COLORADO WHEAT DISEASE NEWSLETTER

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COLORADO WHEAT FIELD DAYS SUMMARY

It was great meeting many of you at the Colorado Wheat Field Days this past week! Visiting the ten field trial sites across Colorado gave me insights into the pest issues across the state, and allowed me to see how pest challenges vary across sites. I am very lucky to be part of a great Colorado Wheat team aimed at supporting the wheat farmers of Colorado. I am looking forward to continuing my work with our ‘wheat improvement’ team, including Dr. Esten Mason and the CSU plant breeding team, Dr. Punya Nachappa and the CSU entomology team, the Colorado Wheat Administrative Committee, and the Colorado Wheat Research Foundation.

Many thanks to all who organized the event, supplied food and drinks, donated funds to cover costs, hosted the trials, contributed to the ‘Making Better Decisions’ field days publication, and all farmers who attended and asked great questions. A full list of contributors is available in ‘Making Better Decisions.’ If you were unable to attend in person or would like a digital copy of ‘Making Better Decisions,’ please visit the link below. In addition to the 2020 trial information, variety performance results, and a variety selection decision tree, I authored an article covering ‘FAQs about Stripe Rust.’ There is a wealth of expertise in the publication covering the trials, varieties, weeds, insects, and diseases, so I encourage you to look through the book when you have time.

‘Making Better Decisions’ 2021 Wheat Field Days Publication:  
https://webdoc.agsci.colostate.edu/csucrops/reports/winterwheat/wheatreport_2021_WFD.pdf

Most of the disease observations reported in this newsletter were made during the field days (Figures 1 and 2). Many thanks to the extension agents, crop consultants, farmers, and CSU experts who brought us samples or pointed out on-farm disease problems over the week.

Figure 1. Colorado Wheat Field Day at Roggen. Photo: Madison Anderson.

Figure 2. Entomologists Dr. Punya Nachappa (right) and Erika Peirce (left), and pathologist Dr. Robyn Roberts (center) collecting samples and making observations at the 2021 field days. Photo: Erika Peirce.
**DISEASE OBSERVATIONS**

**Stripe Rust** was found across Eastern Colorado (**Figure 3 and Figure 4**). In most cases incidence and severity was low, but moderate severity was observed in Lincoln county. Stripe rust in Lincoln county is being well-managed, with no symptoms observed on flag leaves at the time of the disease observation.

**Should you apply fungicide?** In most cases, it is too late to apply fungicides due to pre-harvest interval (PHI) limitations. PHI is the minimum amount of time that must pass between the last pesticide application and harvest, which is set by the EPA to limit pesticide residues in food and feed. Typically, PHIs for wheat pesticides range between 30-45 days and the PHI for each pesticide product is listed on the product label. If PHI is not followed, there may be too much pesticide residue on grain, and pesticide residues above legal limits can prevent crop sale or export.

If you had stripe rust challenges this year, consider choosing varieties that carry resistance against stripe rust for the 2021-2022 season (see the variety table and/or the decision tree in the ‘Making Better Decisions’ Field Days publication, link on first page). While no genetic resistance is a ‘silver bullet,’ it can greatly reduce the need to spray fungicides in future years and will help keep stripe rust pressure low. Genetic resistance can also help slow down stripe rust infections and protect the flag leaf longer to allow more time for grain fill. The grain fill period lasts for about 20 days after flowering, with the greatest grain fill occurring up to about 16 days post flowering. Protecting the flag leaf up to about 16 days post flowering will greatly help grain fill. Because stripe rust pressure can quickly increase on susceptible plants under conducive weather conditions, genetic resistance is an important tool to help control the disease and protect the flag leaf.

**Leaf rust** was found at very low levels in several Eastern counties, often coinciding with stripe rust. While stripe rust and leaf rust are both ‘rust’ diseases, they are caused by two different fungal pathogens and cause different symptoms (**Figure 4**). 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.

![Image of leaf rust and stripe rust](image)

**Figure 4. Comparison of stripe rust versus leaf rust.** Stripe rust (top and bottom, black arrows) has bright orange-yellow spores that develop parallel to 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. Many rust samples found across the Eastern counties during the Wheat Field Days had both leaf rust and stripe rust symptoms, similar to the bottom photo.

*Cephalosporium stripe* disease (caused by the fungus *Cephalosporium gramineum*) was observed in Morgan, Weld, Sedgwick, and Phillips counties (Figure 4). In Morgan county, one field was highly affected with symptoms on flag leaves in a large portion of the field. *Cephalosporium stripe* is a fungal wilt disease that usually develops when there is high residue on the soil and limited or short crop rotations have been implemented. The fungus survives in residue over the winter and infects crops in the spring when the weather is cool and wet. Susceptibility also appears to be somewhat variety specific. This disease has not been particularly problematic in Colorado in the past, but because we have experienced unusually extended cool, wet weather we are seeing more incidences of *Cephalosporium stripe* this year with greater severity than in previous years.

*What should you do if you see *Cephalosporium stripe* in your fields?* Unfortunately, there are no fungicides available to control the disease so applying fungicides will not help. Document the incidence and take note of whether there is a lot of residue build-up in your field, and if the crop was recently rotated away from wheat.

![Image of Cephalosporium stripe symptoms](image)

**Figure 4. Cephalosporium stripe symptoms on wheat.** Note yellow stripes that run parallel to veins and move out into the surrounding green leaf tissue. Symptoms were observed on flag leaves. *Photo: Dr. Wilma Trujillo*
June 21, 2021

**Tan spot** was observed in several counties, and in some cases on the flag leaves (Figure 5). Tan spot appears as necrotic (dead, brown) spots inside diamond-shaped yellow halos or borders. The extended cool, wet weather was favorable for tan spot disease development this year. Higher incidence of tan spot was typically observed in fields with high levels of wheat residue on the soil surface.

![Figure 5. Tan spot symptoms on wheat. Note the diamond-shaped, yellow lesions with a dark tan spot in the center. Black arrows indicate tan spot symptoms.](image)

**What should you do if you see Tan Spot in your fields?** In most cases, it is too late to apply fungicides to protect Colorado wheat because of pre-harvest interval (PHI) limitations. Outside PHI limits, fungicides are recommended for tan spot only if the flag leaf is at risk of infection.

**Wheat streak mosaic virus** (WSMV), **Triticum mosaic virus** (TriMV), and **High plains wheat mosaic virus** (HPWMoV) have been detected in samples from several counties. Symptoms appear as yellow streaks and/or mosaic, yellow and green patterns or spots on leaves (Figure 6). TriMV has been detected at very high levels in a majority of symptomatic samples we have tested this year, with WSMV and HPWMoV detected at low levels and not in all samples. This could suggest that the viral population may be shifting towards more TriMV pressure since WSMV resistance has been implemented well in Colorado. We plan to monitor TriMV levels in the coming years and investigate why TriMV was a bigger problem this year.

![Figure 6. Virus symptoms on wheat. Left, TriMV. Center and right, WSMV.](image)

**What should you do if you see virus symptoms in your fields?** 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 varieties like Guardian, which carry resistance for both WSMV and the wheat curl mite vector, are the best control measures. If you think you see virus symptoms in a WSMV resistant variety, please send me photos.

**Barley yellow dwarf virus** (BYDV) and/or **Cereal yellow dwarf virus** (CYDV) symptoms were observed in Lincoln county. BYDV and CYDV are closely related viruses with similar symptoms that include plant stunting and yellowing of the leaves (Figure 7). Unlike the other common wheat viruses, BYDV and CYDV do not display any mosaic or streaking patterns. BYDV and CYDV are both transmitted by aphids. My lab is working closely with the Plant Diagnostic Clinic to determine which virus may be causing the symptoms.
What should you do if you see BYDV/CYDV in your fields? In most cases, it is too late to apply pesticides to protect Colorado wheat from the aphid vector because of pre-harvest interval (PHI) limitations. Outside PHI limits, pesticides are recommended only if you observe a high incidence of aphids in your fields that is above the economic threshold.

**Figure 7A.** Plant stunting, likely caused by BYDV or CYDV.

**Figure 7B.** Leaf yellowing, likely caused by BYDV or CYDV.

**Figure 8.** Bacterial leaf streak symptoms on wheat. Leaves were injected with the pathogen in the laboratory. Upper photo shows water-soaked appearance, and lower photo shows yellowing. Both may be signs of the disease. Photo: Diego Gutierrez.

**Bacterial leaf streak** (BLS) has been detected in samples from Weld county, and symptoms typical of BLS were observed in Phillips, Sedgewick, Morgan, and Kit Carson counties (formal diagnosis results are pending). BLS is caused by the bacterial pathogen *Xanthomonas translucens*, which causes water-soaked brown or yellow elongated lesions or spots that often follow leaf veins (Figure 8). BLS requires hot, wet conditions for disease development, and the sites that had BLS symptoms had higher soil moisture levels and recent hot weather conditions. While BLS typically does not severely impact yield in Colorado because it appears later in the season, BLS can be seed transmitted.

What should you do if you see BLS in your fields? Unfortunately, there is no pesticide available to control BLS and no disease resistance. BLS is an emerging disease in the U.S., and my lab is currently studying the isolates collected in Colorado in 2018 and will compare these strains to isolates we found this year. BLS can be transmitted through rain splash or irrigation water, and hail or wind damage can cause more severe BLS symptoms. If you observe BLS, please contact me.
Fusarium head blight (head scab) (FHB) symptoms were observed in Phillips county (Figure 9). FHB is caused by the fungus *Fusarium graminearum*, which infects individual rachis and spikelets. Symptoms of FHB include individual bleached spikelets on green heads, and pinkish-orange fungal spores may be visible on infected spikelets. The pathogen also produces a mycotoxin called deoxynivalenol (DON), which is a toxic chemical to people and livestock. Elevated levels of mycotoxin can accumulate even under minor disease conditions, and high numbers of damaged, wrinkled, or ‘tombstone’ grains can indicate high levels of mycotoxin. The pathogen requires wet conditions, so FHB is more common in irrigated fields or after significant, prolonged rainfall. The fungus prefers warm temperatures (~75-85°F), but under prolonged wet conditions the fungus can infect at cooler temperatures. The spores produced from the initial infection can produce additional spores that infect other heads. Significant disease problems can therefore occur if wheat stands are uneven with late flowering tillers.

What should you do if you see FHB in your fields? Infected corn residue can be a significant source of inoculum, so planting wheat into corn residue that was infected with the pathogen can greatly increase the likelihood of infection, especially in irrigated fields. Managing corn residue and applying a fungicide that is labeled for FHB at early wheat flowering are the best control methods, in addition to genetic resistance. Note that the mycotoxin can continue to be produced by the fungus until the grain moisture levels fall below 13%, so mycotoxin can build up to very high levels when wheat is harvested late. Consider testing for the presence of mycotoxins in infected grain if you observe symptoms.
DISEASE MANAGEMENT

The Colorado Wheat Entomology Newsletter, written by Dr. Punya Nachappa and Darren Cockrell, 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.

Additional resources

2. Wheat variety database with stripe rust resistance ratings from field trials: https://wheat.agsci.colostate.edu/database/

CONTRIBUTORS

Many thanks to all who contributed to this report: Dr. Wilma Trujillo, Ron Meyer, Todd Ballard, Dr. Esten Mason, Roger Tyler, Brad Erker, Amy Lentz, and Dr. Ana Cristina Fulladolsa Palma and her team at the Plant Diagnostic Clinic.