

Uncovering the mystery of a major threat to wheat

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Agricultural Research Service (ARS) scientists have solved a longstanding mystery as to why a pathogen that threatens the world's wheat supply can be so adaptable, diverse and virulent. It is because the fungus that causes the wheat disease called stripe rust may use sexual recombination to adapt to resistant varieties of wheat.

ARS plant pathologist Yue Jin and his colleagues Les Szabo and Marty Carson at the agency's Cereal Disease Laboratory at St. Paul, Minn., have shown for the first time that stripe rust, caused by *Puccinia striiformis*, is capable of sexually reproducing on the leaves of an alternate host called barberry, a common ornamental. The fungus also goes through asexual mutation. But sexual recombination offers an advantage because it promotes rapid reshuffling of virulence gene combinations and produces a genetic mix more likely to pass along traits that improve the chances for survival.

Barberry (*Berberis* spp) is already controlled in areas where [wheat](#) is threatened by [stem rust](#), caused by another [fungal pathogen](#). But the work by the ARS team is expected to lead to better control of barberry in areas like the Pacific Northwest, where cool temperatures during most of the wheat growing season make stripe rust a particular threat.

The researchers suspended wheat straw infected with the stripe rust pathogen over barberry plants and found that [fungal spores](#) from the wheat infected the barberry. They also took infected barberry leaves, treated them to promote the release of spores, and exposed them to

wheat. Tests confirmed that the wheat plants were infected within about 10 days.

The researchers began the study last year after finding infected leaves on barberry plants at two sites on the University of Minnesota campus. They initially thought the symptoms were a sign that the stem rust pathogen had overcome the resistance commonly found in U.S. varieties of barberry.

Instead, they found barberry serving as a sexual or "alternate" host for stripe rust. When the overwintering spores of the stripe rust fungus germinate in the spring, they produce spores that reach barberry leaves, forming structures on the top of the leaves that allow mating between races or strains of the fungus. Spores resulting from this mating can, in turn, infect wheat.

More information: The results were recently published in *Phytopathology*.

Provided by United States Department of Agriculture

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