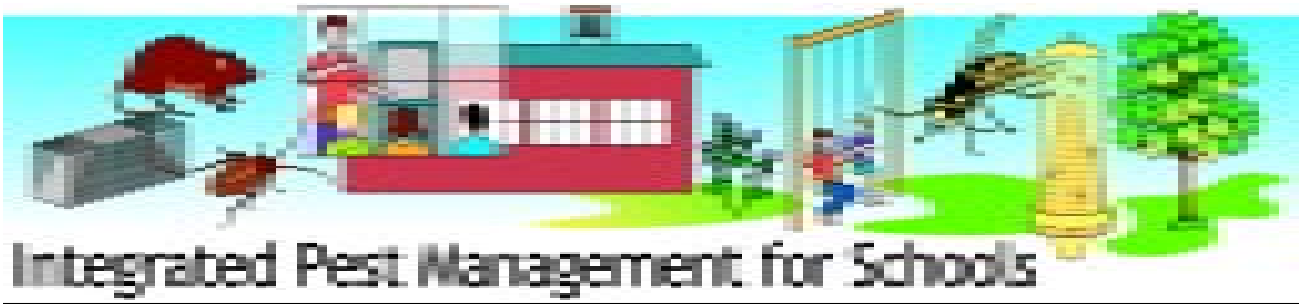

IPM 70-6 March 2003

Exterior Pests: Hawthorn Rust

by Paula Flynn, Extension Plant Pathologist, Iowa State University

Some tree health problems can be difficult to diagnose, especially when the culprit is not easy to see. The colorful symptoms of hawthorn rust, however, make the disease easy to spot and diagnose. Bright orange spots dot the leaves of the hawthorn. Orange, jelly-like galls form on leaves and twigs of the other host plant, a cedar.

Hawthorn rust, also called cedar-hawthorn rust, is an interesting disease. The rust fungus affects two different host plants, the hawthorn and a *Juniperus* species, most often eastern red cedar. If either host plant is missing, the disease will not occur. Wind moves the fungus from tree to tree, even if the hosts are located a mile or more apart.

The cedar-hawthorn rust fungus alternates between the hawthorn host and the cedar host. When warm, moist weather occurs in the spring, rusty orange, jelly-like galls form on the leaves and small twigs of the infected cedar. If many galls are present, the tree seems to be decorated. The jelly-like tendrils that ooze from the galls are loaded with spores (transport units) of the fungus. Moist winds move these microscopic spores to the newly emerging leaves of nearby susceptible hawthorn trees. A week or so after the fungal spores land and infect the young leaves, small yellow spots occur. Within weeks, these spots enlarge and turn an eye-catching yellow-orange. If you look closely at the leaf spots, you also might see small black dots scattered in the affected areas. Thread-like tubes are formed on the underside of the leaves, opposite the bright orange leaf spots. Fungal spores emerge from these tubes and are blown to the cedar, completing the life cycle.

Infection of the leaves and twigs on the cedar eventually causes a small gall to form. It remains as a slightly rough, rusty-colored gall for 18 months, until spring weather signals the jelly-like tendrils to emerge.

Cedar-hawthorn rust is usually most problematic for the hawthorn. When rust is severe on the leaves, they may turn yellow and fall from the tree prematurely. Losing leaves in several successive years can reduce tree vigor, making it more susceptible to other pests and environmental stress. The galls formed on the cedar host are usually of minor significance. Galls occasionally girdle and kill small twigs.

Quince rust, also known as cedar-quince rust, can affect hawthorn and cedar trees as well. This rust, related to cedar-hawthorn rust, usually affects the fruit and young twigs of the hawthorn tree, not the leaves. This fungus causes thread-like tendrils to form on the fruit. Similar to rust on the leaves, orange fungal spores are produced in these structures. As spores emerge, they are blown to the cedar host. Instead of causing small circular galls to form, the rust fungus causes spindle-shaped galls or cankers on twigs.

Bright orange spots on hawthorn leaves caused by cedar-hawthorn rust fungus.

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Thread-like tubes on the underside of leaves infected with cedar-hawthorn rust fungus.

Jelly-like tendrils ooze from galls infected with cedar hawthorn rust fungus.

Thread-like tubes on fruits of hawthorn infected with quince rust fungus.

Infection of twigs on the hawthorn and the cedar host can lead to deformed growth or death of twigs.

Management of these rust diseases on hawthorn and cedar involves both cultural and chemical methods. Removal of one of the hosts is usually not practical because the spores can travel by wind a mile or more. When feasible, galls or cankers on the juniper host can be removed by pruning during the winter months. Quince rust galls also should be removed from hawthorn trees.

Certain hawthorns have been reported to be resistant to the cedar-hawthorn fungus, including Washington hawthorn (*Crataegus phaenopyrum*) and cockspur hawthorn (*Crataegus crusgalli*). The drawback to these species is the presence of thorns. Unfortunately, the thornless cultivars are troubled by insect pests. An alternative plant to use in the landscape is blackhaw viburnum (*Viburnum prunifolium)*. This ornamental has a similar appearance to hawthorn, but does not share the insect and disease problems.

Protective fungicide sprays may be used on specimen landscape plants or where rust diseases are perennial problems. Timing of application is important. The fungicide should be applied to the hawthorn in the spring, when the jelly-like orange galls are visible on the cedar host; the hawthorn will be at the bloom stage. Additional applications of the fungicide are made at regular intervals until the cedar galls are dry and inactive. Check your local garden center for available fungicides. Be sure to read and follow label instructions.

For further information on rust or for assistance in diagnosing plant disease problems, you may contact the Iowa State University Plant Disease Clinic, 323 Bessey Hall, Ames, IA 50011; phone (515) 294-0581.

Evolution of School IPM in Minnesota

by Jeanne Ciborowski, IPM Program Coordinator, Minnesota Department of Agriculture

There are various ways to start a school integrated pest management (IPM) program in a state. The primary landmarks and highlights in the development of the program in Minnesota are given below.

IPM in K-12 Schools Working Group (July 1998). The Minnesota Department of Agriculture and the University of Minnesota jointly established a voluntary IPM in K-12 Schools Working Group. The group's purposes were to facilitate coordination between state agencies and to solicit input from interested parties. Representatives came from Minnesota Department of Agriculture; University of Minnesota Extension Service; Minnesota Office of Environmental Assistance; Minnesota Department of Children, Families, and Learning; Minnesota Department of Health; St. Paul Public Schools; the Minnesota pest management industry; and an environmental organization. Awareness of IPM principles and practices was considered essential for school staff, students, parents, board members, pest control industries, and the general public. The working group concluded that time, personnel, and money were key considerations in developing and implementing an IPM program.

School Pest Management Survey (Fall 1999). A survey of pest management practices in Minnesota public and private K-12 schools was the next step in developing an IPM program due to limited meaningful data. The survey was designed to provide general information about pest management in schools. It was not intended to define the intensity and frequency of pesticide use nor to describe any specific school. The survey was sent to all independent school district superintendents and to a statewide random sample of head custodians at public and private K-12 schools. Funding was provided by the U.S. Environmental Protection Agency (EPA).

Pest Patrol – IPM Activity Book for Kids (June 2000). The Minnesota Department of Agriculture developed the "Join Our Pest Patrol – A Backyard Activity Book for Kids – An Adventure in IPM" and an accompanying teacher's guide, with funding from the EPA. These resources were developed for the 3rd and 4th grade levels and included many fun activities.

Minnesota Statute 121A.30, Article 7, "Parents' Right to Know" Act (July 1, 2000). Formal state legislation was passed that required notification of parents and school employees regarding pesticide use and encouraged schools to develop and adopt an IPM plan. Furthermore, the law required the Minnesota Department of Agriculture to review pesticide use and IPM in and around state-owned buildings and K-12 buildings and present their findings to the Minnesota legislature. For more information about the law, see **http://www.health.state.mn.us/divs/eh/pesticide/notices/index.html**.

IPM in Schools Training Workshop Pilot Project (September–October 2000). MDA began a pilot school IPM project, which created seven school IPM fact sheets and a training curriculum. It was funded by the EPA. School health and safety officers, and other district personnel in lead maintenance roles attended 10 statewide regional half-day workshops for basic IPM information.

Pest Management Coordinator Registry Legislation (July 1, 2001). Minnesota Statute 18B.01, Sec. 34, Subd. 26a and 18B.095, Sec. 36 directed the Minnesota Department of Agriculture to develop and administer a pest management registry to provide information about pesticides and pest management to school personnel.

IPM in Schools Project (June 2002). Minnesota Department of Agriculture received funding from the Legislative Commission on Minnesota Resources to develop additional IPM fact sheets and expand the curriculum as a day-long IPM training workshop for K-12 school staff responsible for pest control. The workshop should provide participants with an understanding of school IPM, and the ability to develop an IPM policy and implement an IPM plan. Sixteen IPM fact sheets for schools were developed and are available at **http://www.mda.state.mn.us/ipm/ipmpubs.html**. IPM training workshops for school maintenance and health and safety personnel took place statewide during summer 2002.

For questions about our program, please contact me by phone at (651) 297-3217 or e-mail at jeanne.ciborowski@state.mn.us. Our Web site is at **http://www.mda.state.mn.us/ipm/**.

Interior Pests: Mice

by Jim Pease, ISU Extension Wildlife Specialist

Mice like the way we live: they like the food, shelter, and water that we provide. School buildings may inadvertently provide all three requirements for mice to thrive. Because mice are so adaptable, they often thwart our best efforts to manage their populations.

Determining if one or more mice are "visiting" a school can be difficult. Mice are usually nocturnal, confining their foraging to the nighttime. Look for fecal droppings along walls, under sinks, and behind water heaters and furnaces. Droppings are 1/4 inch in length, dull brown or black, and pointed on both ends. Mice often leave smudges, urine stains, and gnaw marks around their shelter. Nests, constructed of a variety of material gathered by mice—dried plants, shredded carpet, paper, lint, and insulation to name a few—may be found in boxes, behind walls, or inside machinery. Talcum powder placed along walls in kitchens, food storerooms, or other areas at night reveals tracks the following morning.

Two species of mice are most likely to inhabit buildings in Iowa. The non-native **house mouse** is usually solid grey and has a body about 3 inches in length. The mostly naked tail is about the same length as the body. Often closely associated with humans, this mouse has small ears and eyes. The native **deer mouse** is typically found in grassy areas but often moves into buildings in the fall and winter. The body is generally light brown along the back and sides with a white belly and feet. Deer mice have large ears, large brown eyes, and long whiskers. The tail is long, hairy, brown on top and white on the bottom, and it often has a tuft of hair at the end. Although deer mice look "cute" compared with house mice, both are vectors of several diseases affecting humans. Both

House mouse.

Deer mouse.

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species consume grain products and other foodstuffs and can cause significant damage and spoilage in schools and other buildings.

Mouse management involves exclusion, sanitation, monitoring, and physical control. Exclusion techniques include denying mouse entry into buildings by proper construction and maintenance, particularly around building foundations and pipes or conduits entering the structure. Door sweeps and weather stripping should be checked weekly and replaced when worn; a space the diameter of a dime allows some mice to enter a building. Groundcovers and shrubbery should be kept 1–2 feet away from the building, especially doorways. Foodstuffs should be stored on raised shelving in secure packaging, and frequently rotated; or placed in cold storage when possible. Removal of clutter and frequent cleaning of food service, storage, and custodial areas also assist in management.

A monitoring program for mice should be ongoing during the year. This program might include the use of talcum powder for tracking, glueboards, multiple-catch devices, or single snap traps. Any of these techniques need to be strategically placed to catch mice and not students! If a mouse problem is discovered, immediate efforts should be undertaken to both remove the "residents" and prevent others from entering. Although the use of rodenticides is sometimes warranted, this option should be pursued only when other management methods have failed and when students and staff are off campus for scheduled, extended breaks. Baits must be placed in secure bait stations at the beginning of the break and then taken up before school resumes. This method also requires locating and picking up carcasses. Constant baiting only serves to produce mouse populations that become immune to the rodenticides used. To date, none of the so-called "ultrasonic" devices have proven to have any effect on mouse populations.

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