

Identifying and Managing Southern Rust of Corn

Southern rust is caused by the fungus *Puccinia polysora* and while it is considered a tropical disease, it can occur in the Midwest and Eastern Canada. A similar disease, common rust, is sometimes mistaken for southern rust. Southern rust pustules are raised masses of colored spores that rupture epidermal leaf tissue. They appear as densely packed small brownish orange ovals and occur almost exclusively on the upper leaf surface (Figure 1). As southern rust pustules age, they become dark brown to black, often forming dark halos around the original pustule. Common rust pustules differ from southern rust because they are more loosely scattered on the leaf surface, are more reddish brown, and elongated in shape. Pustules caused by either disease are usually found on the upper canopy. Infections of both rusts can occur on the same plant, which can make diagnosis difficult.



Figure 1. Southern rust on corn leaf surface.

Disease cycle^{1,2}

The *P. polysora* requires a live host to survive, thus in Canada and most of the United States it does not overwinter and must recolonize every year. Rust fungi are biologically complex and require more than one host species to reproduce sexually. However, the spores produced on corn (urediniospores) are capable of indefinite asexual reproduction as long as the corn plant is living and can be re-infected by the urediniospores. North blowing winds carry the urediniospores from tropical areas where they land on corn fields in temperate areas.

Leaf wetness is critical for infection to occur, a dew of six hours is usually enough moisture for infection. Temperature also plays a critical role, while common rust prefers somewhat cooler temperatures of 61 to 77° F southern rust prefers warmer conditions of 77 to 82° F. Therefore, common rust is usually the first to show up and southern rust is typically a late summer occurrence. Under favorable conditions, the infection cycle will continually repeat resulting in secondary infections. Each pustule produces thousands of spores that can infect the plant and produce additional pustules in as few as seven days. If conditions are favorable, disease intensity can reach epidemic levels very quickly. Young leaves are more susceptible and late-planted corn may be at greater risk for infection. Generally, favorable conditions for southern rust are more common in the southern United States, and the disease is more of an economic issue in these states.

Economic impact

Southern rust can rob the plant of nutrients required for grain fill, reducing yield potential. Pustules can rupture the epidermis, impacting water regulation in the leaf. Severe infections can increase susceptibility to stalk rots pathogens. Yield losses as high as 45% have been reported with severe disease.²

Predicting the Occurrence

A map is available that has been developed by a network of Land Grant University Extension systems that is used to monitor the movement of southern corn rust during the growing season. It can be accessed at the website: <https://corn.ipmpipe.org/southerncomrust/>.

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Management

- **Cultural practices** are of limited value since the spores are wind-blown into the area. However, late planting may increase risk of infection and as such, resistant corn products should be used.
- Most corn products are susceptible to southern rust; however, a few **resistant corn products** may be available. Resistant corn products may contain a specific gene (Rpp gene) that confers resistance to southern rust. However, in 2008, researchers in Georgia discovered a new strain (race or pathotype) of the southern rust fungus that was not affected by the Rpp9 resistance gene. The new race has increased the concern of the disease in southern areas, and scouting programs should be implemented in the region to monitor fields.
- **Foliar fungicides** are effective at protecting uninfected leaf tissue from southern rust; however, there currently is no treatment threshold established for this disease. Prior to the use of a fungicide the following factors should be considered:
 - » The threat or occurrence of southern rust in the area
 - » Stage of development of the crop
 - » Yield potential
 - » Type of irrigation, if applicable
 - » Environmental conditions that favor disease development

Delaro® Complete fungicide is labeled for control of southern rust and is recommended at the appearance of the disease and if favorable conditions for disease development continue, further applications can be made on a 14 day (7 to 14 day) schedule. Applying fungicides between the silking (R1) and milk (R3) stages when southern rust has been detected has been the most beneficial at protecting corn yield potential. However, if favorable conditions for the disease continue, additional applications may be needed (Table 1).²

Table 1. Possible benefits of applying fungicide to control southern rust.

Crop Stage when Southern Rust first detected	Possible Benefit from Application	Comment
Vegetative	Not likely to occur at this stage unless late planted	Scout field for disease
VT	Yes	May need second application
R1	Yes	May need second application
R2	Yes	Less likely to need second application
R3	Yes	No second application needed
R4	Maybe, under severe pressure	No second application needed
R5	Unlikely	No second application needed
R6	No	

Source: Bradley, C. et al. 2019. Southern Rust. Crop Protection Network. <https://cropprotectionnetwork.org/resources/publications/southern-rust>.

Sources

¹Bradley, C. et al. 2019. Southern Rust. Crop Protection Network. <https://cropprotectionnetwork.org/resources/publications/southern-rust>.

²Wise, K. 2010. Common and Southern Rusts. Purdue University Extension. <https://www.extension.purdue.edu/>.

Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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