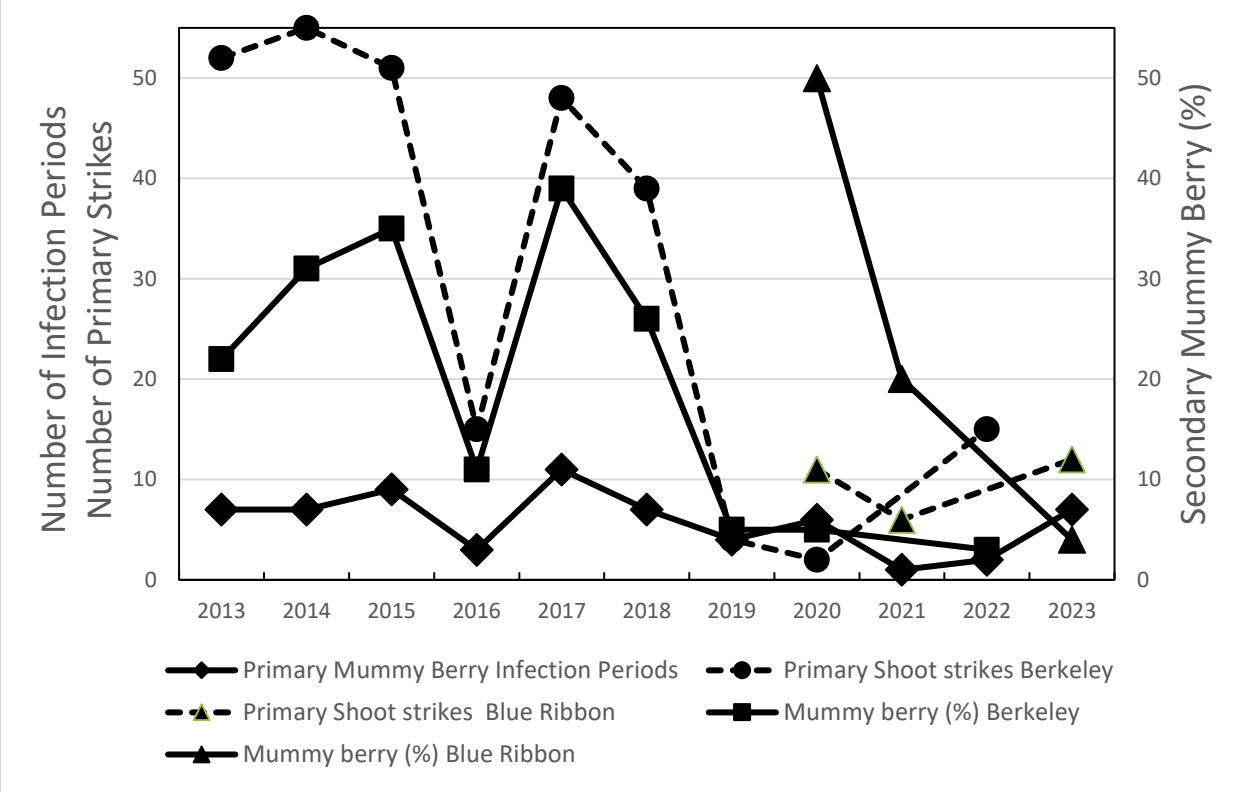
Blueberries are an important agricultural commodity in the Pacific Northwest (PNW), and the area accounts for 55% of the total production of highbush blueberries (*Vaccinium corymbosum* L.) in the US and 60% of the total organic production. Mummy berry (*Monilinia vaccinii-corymbosi*) is an important production issue that, without proper management, can result in significant monetary losses of up to 70 to 85%. The disease is characterized by floral and shoot blight, discoloration, and shriveling of berries before harvest. Management of mummy berry focuses on minimizing both primary and secondary infections.

Primary infections are initiated in the spring due to ascospores from apothecia produced from overwintering pseudosclerotia. Infections occur during warm rain events with short wetness periods but can also occur during cool rain events with longer wetness periods. The relationship between temperature and wetness for ascospore infection was incorporated into a model based on data from Nova Scotia, Canada (Hildebrand and Braun, 1991). The use of this model in the Willamette Valley of Oregon has not been fully investigated.

Ascospore infection periods were monitored from 2013 to 2019 using an Adcon A730 weather station equipped with standard sensors and from 2020 to 2023 with a Meter Atmos 41 weather station equipped with standard sensors including one for leaf wetness. Weather station placement was in the canopy of apple trees located nearby to blueberry plots. The development stage of pseudosclerotia was monitored regularly just prior to blueberry bud break through early bloom. The number of infection periods during sporulation (apothecial emergence) was enumerated from 2013 to 2023 (Figure 1 – square symbols, solid line).

The number of floral clusters and vegetative shoots per bush with symptoms of primary mummy berry was evaluated each year. An experimental block of 'Berkeley' blueberries planted at the Botany and Plant Pathology Field Laboratory in 1999 on 5 x 10 ft spacing was used from 2013 to 2023. An additional block of 'Blue Ribbon' blueberries planted in 2014 on 3 x 11 ft spacing at Riverbend Organic Farm was monitored in 2020, 2021 and 2023. Green berries were arbitrarily harvested from bushes each year, then 200 berries were cut in half and evaluated for symptoms of secondary mummy berry (white mycelial mats within the carpels of the berry).

Figure 1. Ascospore infection periods relative to primary and secondary mummy berry disease levels.



The number of infection periods identified during apothecial sporulation varied from 1 (in 2021) to 11 (in 2017) for an average of 5.8 per spring. An infection period occurred for every rain event that occurred when apothecia were detected. When comparing between years, primary disease measurements of blight tended to be lower when fewer infection periods were detected. For example, only 3 infection periods were detected in 2016 which resulted in fewer shoot and floral blights than the year before. The spring season of 2021 was notable for the driest spring on record. That year the lowest number of infection periods along with a significant drop in both primary and secondary mummy berry in a very susceptible cultivar was recorded. The one exception was in 2022 when only 2 infection periods were detected but more floral blights were recorded than the year before. This was likely due to symptom similarity between infections by *Monilinia* and *Botrytis*. Many more *Botrytis* infections were detected that year.

The percentage of berries with secondary mummy berry symptoms tended to follow the number of primary infections. Again, in 2016 when compared to the prior year, fewer primary shoot or floral blights resulted in a lower (11%) number of berries with signs of secondary fungal infection. The only exception was in 2023 when more primary blights were recorded for the highly susceptible 'Blue Ribbon' block when compared to 2020 and 2021 but very low secondary signs were observed. The spring of 2023 was characterized with rain events prior to bloom and then a rapid change to virtually no rain during bloom and for the rest of the summer.

It may not be necessary for growers to monitor the weather with instrumentation and closely follow the mummy berry ascospore infection model. Any rain event from bud break through bloom could be considered an infection period requiring active management. Although lower primary infections reported here were due to Mother Nature, growers can also expect lower mummy berry incidence if primary infections are prevented or reduced through cultural or chemical management tactics.

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