The Plant Doctor's LANDSCAPE TIPS

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Photo 1: One of the most serious rust diseases on pine is an introduced disease known as White Pine Blister Rust (WPBR). WPBR is a macrocyclic disease, requiring an alternate host to complete its life/disease cycle. Wild currant (Ribes-lower left of photo) is the alternate host for WPBR.

Photo 2: Cedar apple rust is also a macrocyclic disease, requiring a deciduous host and a juniperus host to complete its disease/life cycle. The brown globose object in the photo is a "juniper apple" caused by the rust fungus.

Photo 3: In the springtime, the "juniper apple" from Photo 2 grows "tentacles" that release spores to infect the alternate host, apple.

GALL RUSTS OF PINES

INTRODUCTION:

Many kinds of rust diseases occur on conifers. Some of the more common rust diseases include Fusiform Rust, White Pine Blister Rust (Photo 1), Cedar-Apple (Photos 2 & 3), Cedar-Quince and Cedar Hawthorne Rusts, Gall rusts, various needle rusts, broom rust, and various limb and cone rusts.

Rust diseases are caused by a group of fungi catalogued in the fungal class known as Basidiomycotina (aka Basidiomycetes - More specifically the Uredinales for our taxonomy fans). Rust fungi are generally considered obligate parasites, meaning they must have living plant host tissue to infect and propagate themselves. Many rust fungi have evolved in such a manner that they require two different host plants in order to complete their life/disease cycles. A common example is cedar-apple rust, a fungus that must infect its two different plant hosts (apple and juniper) "alternately" to survive and complete its livelihood on this earth. In such cases, the two host plants are called "alternate hosts," and as many as four or five different spore types may be produced by the rust fungus. Such diseases that produce so many different spore types on alternate plants are termed "macrocyclic" rusts. Other rust diseases may only attack one host and produce a limited number of spore types; these are termed microcyclic rust diseases.

We see several types of rust diseases on pines in Michigan; however, two of the more economically prominent are the Galls Rusts: Western Gall Rust and Eastern Gall Rust (Photos 4 & 5). Western Gall Rust is caused by the fungus Endocronartium harknessii. Eastern Gall Rust is caused by forms of the fungus, Cronartium quercuum.

SYMPTOMS AND DISEASE CYCLE:

WESTERN GALL RUST (AKA PINE-PINE GALL RUST):

Western gall rust is a microcyclic disease and does not need an alternate host to complete its disease cycle; the fungus can simply reinfect the same host plant, pine. The various Galls Rusts induce similar symptoms in pines, namely globose swellings on twigs, branches or trunks of pine trees (Photos 4 & 5). At certain times of the year, primarily in the spring, yellowish rivulets of spores of the rust fungus may be observed on the surface of the gall. Spores are windborne to nearby trees where damp surfaces of stems provide an environment conducive for spore germination and infection. Infection occurs on the newest succulent stem tissue. The galls that develop on pine start out as tiny almost inconspicuous swellings the following season. As the small swellings expand over years, they initially appear spindle-shaped and eventually globose (spherical). If seedlings are infected, galls may develop on the main stem and kill the seedlings within a few years; in some cases the portion of the tree above the gall is killed while lower portions continue to grow, causing a disfigured tree. Galls that develop on the stems/trunks may kill the tree or simply stress or stunt it. Likewise, galls that develop on branches or twigs may cause external portions to be killed or stunted. In some instances, symptoms of "witches broom" may develop. Yet in other cases, the galls may die, sometimes killed by other fungi or insects. Galls may grow and increase in size for many years as the host tree grows. I have witnessed galls over one foot in diameter on Scotts Pines in abandoned Christmas tree farms. The gall is induced by the fungal infection and is largely composed of woody plant material. In the literature, two- and three-needle pines are susceptible to Western Gall Rust: Jack pine, lodgepole pine, Austrian, Scotts, mugo and a variety of other pines. In Michigan, I have seen Western Gall Rust predominantly on Scotts pine.

EASTERN GALL RUST (AKA PINE-OAK RUST):

Eastern Gall Rust develops on pines and exhibits similar symptoms to those observed with Western Gall Rust. And as with Western Gall Rust, similar species of two- and three-needle pines are affected by the Eastern Gall Rust fungus. In particular, many southern species of pine are affected. There are, however, different form species of Cronartium quercuum that attack different pines (form species are essentially different strains of the fungus). In Michigan, I've witnessed Eastern Gall Rust primarily on Scotts pine. A significant difference between Eastern and

Western Gall Rusts is that with Eastern Gall Rust, oak species serve as alternate hosts for the fungus to complete its life/disease cycle. Again, Western Gall Rust requires no alternate host. With respect to Eastern Gall Rust, oak species which may serve as alternate hosts (depending on the form species) include chinkapin, bur, chestnut, pin, northern pin and northern red oak, among others. On oaks, the primary symptom is small, yellowish, pimple-like bumps on the foliage. Distinguishing Eastern Gall Rust from Western Gall Rust could theoretically be difficult. However, because Western Gall Rust has no alternate host, and the fungus can initiate infections from galls without "traveling to" an alternate host plant, the galls tend to be scattered along the branches of pine (Photos 4). Conversely, because Eastern Gall Rust requires an alternate host (oak) that the fungus must "travel to" before returning back to its pine host, the galls tend to be singly isolated (Photo 5) on affected pines.

Photo 4: Western Gall Rust is characterized by globose galls that may form on twigs, branches or the main stem (trunk) of pines. In Michigan, the disease is seen most often on Scotts pine. Note powdery masses of yellowish spores on the galls.

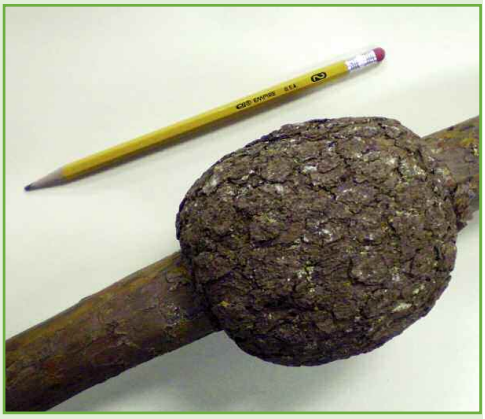

Photo 5: Eastern Gall Rust also occurs on Scotts pine in Michigan. Unlike Western Gall Rust, Eastern Gall Rust requires oak (Quercus sp.) as an alternate host to complete its life/disease cycle.

MANAGING GALL RUSTS:

Gall Rusts can be severe problems in nurseries, Christmas tree plantations and landscapes. However, Gall Rusts can be managed by several means. In the case of Eastern Gall Rust where field production of pines are ongoing, eliminating nearby alternate oak hosts may be feasible, particularly "weed oaks seedlings" which have developed in pine fields. Appropriately timed fungicides may also help if warranted. With either Eastern or Western Gall Rust, pruning out the galls, preferably before spores develop, is probably the most effective and practical method of disease management.

From the perspective of landscape managers and arborists, inspect pines for the presence of Gall Rust (and other issues) before accepting plants for establishment in landscapes. Galls on main stems or trunks are particularly detrimental. Otherwise, pruning out any galls that become evident is generally a very effective method of disease control.

For more information, please feel free to email me at robertsd@msu.edu or contact a professional plant health-care provider. The author, MSU or MGIA do not endorse any particular treatment procedure or products. If using pesticides, be sure to read and follow label directions.

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