

FACT SHEET

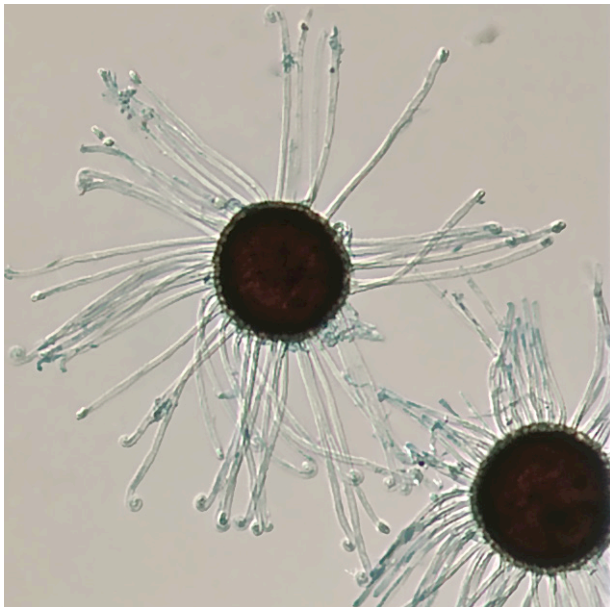
Powdery Mildew

INTRODUCTION

Powdery mildews are plant pathogenic fungi that can only grow and reproduce on live host tissue. Most of the body of a powdery mildew fungus remains outside host cells and is readily visible on infected leaves. Parasitism is by way of a specialized organ (haustorium) that siphons nutrients from epidermal cells without injuring the plant. Willows (*Salix* spp.) are susceptible to two powdery mildews: *Erysiphe adunca* and *Phyllactinia guttata*.

HOSTS AND DISTRIBUTION

Erysiphe adunca is known to occur on aspen and cottonwood (*Populus* spp.) as well as on willow throughout temperate regions of the Northern Hemisphere. *Phyllactinia guttata* is also broadly distributed in North America and has been reported to infect over 38 species of woody plants including aspen/cottonwood and willow as well as elm, hawthorn, maple, oak, serviceberry, and sycamore.

Cleistothecia of *Erysiphe adunca* (100x).Cleistothecia of *Erysiphe adunca* (90x) in various stages of development on the upper leaf-surface of *Salix*.

SYMPTOMS AND SIGNS

Signs and symptoms generally appear in the late summer (August) or early fall (September). The mycelia of *E. adunca* and *P. guttata* appear as fuzzy white spots that may coalesce to produce a continuous coating over affected leaves. Each fungus produces massive amounts of asexual and sexual spores, and the two species are easily differentiated following microscopic examination of the fruiting bodies (cleistothecia) in which the sexual spores are borne. Cleistothecia of *E. adunca* are dark brown, spherical, and have slender, thread-like appendages. *Phyllactinia guttata* also produces dark brown cleistothecia but they have needle-like appendages.

DISEASE CYCLE

Powdery mildews are spread by spores produced on the surface of infected leaves. Conidia are produced throughout the growing season, particularly in early fall, and they are dispersed short distances by wind to other parts of the same plant or to adjacent hosts. Sexual fruiting bodies appear in autumn as minute brown to black spheres within the white fungal mats and they serve as the overwintering structures. In the spring, sexual spores (ascospores) are expelled from the cleistothecia into the air and carried by wind to susceptible hosts.

Ascospores and conidia are equally effective at causing infection. When either spore settles on a leaf, it germinates to produce a primary germ tube and radial hyphae that explore the leaf surface. Shortly thereafter, swellings develop on individual hyphae that secure the young fungus to the leaf surface. Infection is initiated by the mechanical penetration of the leaf cuticle via penetration tubes and parasitism is established by the intercellular growth of haustoria within epidermal cells of the leaf.



Colonies of *Erysiphe adunca* on *Salix*.

DAMAGE

Because powdery mildews siphon nutrients from the plant, they often cause an overall decline in growth and vigor, premature defoliation, or stunting. Several consecutive years of severe infection may result in significant growth loss and predispose willow shrubs to secondary pathogens and/or pests.

SELECTED REFERENCES

- Horst, R. K. 2001. Westcott's disease handbook. 6th edition, Kluwer Academic Publishers. Norwell, MA, USA. pp 901.
- Sinclair, W. A. and H. H. Lyon. 2005. Diseases of Trees and Shrubs. 2nd edition, Cornell University Press. Ithaca, NY, USA. pp 8-10.

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