MSU Ag Facts — Extension Bulletin E-1441, September 1980, FILE 27.331

Cedar-Apple Rust

Randy Kelley, *Research Assistant and*
Franklin Laemmlen, *Formerly Extension Plant Pathologist*
Department of Botany and Plant Pathology

Figure 1. Galls on juniper with and without tendrils (telial horns).

Figure 2. Leaf and fruit infection on the alternate host, in this instance, apple.

Introduction

Cedar-Apple Rust is a fungal disease which occurs on a number of apple varieties including crabapple, and several species of the genus *Juniperus* (i.e. - Eastern and Western Red Cedars, and Horizontal and Savin Junipers). While the symptoms on the apple host are distinctly different from those on the cedar or juniper host, they are the result of infection by the same fungus, which alternates between them at different stages of its development. Damage to cedars is usually not severe. However, infections may appear quite striking when the orange, spore-bearing tendrils emerge from the cedar galls in the spring. Apple trees are more seriously affected, with leaves yellowing and falling prematurely. Fruit infection may also occur.

The Causal Organism

Cedar-Apple Rust is caused by the fungus *Gymnosporangium juniperi-virginianae*. Similar symptoms are caused by two other related fungi; *Gymnosporangium globosum* which causes Cedar-Hawthorn Rust, and *Gymnosporangium clavipes* which causes Cedar-Quince Rust. As indicated by their names, each fungus attacks a different broad-leaf host; apple, hawthorn and quince, respectively. The stages of their disease cycles are similar to Cedar-Apple Rust and control measures are identical for all three.

Symptoms and Disease Cycle

Brown spherical galls, from pea size up to two inches in diameter, form on the branches of susceptible varieties of cedar and juniper (Fig. 1 and Fig. 3-B). The fungus overwinters within these structures. In the spring, during periods of wet weather, bright orange, jelly-like tendrils, or "horns", protrude from the galls (Fig. 3-C) and are quite easily seen. Fungal spores (teliospores) are produced on these horns. The teliospores (Fig. 3-E), in turn, produce basidiospores (Fig. 3-F) which are blown by the wind to a susceptible apple tree where they germinate and infect the leaves and fruit. Two to 3 weeks later, the infected areas of the apple leaves turn yellow and small pustules (pycnia) form on the upper leaf

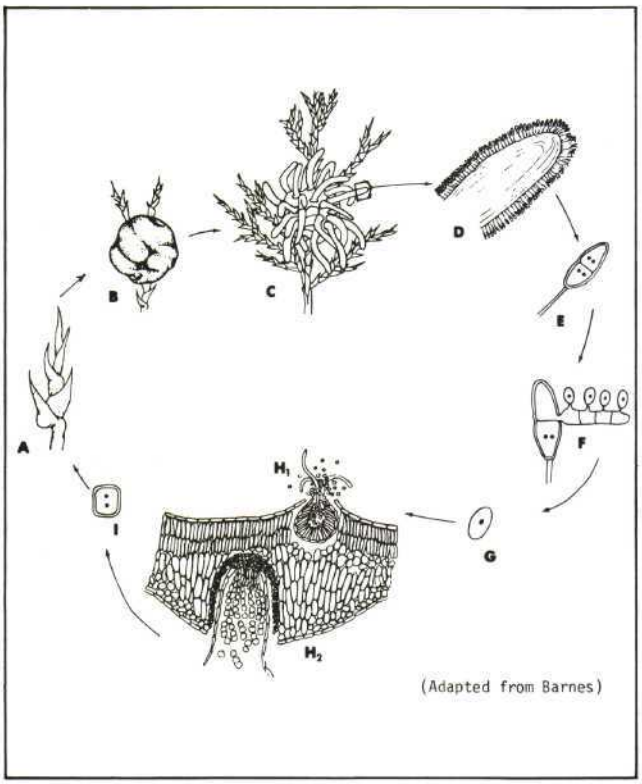

Figure 3 Cedar-apple rust life cycle.

A. Juniper infected in fall
B. Juniper gall 1 year old
C. 1½ yr. old gall with telial horns
D. Telial horn-X section
E. Teliospore
F. Teliospore with basidium and basidiospores
G. Basidiospores infects alternate host in spring
H¹ Pycnia and pycniospores on upper leaf surface
H² Aecia and aeciospores on lower leaf surface
I. Aeciospore infects juniper in fall

surface (Fig. 3-H¹). These pustules produce a spore-containing ooze (pycniospores) attractive to insects, which feed upon it and, in the process, transfer the spores from one pustule to another. This results in a sort of mating between different strains of the fungus and, subsequently, symptoms appear on the bottom of the leaves as small circular lesions surrounded by ribbon-like strands (Fig. 2 and 3-H²). These are referred to as "cluster-cups" or aecia, and are typically yellow to orange in color with tan fringes. A similar sequence of symptoms takes place on infected fruit. A circular area of oozing pustules forms first, and may later be surrounded by a ring of cluster-cups (aecia) (Fig. 2).

Spores (aeciospores) produced by these lesions on either leaves or fruit are wind blown to susceptible cedars and junipers, where they infect the foliage (Fig. 3-A) and, over a period of 20 months, form galls (Fig. 3-B). During wet spring weather of the second year, spore horns are exuded from the galls and the cycle begins again.

Control

It is usually recommended that any cedar host within two miles of a commercial apple orchard be removed entirely. However, this is not an acceptable alternative for the homeowner. Any galls observed on cedars should be pruned out and either burned or removed from the area. Protective fungicide sprays, which give good control, are available for both apple and cedar, but the timing of their application is important (i.e. - just after bud break and at weekly intervals for 4 or 5 weeks). Springtime protective sprays of the apple are important because the spores produced by the cedar galls are blown to infect the apple leaves at this time. Spore release is enhanced by wet weather, so more sprays may be necessary if rainfall is frequent.

For protection of the cedar or juniper host, the sprays must be applied when spores are being released from the lesions on the apple leaves and blown to the cedar. Therefore, cedars should be sprayed three times at 2-week intervals beginning in mid-July. Ferbam and Mancozeb are possible choices of chemical for both apple and cedar hosts.

NOTE: Whenever a pesticide chemical is used, read the label and follow recommended application instructions. Do not misuse or abuse pesticide chemicals.

MICHIGAN STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICE

MSU is an Affirmative Action/Equal Opportunity Institution

1P-5M-9:80-VP, Price 35¢