The Plant Doctor's LANDSCAPE TIPS

By Dr. David L. Roberts, The Plant Doctor LLC a.k.a. The Tree Doctor

THE ADVANCE OF TRELLIS RUST

INTRODUCTION

I have been reporting on Trellis Rust (a.k.a. European Pear Rust) since 2014. Trellis Rust is caused by the fungus, *Gymnosporangium sabinae* (= *Gymnosprangium fuscan*), and is a relatively new disease in Michigan. Being very common in, and probably having originated from, Europe, Trellis Rust (TR) was found in portions of Canada since the 1960s and in the Pacific Northwest since the late 1990s. The disease was first reported in Ontario in 2007, in Michigan in 2009, in New York State in 2011, and more recently in Connecticut in 2012. Trellis Rust is only capable of attacking Pear (*Pyrus* sp.) and can cause extensive harm to both orchard producing pears (*Pyrus communis*) and landscape ornamental pears (*Pyrus calleryana*) (Photo 1A and 1B). Unique among the plant diseases we manage in nurseries and landscapes, most rust diseases have an alternate host. For Trellis Rust, the alternate host is *Juniperus* sp. (Photo 2). Interestingly, Callery Pear was undoubtedly the most common ornamental tree utilized after the Emerald Ash Borer decimated native Ash (*Fraxiunus* sp.) tree populations in Michigan and beyond (Photos 3A & 3B).

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PHOTO 1A


PHOTO 1B

Photos 1A: Trellis Rust, an introduced disease, can decimate ornamental pear trees in one season. In Photo 1A, these three trees appear reasonably healthy in the spring even though their yellowish color indicates numerous yellow lesions of trellis rust on the foliage (Inset). **Photo 1B** depicts the same trees a couple of months later when the disease has caused severe leaf death (Inset) and drop.


PHOTO 2

Photo 2: *Juniperus virginiana* serves as the alternate host for Trellis Rust on *Pyrus* sp. The fungus overwinters on juniper as somewhat inconspicuous galls; the galls blossom in the spring and may appear in different forms (Insets) as they produce spores that infect newly emerging pear leaves, around the time of flowering.


PHOTO 3A

PHOTO 3B

Photos 3A & 3B: Ornamental Pear was likely the most common replacement tree for ash trees decimated by the Emerald Ash Borer (EAB). In Photo 3A, ash trees are in serious decline from EAB infestations at this restaurant landscape in SE Michigan. The same restaurant location 10 years later; pear replacements are now infected with Trellis Rust.

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For the last eight years, I have monitored the Trellis Rust spread through large portions of southeast Michigan, anticipating it would eventually spread to other regions of Michigan. This article will briefly review some of the existing and new locations where Trellis Rust has been found.

EXISTING & NEW LOCATIONS OF TRELLIS RUST

Please bear in mind that the examples of existing and "new" locations presented herein are by no means a complete listing of where Trellis Rust may be found in Michigan. I rely on my own observations and those from Arborists, Landscapers and Nurserypersons to determine where Trellis Rust may be found around the state.

Southeast Michigan: This extensive region including Metro-Detroit became the initial epicenter for Trellis Rust. Over the last eight years, Trellis Rust has been spreading through this region. Many of us witnessed the devastation this invasive disease has had on pear trees, especially ornamental flowering pears over the last decade (Photo 1A & 1B). The disease has become so severe in some locales that trees, even well established and mature ones, have been removed due to their decline and unsightly appearance in landscapes. While some of the sites listed in this article are technically located in SE Michigan, many are in the extreme reaches, where we might expect Trellis Rust to spread first.

Holly, Michigan: While visiting a private property near Holly, Michigan in 2020 to examine why spruce trees were declining even though they were being treated for various diseases and pest problems, I noticed this fruit producing pear in this "deer-proof" garden afflicted with Trellis Rust (Photo 4).

Photo 4: At this site near Holly, Michigan, fruit-bearing pears in a deer-proof garden are exhibiting symptoms of Trellis Rust (Inset).

Ypsilanti, Michigan: While visiting a property in Ypsilanti, Michigan to diagnose problems with a declining Japanese maple in 2021, I observed initial infections of Trellis Rust on a mature fruit-bearing pear (Photo 5).

Ann Arbor, Michigan: For those familiar with Ann Arbor, you know the city whose colors are proudly pronounced "Maize and Blue", this tree along South State Street exhibits early infections of a Trellis Rust that will likely build up over the coming years (Photo 6).

Photo 5: At this nicely maintained landscape in Ypsilanti Michigan, a fruit-bearing pear is showing infections of Trellis Rust (inset) . . . well outside the original Trellis Rust infestations in SE Michigan.

Photo 6: While driving down State Street in Ann Arbor, I noticed that these pear trees had orangish lesions tyPhotoal of Trellis Rust (Inset). The disease had spread from the Metro-Detroit area, about 20-30 miles distant.

Grand Rapids: Andy Niemeyer with Oak Meadow Tree Service reported Trellis Rust infections on landscape pears in Southeast Grand Rapids (Photo 7). He noted extensive lesion development on these trees and is preparing management options beginning in 2023.

Western Michigan: Dr. Roger May, Senior Technical Manager, Great Lakes Region, TruGreen, discovered Trellis Rust on some Bonsai Pears at a well-known garden in Western Michigan (Photo 8). In this particular situation, which would be very interesting to study, we might wonder if the Juniper alternate hosts were from nearby landscapes or from Bonsai Junipers.

Photo 7: Andy Niemeyer found this infestation of Trellis Rust in SE Grand Rapids. According to Andy, the pear trees showed many leaf infections (Inset) that will eventually cause defoliation and dieback on these trees in subsequent years.

Photo 8: Dr. Roger May was visiting a well-known garden in western Michigan when he spied Trellis Rust lesions on some Bonsai Pear trees. It would be interesting to know if the Trellis Rust fungus originated from Junipers in nearby landscapes or from Bonsai Junipers.

IDENTIFYING TRELLIS RUST

There are a variety of rust diseases caused by fungi that occur on the family Rosaceae. Cedar-Apple Rust (caused by *Gymnosporangium juniperus-virginana*), Cedar-Quince Rust (caused by *Gymnosporangium globosum*), and Cedar-Hawthorne Rust (*Gymnosporangium clavipes*) are three native and common rust diseases that infect a deciduous host and juniper (*Juniperus virginaium*) as their alternate host. Trellis Rust is an "Introduced" or "Invasive" rust disease with a similar disease or life cycle to the three native rust diseases. Trellis Rust and the three native rust diseases have several things in common. They all produce yellowish-orangish lesions on the foliage of their rosaceous, deciduous hosts (Photo 1A), and all overwinter on their *Juniperus* alternate host (Photo 2).

While identification could be performed by DNA/PCR analysis, I think that understanding disease symptoms and the disease cycle plus identification of the deciduous host can lead us to reasonable certainty of Trellis Rust. A unique characteristic about Trellis Rust I have noticed is when the "Telial Horns" are produced on the deciduous host for infection of the juniper host for overwintering of the fungus. On the three native rust diseases mentioned above, the "Aceia Horns" are generally visible on the undersides of the leaves in late July or August (Photo 9A). For Trellis Rust, the "Aceia Horns", which resemble trellises to some individuals, do not develop on the undersides of leaves until September or later in the fall (Photo 9B).

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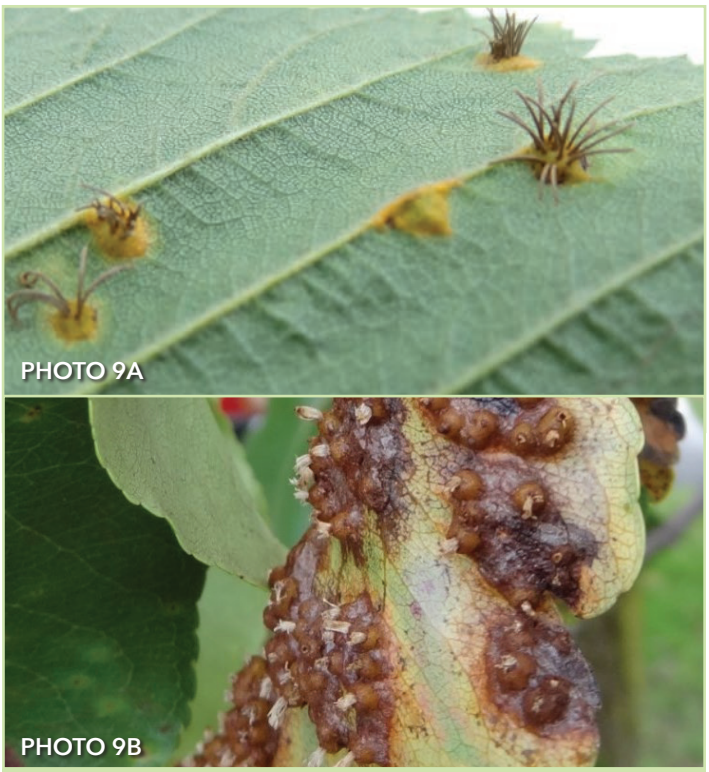

Photos 9A & 9B: With native rust diseases such as Cedar-Apple Rust, "Aecial Horns" (tendrils) typically form in August on the underside of foliage and release spores that infect junipers for overwintering. With Trellis Rust, "Aecial Horns", which some folks believe look like trellises, form in the fall and release spores to infect junipers for overwintering. The aecial structures of Trellis Rust appear more like mini volcanoes to me. Shouldn't we call it "Volcano Rust"?

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MANAGING TRELLIS RUST

Disease management has been discussed in other articles from *the Landsculptor*. These management procedures may involve eliminating one of the host species, separating the two host species (pear and juniper), planting resistant species (i.e. there are resistant junipers), pruning out overwintering galls on juniper (likely not practical), and specific treatments with fungicides. While fungicide treatments during a very narrow window at the time of flowering in the spring may arrest infections, fungicides can be harmful to the bee population. Management aspects as well as other factors about Trellis Rust are available in the following publications: *Trellis Rust on Ornamental Pear, the Landsculptor*, September 2014, Pages 14 & 15; *Trellis Rust: An Update, the Landsculptor*, September 2015, Pages 19-21; *The Trellis Rust Epiphytotic, the Landsculptor*, November 2017, Pages 11-14; *Trellis Rust Management: Testimonials from the Arborists, the Landsculptor,* November 2018, Pages 10-12. Please feel free to contact me or the Michigan Green Industry Association if you desire any of these publications. All can be had free of charge as electronic PDFs.

One aspect we might want to reconsider is the replacement of ornamental pear with another member of the Rosaceae family. If Trellis Rust is a serious problem on Ornamental Pears in a specific neighborhood, then this indicates that a significant population of junipers is likely to reside there. Due to the population of junipers, other native rust diseases are likely to develop to an increased incidence on replacement species such as crabapple, apple, hawthorn, etc. (Photos 10A & 10B).

REPORTING TRELLIS RUST

Trellis Rust may be disseminated locally or distantly by wind-borne spores. Viable spores of some rust diseases have been found in the stratosphere; hence, it would not be surprising to find Trellis Rust eventually spreading throughout North America. However, a major means of spread of the disease over extensive geographical distances is in nursery stock, where control of the disease may be difficult. If anyone in Michigan encounters what appears to be Trellis Rust symptoms on Pyrus sp., please feel free to report the cases to me, and I'll keep the industry informed so local arborists and landscapers may be prepared for Trellis Rust infections in their area.

Dr. David Roberts has retired from Michigan State University but intends to remain active with the industry. He can be reached at 248-320-7124 or treedoctordave@gmail.com.

Photos 10A & 10B: Trellis Rust is so serious where it has become established that replacement trees are often incorporated into landscapes. In this case, ornamental pear trees were decimated by Trellis Rust (10A, winter) and replaced by Crabapples (10B). Unfortunately, because of large numbers of nearby junipers, Cedar-Apple Rust is now infecting the crabapples in elevated levels. *(Photos credit: Gary Olgart, Land and Lake Management, LLC)*