

Gymnosporangium Rusts

Commonly called juniper rust

Pathogen—Rust fungi in the genus *Gymnosporangium* cause these diseases, commonly called juniper rust. There are at least nine (and likely more) *Gymnosporangium* species in the Rocky Mountain Region.

Cedar-apple rust, *G. juniperi-virginianae*, is often incorrectly credited for all rusts in this group and is only common in the eastern part of the Rocky Mountain Region, in the Great Plains.

Hosts—The *Gymnosporangium* rusts require two hosts to complete their disease cycle. In this Region, one spore stage (telial stage) occurs on juniper species, and the other spore stage (aecial stage) occurs on rosaceous species. Different *Gymnosporangium* rusts can have different hosts.

Various juniper species are affected by these diseases, including Rocky Mountain juniper, common juniper, and eastern redcedar. *Rosaceous* hosts in the Region include apple, crabapple, hawthorn, Juneberry, and serviceberry. Cedar-apple rust is found on apple and crabapple along with juniper host species.

Signs and Symptoms—On junipers, the telial stage looks like exploding, orange “Jell-O” masses on branches (figs. 1-2), stems, or needles. These telial horns are finger-like, bright orange, gelatinous, and emerge from the areas where symptoms occur. On rosaceous species, the aecial stage is the most visible sign. During this stage, yellow to orange fungal tissue can be seen within the lesions and spots (fig. 3). These areas first contain small, black, pimple-like fruiting bodies (spermogonia). Later, in the same area, tube-like, orange fruiting structures (aecia) form.

On junipers, symptoms include branch galls, branch knots, brooms, stem swelling, and small needle lesions (figs. 4-5). The type of symptom depends on the rust species involved. On rosaceous species, symptoms are lesions and circular spots on leaves, fruit, petioles, or young twigs.

Disease Cycle—These rusts have four spore types or spore stages, and two hosts are required for the pathogens to complete their disease cycle.



Figure 1. Sign of *Gymnosporangium* rust: fresh telial horns on branches. Photo: Rocky Mountain Region, USDA Forest Service.



Figure 2. Close-up of dried telial horns. Photo: Petr Kapitola, State Phytosanitary Administration, Bugwood.org.



Figure 3. Signs of *Gymnosporangium* rust: pycnia and aecia on leaves. Photo: Clemson University, USDA Cooperative Extension, Bugwood.org.

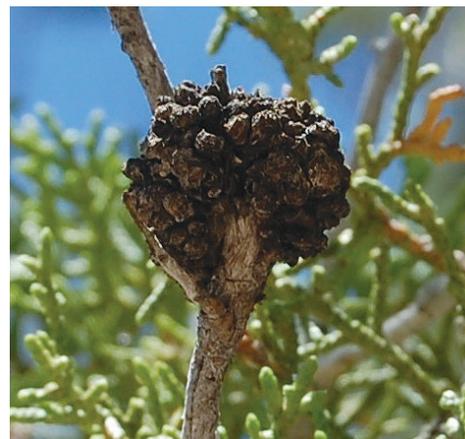


Figure 4. Symptom of *Gymnosporangium* rust: branch galls. Photo: James T. Blodgett, USDA Forest Service.

Gymnosporangium Rusts - page 2

Usually, after a heavy spring rain, telial horns extrude from the branch galls, branch knots, brooms, stem swelling, or needle lesions on the juniper host. Teliospores in the gelatinous horns produce basidiospores that are wind-blown to rosaceous hosts. These basidiospores do not survive long, so the distance of spread is generally short. Telial horns dry and re-wet rapidly during spring.

If infection is successful in the rosaceous host, spermogonia develop in orange lesions or leaf spots, often on the upper surface of a leaf. Aecia also develop in orange lesions or leaf spots, but often on the lower surface of the leaf. These two rust stages can also develop on fruit, petioles, or young twigs; the locations where fruiting occurs vary by the rust species and hosts. Aeciospores (spores produced in the aecia) are wind-blown to the juniper host the same year from early summer to fall, depending on the rust species.

If infection is successful in the juniper host, galls, witches' brooms, or stem swellings form. The telial horns grow from these symptomatic tissues the next spring or a year after the next spring.

Impact—The biggest impacts from these rusts are on the rosaceous hosts. Damages include growth loss and degraded fruit quantity and quality. Numerous infections, which can be common in wet years, can reduce rosaceous host vitality and result in attacks by other diseases or insects.

Although the strange appearance and bright color of the telial horns cause much concern, damage is usually minor. The aesthetic value is only impacted for about a week and soon fades. Rarely, numerous infections may reduce juniper host vigor, resulting in attacks by other diseases or insects. The *Gymnosporangium* species that cause stem swelling and occasionally the ones that cause branch knots can kill the tree host. The rust species that cause brooms can deform branches but seldom stems.

Management—It may be possible to reduce new infections in landscape settings by eliminating one of the hosts from an area. Rust infections will be minimized with a 2-mile separation of the hosts. Because basidiospores (produced on the juniper host) are more delicate and short-lived, eliminating juniper at a shorter distance will reduce new infections on rosaceous hosts.

Some varieties of both host groups are resistant to some of these rusts and can be used in areas where these rusts are a problem. *Gymnosporangium* rusts may also be host-specialized. For example, planting apple near juniper may not be a problem if the dominant rust in the area has hawthorn or Juneberry as its alternate host. However, host resistance has not been determined for some *Gymnosporangium* rusts.

Pruning the affected parts of the juniper can reduce losses, especially for rust species that cause stem swelling, branch knots, or brooms. Preventive fungicides are registered to control some of these rusts on both hosts. However, these treatments are costly and are usually not needed. If used, an appropriately registered fungicide for the individual state should be selected. Depending on the rust species, fungicides should be applied in spring to the rosaceous host and to the juniper host when aecia form on their rosaceous host.



Figure 5. Symptom of *Gymnosporangium* rust: stem swelling. Photo: William Jacobi, Colorado State University, Bugwood.org.

-
1. Himelick, E.B.; Neely, D. 1960. Juniper hosts of cedar-apple and cedar-hawthorn rust. *Plant Disease Reporter* 44:109-112.
 2. Kern, F.D. 1973. A revised taxonomic account of *Gymnosporangium*. University Park, PA: Pennsylvania State University Press. 134 p.