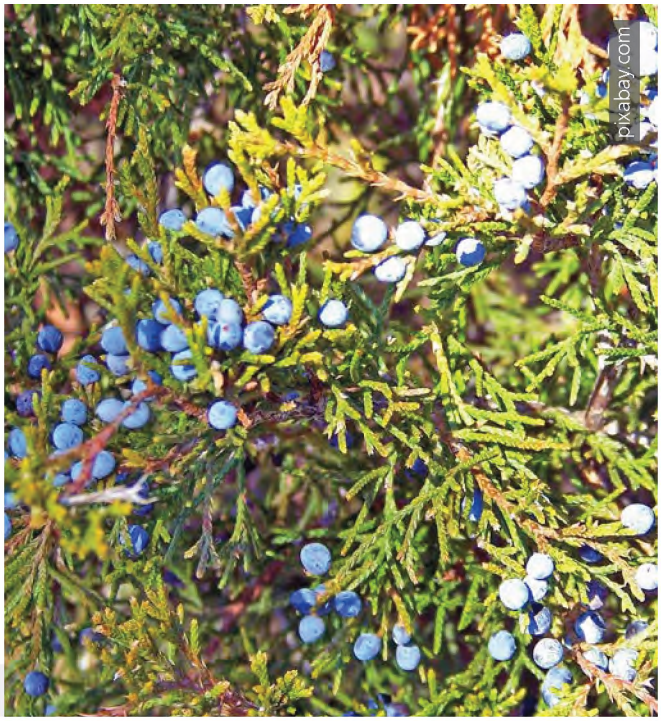
Search for this title at the NYSIPM Publications collection: ecommons.cornell.edu/handle/1813/41246

Disease and Insect Resistant Ornamental Plants

Mary Thurn, Elizabeth Lamb, and Brian Eshenaur
New York State Integrated Pest Management Program, Cornell University

JUNIPERUS

Juniper



Juniperus is a genus of about 60 species of conifer trees, shrubs and groundcovers. Junipers are widely grown for their diverse ornamental qualities including needle-like foliage in shades ranging from green to blue.

Junipers are tolerant of harsh growing conditions such as drought and poor soil. However, many are susceptible to tip blight and rust diseases, especially in shaded, wet sites. Insect pests include mites, needle miners and bagworms.

DISEASES

Phomopsis Tip Blight, caused by the fungus *Phomopsis juniperovora*, is one of the major diseases of *Juniperus* species in North America (11). Sometimes called juniper tip or twig blight, infections first appear as yellowish spots on new foliage. As the disease spreads, affected shoots turn light green and then reddish brown as they are girdled and die.

Wet foliage increases spread and severity, so planting in full sun with good air circulation can help control the disease. In nursery settings, avoid overhead irrigation and do not crowd plants. Prune out dead tips only when conditions are dry.

Phomopsis Tip Blight			
Species/Hybrids	Cultivar	Reference	
		Resistant	Susceptible
*Juniperus chinensis**	Foemina	11	
	Iowa	11	
	Keteleeri	11	
	Robusta Green	11	
	Shoosmith	11	
Juniperus chinensis var. *sargentii*		11	
Juniperus chinensis var. *sargentii*	Glauca	11	

*Nomenclature within *J. chinensis* varies, and some cultivars may be identified under *J.* x *pfitzeriana* or *J.* x *media* in the trade.

Phomopsis Tip Blight			
Species/Hybrids	Cultivar	Reference	
		Resistant	Susceptible
Juniperus communis	Ashfordii	11	
	Aureospica	11	
	Depressa	11	
	Depressa Aurea	11	
	Hulkjaerhus	11	
	Repanda	11	
	Saxatilis	11	
	Suecica	11	
Juniperus conferta		11	
Juniperus horizontalis			11
Juniperus horizontalis	Procumbens	11	
Juniperus x *pfitzeriana*		11	
Juniperus x *pfitzeriana*	Aurea	11	
Juniperus sabina			11
Juniperus sabina	Broadmoor	11	
	Buffalo	11	
	Calgary	11	
	Knap Hill	11	
	Skandia	11	
Juniperus scopulorum			11
Juniperus scopulorum	Silver King	11	
Juniperus squamata	Campbellii	11	
	Prostrata	11	
	Pumila	11	
Juniperus squamata var. *fargesii*		11	
Juniperus virginiana			11
Juniperus virginiana	Hillii	11	
	Tripartita	11	

Kabatina Tip Blight, caused by the fungus *Kabatina juniperi*, has symptoms similar to Phomopsis tip blight (11) and similar management techniques can reduce disease incidence. Infection by Kabatina requires a wound for entry and may be associated with insect feeding or mechanical damage (12).

Kabatina Tip Blight		
Species/Hybrids	Cultivar	Reference
		Resistant
Juniperus chinensis	Ames	11
	Aurea	11
	Gold Coast	11
	Hetzii Columnaris	11

Kabatina Tip Blight		
Species/Hybrids	Cultivar	Reference
		Resistant
Juniperus chinensis	Hetzii Glauca	11
	Keteleeri	11
	Maney	11
	Mint Julep	11
	Mountbatten	11
	Perfecta	11
	Plumosa	11
	Robusta Green	11
	Spartan	11
Juniperus chinensis var. *sargentii*	Glauca	11
	Viridis	11
	Wintergreen	11
Juniperus communis	Hibernica	11
	Hornibrookii	11
Juniperus davurica	Expansa	11
Juniperus horizontalis	Prostrata Glauca	11
Juniperus x *pfitzeriana*	Aurea	11
Juniperus procumbens	Nana	11
	Variegata	11
Juniperus sabina var. *tamariscifolia*		11
Juniperus virginiana	Blue Mountain	11
	Grey Owl	11

Cedar-Apple Rust and **Cedar-Hawthorn Rust** are fungal diseases of juniper caused by *Gymnosporangium juniperi-virginianae* and *Gymnosporangium globosum*. These pathogens require two hosts to complete their lifecycles and can occur in all juniper species, but *J. virginiana* and *J. scopulorum* are commonly affected (11).

Alternate hosts are primarily apple, crabapple and hawthorn. Galls on infected junipers develop bright orange tendrils during moist spring weather. The effect on junipers is usually minor, but damage to alternate hosts can be considerable. To minimize infection, avoid planting host plants in the same area. Some species and cultivars are reported to be resistant to one or both pathogens.

Rust		
*=resistant to cedar-apple rust, **=resistant to cedar-apple & cedar-hawthorn rusts		
Species/Hybrids	Cultivar	Reference
		Resistant
Juniperus ashei		11**
Juniperus chinensis	Ames	11*
	Blue Point	11*
	Foemina	11**

Rust		
*=resistant to cedar-apple rust, **=resistant to cedar-apple & cedar-hawthorn rusts		
Species/Hybrids	Cultivar	Reference
		Resistant
Juniperus chinensis	Fortunei	11**
	Hetzii	11**
	Hetzii Columnaris	11*
	Iowa	11*
	Japonica	11**
	Keteleeri	11*
	Leeana	11**
	Maney	11*
	Mas	11**
	Mountbatten	11*
	Perfecta	11*
	Plumosa Aurea	11**
	Pyramidalis	11**
	Robusta Green	11*
	Spartan	11*
Juniperus chinensis var. *sargentii*		11**
Juniperus chinensis var. *sargentii*	Variegata	11**
	Wateri	11**
	Wintergreen	11*
Juniperus communis	Aurea	11**
	Aureospica	11**
	Cracovia	11**
	Depressa	11**
	Hibernica	11**
	Oblonga Pendula	11**
	Saxatilis	11**
	Suecica	11**
	Suecica Nana	11**
Juniperus communis f. *oblonga*		11**
Juniperus conferta		11**
Juniperus horizontalis	Admirabilis	11**
	Adpressa	11**
	Argenteus	11**
	Douglasii	11**
	Eximius	11**
	Filicina	11**
	Glomerata	11**

Rust		
*=resistant to cedar-apple rust, **=resistant to cedar-apple & cedar-hawthorn rusts		
Species/Hybrids	Cultivar	Reference
		Resistant
Juniperus horizontalis	Livida	11**
	Petraea	11**
	Plumosa	11**
Juniperus x pfitzeriana		11**
Juniperus x pfitzeriana	Compacta	11**
	Glauca	11**
Juniperus procumbens		11**
Juniperus rigida		11**
Juniperus sabina		11**
Juniperus sabina	Broadmoor	11**
	Fastigiata	11**
	Knap Hill	11**
Juniperus sabina var. *tamariscifolia*		11**
Juniperus scopulorum	Medora	11*
	Moonglow	11*
	Wiltonii	11**
Juniperus squamata	Albo-variegata	11**
	Meyeri	11**
	Wilsonii	11**
Juniperus squamata var. *fargesii*		11**
Juniperus virginiana	Aurea	11**
	Berg's Rust Resistant	11**
	Blue Mountain	11*
	Burkii	11**
	Globosa	11**
	Grey Owl	11*
	Hillspire	11*
	Kosteri	11**
	Pseudocupressus	11**
	Pyramidalis	11**
	Skyrocket	11**
	Tripartita	11**
	Venusta	11**

Researchers at the Long Island Horticulture Research and Extension Center evaluated juniper cultivars for their resistance to rust caused by various *Gymnosporangium* spp.

Rust			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Fairview	1	
	Hooks	1	
	Iowa	1	
	Keteleeri	1	
Juniperus chinensis var. *sargentii*	Glauca	1	
Juniperus communis	Berkshire	1	
	Gold Cone	1	
	Hornibrookii	1	
	Pencil Point	1	
Juniperus conferta	Emerald Sea	1	
	Silver Mist	1	
Juniperus horizontalis	Bar Harbor	1	
	Wiltoni	1	
Juniperus procumbens	Nana	1	
Juniperus scopulorum	Moonglow		1
	Skyrocket		1
Juniperus squamata	Blue Star	1	
Juniperus virginiana	Grey Owl	1	
	Hillspire	1	

Pear Trellis Rust is a disease of pear trees and junipers caused by the fungus *Gymnosporangium sabinae*. The disease is well established in parts of the Pacific Northwest and British Columbia (9) and was reported in Michigan in 2009 and southeastern New York in 2011 (5). The disease was identified in Connecticut in 2012 and Virginia in 2014 (2).

Like many rust diseases, the pathogen requires two hosts to complete its life cycle. Ornamental (*Pyrus calleryana*) and orchard (*P. communis*) pears and many species of juniper are susceptible. The impact on junipers is usually minimal, but damage to pears can be serious. To minimize this disease, avoid planting host plants in the same area.

Pear Trellis Rust			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Blaauw	10	
	Blue Alps	10	
	Kaizuka (=Torulosa)	10	
	Keteleeri		10
	Obelisk	10	
	Plumosa Aurea	10	

Pear Trellis Rust			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Robusta Green		10
	San Jose	10	
Juniperus communis		8, 10	
Juniperus conferta	Blue Pacific	10	
Juniperus horizontalis		8	
Juniperus horizontalis	Blue Chip (=Blue Moon)	10	
	Emerald Spreader	10	
	Hughes	10	
	Prince of Wales	10	
	Webber (=Webberi)	10	
	Wiltonii (=Glauca, Blue Rug)	10	
	Younstar	10	
Juniperus x *media*	Gold Sovereign		10
	Mathot		10
	Mint Julep	10	
	Old Gold		10
	Pfitzeriana		10
	Pfitzeriana Aurea		10
	Pfitzeriana Compacta		10
	Pfitzeriana Glauca	10	
	Swiss Gold		10
Juniperus procumbens	Nana (=Green Mound)	10	
Juniperus sabina	Arcadia		10
	Blue Danube		10
	Tamariscifolia		10
Juniperus scopulorum	Blue Haven		10
Juniperus squamata	Blue Carpet	8, 10	
	Blue Star	10	
	Holger	10	
	Loderi	10	
	Meyeri	10	
Juniperus virginiana	Blue Arrow	10	
	Canaertii	10	
	Glauca	10	
	Grey Owl	10	
	Hetz	10	
	Kim	10	
	Tripartita	10	

Botryosphaeria Canker is a disease caused by the fungus *Botryosphaeria stevensii*. Girdling cankers kill branches and may result in rapid or gradual decline. The disease is mainly a problem on *J. sabina* and *J. scopulorum*, while *J. chinensis* and *J. virginiana* are more resistant (12).

Botryosphaeria Canker			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Ames	13	
	Blue Point	13	
	Columnaris hetzii	13	
	Keteleeri	13	
	Maneyii	13	
	Mountbatten	13	
	Perfecta	13	
	Robusta Green	13	
	Spartan	13	
	Wintergreen	13	
Juniperus scopulorum	Blue Haven		13
	Cologreen		13
	Gray Gleam	13	
	McFarland		13
	Medora		13
	Moffetti	13	
	Moonglow		13
	Pathfinder	13	
	Platinum	13	
	Silver Globe	13	
	Skyrocket		13
	Sparkling Skyrocket		13
	Table Top	13	
	Wichita Blue		13
Juniperus virginiana	Admiral	13	
	Blue Mountain	13	
	Burkii	13	
	Canaertii	13	
	Emerald Sentinel	13	
	Grey Owl	13	
	Henryii	13	
	Hillii Dundee	13	
	Hillspire	13	
	Manhattan Blue	13	
	Oxford	13	
	Wren	13	

Root Rot, caused by various soil-borne *Phytophthora* spp., is a water mold disease that affects many ornamentals, particularly in sites with poor drainage. Favored by high soil moisture and warm soil temperatures, the disease kills roots which disrupts movement of water and nutrients eventually resulting in wilt and death of the plant. Water and site management are key to prevention–avoid heavy, poorly drained soils and overwatering.

Juniper is one of many ornamental plants that may be affected by *Phytophthora* spp., and *J. horizontalis* and *J. sabina* appear to be particularly susceptible (12). Some cultivars are reported to be tolerant of root rots caused by *P. cinnamomi* and *P. cryptogea.*

Root Rot (caused by *P. cinnamomi*)			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Gold Coast		12
	Parsonii		12
	Pfitzer	12	
	Plumosa	12	
	Prostrata	12	
	Sargent's		12
Juniperus conferta	Blue Pacific	12	
Juniperus horizontalis	Andorra		12
	Bar Harbor		12
	Blue Rug	12	
	Douglasii	12	
	Prince of Wales	12	
	Winter Blue		12
Juniperus procumbens	Nana		12
Juniperus sabina	Tamariscifolia		12
Juniperus virginiana	Prostrata	12	

Root Rot (caused by *P. cryptogea*)			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Gold Coast	12	
	Plumosa	12	
	Prostrata	12	
Juniperus conferta	Blue Pacific		12
	Bar Harbor	12	
	Prince of Wales	12	
Juniperus sabina	Tamariscifolia	12	
Juniperus virginiana	Prostrata	12	

INSECTS

Bagworm, *Thyridopteryx ephemeraeformis*, is a common pest of many species of landscape and nursery plants, but is particularly damaging to *Juniperus* species (3). Larvae feed on foliage and bind leaves together to form bag enclosures to overwinter eggs. A severe infestation can defoliate and kill plants. The bacterial insecticide, *Bacillus thuringiensis*, is effective against bagworm (4). Researchers at the University of Kentucky report several resistant and susceptible cultivars.

Bagworm			
Species	Cultivar	Reference	
		Resistant	Susceptible
Juniperus chinensis	Keteleeri	3	
Juniperus communis	Hibernica	3	
Juniperus conferta	Blue Pacific		3
juniperus copulorum	Wichita Blue	3	
Juniperus davurica	Expansa	3	
Juniperus horizontalis	Blue Mat		3
	Blue Rug		3
	Emerald Isle		3
Juniperus sabina	Broadmoor		3

Juniper Webworm, *Dichomeris marginella*, is the larva of a moth that feeds only on *Juniperus* species. Native to Europe, this insect was first reported in the US in 1910 and is found from Quebec and Maine to North Carolina and west to the Pacific Coast (4). Young larvae mine needles at first and then move to leaf surfaces causing foliage to turn brown. Caterpillars produce large amounts of silk webbing that entangles living and dead foliage creating unslightly mats.

Juniper Webworm				
Species	Cultivar	Reference		
		Resistant	Intermediate	Susceptible
Juniperus chinensis				4
Juniperus chinensis	Pyramidalis			7
Juniperus chinensis var. *pfitzeriana*		4		
Juniperus communis				7
Juniperus communis	Hibernica			4
	Stricta			7
Juniperus communis vars. *aurea, depressa, suecica*				7
Juniperus horizontalis				7
Juniperus procumbens			7	
Juniperus sabina		4		
Juniperus squamata			7	4
Juniperus squamata	Meyeri			7
Juniperus virginiana				7

Cypress Tip Miner, *Argyresthia cupressella*, is the larva of a moth commonly found along the Pacific Coast where it is a widespread pest of junipers and other plants in the Cupressaceae family (6). Larval feeding causes unsightly brown tips, and heavy infestations can cause entire plants to appear brown (4).

Researchers in California evaluated ten species and cultivars for resistance to the cypress tip miner.

Cypress Tip Miner				
Species	Cultivar	Reference		
		Resistant	Intermediate	Susceptible
Juniperus chinensis	Kaizuka	6		
	Pfitzerana			6
	Pfitzerana aurea		6	
	Robust Green			6
Juniperus chinensis var. *sargentii*	Glauca	6		
Juniperus sabina	Arcadia		6	
	Tamariscifolia		6	
Juniperus scopulorum	Erecta Glauca	6		
Juniperus virginiana	Cupressifolia			6
	Prostrata		6	

REFERENCES

1. Daughtrey, M., B. Seagraves, L. Michaliger, and L. Loizos. 2007. Evaluating genetic resistance of junipers to rust. Long Island Research and Extension Center 2007 Research Summaries.
2. Hansen, M.A., J. Demers, M. Sutphin, K. Yoder, E. Bush, and L. Castlebury. 2016. First report of European pear rust caused by *Gymnosporangium sabinae*, on ornamental pear (*Pyrus calleryana*) in Virginia. Plant Dis. 100(10):2166. doi: 10.1094/PDIS-03-16-0396-PDN
3. Johnson, M.P., D.A. Potter, and G.S. Gilmore. 1993. Suitability of juniper cultivars for survival and growth of the bagworm. J. Environ. Hort. 11(4):167-170.
4. Johnson, W.T., and H.H. Lyon. 1991. Insects that Feed on Trees and Shrubs. 2nd Ed. Cornell Univ. Press, Ithaca, NY.
5. Kenaley, S., M. Daughtrey, D. O'Brien, S. Jensen, K. Snover-Clift, and G. Hudler. 2012. First report of the pear trellis rust fungus, *Gymnosporangium sabinae*, on *Pyrus calleryana* ('Bradford' and 'Chanticleer') and *P. communis* in New York State. Plant Dis. 96(9):1373. doi: 10.1094/PDIS-11-11-0972-PDN
6. Koehler, C.S., and W.S. Moore. 1983. Resistance of several members of the Cupressaceae to the cypress tip miner, *Argyresthia cupressella*. J. Environ. Hort. 1(4):87-88.
7. Nordin, G.I., and J.E. Appleby. 1969. Bionomics of the juniper webworm. Ann. Entomol. Soc. Am. 62(2):287-292.
8. Ormrod, D.J., H.J. O'Reilly, B.J. van der Kamp, and C. Borno. 1984. Epidemiology, cultivar susceptibility, and chemical control of *Gymnosporangium fuscum* in British Columbia. Can. J. of Plant Pathol., 6(1):63-70. doi: 10.1080/07060668409501592
9. Pscheidt, J.W., and C.M. Ocamb (Senior Eds.) 2018. Pacific Northwest Disease Management Handbook. ©Oregon State University.
10. Siegfried, W. 2002. Susceptibility of *Juniperus* species and varieties to the pear rust. Research Station Agroscope Changins-Wädenswil ACW, Switzerland.

11. Sinclair, W., and H.H. Lyon. 2005. Diseases of Trees and Shrubs. 2nd Ed. Cornell Univ. Press, Ithaca, NY.

12. Tisserat, N.A., and D.M. Benson. 2001. Juniper diseases, pp. 201-209. In: R.K. Jones and D.M. Benson, editors. Diseases of Woody Ornamentals and Trees in Nurseries. APS Press, St. Paul, MN.

13. Tisserat, N.A., and J.C. Pair. 1997. Susceptibility of selected juniper cultivars to cedar-apple rust, Kabatina tip blight, Cercospora needle blight and Botryosphaeria canker. J. Environ. Hort. 15(3):160-163.

OTHER RESOURCES

Bitner, Richard L. 2007. Conifers for Gardens. Timber Press, Inc., Portland, OR.

Dirr, Michael A. 2009. Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses. 6th ed. Stipes Publishing L.L.C., Champaign, IL.

Dirr, Michael A. 2011. Dirr's Encyclopedia of Trees & Shrubs. 1st Ed. Timber Press, Inc., Portland, OR.

"Juniper Tip Blights: *Phomopsis juniperovora*, *Kabatina juniperi*, or *Sclerophoma pythiophila*." Plant Disease Diagnostic Clinic, Cornell University. plantclinic.cornell.edu/factsheets/junipertipblight.pdf

"Missouri Botanical Garden." missouribotanicalgarden.org

"Woody Plants Database." *Urban Horticulture Institute*, Cornell University. woodyplants.cals.cornell.edu/plant/search

New York State Integrated Pest Management Program

Cornell Cooperative Extension

Produced by the New York State Integrated Pest Management Program, which is funded through Cornell University, Cornell Cooperative Extension, the New York State Department of Agriculture and Markets, the New York State Department of Environmental Conservation, and USDA-NIFA. Design by Karen English, New York State IPM Program. Cornell Cooperative Extension provides equal program and employment opportunities. Updated 3/2019. Search for this title at the NYSIPM Publications collection: ecommons.cornell.edu/handle/1813/41246

nysipm.cornell.edu