



COMMON RUST AND SOUTHERN RUST OF SWEET CORN

Common rust and southern rust occur wherever sweet corn and field corn are grown, but cause no real economic damage on dent corn in the Midwest. In commercial sweet corn, yield losses range from 0 to nearly 50 percent depending on the environment and the type of resistance in the individual hybrid or variety. Quality factors and quantity are also affected, such as ear length, ear diameter, percentage of moisture, and percent soluble solids in the kernel. One important difference between the two rusts is that southern rust may possibly kill the corn plant while common rust seldom does. Southern rust occurs primarily in relatively warm regions.



Figure 1. Common rust. Reddish brown pustules occur on scattered groups on both upper (right) and lower (left) surfaces.

COMMON RUST

Symptoms

Common rust is caused by the fungus *Puccinia sorghi*. Symptoms are circular to elongate (usually 0.2 to 2 mm long), golden or reddish brown to cinnamon brown pustules that appear on the upper and lower leaf surfaces, and less frequently on other above-ground plant parts (Figure 1). Most of the infection is found on the upper leaf surface and may occur in bands. The pustules break through the epidermis early in their development and become powdery as spores (urediniospores) are produced.

Later in the season they become brownish black as a second spore stage (teliospores) develops which also breaks through the epidermis. If severe, chlorosis and premature drying of the leaves may occur, reducing sweet corn yields. Symptoms may vary slightly depending upon the hybrid being grown. Common rust is especially severe on many sweet corn hybrids containing the shrunken-2 (sh_2) endosperm mutation for high levels of kernel sugars and on some of the sugary-1 (su) hybrids grown for processing.

Disease Cycle

In warmer climates, urediniospores overwinter and serve as primary inoculum. Urediniospores are windblown into the Midwest following a pathway of infected corn plants starting from southwestern United States and Mexico. Infected corn plants appear in Illinois usually about mid-season, and powdery pustules are formed that produce large numbers of microscopic spores (urediniospores) in what is called

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the repeating stage. The urediniospores reinfect the same or additional corn plants, producing more urediniospores. Several repeating cycles may occur during a single growing season. Later in the season, the same pustules produce brownish black teliospores. The teliospores may overwinter and germinate in the spring to form basidiospores, which will only infect species of wood sorrel (*Oxalis* spp). Two more spore stages are produced in Mexico on *Oxalis*: spermatia (pycniospores) are formed and mate with receptive hyphae. From this mating, aeciospores are formed which are wind-disseminated to infect corn. However, the alternate host (*Oxalis* spp) is not considered important in the life cycle of this rust disease in the United States. The only other host of the common rust fungus is teosinte (*Zea mays* subsp. *mexicana*; synonym *Euchlaena mexicana*), a close relative of corn.

Common corn rust becomes a problem under ideal environmental conditions which include cool temperatures of 65° to 75°F (18.3° to 23.8°C), abundant moisture in the form of light rains or heavy dews, and high humidity (98 to 100 percent). Optimum temperature for urediniospore germination is approximately 50° to 85°F (10° to 28.5°C). An average time from infection to the production of a new generation of mature urediniospores is 7 to 8 days.

SOUTHERN CORN RUST

Symptoms

The fungus causing southern corn rust is *Puccinia polysora*. This disease is much less common in Illinois than common corn rust and is usually considered of minor importance, but can be widespread in some years. The disease becomes progressively more severe as the plant develops, with the greatest damage occurring in late-season plantings. In years where it is severe in the southwestern United States, southern corn rust may cause premature desiccation and death of the corn plant. Symptoms are similar to that of common corn rust, with the pustules being lighter in color, smaller (0.2 to 2 mm long), and circular to oval (Figure 2). The orange-red to light cinnamon brown pustules are often much more numerous on the upper surfaces of leaves with development being slower and less abundant on the lower leaf surface. The pustules are initially less powdery than common corn rust. The leaf epidermis remains intact covering the pustule for a long time, frequently opening by a longitudinal slit. Chocolate brown to black teliospores are often produced in a circle around the uredial pustule later in the season than teliospores of common corn rust. It is often difficult to separate these two diseases unless the causal fungi are examined microscopically (Figure 2).



Figure 2. Close-up of southern corn rust on the upper side of a corn leaf (courtesy Dr. R.R. Bergquist, Pfister Hybrid Corn Co).

Disease Cycle

Urediniospores of this fungus are windblown from previously infected corn leaves, and are blown progressively northward during the growing season. Although teliospores are produced, they do not rupture the epidermis and have not been shown to germinate, and thus are unimportant in the disease cycle.

Disease progress is most rapid when favorable temperatures of 77° to 80°F (25° to 28°C) and high humidity occur in fields of susceptible varieties. As with the common rust pathogen, free water as dew is needed on plant surfaces for urediniospore germination and initial penetration of the corn leaf. Symptoms appear about 3 to 6 days after infection and by 7 to 10 days, the pustules may rupture to expose mature urediniospores. Southern rust is associated with high temperatures, high relative humidity, and heavy rainfall.

Other hosts of the southern corn rust fungus include silver plumegrass (*Saccharum [Erianthus] apopecuroides*), eastern gamagrass (*Tripsacum dactyloides*), *Tripsacum lanceolatum*, *T. laxum*, and *T. pilorum*.

Control

1. Plant moderately resistant varieties. Commercial varieties of sweet corn vary in their resistance to both common and southern rusts and are much more susceptible than dent corn. Early season varieties often escape infection due to low levels of inoculum or environmental conditions which are not conducive to disease development.
2. In susceptible varieties, or when conditions are extremely favorable for development of an epidemic, foliar fungicide applications may be feasible starting when pustules **first** appear on the leaves, particularly in seed-production fields. Recommended fungicides for spraying sweet and dent corn are given in the current Illinois Agricultural Pest Management Handbook, available from ITCS, P345 University of Illinois, 1917 S. Wright St., Champaign, IL 61820.

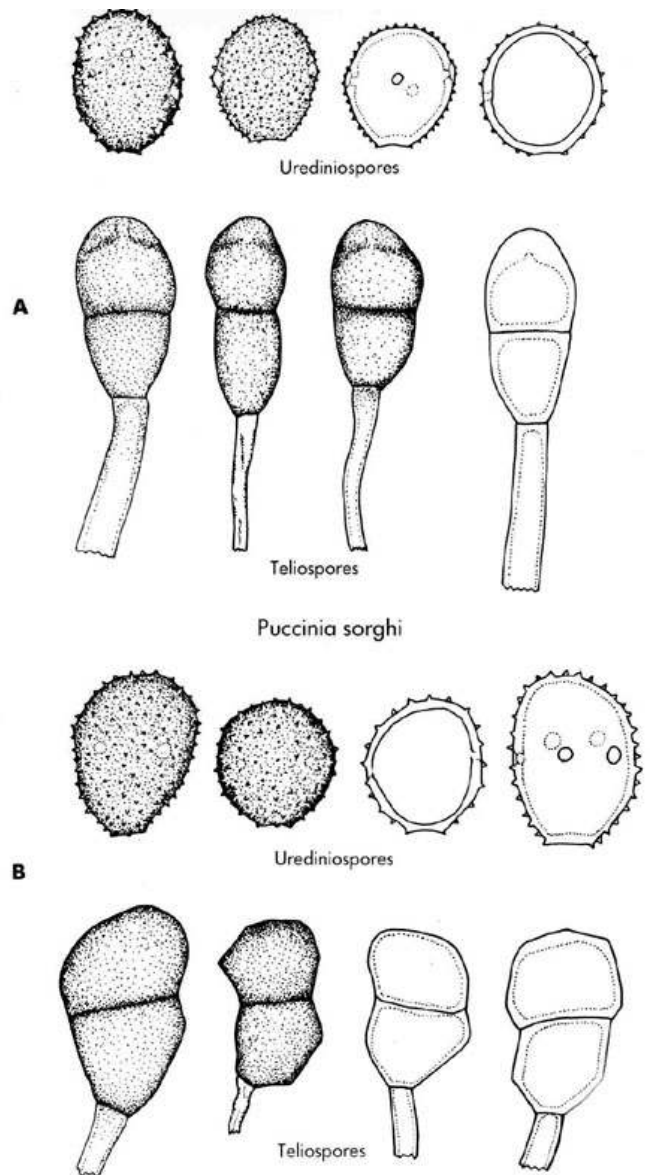


Figure 3. Urediniospores and teliospores of the corn rust fungi *Puccinia sorghi* (above) and *Puccinia polysora* (below). The spores to the right show the arrangement of germ pores (drawing by Lenore Gray).