Issue 812

K-STATE
Research and Extension

Extension Agronomy

eUpdate

07/31/2020

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate 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 Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Department of Agronomy to welcome new department head in January 2021

Dr. Raj Khosla has been selected to lead Kansas State University's department of agronomy beginning in January 2021.

Dr. Raj Khosla

For the past 21 years, Khosla has been on the faculty in the Department of Soil & Crop Sciences at Colorado State University, where he leads a thriving, globally recognized research, teaching and extension program in precision agriculture.

He has co-authored more than 100 refereed journal articles, book chapters, extension publications, proceedings and other publications.

"Dr. Raj Khosla comes to us with a tremendous reputation as a research scientist, accomplished teacher and rising administrative leader," said Ernie Minton, dean of the College of Agriculture and director of K-State Research and Extension. "Raj is an excellent choice as the next administrative leader for the Department of Agronomy and an ideal fit to inspire and focus the department toward strategic areas of unique global impact."

The Department of Agronomy is among the leading departments in the College of Agriculture and at the university level in total research expenditures and extramural awards annually. Research, teaching, and extension programs in the department link directly to key crops of economic importance to Kansas.

Khosla holds a Ph.D. and master's degree in soil fertility & crop management and soil physics, respectively, from Virginia Polytechnic Institute and State University (Virginia Tech). He obtained his bachelor's degree in agricultural sciences from the University of Allahabad.

He is a fellow of the American Society of Agronomy, Soil Science Society of America, Soil and Water Conservation Society, and an Honorary Life Fellow of the International Society of Precision Agriculture. In 2011, Khosla was appointed to membership for NASA's Presidential Advisory Board on Positioning, Navigation and Timing to work on space-based GPS policy for the United States. He was named the Jefferson Science Fellow by the National Academy of Sciences in 2012 and was appointed as the Senior Science Advisor to the U.S. Department of State. In 2015, he was recognized as the Precision Ag Educator of the Year, a national honor bestowed by the agricultural industry.

"I'm thrilled and honored to be joining the Department of Agronomy as head," Khosla said. "I am looking forward to learning, leading, and working with world-class faculty, staff, students and stakeholders as we move the department forward in key areas of global strength."

Dr. Michel "Mickey" Ransom has been successfully leading the department as interim head since the summer of 2018. The college has removed the interim title and appointed him head of the department until the transition to Dr. Khosla in January 2021.

2. Plant analysis for testing nutrient levels in soybeans

When crop fields appear variable, one question commonly asked is whether this is due to a nutrient problem. An excellent tool that can be used to answer this question is plant analysis or tissue testing.

For corn, soybean, wheat, and other crops, there are two primary ways plant analysis can be used: as a *routine monitoring tool* to ensure nutrient levels are adequate in the plant in normal or good looking crops, and as a *diagnostic tool* to help explain some of the variability and problems we see in soybean growth and appearance in fields.

Plant analysis as a routine monitoring tool

For monitoring nutrient levels purposes, collect 20-30 sets of the upper, fully developed trifoliate leaves, less the petiole, at random from the field anytime between flowering and initial pod set (growth stages R1-4). The top fully developed leaves are generally the dark green leaves visible at the top of the canopy, which are attached at the second or third node down from the top of the stem.

Sampling later, once seed development begins, will give lower nutrient contents since the soybean plant begins to translocate nutrients from the leaves to the developing seed very quickly. Sampling leaf tissue under severe stress conditions for monitoring purposes can also give misleading results and is not recommended.

The sampled leaves 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. Producers should not place the leaves 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.

Which nutrients should you request analysis?

In Kansas, nitrogen (N), phosphorus (P), potassium (K), sulfur (S), zinc (Zn) and iron (Fe) are the nutrients most likely to be deficient in soybeans. Normally the best values are the "bundles" or "packages" of tests offered through many of the labs. The packages can be as simple as N, P and K, or can consist of all the mineral elements considered essential to plants.

The data returned from the lab will be reported as the concentration of nutrient elements, or potentially toxic elements in the plants. Units reported will normally be in terms of "percent" for the primary and secondary nutrients (N, P, K, Ca, Mg, and S) and "ppm," or parts per million, for the micronutrients (Zn, Cu, Fe, Mn, B, Mo, and Al). 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.

Table 1 gives the range of nutrient content considered to be "normal" or "sufficient" for top, fully developed soybean leaves at early pod set. Keep in mind that these are the ranges normally found in healthy, productive soybeans.

Table 1. Nutrient content considered "normal" or "sufficient" for soybeans

Nutrient	Units	Growth Stage (Top, fully-developed leaves at pod set)
Nitrogen	%	4.25-5.50
Phosphorus	%	0.25-0.5
Potassium	%	1.70-2.50
Calcium	%	0.35-2.00
Magnesium	%	0.26-1.00
Sulfur	%	0.15-0.50
Copper	ppm	10-30
Iron	ppm	50-350
Manganese	ppm	20-100
Zinc	ppm	20-50
Boron	ppm	20-55
Molybdenum	ppm	1.0-5.0
Aluminum	ppm	<200

Plant analysis as a diagnostic tool

Plant analysis is an excellent diagnostic tool to help understand some of the variation seen in the field. When using plant analysis to diagnose field problems, producers should try to take comparison samples from both good/normal areas of the field, and problem areas. Collect soil samples from the same good and bad areas, and don't wait for flowering to sample soybeans. Early in the season, when plants are 8-10 inches tall, collect whole plants from 15 to 20 different places in the sampling areas. Later in the season, collect 20-30 sets of top, fully developed leaves. Handle the samples the same as those for monitoring, allowing them to wilt to remove excess moisture, and avoiding mailing in plastic bags.

Soil samples are important in diagnostic work, because while a plant may be deficient in a nutrient, it may not be due to a shortage in the soil. Other factors such as soil compaction, insect or disease damage to the roots, low pH limiting nodulation, or many other issues can limit nutrient uptake in soybeans.

Plant samples can be sent to the K-State Soil Testing Laboratory for analysis at:

K-State Research and Extension
2308 Throckmorton PSC
1712 Claflin Rd.
Manhattan, KS 66506-5503

For more information on plant analysis testing, including available tests, forms, and costs, please visit the K-State Soil Testing Lab website at:
http://www.agronomy.k-state.edu/services/soiltesting/index.html

Summary

In summary, plant analysis is a good tool that producers can use to monitor the sufficiency of soil fertility levels and inoculant effectiveness, and a very effective diagnostic tool. Producers should consider adding this to their toolbox.

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3. Southeast Kansas 2020 wheat variety test results

The Kansas State University Crop Performance Tests were conducted in replicated research fields throughout the state. Crop production is dependent on many factors including cultivar selection, environmental conditions, soil, and management practices. This report summarizes winter wheat production (hard-red and soft-red varieties) for Parsons, Kansas.

Figure 1. 2020 wheat variety trial at Parson, KS. Photo by K-State Southeast Research and Extension

Overview of wheat variety trials for Parsons, KS

Fifteen hard-red and ten soft wheat varieties were tested in Parsons silt loam soil at the Southeast Research and Extension Center in Parsons. All crop variety trials are managed with conventional tillage. Individual variety results are available at the K-State Crop Performance Test webpage (http://www.agronomy.k-state.edu/services/crop-performance-tests/). This data is part of the 2020 Winter Wheat Performance Tests, SRP 1158 (not available yet).

Wheat was drilled in 7-inch rows at 1.2 million seed/acre (approx. 90 lb/acre) in conventional tillage with an Almaco plot drill on Oct. 23, 2019 in Parsons and harvested June 18, 2020. Plots were 7 feet wide by 27.5 feet long. Fertilizer was applied before planting at a rate of 50-46-30 lb/acre N-P-K (dry), with an additional 60-46-30 lb/acre N-P-K (dry) applied on Feb. 7, 2020 for both hard-red and soft-red cultivars. No fungicide or herbicides were used in wheat.

Rainfall during the 2019-20 wheat growing season was near record highs. Initial rainfall in the fall was very close to average. Beginning in early January, regular high rainfall events increased the cumulative rainfall to well above average. During April, the cumulative rainfall exceeded that received during the previous year. On May 15, 2020, Parsons received 4.7 inches of rain in one 24-hr period. After a very wet spring, however, the rain stopped; Parsons received only 1.18 inches of rain in all of June. This coincided perfectly with wheat harvest. Wet conditions during wheat flowering contribute to fungal disease, in particular Fusarium head blight or scab (De Wolf et al., 2003). There was heavy infestation of scab in some cultivars and wheat fields. The dry conditions at wheat maturity allowed timely harvesting, resulting in little dockage due to scab in 2020.

Temperatures in 2020 were slightly warmer than average, especially during the winter months of December and January. After periods of low temperatures in the late fall, temperatures increased during the winter and remained mild for most of WY20. Below-freezing air temperatures were received on April 17 and 18, and a low temperature of 36.5 on May 9, but were not low enough or long enough to cause damage in the Parsons area.

Winter wheat was planted on 6.9 million acres throughout Kansas. In the variety trials, heading notes were taken on individual varieties. Heading is defined as the date when 50% of the plot had heads emerged. Heading in the hard-red varieties began April 25, 2020, and was complete by April 30. Heading in the soft-red varieties occurred between April 28 and May 1, 2020.

2020 yield results

Yields in all varieties were very good this year (Figures 1A & 2A). The highest yield in the hard-red wheat varieties was measured in WB4401 at 108.8 bu/acre. This is well above the 12-year average yield of 53.1 bu/acre in the variety trials, and the 12-year average yield of 40.7 bu/acre across the state of Kansas.

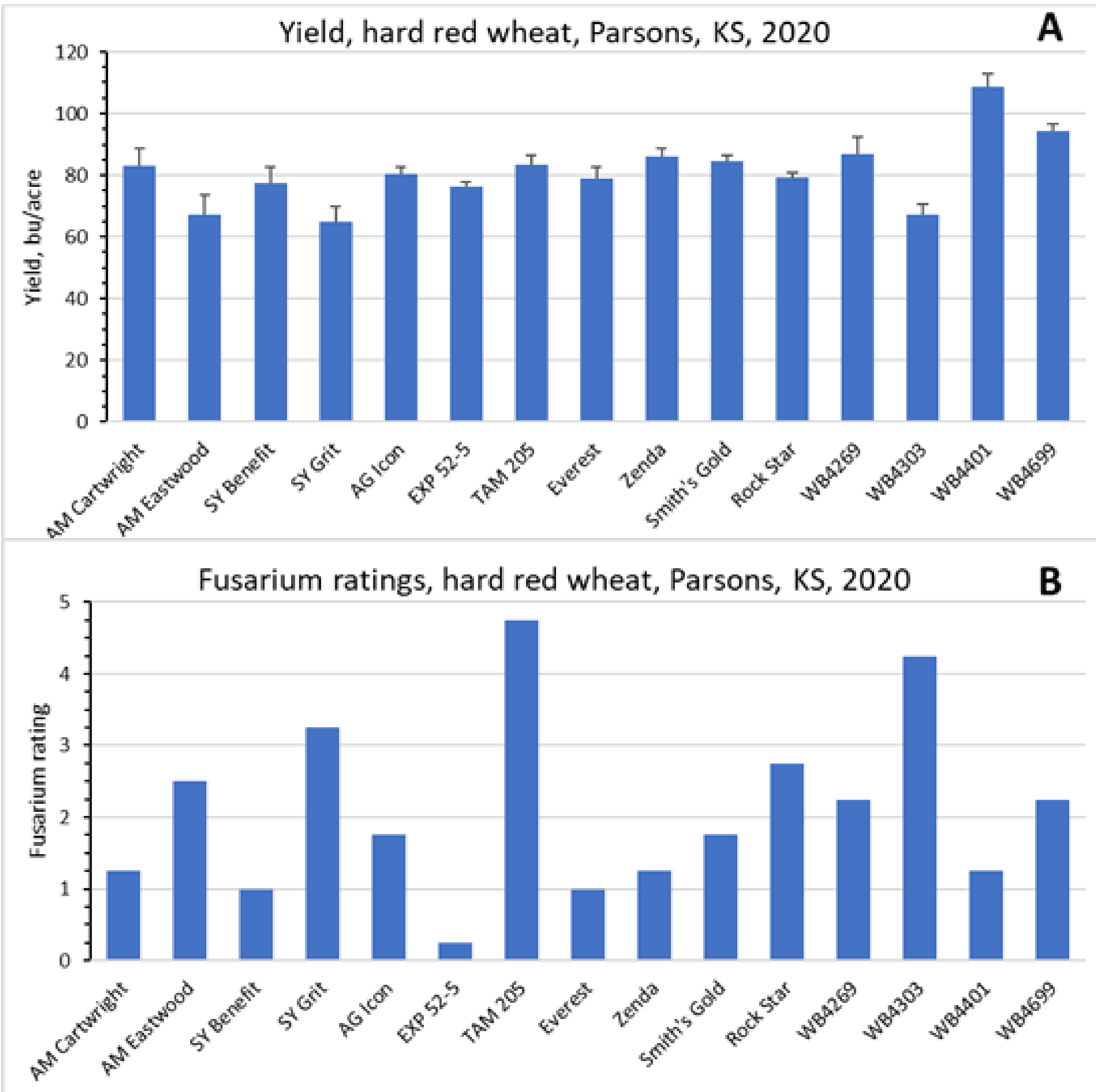
Yields in soft-red varieties were higher than the hard-red varieties, as has been observed previously (Figure 2A). Soft-red yield of 102.4 bu/acre across all varieties in 2020 was much higher than the 11-year average of 64 bu/ac for soft-red wheats in the variety trials. The yields were similar to those harvested in soft-red wheat in 2012 in the variety trials. The highest yield of 113.9 bu/acre was measured in AgriMaxx 503, but several other varieties had yields over 100 bu/acre.

Disease impacts

Cultivars varied in their susceptibility to disease. High rainfall around flowering and heading increases disease pressure (De Wolf et al., 2003). Fungal disease ratings were measured in all varieties as the percent infection and the extent of infection, with 0 being no damage and 10 being highest infection rate. Fusarium head blight (FHB) and stripe rust were both present in the variety trials, and show differences across the soft red wheat varieties (Figure 1B and C). Stripe rust showed greater infection rates than FHB. Varieties with higher yields tended to have better resistance to the fungal diseases.

One advantage of soft-red wheat is their greater resistance to disease. This was observed in the FHB and stripe rust disease ratings (Figure 2B and C). As with the hard-red varieties, those varieties that had greater resistance to diseases tended to have higher yields.

No herbicides or fungicides are normally used in the variety trials to provide an equal comparison based only on genetics. However, timely application of fungicide has been shown to be especially important in high rainfall areas such as southeast Kansas in order to control fungal diseases (De Wolf et al., 2003). Application of appropriate fungicides around flowering are especially important to control FHB (Onofre and De Wolf, 2020).



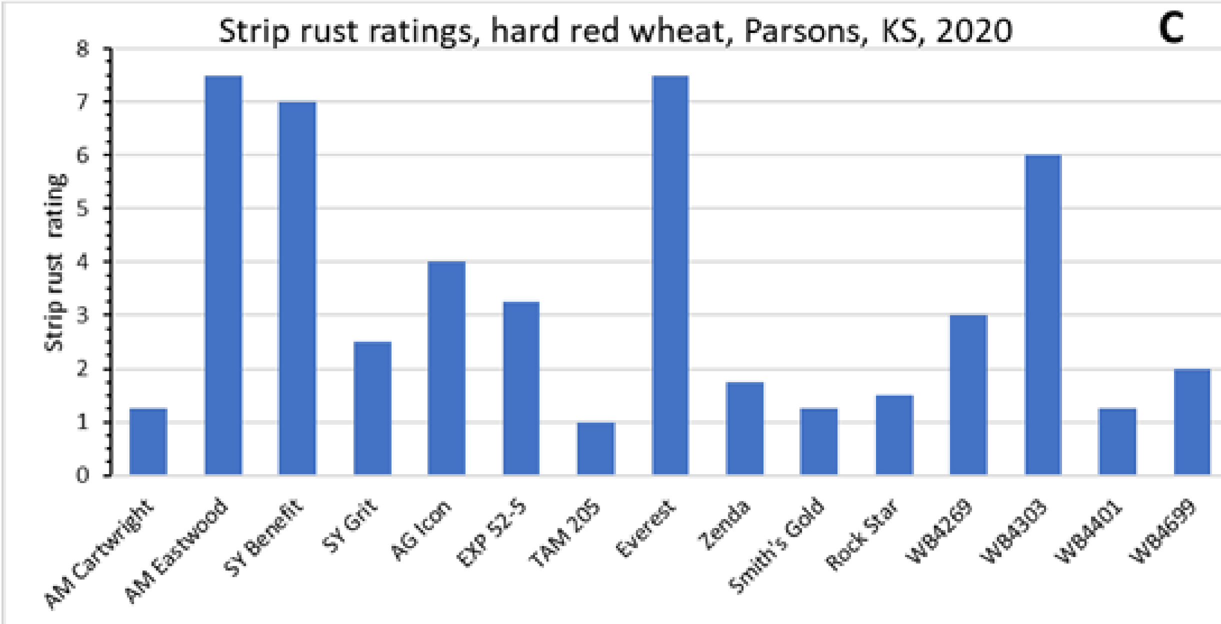
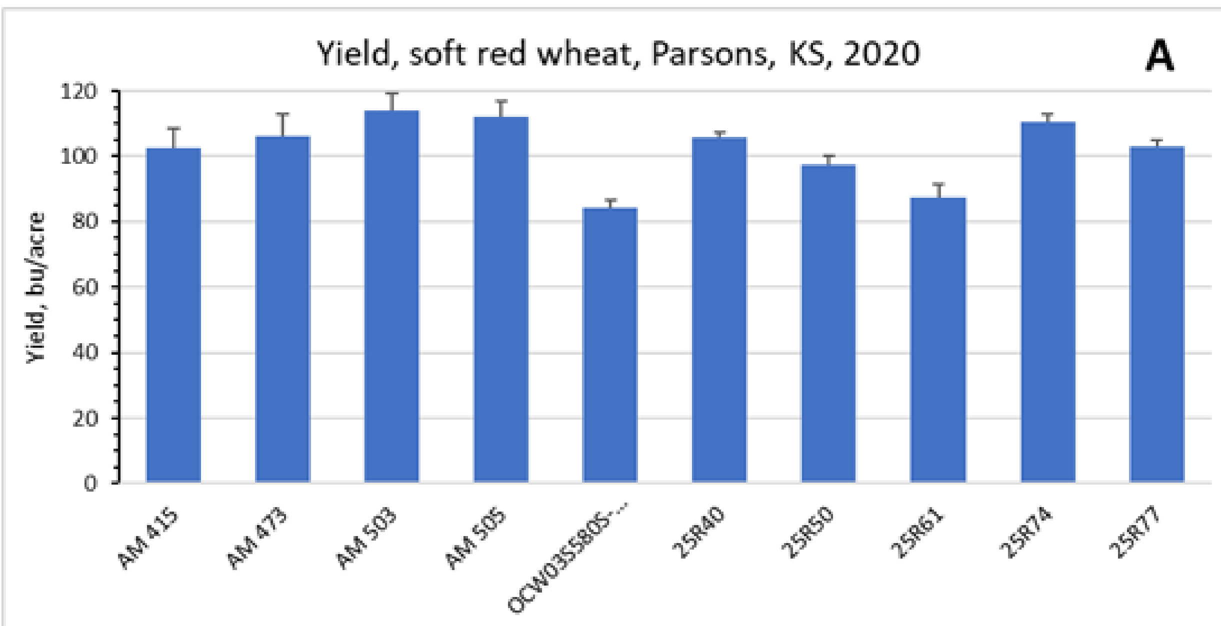


Figure 1. Summary of hard-red wheat variety trials, Parsons, KS, 2020. A. Yield; B. Fusarium ratings; C. Stripe rust ratings.



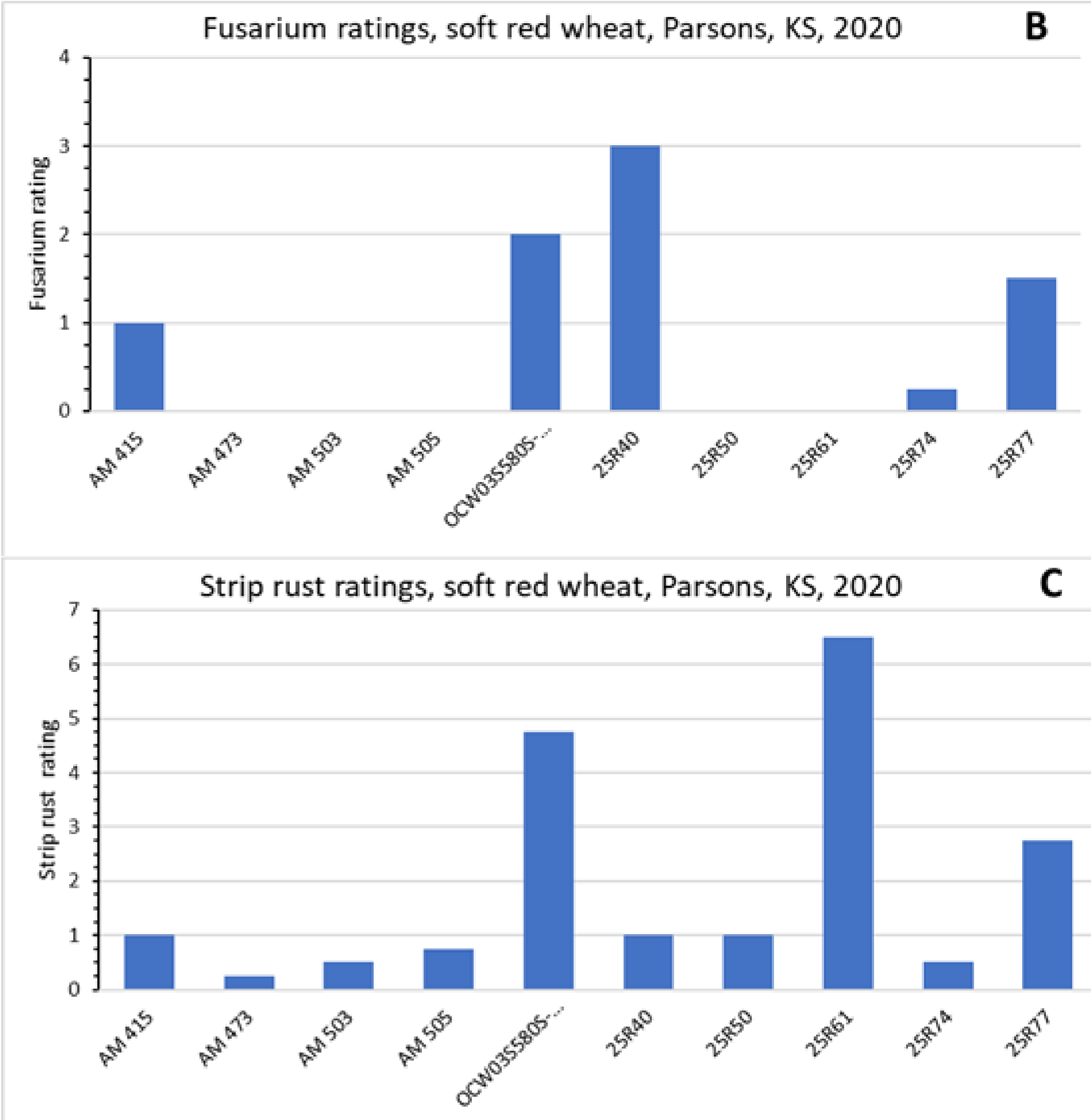


Figure 2. Summary of soft-red wheat variety trials, Parsons, KS, 2020. A. Yield; B. Fusarium ratings; C. Stripe rust ratings.

Summary

Wheat did exceptionally well this year. The planting conditions in the fall and relatively mild winter led to good plant stands. Notable, many plots were thinner than expected. However, ideal dry conditions during harvest made optimal and timely harvest possible. The high probability of rainfall around May 31 in Parsons often confounds wheat harvest, making fields inaccessible and increasing disease damage.

Different varieties are entered in the variety testing each year. Therefore, it is important to compare variety performance across different growing seasons to get an understanding of how a variety responds under different growing conditions. Information on previous wheat variety performance is available at:
www.southeast.kstate.edu/program_areas/crop_production/wheat/Wheat%20Production_2020.pdf

Acknowledgment

This work is supported by the U.S. Department of Agriculture National Institute of Food and Agriculture, Hatch project 1003478. This data is part of the 2020 Winter Wheat Performance Tests, SRP 1158.

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4. Cover crops grown post-wheat for forage under dryland conditions in the High Plains

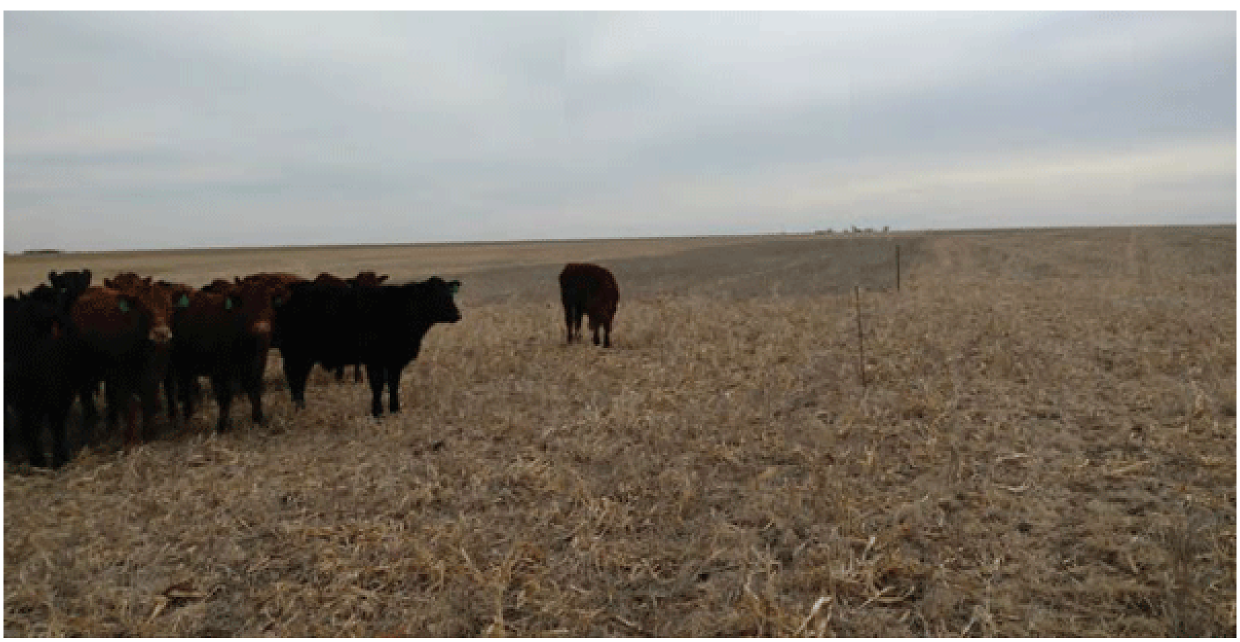
A new publication has been produced in collaboration with extension specialists and research scientists at K-State and Colorado State University. This publication, MF3523 – "**Cover crops grown post-wheat for forage under dryland conditions in the High Plains**", presents information on species selection, variability in forage production, and challenges associated with grazing. Additionally, readers can find recommendations for grazing management, determining stocking rates, and controlling wheat streak mosaic virus

Overview

Post-wheat planted cover crops may offer a longer and more flexible grazing period than spring-planted cover crops within wheat-based dryland cropping systems. However, low available soil moisture and variable weather patterns this time of year can make cover crop establishment and productivity highly variable. Concerns about disrupting good wheat stubble, managing volunteer wheat to reduce disease transmission, and controlling weeds should be considered.

When cover crops are grazed, producers should choose species that will not only benefit soil health but will also be palatable and safe as forage for livestock. Fortunately, many of the species recommended for use as cover crops are also good for forage production. Factors such as nutritive content and potential toxicities must be considered.

Useful information and recommendations on cover crop species selection, managing variable forage production, grazing management options, determining optimal stocking rates, and a planting/grazing timeline is covered in detail in the publication. There are also links to other useful and related online resources within the publication. The entire publication can be viewed and downloaded at https://bookstore.ksre.ksu.edu/pubs/MF3523.pdf.



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