

As we have spent time in many of our customers' corn fields over the past week we have begun to see the development of Southern Rust in the majority of fields that we enter. While this is not a disease we normally encounter it can be devastating to a corn crop if the conditions are right for it to spread.

What is it?

Southern Rust is the only fungal disease of corn that we encounter that does not actually overwinter in our fields. This pathogen actually develops in corn fields in the southern states and is then blown northward with prevailing weather systems, this is why we may not encounter this disease every year. The high temperatures and humidity we have had over the past week have really favored the development of this disease due to the fact that Southern Rust needs it to be 77 degrees or higher to lead to infection. This disease can be especially troubling because of how fast it can spread throughout the plant once infection occurs.

How can I tell Southern Rust from Common Rust?

Southern Rust and Common Rust can look very similar but are very different diseases, common Rust will occur at much lower temperatures than Southern and is very rarely yield robbing. A few different ways to visibly spot the difference between these diseases is that Southern Rust will only have red colored pustules on top of the corn leaf, this is in contrast to the much duller pustules that can exist in Common rust that will be located on both the top and bottom sides of the corn leaf. The picture below, that was taken by our team, shows the yellow lesions surrounding the red pustules that are key identifiers of Southern Rust.

How does it damage the plant?

As any other foliar disease in corn the main damage is done when the plant loses leaf area to the pathogen that is needed to generate photosynthate that is needed for grain fill. Lets look at it this way, when a corn plant tassels it has the maximum amount of leaf area that it will ever have and has no way to replace any that is lost. So when that plant reaches a point that it can no longer produce enough carbohydrates to fill the ear it will either stop filling it, which leads to lower test weight and less kernel fill. or cannibalize the carbohydrates that are stored in the stalk of the plant leading to poor late season standability.

What can we do about it?

Many of the fungicide products that are currently on the market are labeled good to excellent for control of Southern Rust. Economic threshold for this disease sits right around 15% of corn tissue in the field being infected but this could be less if the infection is at the ear leaf or above. Many of the fields that we have seen this disease in have already been sprayed once with a fungicide and will need to be monitored to see if a second application will be needed.



Reddish pustules on the upper leaf surface

Lesions on the underside of the leaf without pustules

Southern Rust of Corn

Pathogen Facts

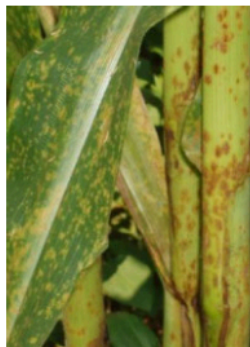
- Southern rust is a disease caused by the fungal pathogen *Puccinia polysora*.
- Southern rust does not occur as frequently in the Corn Belt as common rust (*Puccinia sorghi*), but can be more destructive when infection does take place.
- Unlike other major foliar diseases of corn in North America, the rusts do not overwinter in the Corn Belt.
 - Rusts develop first in southern corn fields, and then may spread into primary corn-growing states.
 - Movement is by windblown spores that travel northward with prevailing weather systems.
- Southern rust is favored by high temperature (over 77 °F, 25 °C) and high relative humidity, which tends to confine it to tropical and subtropical regions.
- Southern rust is generally more damaging to corn than common rust due to its ability to rapidly develop and spread under favorable conditions.
- If economic thresholds are reached, a fungicide application may be warranted.
- Yield impact depends on timing of infection, amount of leaf area damaged, and location of damaged leaves on the plant.



Puccinia polysora pustules on a corn leaf.

Damage

- Photosynthesis is reduced as functional leaf area decreases, which can reduce kernel fill and yield.
- Corn stalk quality can also be negatively affected as plants remobilize carbohydrates from the stalk to compensate for reduced photosynthesis.
- Later-planted corn is generally at higher risk for yield loss due to leaf diseases.
- If damage is confined to lower leaves or occurs after corn is well-dented, yield impact will be low.



Southern rust pustules on a corn stalk.

Life Cycle

- At the start of the growing season, urediospores from infected corn residue are spread by wind and rain on to growing corn plants (Figure 1).
- Infection of these plants produces spores that serve as secondary inoculum and can be disseminated over hundreds of miles by wind.
- In the U.S., southern rust usually appears later in the growing season and is more prevalent in the southern states.
- In seasons with higher than average temperatures, southern rust can spread further up into the Corn Belt where it can impact corn yield.
- *Puccinia polysora* is not known to have an alternate host.
- Urediospores are the sole source of inoculum for both primary and secondary infection.
- Secondary infection can occur multiple times in fields where southern rust is present.

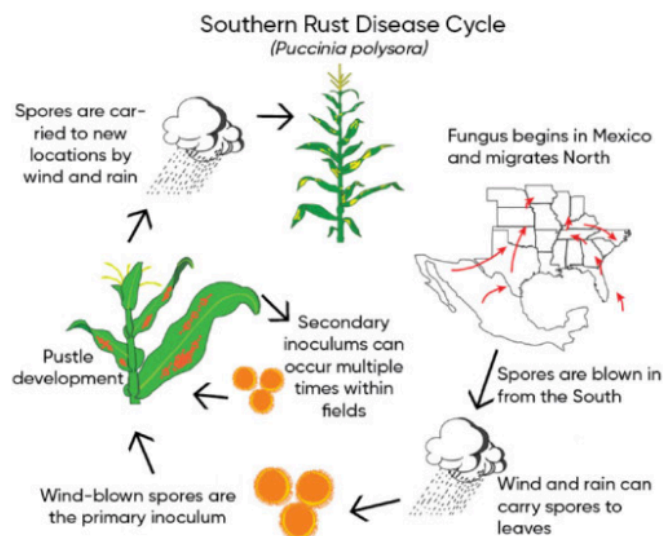


Figure 1. Life cycle of southern rust (*Puccinia polysora*).

Identification

- Both rust diseases of corn can cause substantial yield losses under severe disease pressure; however, southern rust generally poses a greater risk to corn yield than common rust, making proper identification important.
- Southern rust looks very similar to common rust, but several characteristics distinguish the two, including the shape and color of pustules and their location on the plant.

Southern vs. Common Rust



Southern Rust

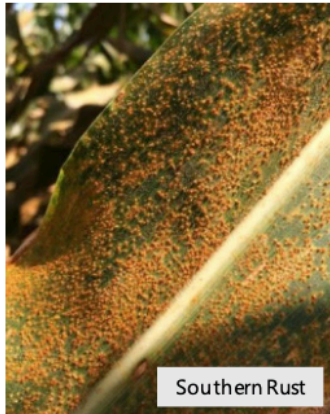
Southern Rust

Has small circular, pinhead-shaped pustules.

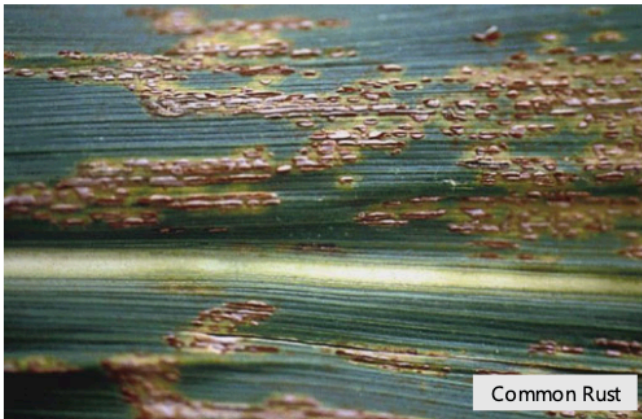
Coloration of pustules/spores is reddish orange.

Only infects the upper leaf surface, not the undersides of leaves.

Optimum temperature is warm-hot (over 77 °F, 25 °C).



Southern Rust



Common Rust

Common Rust

Has larger pustules that are more elongate and blocky.

Coloration of pustules/spores is brown to cinnamon-brown.

Infects both the upper and lower leaf surfaces.

Optimum temperature is cool-warm (60-77 °F, 15-25 °C).



Common Rust

Distribution

- In recent growing seasons, southern rust has occurred further north in the Midwestern U.S. earlier in the season than has been historically typical for this disease.
- There have been confirmed detections in several counties in Indiana, Illinois, Iowa, Nebraska, and Kansas and even some cases in South Dakota and Wisconsin (Figure 2).
- The increased prevalence of southern rust in the Corn Belt makes proper identification of this pathogen especially important.

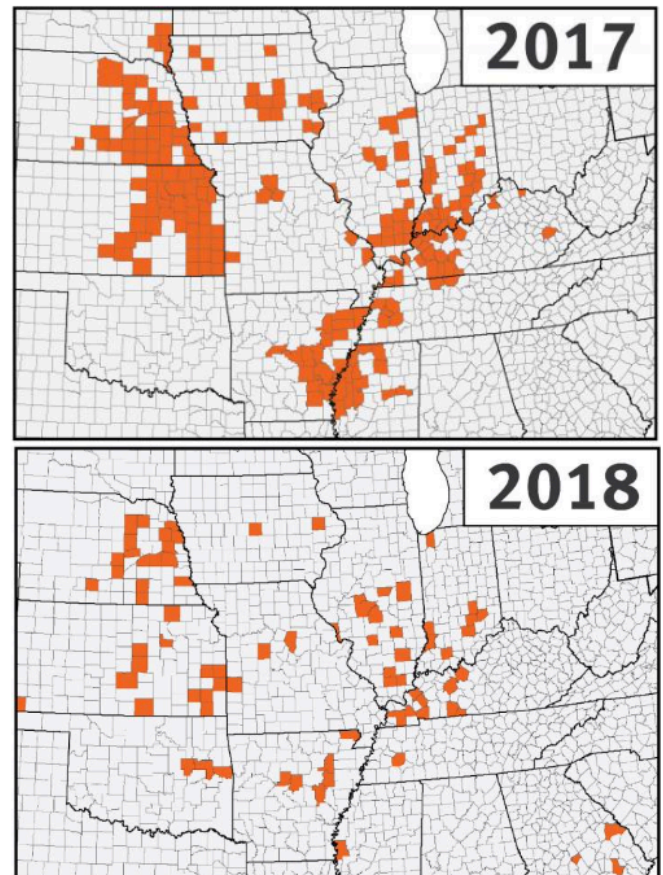


Figure 2. Confirmed detections of southern rust in corn through the first week of September during the 2017 and 2018 growing seasons. (Source: <http://www.ipipe.org>)



Southern rust symptoms visible in the upper canopy of corn in Johnston, Iowa (Sept. 11, 2017). Foliar disease was extensive but infection occurred late enough in the growing season in this instance that yield impact was likely minimal.