

Extension Agronomy

eUpdate

04/24/2015

These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Steve Watson, 785-532-7105 swatson@ksu.edu, Jim Shroyer, Crop Production Specialist 785-532-0397 jshroyer@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Update on stripe rust and leaf rust in wheat

This week's finding of stripe rust in southeast Kansas has stimulated a lot of questions and scouting activity in wheat. Here are some of the most common questions and thoughts to consider while evaluating the stripe rust situation.

What is the distribution and severity of the disease in Kansas?

K-State specialists have found stripe rust at low levels in many fields in southeastern and central Kansas. There have also been also a few reports north I-70 in a few counties. Leaf rust in trace amounts was also present in many of the same locations.



Disease obsevation map based on reports from: E. De Wolf, D. Shoup, S. Duncan

D. Hallauer, J. James, J. Coltrain, K. Larson, C. Otte, Z. Simon, M. Ploger

Distribution of Wheat Stripe Rust April 20-14, 2015

Disease Risk

Stripe rust not observed

Stripe rust observed on lower leaves

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Figure 1. Comparison of stripe rust (yellow stripe on leaf in foreground) and leaf rust. Photo by Stu Duncan, K-State Research and Extension.

What is the disease level at these locations?

Stripe rust was present at only low levels in most fields we checked this week, with less than one percent of the plants infected. The disease was most common in the lower- to mid-canopy; however, a few fields in the southeast and south central region had infections in upper canopy.

Are fungicides needed to manage of stripe rust at this point?

No, at this point, the low levels of disease present in most fields do not warrant a fungicide application. It is important to scout these fields frequently because stripe rust can increase rapidly. If the disease moves to upper leaves (flag leaves) by the heading stages of growth, fungicide may be needed to prevent disease-related yield loss. Some fields may already be at the threshold for application.

At what growth stage would a fungicide be most beneficial?

The most effective fungicide applications are made between flag leaf emergence and the flowering stages of growth. The boot and heading stages of growth are optimal. Be sure and follow the label

directions on the fungicide product. Some fungicides are off label for application when wheat reaches the flowering stages of growth. Other products labeling allow applications during flowering but have a pre-harvest interval of 30 days. For more information about fungicide options on wheat consider reviewing K-State Research and Extension publication EP-130, *Foliar Fungicide Efficacy for Wheat Disease Management*, at: http://www.ksre.ksu.edu/bookstore/pubs/EP130.pdf/

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2. Management of soybean diseases in Kansas

(Editor's Note: The following is from the K-State Research and Extension publication *Kansas Soybean Management 2015*, MF-3154, available online at: <u>http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf</u>)

Numerous soybean diseases attack soybeans throughout the growing season. Long-term estimates predict a 12.5 percent increase in soybean yields in Kansas if diseases could be eliminated. Approximately 25 diseases might occur in any given year, a much smaller number are responsible for the bulk of disease losses.

Early in the season, seed rots and seedling blights reduce yields an average of 2.5 bushels per acre. The responsible pathogens primarily include Pythium, Rhizoctonia, and Fusarium, although occasionally others can be involved. Seed treatment is an effective means of dealing with seedling blights. Numerous products are available that provide good to excellent control of these earlyseason problems. Use products containing two or more active ingredients to broaden the spectrum of control.

General recommendations for seed treatment are that all fields planted before May 15 should be treated with a fungicide. Use seed treatment in no-till fields at least through May 31. With the expense of high-tech seeds, many growers are now using seed treatment as insurance even on double-cropped soybeans.

Two other important diseases, soybean cyst nematode and soybean sudden death syndrome are best managed at planting. That is because resistant varieties are the best way to manage both diseases. Research has shown that soybean cyst nematode is a predisposition agent to sudden death syndrome, that is, you rarely see a field infected with sudden death syndrome that does not already have soybean cyst nematode in it.

A recent two-year survey indicated that approximately 20 percent of Kansas soybean fields are infested with soybean cyst nematode. In two counties, Cherokee and Doniphan, that number is near 100 percent. Unfortunately, fewer than 10 percent of growers indicate they soil test for soybean cyst nematode. While nearly all soybean varieties have some level of soybean cyst nematode resistance, their effectiveness in the field can be highly variable. Growers should continuously monitor nematode levels in known infested fields to make sure appropriate varieties are being grown. It is recommended that all fields be tested after every third soybean crop to confirm the nematode has not become established, or that it is being properly managed.

Recently, seed treatments have become available for soybean cyst nematode control and a new, soon to-be-registered product shows promising control of sudden death syndrome. The cost effectiveness of this product is currently being evaluated.

The most significant soybean disease in Kansas is charcoal rot. While this pathogen infects soybean roots early in the season, it does not make itself known until the reproductive stages of growth when hot, dry weather occurs. Under heat and drought stress, the fungus becomes active and slowly kills the plant. Plants that die prematurely typically have smaller seeds and reduced yields. While all soybean varieties are susceptible, some are more susceptible than others.

Careful observation of varietal differences can be useful in management. Also, shorter MG varieties tend to express disease symptoms more than late MG varieties. Irrigation and any type of moisturesaving cultural practices can reduce disease losses. The most effective management strategy is to reduce seeding rates to approximately 100,000 seeds per acre. At this rate, there are fewer plants competing for moisture in a dry year. In wet years, plants still have the ability to branch and compensate for fewer plants per acre.

In 2014, Kansas suffered its most severe outbreak of Phytophthora root rot in many years due to soaking rains for much of early June. Resistant and field tolerant varieties are the best means of management.

There are several foliar and late-season stem and pod diseases that reduce soybean yields. These include frogeye leafspot, brown spot, pod and stem blight, anthracnose, and Cercospora leaf blight/purple seed stain. Fungicides can be profitable in certain instances, most notably for frogeye leafspot control. Pod and stem diseases are tricky to manage because at the time fungicides need to be applied, it is not apparent as to whether or not the diseases are likely to appear. Pod and stem diseases are favored by late-season rains.

When a fungicide is necessary, it should be applied at the R3 to R5 growth stage for maximum effectiveness. Growers should be cautious about overuse of strobilurin fungicides. Strobilurin-resistant frogeye leafspot has already been reported in 11 states; fortunately, Kansas is not yet one of them.

Soybean rust has only occurred once in Kansas, in 2007, since its introduction into the United States in 2004. Each year, its spread is tracked through a national reporting network. Should it threaten Kansas in the future, numerous outlets will update growers as to the need for fungicide usage.

All other diseases, including bacterial blight, downy mildew, aerial blight, Sclerotinia white mold, stem canker, bean pod mottle virus, bud blight, and soybean vein necrosis virus occur either too infrequently to warrant control, or there are no effective control measures.

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From *Kansas Soybean Management 2015*, MF-3154, available online at: <u>http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf</u>

3. Recommendations for plant analysis of wheat

Wheat producers may want to start planning soon for taking tissue samples of wheat for plant analysis. Sampling can be done at the tillering-jointing stage, or later in the season near boot to heading. The later-season sampling, once the flag leaf has emerged until flowering, is commonly used for routine monitoring or quality control. The process is fairly simple, but care needs to be taken to ensure the correct plant parts are taken and that they are handled properly to ensure the best information is obtained.

There are two primary ways plant analysis can be used: as a routine monitoring tool to ensure nutrient levels are adequate, and as a diagnostic tool to help explain some of the variability in wheat growth we see in fields this time of year. Keep in mind, however, that any plant stress (drought, heat, frost, etc.) can have a serious impact on nutrient uptake and plant tissue nutrient concentrations. Sampling under stress conditions for monitoring purposes can give misleading results, and is not advisable.

Sampling for routine monitoring

For monitoring purposes, early in the season, 40-50 whole plants, without roots, should be collected at random from the field. The plants should be allowed to wilt overnight to remove excess moisture, placed in a paper bag or mailing envelope, and shipped to a lab for analysis. Do not place the plants in a plastic bag or other tightly sealed container, as they will begin to rot and decompose during transport, and the sample won't be usable.

Later in the season as the stem elongates and new leaves emerge, the top fully developed leaves with a leaf collar visible should be collected. Ideally, samples for routine monitoring would be the flag leaves during the heading to flowering stages. Again, 40 to 50 fully developed leaves would be collected, allowed to wilt to remove excess moisture, placed in a paper bag or envelope, and shipped to the lab.

The data returned from the lab will be reported as the concentration of nutrient elements, or potentially toxic elements in the plants tissue collected. Most labs/agronomists compare plant nutrient concentrations to published sufficiency ranges. A sufficiency range is simply the range of concentrations normally found in healthy, productive plants during surveys. It can be thought of as the range of values optimum for plant growth. The medical profession uses a similar range of normal values to evaluate blood work.

The sufficiency ranges change with plant age (generally being higher in young plants), vary between plant parts, and can differ between varieties. So a value slightly below the sufficiency range does not always mean the plant is deficient in that nutrient, but it is just an indication that the nutrient is relatively low. In many cases, very high yielding wheat that is growing efficiently will have nutrient concentrations at the low end of the sufficiency range. However, if a nutrient is significantly below the sufficiency range, then one should ask some serious questions about the availability and supply of that nutrient.

Levels above sufficiency can also indicate problems. High values might indicate over fertilization and luxury consumption. Plants will also sometimes try to compensate for a shortage of one nutrient by

loading up on another. This occurs at times with nutrients such as iron, zinc, and manganese. In some situations very high levels of a required nutrient can lead to toxicity. Manganese is an example of an essential nutrient which can be toxic when present in excess.

Plant analysis as a diagnostic tool

Plant analysis is also an excellent diagnostic tool to help understand some of the variation seen in the field. When using plant analysis to diagnose field problems, try to take comparison samples from both good/normal areas of the field, and problem spots. Collect soil samples from the same good and bad areas also. Don't wait for the boot stage to take diagnostic samples. Early in the season (prior to stem elongation) collect whole plants from 20-30 different places in your sampling area. Later in the season take the upper most, fully developed leaves (those with leaf collars visible). Handle the samples the same as those for monitoring.

Sufficiency ranges

The following table gives broad sufficiency ranges for wheat early in the season, prior to jointing (Feekes 4-6), and later in the season, at boot to early heading (Feekes 9-10). Keep in mind that these are the ranges normally found in healthy, productive wheat.

		Growth stage		
Nutrient	Unit	Whole plant at tillering-	Flag leaf at boot to	
		jointing	heading	
Nitrogen	%	3.5-4.5	3.5-4.5	
Phosphorus	%	0.3-0.5	0.3-0.5	
Potassium	%	2.5-4.0	2.0-3.0	
Calcium	%	0.2-0.5	0.3-0.5	
Magnesium	%	0.15-0.5	0.2-0.6	
Sulfur	%	0.19-0.55	0.15-0.55	

		Growth stage	Growth stage		
Nutrient	Unit	Tillering-jointing	Boot		
Iron	ppm	30-200	30-200		
Manganese	ppm	20-150	20-150		
Zinc	ppm	15-70	15-70		
Copper	ppm	5-25	5-25		
Boron	ppm	1.5-4.0	1.5-4.0		
Aluminum	ppm	<200	<200		

In summary, plant analysis is a good tool to monitor the effectiveness of your fertilizer and lime program, and a very effective diagnostic tool. Consider adding this to your toolbox.

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4. Early summer weather outlook for Kansas

The precipitation and temperature outlooks for early summer period were released on April 24 by the National Oceanic and Atmospheric Administration. Unfortunately, for Kansas these outlooks are neutral, and provide little guidance. Projections for both temperature and precipitation are that it is equally likely to be above or below the normal. The precipitation outlook shows Kansas between areas of drier than normal conditions to the northeast and wetter than normal conditions to the southwest. A wet pattern in the Southern Plains and the desert southwest makes it less likely that we will have drier-than-normal conditions in Kansas. For Kansas, the average precipitation for this 3-month period ranges from 14-16 inches in eastern Kansas to as little as 7 inches in western Kansas. The outlook doesn't indicate the distribution pattern that might develop.





The temperature outlook calls for warmer-than-normal conditions to continue to dominate the country west of the Rockies. Temperatures are expected to be cooler than normal in west Texas and into the Oklahoma Panhandle. During the summer season, it is difficult to have cooler-than-normal temperatures without having at least normal rainfall. This cooler-than-average pattern doesn't push as far north as Kansas, where temperatures are equally likely to be above or below average. The average temperatures for the period range from over 80 degrees F in the South Central Division to around 70 degrees F in extreme northwest Kansas.





An El Niño has been declared. However, it is very weak and it is uncertain how much impact it will have. An El Niño generally favors wetter-than-normal conditions in the Central Plains. The ridging pattern along the western Rockies is also expected to continue. This has resulted in a split pattern, with the Central Plains as the dividing line. Warmer-than-normal conditions are to the west, while cooler-than-normal conditions are in place to the east.

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5. Comparative Vegetation Condition Report: April 7 - 20

K-State's Ecology and Agriculture Spatial Analysis Laboratory (EASAL) produces weekly Vegetation Condition Report maps. These maps can be a valuable tool for making crop selection and marketing decisions.

Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:

http://www.youtube.com/watch?v=CRP3Y5NIggw http://www.youtube.com/watch?v=tUdOK94efxc

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 26-year average. The report is used by individual farmers and ranchers, the commodities market, and political leaders for assessing factors such as production potential and drought impact across their state.

NOTE TO READERS: The maps below represent a subset of the maps available from the EASAL group. If you'd like digital copies of the entire map series please contact Nan An at nanan@ksu.edu and we can place you on our email list to receive the entire dataset each week as they are produced. The maps are normally first available on Wednesday of each week, unless there is a delay in the posting of the data by EROS Data Center where we obtain the raw data used to make the maps. These maps are provided for free as a service of the Department of Agronomy and K-State Research and Extension.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, the Corn Belt, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

Kansas Vegetation Condition

Period 16: 04/07/2015 - 04/20/2015



Figure 1. The Vegetation Condition Report for Kansas for April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that spring plant development continues to increase along the Missouri border in eastern Kansas. The greatest level of photosynthetic activity is concentrated in the Southeastern Division, particularly in the area from Neosho to Cherokee counties.

Kansas Vegetation Condition Comparison



Mid-April 2015 compared to the Mid-April 2014

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the eastern border counties have much greater photosynthetic activity than last year. This is also true in southwest Kansas and in parts of central Kansas. The Northwest and North Central Divisions have much lower photosynthetic activity. These areas had lower winter precipitation. There is also lower photosynthetic activity in Sumner and Harper counties. Much of this decrease is due to the damage from the April 4th freeze.

Kansas Vegetation Condition Comparison



Mid-April 2015 compared to the 26-Year Average for Mid-April

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that there is a large area of below-normal biomass production across the Northern Divisions and through the Central and South Central Divisions. The combination of dry conditions, winterkill, and a late spring freeze have reduced photosynthetic activity in these areas. U.S. Corn Belt Vegetation Condition Period 16: 04/07/2015 - 04/20/2015



Figure 4. The Vegetation Condition Report for the Corn Belt for April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that there are areas of increased biomass production in southwestern Missouri and central Kentucky, as well as in northern Minnesota and northern Wisconsin. The increased production in the southern portions of the region are due to favorable moisture and temperatures. The increase in production in the north is due to decreased snow pack, with more vegetation exposed. There is an area of decreased production in southern Illinois and western Kentucky. This is due to persistent cloud cover which has masked the photosynthetic activity.



U.S. Corn Belt Vegetation Condition Comparison Mid-April 2015 Compared to Mid-April 2014

Figure 5. The comparison to last year in the Corn Belt for the period April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that there are two areas with large departures. The northern Great Lakes region has much higher photosynthetic activity. This is due to lower snow cover than last year. The low NDVI values in southern Illinois and western Kentucky are due to the persistent cloud cover in these areas.



U.S. Corn Belt Vegetation Condition Comparison Mid-April 2015 Compared to the 26-Year Average for Mid-April

Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows an area of below-average photosynthetic activity in southern Illinois and western Kentucky. Persistent cloud cover has masked photosynthetic activity in the region. In contrast, the below-average photosynthetic activity in northern and central Kansas is due to impacts from the increasing drought and severe winterkill, particularly in winter wheat.



Continental U.S. Vegetation Condition Period 16: 04/07/2015 - 04/20/2015

Figure 7. The Vegetation Condition Report for the U.S. for April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that a high level of photosynthetic activity persists in the Pacific Northwest. There is low photosynthetic activity east of California, and along the Northern Plains. From southern Illinois into western Kentucky and Tennessee right through the central Mississippi Valley, abundant moisture has created flooding problems and reduced plant development.



Continental U.S. Vegetation Condition Comparison Mid-April 2015 Compared to Mid-April 2014

Figure 8. The U.S. comparison to last year at this time for the period April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that there is increased photosynthetic activity in the north and in the Southern Plains, with decreased activity in the southeast. For the northern areas, lower snow cover continues to leave more vegetation than usual exposed, resulting in higher NDVI values. In the Southern Plains, favorable moisture has resulted in increased photosynthetic activity. On the other hand, persistent cloud cover in the southeast has masked photosynthetic activity in this area.



Continental U.S. Vegetation Condition Comparison Mid-April 2015 Compared to 26-year Average for Mid-April

Figure 9. The U.S. comparison to the 26-year average for the period April 7 – 20 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows a large area in the southeast with below-average biomass production. This is due primarily to persistent precipitation in the region. The below-average production in Kansas is due to a combination of dry conditions and cold temperature injury. In the Pacific Northwest, the above-average photosynthetic activity continues. This highlights the low snow cover in these areas and increases concerns for water supply as summer approaches.

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