

May 23, 2023

## COLORADO WHEAT DISEASE NEWSLETTER

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### SUMMARY

The recent rain across much of Colorado has favored development of fungal diseases. Additionally, the first report of plants testing positive for *Wheat streak mosaic virus* and *Triticum mosaic virus* was collected from ARDEC.

**The Plant Disease Diagnostic Clinic is offering free, no-cost diagnostic testing to farmers in Colorado!**

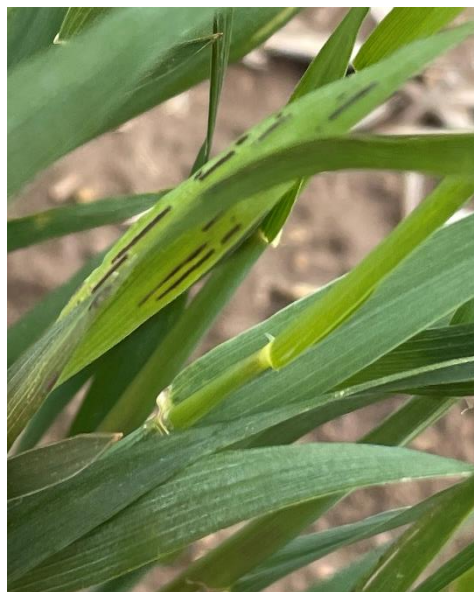
Contact the Plant Diagnostic Clinic for sample submission: <https://plantclinic.agsci.colostate.edu/> or email [plantlab@colostate.edu](mailto:plantlab@colostate.edu).

### DISEASE OBSERVATIONS

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#### Flag smut

Flag smut was reported in Lincoln County (**Figure 1**). Flag smut is caused by a fungus (*Urocystis tritici*), and infected plants have twisted leaves with long, gray-black lesions that run parallel to leaf veins. Lesions will erupt and release large numbers of powdery, black fungal spores. Tillers may become infected, causing poor head development and little to no grain. Some countries have import restrictions



**Figure 1.** Symptoms of flag smut on winter wheat found in Lincoln County.

on grain infected with flag smut. The fungus survives as spores in the soil for up to four years, and can also survive on the surfaces of seed. Infection occurs shortly after fall planting before the seedlings emerge, and the risk of infection is greatest when winter wheat is planted into warm, moist soil (~50-70°F). The fungus invades the growing plant and remains dormant in the winter, becoming active again in the spring where it grows throughout the entire plant.

**Management and Prevention:** Fungicide seed treatments are the most effective at managing flag smut, and many seed treatments are labeled and marketed for control of this disease. Crop rotations with non-hosts, such as soybean, sorghum, or corn, can help decrease spore levels in the soil. There are no fungicides that are effective against flag smut once symptoms develop.

**Wheat streak mosaic virus/Triticum mosaic virus:**



**Figure 2.** WSMV/TriMV symptomatic wheat from ARDEC.

Plants testing positive for *Wheat streak mosaic virus* and *Triticum mosaic virus* were collected from ARDEC (**Figure 2**). Importantly, viruses typically exist in a complex in Colorado, including *Wheat streak mosaic virus* (WSMV), *Triticum mosaic virus* (TriMV), and sometimes *High Plains Wheat Mosaic Virus* (HPWMOV). WSMV and TriMV are transmitted by the wheat curl mite, and typically occur together. Symptoms appear as yellow streaks and mosaic, yellow and green patterns on leaves.

**Management and prevention:** There is no treatment for virus-infected plants, and no miticides are effective against the vector (the wheat curl mite). Controlling volunteer wheat and planting WSMV- and mite-resistant varieties are the best control measures. However, there is no resistance against TriMV available, so controlling volunteer wheat between harvest and planting is critical.

**Tan spot:**

Tan spot was observed in Baca, Otero, and Adams counties (**Figure 3**). Tan spot appears as necrotic (dead, brown) diamond-shaped spots surrounded by yellow halos or borders. It is often found along with *Stagonospora* leaf blotch (**Figure 5**).



**Figure 3.** Tan Spot symptoms on wheat. Photo: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

**Management and prevention:** Typically, as the weather warms tan spot does not continue to be a problem in Colorado, so fungicide applications are not usually recommended. Fungicides are recommended for tan spot only if the flag leaf is at risk of infection. When scouting for tan spot, take note of the growth stage of wheat, the severity of the infection, and whether the flag leaf is at risk of disease, and monitor disease development closely.

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### Stagonospora leaf blotch:

Stagonospora leaf blotch was found in Adams county (**Figure 4**), and is caused by a fungus (*Parastagonospora nodorum* and/or *P. avenae* f. sp. *triticae*). Symptoms develop in the spring and display small, yellow spots on lower leaves that develop into elongated, dark leaves as the season progresses. Wet, rainy weather, high humidity, and moderate temperatures (~68-75°F) favor disease development, and recent weather has been favorable for disease development in some areas. The fungus survives in infected residue. Typically, Stagonospora does not cause significant yield losses in Colorado, and is often found alongside tan spot disease (**Figure 5**).



**Figure 4.** Stagonospora leaf blotch symptoms on wheat. *Photo:* Paul Bachi, University of Kentucky Research and Education Center, Bugwood.org

Management and prevention: As long as the weather continues to get warmer, Stagonospora activity should decrease. Because the fungus survives in wheat residue, rotating crops will help reduce the number of spores in a field the following years. Fungicide seed treatments also help protect seedlings from infection.



**Figure 5.** Wheat from the Front Range area showing both Stagonospora leaf blotch and tan spot. The disease progressed quickly after rain last week. *Photo:* Dr. Ana Cristina Fulladolsa

### Leaf rust

Leaf rust (caused by *Puccinia triticina*) was found in small amounts in Kit Carson county (**Figure 6**). While stripe rust and leaf rust are both 'rust' diseases, they are caused by two different fungal pathogens and cause different symptoms (**Figure 7**). Stripe rust spores are a brighter orange-yellow color, and symptoms appear in stripes that are limited by the leaf veins. Leaf rust spores are typically a darker orange-brown or orange-red color, and symptoms appear scattered across the leaf surface that are not in a particular pattern and are not limited by the veins. Both leaf and stripe rust require wet



conditions, but leaf rust typically progresses at warmer temperatures compared to stripe rust. Leaf rust usually shows up a little later in Colorado and is not typically a major disease problem compared to stripe rust.

***Management and Prevention:*** As the weather continues to get warmer, leaf rust should be controlled. Fungicides should only be used if the flag leaf is at risk of infection.

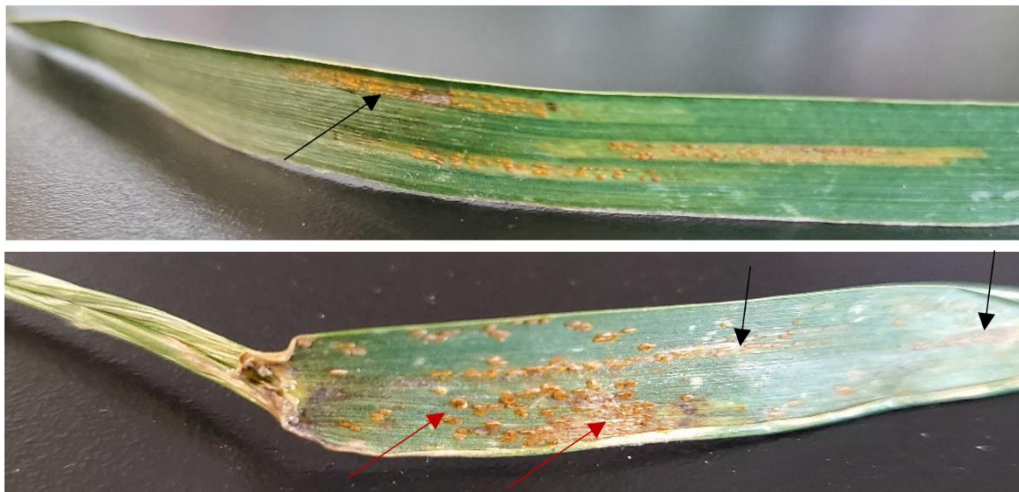
**Figure 6.** Leaf rust found in Kit Carson County.  
*Photo: Ron Meyer.*

## DISEASE WATCH AND MANAGEMENT

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### Stripe Rust

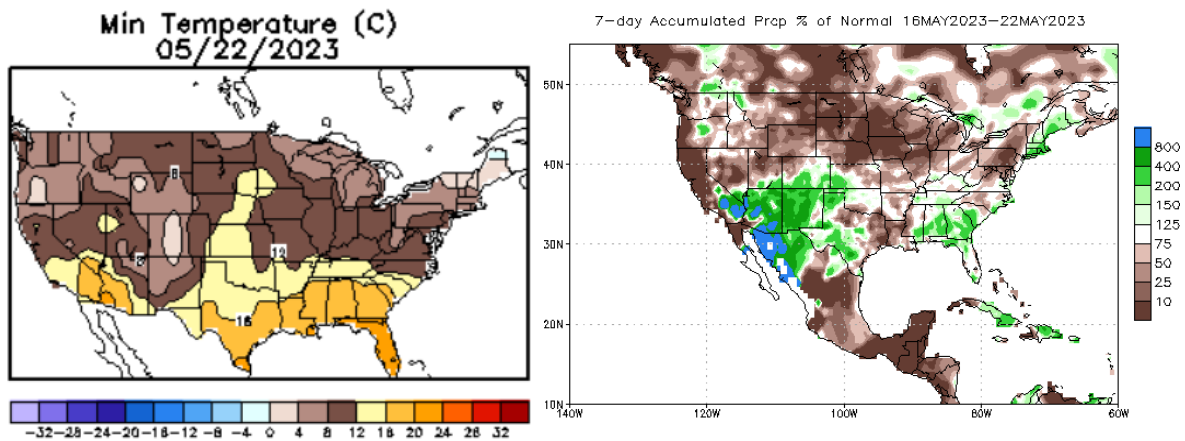
There are currently no reports of stripe rust in Colorado, but stripe rust was reported in Texas, Kansas, and Oklahoma at low incidence and severity, and the drought is suppressing the disease in these states (**Figure 7**). Stripe rust disease is dependent upon cool, wet weather, and while Colorado has been wet overall, the inoculum (spores) will be limited in Texas and Oklahoma and few spores are likely to make it to Colorado. Stripe rust should remain limited in Colorado in the near future.



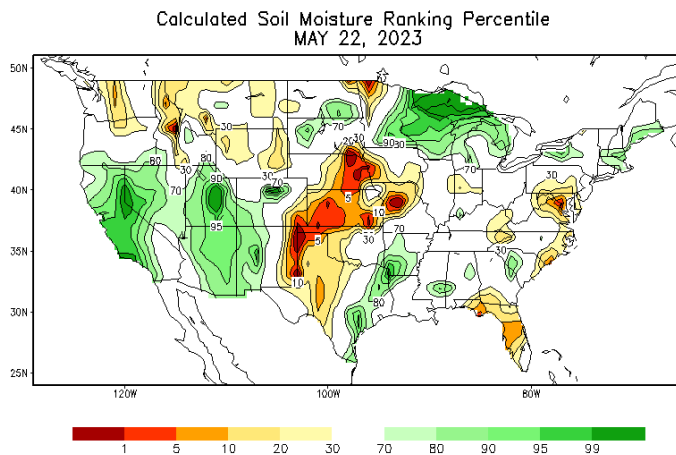
**Figure 7.** Comparison of Leaf Rust vs. Stripe Rust. Stripe rust (top and bottom, black arrows) has bright orange-yellow spores that develop parallel to the veins. Leaf rust (bottom, red arrows) makes darker orange-brown or orange-red spores that do not follow veins and are scattered around the leaf.

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Soil moisture levels are often correlated with stripe rust incidence and can be used as a predictive tool in determining if stripe rust will emerge. This time of year, we look at the temperatures and soil moisture levels in the south, particularly Texas and Oklahoma (**Figures 8 and 9**). Most of Texas and Oklahoma has been very dry since last fall, and is currently experiencing low soil moisture; however, recent weather conditions have been conducive for disease development. At this time, it seems that stripe rust spore levels will remain low, suggesting a low risk for an epidemic in Colorado. We will continue to monitor for rust and provide recommendations as we reach critical growth stages. Please help us protect our fungicides and prevent fungicide resistance by carefully timing applications, following the label, and applying only when the disease pressure is appropriate. If you think you see symptoms, please feel free to send photos.



**Figure 8. Recent weather in states reporting stripe rust is conducive to disease development, though risk for Colorado remains low.** The stripe rust pathogen requires *both* cooler temperatures and wet conditions to cause disease. States that have reported stripe rust (Texas, Kansas, and Oklahoma, at low incidence and severity) have increasingly warmer nighttime temperatures (left panel) and much less than normal moisture (right panel), which is not conducive to disease development. Nighttime temperatures in Colorado are increasing and the precipitation is low-normal, which does not support disease development. Data from the National Weather Service Climate Prediction Center, [https://www.cpc.ncep.noaa.gov/products/tanal/temp\\_analyses.php](https://www.cpc.ncep.noaa.gov/products/tanal/temp_analyses.php)



**Figure 9. Soil moisture levels as a predictive tool for stripe rust risk.** Higher soil moisture levels are typically associated with higher risk. We closely watch the southern states (Texas, Oklahoma, Kansas) for soil moisture levels and the emergence of stripe rust as one tool to predict risk in Colorado. Low soil moisture levels support less stripe rust disease development. Data from the National Weather Service Climate Prediction Center, <https://www.cpc.ncep.noaa.gov/soilmst/w.shtml>.

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***Growers are strongly encouraged to regularly scout wheat fields for diseases.***

The **Colorado Wheat Entomology Newsletter**, written by Dr. Punya Nachappa, covers insect/mite pests and management tips. The newsletters are published bi-weekly during the growing season and are available here: <https://coloradowheat.org/category/news-events/wheat-pest-and-disease-update/>

Do you have a disease that you would like diagnosed? Contact the **Plant Diagnostic Clinic** for sample submission: <https://plantclinic.agsci.colostate.edu/> or [plantlab@colostate.edu](mailto:plantlab@colostate.edu). **Diagnostics are conducted at no cost to farmers!**

#### ***Additional resources***

1. The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) Fungicide Efficacy for Control of Wheat Diseases Table: <https://crop-protection-network.s3.amazonaws.com/publications/fungicide-efficacy-for-control-of-wheat-diseases-filename-2021-04-21-154024.pdf>
2. Wheat variety database with stripe rust and virus resistance ratings from field trials: <https://wheat.agsci.colostate.edu/database/>

#### **CONTRIBUTORS**

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