

## 62. Gymnosporangium Rusts of Junipers

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Gymnosporangium species that infect junipers are commonly called "cedar-apple rusts."

### Hosts and Distribution

Several *Gymnosporangium* species occur in the Great Plains (table 62-1). These species must alternately infect two hosts to complete their life cycle. In the Great Plains, the telial stage is always on juniper species and the aecial stage is always on rosaceous species.

### Symptoms and Signs

Symptoms on junipers vary, depending on the rust species involved. They include small lesions on needles, globular branch galls (fig. 62-1), fusiform stem swellings (fig. 62-2), gall-like branch knots (fig. 62-3), or witches'-brooms (fig. 62-4). During wet periods, especially in spring, one to many orange, gelatinous, fingerlike, telial horns extrude from these structures.

Symptoms on rosaceous hosts are rust lesions on leaves, fruit, petioles, or new twigs. Yellow to orange lesions containing black pimple-like pycnia develop first (fig. 62-5); then tubelike aecia form in the same lesions.

### Disease Cycle

After spring rains (March-June), telial horns extrude from each lesion, gall, swelling, or broom on junipers.



Figure 62-1. Orange telial horns of a *Gymnosporangium* species extruding from a branch gall on eastern redcedar.

Teliospores in the horns germinate to produce basidiospores, which are carried by wind or insects to nearby rosaceous hosts. After infection of susceptible host tissue by basidiospores, pycnia develop in yellow to orange lesions, followed by production of aecia. Aeciospores are wind-blown to junipers in the same growing season from late spring to early fall, depending on species of rust fungus. After infection of the juniper, galls or other structures form. The orange gelatinous telial horns appear on them either the following spring or one year later. The cycle is then repeated.

### Damage

Damage due to massive infection of rosaceous hosts can influence yield (current and following year), fruit quality, vigor, and esthetic value. Apples are particularly subject to these effects.

Damage to junipers is usually slight. If massive infection occurs, reduction in vigor, growth rate, and esthetic value can result. Rust fungi that cause either stem swellings or knotlike branch galls kill branches above the infected points. Fungi that cause witches'-brooms can deform trees.

### Control

Several control methods are available, depending on individual situations. Similar control methods should be



Figure 62-2. Dry orange telial masses of a *Gymnosporangium* species extruding from a branch with a stem swelling.

Table 62-1. Some *Gymnosporangium* species in the Great Plains.

Species of rust fungus	Great Plains distribution	Symptoms on junipers	Major aecial hosts <sup>1</sup>
<i>juniperi-virginianae</i>	Widespread	Branch gall	Apple, crabapple
<i>connersii</i>	Northern Plains	Branch gall	Hawthorn
<i>corniculans</i>	Northern Plains	Branch gall	Juneberry
<i>trachysorum</i>	Southern Plains	Branch gall	Hawthorn
<i>bethelii</i>	All except Texas	Gall-like branch knots	Hawthorn
<i>globosum</i>	Widespread	Gall-like branch knots	Hawthorn
<i>nelsonii</i>	Western and Northern Plains	Gall-like woody knots or no symptoms	Juneberry
<i>clavipes</i>	Widespread	Stem swellings	Many Rosaceae
<i>gracile</i>	Texas	Stem swellings, Witches'-brooms	Juneberry
<i>nidus-avis</i>	Widespread	Stem swellings, Witches'-brooms	Juneberry
<i>clavariforme</i>	Widespread	Stem swellings, Witches'-brooms	Juneberry
<i>exiguum</i>	Southern Plains	Foliar lesions	Hawthorn

<sup>1</sup> Other Rosaceae may be aecial hosts for some of these rusts.

effective for all *Gymnosporangium* rusts with similar life cycles.

Two hosts are required to complete the life cycle; eradication of one host from the vicinity will eliminate new infections. A 2-mile separation usually will minimize rust infections.

In some situations, control may be achieved by pruning affected parts from the *Juniperus* host. Do not plant susceptible varieties near alternate hosts. Susceptibility of available varieties of both hosts has been determined for some *Gymnosporangium* rusts.

Several preventative fungicides are registered for control of some rust fungi on both hosts. They may be applied on orchard and ornamental trees. The rosaceous

host must be protected in the spring, starting before flowering and continuing until telial horns on juniper become inactive (usually 4 to 6 weeks). The *Juniperus* host must be protected when aecia have formed on the corresponding rosaceous host.

#### Selected References

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



Figure 62-3. Orange telial horns of a *Gymnosporangium* species extruding from a gall-like branch knot on eastern redcedar.



Figure 62-4. Witches'-broom on Rocky Mountain juniper caused by *G. nidus-avis*.



Figure 62-5. Rust lesions on juneberry leaves caused by *G. nidus-avis*.