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New Ornamental Pear Rust in the Neighborhood

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Although Callery pears suffered tremendously from snowstorms in recent years, many still stand tall in the landscape and new ones will likely replace the old in years to come. One feature that has been in the tree's favor is its relative resistance (immunity?) to insects and diseases; but enthusiasm for that feature may now be dampened by the occurrence of pear trellis rust caused by *Gymnosporangium sabinae*. The fungus—related to the cedar-apple rust pathogen, originated in Euroasia and North Africa—has become widespread in western Europe, and has been reported in parts of Canada, the U.S. Pacific Northwest and in recent years, Michigan.

Beginning in 2009, unusually colorful (yellow to purple-red) leaf lesions were noted on some ornamental Callery pear in scattered locations in southeastern New York. Symptoms also were found in nursery stock in 2010 and 2011. The lesions often have minute black fruit-bodies on the upper leaf surface, enabling identification of the causal organism as a rust fungus. If the pathogen is able to progress to the next spore stage—development of spores in cup-like structures on the lower leaf surface—identification to species can be confirmed. Unfortunately, this progression to the second spore stage is often hampered by invasion of rust-infected tissue by anthracnose-like secondary pathogens that obscure progress.

In 2011, expansion of the range of pear-trellis rust into New York was formally documented by Cornell faculty and staff—using the same contemporary technology that is revolutionizing the study of all forms of life—to conclusively identify *G. sabinae*. The "new" technology allowed our staff to isolate and amplify selected segments of DNA of the pathogen from infected leaves, determine the nucleic acid sequences of those selected segments, and compare these sequences to others published previously in the open-access, worldwide database GenBank. Researchers who use these tools focus most of their attention on short DNA sequences that encode(s) crucial, life-sustaining organelles called ribosomes. Ribosomes convert the genetic code into enzymes that define the unique chemical and physiological features of every organism, and they are "built" via the copy and translation of three, linked-genes, sitting adjacent to one another on a chromosome but separated by somewhat inert "spacer" regions. By comparing the sequences of one of the three genes with published data, *G. sabinae* was determined to occur on *Pyrus calleryana* 'Bradford' and/or 'Chanticleer' in Hempstead, Moriches, Riverhead, and Staten Island, and Rochester.

Although we have yet to find *G. sabinae* on *Juniperus* spp., others have in North America. From these reports, we know that it produces spindle-shaped cankers on twigs and small branches. On infected needles, emergent fruiting bodies are similar to young galls associated with hawthorn rust caused by *G. globosum*. In fact the two are so similar morphologically on junipers that we may have been walking past *G. sabinae* for years, not knowing just what trouble might be brewing.

Research to determine susceptible and resistant host cultivars, alternate hosts, and effective control measures is underway at Cornell and elsewhere because, like it or not, Callery pear is here for the long haul and we may as well prepare to make informed decisions on how to help it look its best.

Colorful (yellow to purple-red) leaf lesions of Callery pear with pear-trellis rust Uppersurface (left) and undersurface (right) of pear leaf. Photo courtesy of Shawn Kenaley, taken by Kent Loeffler

Left: Reddish lesions of pear trellis rust accompanied by brown areas of anthracnose infection on Callery pear leaf. Right:Mature sporulation of Gymnosporangium sabinae on the undersurface of a Callery pear leaf. Photos courtesy of Margery Daughtrey

Close-up view of the mature sporulation of Gymnosporangium sabinae on the undersurface of a Callery pear leaf. Photo by Shawn Kenaley