

Blueberry industry at risk as powdery mildew spreads worldwide

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Powdery mildew covers a plant, stealing nutrients and limiting photosynthesis. Credit: Michael Bradshaw, NC State University.

A new North Carolina State University study pinpoints the worldwide spread of a fungus that taints blueberry plants with powdery mildew, a disease that reduces blueberry yield and encourages the use of fungicides to combat disease spread. The findings, [published](#) in *New Phytologist*, could help blueberry growers predict, monitor and control the spread of

powdery mildew.

The study shows that the [fungus](#), *Erysiphe vaccinii*, has in the last 12 years or so spread from its point of origin in the eastern United States to multiple continents.

"We're watching this global spread happen right now, in real time," said Michael Bradshaw, assistant professor of plant pathology at NC State and the corresponding author of a paper describing the research.

As its name suggests, [powdery mildew](#) disease causes a white, powdery substance to cover [host plants](#), stealing nutrients and retarding photosynthesis while keeping the host alive. Different species of this fungus affect different plants; wheat, hops, grapes and strawberries, among other plants, have been detrimentally affected by powdery mildew.

"There are other closely related powdery mildews that affect plants like wild berries or eucalyptus, but these are genetically different from the ones spreading across the world on blueberries," Bradshaw said.



Powdery mildew infecting blueberries. Credit: *New Phytologist* (2025). DOI: 10.1111/nph.20351

In the study, Bradshaw and his colleagues examined historic and modern plant leaves plagued by powdery mildew. The collection includes 173 samples from North America, Europe, Africa and Asia; one sample analyzed from a North American herbarium was collected over 150 years ago, while the foreign samples were all collected within the past five years. In this study, powdery mildew was first spotted outside North America on a farm in Portugal in 2012, as noted by a co-author of Bradshaw's who was employed by a major berry company.

The researchers performed [genetic testing](#) on the fungal samples to trace the history and spread of powdery mildew disease. Interestingly, none of

the old specimens have the same genetic makeup, or genotype, as the specimens currently spreading throughout the world.

The study showed that the disease originated in the eastern United States and was set loose globally in two different introductions. One strain of *E. vaccinii* found its way to China, Mexico and California, while a different strain wound up in Morocco, Peru and Portugal. Bradshaw thinks humans are responsible for the spread as nursery plants traveled to foreign shores.

"This is a hard organism to control," Bradshaw said. "If you're sending plant material across the world, you're likely spreading this fungus with it."

Interestingly, the study also showed that the *E. vaccinii* fungus found in blueberries in other countries appears to solely reproduce asexually; both sexual versions of the fungus are not required in reproduction, whereas the fungus reproduces sexually and asexually in the United States.

The study also worked with a large company and farmers to provide an estimate of the global cost of powdery mildew to blueberries, reflecting the cost of spraying fungicide to prevent or reduce powdery mildew. The study estimates a cost range of between \$47 million and \$530 million annually to the global blueberry industry.

Finally, the study provides some [early warning signals](#) to important [blueberry](#) producing areas, like the U.S. Pacific Northwest. Conditions there are ripe for powdery mildew to take hold and spread, but the disease has not found its way there yet.

"Disease spread could also be impacted by agricultural conditions," Bradshaw said. "Some areas that grow blueberries in tunnels, or enclosed areas, seem to have worse disease outcomes than areas that grow

blueberries outdoors without any covering, like in North Carolina."

Bradshaw added that the researchers utilized a useful tool that can help identify *E. vaccinii* strains to aid farmers and other researchers.

"It's difficult to identify the fungus that causes powdery mildew in blueberries, so we input our data in a public database developed at NC State by a co-author, Ignazio Carbone. This platform allows growers to enter their data and learn which specific strain is in their fields," Bradshaw said. "That's important because understanding the genetics can warn farmers about which strain they have, whether it is resistant to fungicides, and how the disease is spreading, as well as the virulence of particular strains."

More information: Michael Bradshaw et al, An emerging fungal disease is spreading across the globe and affecting the blueberry industry, *New Phytologist* (2025). DOI: [10.1111/nph.20351](https://doi.org/10.1111/nph.20351).
[nph.onlinelibrary.wiley.com/doi/10.1111/nph.20351](https://onlinelibrary.wiley.com/doi/10.1111/nph.20351)

Provided by North Carolina State University

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