



WITCHES' BROOM OF HACKBERRY

Witches' broom is a very common disfiguring disease of hackberry. It contributes to the undesirability of hackberry as a shade tree throughout much of its range. Witches' broom is attributed to two agents acting together: a powdery mildew fungus (*Sphaerotheca phytoptophila*) and a minute, wormlike, eriophyid mite (*Eriophyes celtis*, synonym *Aceria snetsingeri*) about 200 microns long. The two agents are consistently and readily found attacking buds and shoots in "brooms," but neither has been tested for its ability to induce broom formation. Observations suggest that mites may induce brooms and that the mildew fungus then invades the deformed buds that result in the formation of the brooms.

Large common hackberry trees (*Celtis occidentalis*) may have a few to hundreds of brooms without obvious loss of vigor (Figure 1). The brooms detract greatly from a tree's appearance, especially during the dormant season. Trees



Figure 1. Witches' brooms in a common hackberry tree.

growing in lawns, parks, and other open areas are more frequently and severely affected than those in woodlands.

The severity of attack varies greatly among trees growing in close proximity to one another, but the reasons for this variation are unknown.

Sugarberry (*Celtis laevigata*) is also affected but much less frequently than the common hackberry. Chinese hackberry (*Celtis sinensis*) and Jesso hackberry (*C. jessoensis*) are considered resistant. The Jesso hackberry may not be hardy in central and northern Illinois.

SYMPTOMS

Each broom consists of numerous thin, short, stubby twigs that arise close together, often at a conspicuous swelling or knot on a branch (Figure 2). Many twigs in a broom die back during the dormant season after a year's growth. Buds on the surviving twigs are very numerous, larger than normal, usually grayish, and with looser scales than the buds on normal twigs.

Brooms first arrive from single infested and deformed buds, each of which produces shoots with more infested buds. A loose broom may form on a vigorously growing branch. Tight clusters of twigs

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commonly form along its axis. Tight brooms, centered on knots, form on slowly growing branches which lose their apically dominant habit.

DISEASE CYCLE

From spring to early summer the mycelium and chains of microscopic spores (conidia) of the powdery mildew fungus, which appears as a fine white powder, colonize the surface of young stems, petioles, buds, and sometimes the lower leaf surface. Black specks (fungus fruiting bodies called cleistothecia) soon form in the mycelial mat. Ascospores formed in an ascus within each cleistothecium mature beginning in autumn. It is unknown whether the first infections each year come from ascospores or mycelium within the buds. Also unknown is whether conidia cause secondary infections.

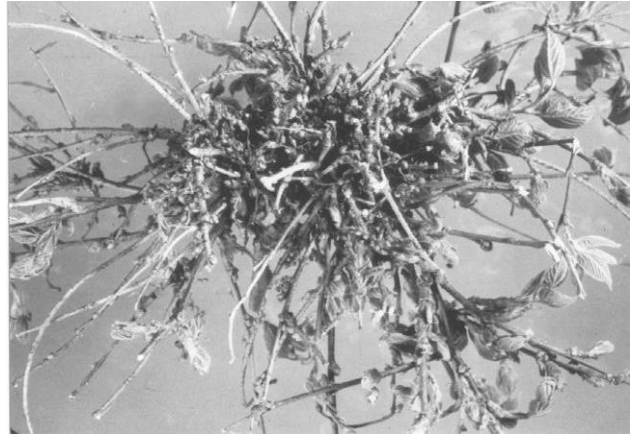


Figure 2. Close-up of witches' broom showing a tight cluster of thin, short twigs, some of which have already died (Purdue University photograph).

Mites in all stages of development can be found throughout the year, being most numerous in late summer. Up to 2,000 or more mites may colonize a single bud. The mites overwinter beneath the bud scales and on the primordial shoots within the buds. In the Midwest, female mites crawl to the new buds and begin to lay eggs in May. New generations of mites develop throughout the spring, summer, and fall.

CONTROL

1. Where feasible, purchase broom-free trees of resistant species such as *Celtis sinensis* and *C. jessoensis*. Avoid planting the common hackberry if the presence of witches' brooms is aesthetically unpleasant.
2. Pruning out and burning or otherwise destroying witches' brooms is of limited value.
3. A lime-sulfur spray applied **before** the buds begin to open in early spring is an old recommendation which is not usually practical.