

Extension Agronomy

eUpdate

08/14/2015

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. Managing wheat for forage and grain: The dual-purpose system

Dual-purpose wheat management (wheat grown for forage and grain) spreads production risks by providing producers a second source of income in addition to the harvested grain. If wheat grazing is managed properly, its grain yield penalty can be minimized.

If cattle are removed prior to first hollow stem, grazing wheat during late fall, winter, and early spring can reduce grain yields by 0 to 15% compared to wheat managed for grain only. If cattle is not removed prior to first hollow stem, greater grain yield reductions can occur. In years when early spring conditions are not favorable – such as when there is a spring freeze after some varieties have begun jointing – wheat that has been grazed may even outyield ungrazed wheat. That's because moderate to heavy grazing will typically delay maturity a bit in the spring.

Overall, wheat pasture can provide high-quality forage when other forage sources are typically low in quality and quantity, and its management requires a few distinct considerations:

Seeding date. Early-planting is essential to ensure good fall forage production as long as soil moisture and temperature allows. Wheat grown under dual-purpose management is usually sown in September, at least two to three weeks earlier than wheat sown for grain-only. Research performed in north-central Oklahoma indicates that wheat fall forage production decreases approximately 1000 pounds per acre for each two-week delay in planting in September.

Basic Recommended Seeding Rates for Kansas						
Precipitation Zone	Grain only (lbs/acre)	Dual –purpose forage + grain				
		production (lbs/acre)				
Less than 20	40-60	60-90				
20-30	50-60	75-120				
More than 30	60-75	90-120				
Irrigated	60-90	90-120				

Seeding rate. Dual-purpose wheat management requires seeding rates 1.5 to 2.0 times greater than that for grain-only management.

Seeding depth. Earlier planting date results in wheat planted into hotter soils. Increased soil temperature decreases the coleoptile length of germinating wheat, which can affect emergence of deep-planted seeds. Therefore, if moisture is not available in the top inch or inch-and-a-half of the soil profile, it is preferable to seed shallower and hope for rain ("dust the wheat in") than to try to reach moisture deeper in the profile.

Variety selection. Wheat varieties grown under dual-purpose management should germinate well under high soil temperatures (> 85°F), should have excellent grazing potential in the fall, and recover well from grazing. Genetic resistance to barley yellow dwarf, wheat streak mosaic, and Hessian fly are also valuable traits as early planted wheat is at greater risk of damage by these diseases and pests.

Nitrogen fertility. Approximately 30 pounds of nitrogen per acre are needed to produce 1000 pounds of wheat forage. Thus, nitrogen requirements of dual-purpose wheat are greater than that of grain-only wheat. Nitrogen removed by grazing should be accounted for by additional pre-plant

nitrogen fertilizer or by a topdress application during spring to ensure proper grain formation.

Soil pH. Acidic soils are an especially important issue when growing wheat for forage and grain. Wheat forage production is more impacted by low soil pH than wheat grain yield, and extremely acidic soils can decrease forage production even in low pH tolerant varieties (Figure 1). A minimum soil pH of approximately 6 is needed to maximize wheat fall forage production for most wheat varieties. In-furrow phosphorus fertilizer can be used as a strategy to ameliorate the effects of low soil pH and increase wheat forage production in acidic soils.



Figure 1. Duster, a variety with excellent tolerance to acidic soils, showing decreased forage

production under dual-purpose management due to extremely low soil pH. Photos by Romulo Lollato, K-State Research and Extension (courtesy of Oklahoma State University).

When to start grazing. Winter wheat should not be grazed before the secondary root system has developed enough to anchor the plant, which generally occurs with a minimum of 6 to 8 inches of top growth. If the grazing process is started before the wheat plants are well anchored, cattle will pull the whole wheat plant with its rooting system and decrease plant population.

Stocking rates. Climatic conditions such as precipitation and temperature will influence the optimum stocking rate, which will vary from year to year. Generally for fall grazing, the recommendation is 250 to 500 pounds of animal per acre (1 to 2 acres per stocker, depending on weight). Spring stocking rates are 1.5 to 2.0 times greater than that for fall due to the lush vegetative growth. Usually 0.75 to 1.3 acres per stocker, although rates as high as 1,400 pounds of animal per acre (2.5 stockers/acre) have been noted in some research trials during late spring graze out.

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2. Tips for fall planting of alfalfa

Alfalfa is often considered as the "Queen of Forages" because it produces high yields that are highly digestible and high in protein. Alfalfa is a very important leguminous crop for dairy and other livestock industry in Kansas. Late summer and early fall are often the best times to plant alfalfa in Kansas due to less weed pressure than spring planting.

With the rains this spring and summer in most areas of Kansas, there may be enough moisture to achieve good stand establishment in many fields. Available moisture at planting is crucial for alfalfa establishment, but too much moisture can increase seedling disease incidence.

If soil moisture is available, growers in northwest Kansas can plant as early as Aug. 10-15. Those in southeast Kansas can plant in mid- to late-September. In other parts of Kansas, the optimal planting time is late August or early September. Producers just need to plant early enough to have three to five trifoliate leaves before the first frost.

Alfalfa is a three- to five-year, or longer, investment and therefore it is crucial to ensure proper establishment. Some producers shy away from alfalfa because of its high establishment cost and risk of stand failure. In the long run, however, it's relatively inexpensive, if amortized over the life of the crop.

If managed properly and given favorable weather conditions, dryland alfalfa can produce 3 to 6 tons of forage per acre per year. Irrigated fields can produce 8 tons per acre per year or more.

When planting alfalfa, producers should keep the following in mind:

- Soil test and correct soil acidity. Alfalfa grows best in well-drained soils with a pH of 6.5 to 7.5, and does not tolerate low soil pH. If the soil is acidic, add lime to raise soil pH to 6.8 before planting.
- Soil test and meet fertilization needs. Apply the needed phosphorus (P) and potassium (K) amounts according to soil test recommendations. Phosphorus fertilizer will be required if soil test P levels are below 25 ppm, and potassium fertilizer will be required if soil K levels are below 120 ppm. Even soils that test higher than these thresholds may need additional fertilizer. Small amounts of nitrogen fertilizer (15 to 20 lb/acre) as a starter at planting are beneficial for alfalfa establishment.
- Plant certified, inoculated seed. Ensuring the correct *Rhizobium* inoculation is crucial for alfalfa seedlings to fix available soil nitrogen to meet the needs of growing alfalfa for optimum production.
- Plant in firm, moist soil. A firm seedbed ensures good seed-soil contact; therefore, use a press wheel with the drill to firm the soil over the planted seed. No-till planting in small-grains stubble will usually provide a good seedbed.
- Don't plant too deeply. Plant one-fourth to one-half inch deep on medium- and fine-textured soils and three-fourths inch deep on sandy soils. Don't plant deeper than 10 times the seed diameter.
- Use the right seeding rate. Plant 8 to12 pounds of seed per acre on dryland in western Kansas, 12 to15 pounds per acre on irrigated medium- to fine-textured soils, 15 to 20 pounds per acre on irrigated sandy soils, and 12 to 15 pounds per acre on dryland in central and eastern Kansas.

- Check for herbicide carryover that could damage the new alfalfa crop especially when planting alfalfa no-till into corn or grain sorghum stubble. In areas where row crops were drought-stressed and removed for silage, that sets up a great seedbed for alfalfa, but may still bring a risk of herbicide damage.
- Choose pest-resistant varieties. Resistance to phytophthora root rot, bacterial wilt, fusarium wilt, verticillium wilt, anthracnose, the pea aphid, and the spotted alfalfa aphid is essential. Some varieties are resistant to even more diseases and insects.

More information about growing alfalfa in Kansas can be found in the annual performance bulletins and the *Alfalfa Production Handbook*. That information also is available on the web at: www.ksre.ksu.edu/bookstore/pubs/c683.pdf



Figure 1. Alfalfa seedlings. Photo by Doohong Min, K-State Research and Extension.



Figure 2. Early bloom alfalfa. Photo by Doohong Min, K-State Research and Extension.

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3. Planning your wheat fertility program: Start now by soil testing

Wheat planting is just a few weeks away, so now is the time to get your soil sampling done to have good information on which to base your fertilizer inputs. This is particularly important now since 2016 wheat prices are currently lower than most of us would like and efficiency in production will be critical.

Which nutrients should be tested?

The most important tests and nutrients to focus on this year depends in part on where you are located, the choices you make when applying N, and your tillage system. The nutrients for which wheat is most likely to show responses statewide are nitrogen (N) and phosphorus (P). Wheat is the most P-responsive crop we grow in the state, and while P removal with wheat may be less than with corn or soybeans, the relative yield response is often the highest. So knowledge of P soil test levels and fertilizer needs will be valuable. In addition, low soil pH is becoming a problem in fields everywhere in the state, especially fields with a history of high rates of N application and relatively low cation exchange capacity.

In addition to the "Big 3" of pH, N, and P, potassium (K) deficiency in wheat can also be found in some areas of southeast and south central Kansas. Wheat is generally less prone to K deficiency than many of the rotation crops commonly grown, such as corn, soybeans or grain sorghum. Generally the focus of a K fertilization program is with the rotation crops, and meeting the higher K needs of corn and soybeans minimizes the chance of a K deficiency in wheat.

The 0-6" soil sample

A standard 0-6" surface sample is normally used to test for pH and the non-mobile nutrients such as P and K. Phosphorus and K along with soil pH are buffered processes in our Kansas soils. This simply means that the soil contains significant quantities of these nutrients, and the soil tests we commonly use provide an index value of the amounts available, not a true quantitative measure of the amounts present.

In the case of P, most Kansas soils have a "buffer factor" of about 18. This means that if you remove 18 pounds of P_2O_5 in harvested grain, the soil test will drop 1 ppm. The same works in reverse, if you add 18 pounds as fertilizer or manure, the soil test value goes up 1 ppm. The buffering value for K is around 8 pounds K_2O per 1 ppm K soil test.

The buffering value for both P and K varies based on soil cation exchange capacity and the soil test levels. On high CEC soils, especially those soils with high clay content, the buffering capacity goes up, so the soil test levels will change more slowly. But on low CEC soils the buffering capacity can be much lower, and soil test levels can change rapidly. The same situation occurs with soil test levels. On soils with low soil test P or K levels, it will require more P or K to raise the soil test than at high soil test levels.

In addition to requesting the standard soil tests of pH, P, and K from the 0-6" surface sample, producers might also want to monitor soil organic matter levels and micronutrients such as zinc (Zn). Zinc is not a nutrient commonly found deficient in wheat production. However it is important for corn and grain sorghum. Thus including it in your sample package would be helpful for planning for

these rotation crops.

Soil organic matter (SOM) is an important source of nutrients such as N and S. When calculating the fertilizer needs for both these nutrients, SOM is taken into consideration. For wheat production, 10 pounds of available N and 2.5 pounds of sulfur (S) is credited for every 1% SOM in the soil.

The 0-24" soil sample

In addition to pH, SOM, P, K, and Zn -- all of which are non-mobile in soils and accumulate in the surface -- N, S, and chloride are also nutrients which can provide significant yield responses when deficient in soils. Since all three of these nutrients are mobile in soils and tend to accumulate in the subsoil, we strongly recommend the use of a 24-inch profile soil sample prior to growing wheat, corn, or grain sorghum.

Nitrogen is a nutrient which is likely to provide yield response statewide. One common misconception is that the accumulation of N in the soil profile only occurs in the drier, western half of the state. However with our dry winters, N can accumulate in the soil statewide in many years. Rainfall tends to peak in Kansas in June and July, with a rapid decrease in monthly precipitation in August and September. Rainfall totals are generally lowest in December and January. Wheat takes up the majority of its N prior to flowering. In southeast Kansas that is in April, and in north central Kansas it is in early May most years.

In many years, especially following dry summers, significant amounts of N can be present in soils at wheat planting. In addition, N mineralization will continue in the fall until the soils freeze. Since many producers in southeast Kansas use poultry litter as a fertilizer source, N mineralization is common in these fields and should be considered when making fertilizer decisions.

Sulfur deficiency is increasing across the state in wheat production also. Unheard of 10 years ago, S deficiency is now common in northeast and north central Kansas, and the area where these deficiencies are found is growing. There are two primary causes: the reduction in sulfur deposition from the atmosphere seen over the past 2-3 decades, and the reduction in S content in many P fertilizers. While not as soluble as nitrate, S is also a relatively mobile nutrient which accumulates in the subsoil. The S profile soil test has been well calibrated in Kansas and is a good way to determine S needs.

A third essential mobile element to be considered for wheat production with profile soil testing is Chloride (Cl). Chloride deficiency is normally found in the eastern half of the state on soils that do not have a history of potash (KCl) application. In general this includes many areas in eastern Kansas, north of the Kansas River, and the central corridor of wheat production. Chloride deficiency is associated with grass crops, wheat, corn, and grain sorghum, and is correlated with the plants ability to resist plant disease. Again, the profile soil test for chloride is well calibrated in Kansas and should be considered.

Summary

In summary, crop producers in Kansas should consider soil testing to help in making fertilizer decisions. Wheat producers specifically, should use surface 0-6" samples to determine the need for lime on low pH soils (special sampling procedures are needed for continuous no-till fields, but that will be discussed in a later article), P, K, SOM and Zn. They also should be using 24" profile soil tests

for N, S and Cl. Now is the time to get those samples taken, to ensure there will be enough time to consider those test results when planning your fall fertilizer programs.

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4. Correlation of soil test nitrate level and wheat yields

Soil testing for nitrate-N in the fall is a valuable practice for making nitrogen (N) recommendations on winter wheat, particularly when using 24-inch profile sampling. Unfortunately, few farmers utilize this tool, and its value has been questioned in some areas due to the potential for overwinter N loss. However, with the exception of sands, N losses over winter in Kansas are normally quite low due to our low rainfall in December, January, and February.

To evaluate the relationship between wheat yield and fall soil nitrate-N -- and to determine if it is still a viable practice to utilize in N management of wheat -- we summarized data from 33 different N management experiments conducted across Kansas from 2007 through 2014. Most were from 2010 through 2013.

The driving force behind this study is the growing interest in improving N management in winter wheat production. Recent efforts have been focused on improving nitrogen use efficiency (NUE), or the portion of the fertilizer N we apply that is used by the plant. This has resulted in the creation of N fertilizer products designed to reduce N loss, optical sensors that can evaluate wheat's N status, and changes in methods and timing of N applications. With so many new practices incorporated into N management systems, older practices are starting to be considered dated and discarded.

Taking fall soil profile-N samples has been a recommended practice for making an N recommendation for winter wheat for many years. However, due to the mobility of nitrate-N in the soil, soil test values observed in the fall may be completely different than values observed in the spring, particularly on soils prone to leaching. Because many producers wait until spring greenup to make their N application, does soil sampling in the fall for nitrate-N really provide useful information for N management in wheat? That's a legitimate question.

The objective of our study was to evaluate the relationship between N fertilizer response by wheat and fall soil nitrate-N, and to determine if it is still a viable practice to utilize in N management of wheat.

Procedures

Data were drawn from 33 dryland wheat experiments conducted in 2007 through 2014 throughout Kansas in cooperation with producers and Kansas State University experiment stations. Locations included Manhattan, Tribune, Partridge, Johnson, Randolph, Rossville, Ottawa, Sterling, Pittsburg, Silver Lake, Solomon, Yates Center, McPherson, and Gypsum.

Soil samples to a depth of 24 inches were taken prior to planting and fertilization. Samples from 0 to 6 inches were analyzed for soil organic matter, phosphorus, potassium, pH, and zinc. Soil profile 0- to 24-inch samples were analyzed for nitrate-N, chloride, and sulfate. Fertilizer needs other than N were applied in the fall at or near seeding.

Results

1) Analysis of yields taken from plots that received no N fertilizer shows a strong positive relationship

with fall soil profile nitrate-N (Figure 1). Wheat yields increased rapidly as soil N levels increased to about 80 pounds soil N per acre, and then leveled off.



Figure 1.Relationship between fall soil profile nitrate-N level and wheat yield with no N fertilizer applied.

2) We then converted check plot yields to a relative yield, or percentage of the maximum fertilized yield obtained at each location (Figure 2). The results revealed not only the yield of the check plot, but also the N responsiveness of the site. This shows that at low soil nitrate levels, sites respond well to applied fertilizer. When fall soil profile nitrate-N levels are greater than 80 to 100 lb/acre, relative yield is approaching 100%, and it is unlikely the site will respond to additional fertilizer N applied in the spring.



Figure 2. Relationship between fall soil profile nitrate-N and Relative Yield, or percent of the maximum yield obtained with fertilizer at each site.

3) A third way to show this relationship between fall soil nitrate and N response is to calculate the Delta Yield, or the increase in yield obtained from the addition of fertilizer at each site. This is a good measure of N responsiveness of an individual research site. The relationship between fall profile N level and Delta Yield is shown in Figure 3. It is clear from this graph that at low soil nitrate levels in the profile, sites respond well to applied nitrogen fertilizer. However, as the profile N level increases beyond 75 to 80 pounds N per acre, little or no N fertilizer response was found.



Figure 3. Increase in yield due to N fertilization, Delta Yield, as a function of soil N level.

4) A commonly used way to measure the efficiency of N use is to determine the amount of N fertilizer required to produce one additional bushel of yield. This relationship is shown in Figure 4.



Figure 4. Pounds of N fertilizer required per bushel of yield increase at different levels of N responsiveness, or Delta Yield.

On highly N-responsive sites, those with a large Delta Yield, the amount of N required to increase yield by one bushel is relatively low, near the 2.4 pounds N per bushel used in the K-State fertilizer recommendations. However, as the yield response decreases, the amount of N required to obtain that response increases dramatically. This relationship provides a good explanation of why fertilizer recommendations are generally made not to obtain the maximum yield, but rather the economic optimum yield. The efficiency of squeezing out those last one or two bushels is just too low. The cost of the added fertilizer will exceed the value of the extra grain produced. A number of additional conditions such as drought, disease, and poor root growth can influence this relationship. Many of the new technologies being developed to enhance N management and NUE, should help reduce the pounds of N fertilizer required to obtain a bushel of N response.

Summary

Wheat yield with no N fertilizer applied was compared with fall nitrate-N levels from 24-inch profile

soil test analyses and a strong relationship was established. Although new practices have been developed to improve N management in winter wheat, soil sampling in the fall for nitrate-N remains an important practice to manage N efficiently and can result in considerable savings for producers.

When soil sampling for N is not done, the K-State fertilizer recommendation formula defaults to a standard value of 30 lb/acre available N. In this particular dataset, the average profile N level was 39 lb N/acre. However the N level at individual sites ranged from 11 to 197 lbs N/acre. Most recommendation systems default to a standardized set of N recommendations based on yield goal and/or the cost of N. Without sampling for N or using some alternative method of measuring the soil's ability to supply N to a crop, such as crop sensing, the recommendations made for N will be inaccurate, resulting in a reduction in yield or profit per acre and increased environmental impact.

Failure to account for the N present in the soil wastes a valuable resource and can result in excess foliage, increased plant disease, inefficient use of soil water, and reduced yield. Soil sampling in fall for nitrate-N can have a significant impact on N recommendations for winter wheat, thus improving N management, and is still strongly recommended.

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5. Liming acid soils for optimum wheat production

Problems of low soil pH are common throughout central and south central Kansas. Well-drained, productive soils under good management usually become acidic over time as natural result of high crop production. This problem typically starts in sandier soils, and is exacerbated by high rates of nitrogen (N) fertilizer application over the years; making long-term continuous wheat production in central and south central Kansas especially vulnerable to this problem. However, long term application of N also generated acid soils in other regions of the state with different soil types.

Strongly acidic soils may present several problems for wheat production. These include aluminum toxicity and in some cases manganese toxicity, as well as deficiencies of phosphorus, calcium, magnesium, and molybdenum. These problems caused by acid soils are difficult to separate one from another and are often related to root damage due to Al toxicity.

Typical symptoms of aluminum toxicity include thin stands, poor plant vigor, and purpling. High concentrations of aluminum will reduce development of the roots, giving them a short stubby appearance. The roots will often have a brownish color.



Figure 1. Wheat growing on very acidic soils, such as this soil in Harper County with a pH of 4.6, is often spindly and has poor vigor. Photo courtesy of K-State Research and Extension.

In general terms, aluminum toxicity will reduce grain yield potential of wheat when soil pH levels get below 5.2 to 5.5 and KCI-extractable (free aluminum) levels are greater than 25 parts per million (ppm). If aluminum levels are not high, pH levels in this range are not as much of a problem for wheat. When soil pH levels are 5.0 or less, yields start dropping off rapidly in most cases. A minimum soil pH of approximately 6.0 is needed to maximize wheat fall forage production for most wheat varieties

Where acid soils are causing reduction in wheat production, plant growth and yield can be significantly improved by liming the soils and raising the pH to an optimum range.

If a half-rate of lime is applied now, or in late August, will that give it enough time to benefit wheat planted in early to mid-October this year? Would it have to be incorporated to have enough time to be effective in that situation? Lime application may require time to react and increase soil pH. However, most of the change in pH will occur in the first 4-6 weeks after lime application. If the lime is incorporated the effect in the upper profile would be quick. With a lower application rate to the surface the effect on pH would be limited to the upper 2-3 inches, and would require more time to have a significant effect – depending on factors such as soil texture and moisture.

What kind of yield increases can you expect? Several studies in Kansas have shown significant increase in yield as well as test weight when liming acid soils (Figure 1 and Table 1). In some cases yield can easily double depending on the severity of the problem.





It can be expensive to apply the full recommended rate of lime to soils. The yield increases from an application of the full rate of lime are likely to hold up for up to 8 years or more. But the initial cost can be quite high. Lime is a long-term investment that many producers are reluctant to make for several reasons. Should producers consider applying a lower rate of lime than what is recommended by the K-State soil testing laboratory?

If the cropping system consists of some combination of wheat, grain sorghum, corn, or sunflowers, without a legume in the rotation, then it's not critical to use the full recommended rate of lime. With these crops, which can tolerate somewhat lower pH levels than soybeans and alfalfa, producers may realize some benefit by applying less-than-recommended rates of lime as long as they are willing to make more frequent applications. If soybeans or alfalfa will be grown on the field in question, and if the pH level is less than 6.0, then the full rate of lime should be applied.

Table 1 below shows the effect of a lower than-recommended rate on wheat yield and test weight. The half-rate increased yield and test weight nearly as much as the full rate in this case. However,

producers should be aware that if they use lower-than-recommended rates of lime, they will need to make more frequent applications.

Table 1. Effect of lime rate on wheat yield and test weight, Sedgwick County						
Lime rate (lb ECC/acre)	Yield (bu/acre)	Test weight (lb/bu)				
0	23	46				
3750 (half rate)	42	60				
7500 (full rate)	46	61				

Variety: Karl (susceptible to acid soils). Initial soil pH: 4.7. Lime recommendation: 7500 lb ECC/acre (full rate)

Source: Suderman, A.J., et al. Kansas Fertilizer Research 1994, SRP719.

What type of lime is best to apply? All lime materials must guarantee their ECC content and are subject to inspection by the Kansas Department of Agriculture. The purity of the lime material relative to pure calcium carbonate and fineness of crushing are the two factors used in determination of the Effective Calcium Carbonate (ECC) content. Lime can be from various sources and with different qualities. Consecutively, to ensure a standardized unit of soil-acidity neutralizing potential, we use units of ECC.

Research has clearly shown that a pound of ECC from ag lime, pelletized lime, water treatment plant sludge, fluid lime, or other sources are equal in neutralizing soil acidity. All lime sources have a very limited solubility and must be incorporated and given time to react with the acidity in the soil to effect neutralization.

Therefore, when selecting a lime source the cost per pound of ECC should be a primary factor in source selection. Such factors as rate of reaction, uniformity of spreading, and availability should be considered, but the final pH change will hinge on the amount of ECC applied.

Other recommendations to increase yields in acid soils include the use of aluminum-tolerant wheat varieties and applying phosphate fertilizer with the seed to tie up aluminum and reduce toxicity. These management practices can certainly help to maintain yields and may be the best alternatives for some producers. However, there is only one long-term solution to low soil pH levels: liming.

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6. New faculty in Department of Agronomy

Ray Asebedo

Ray Asebedo is the new assistant professor of precision agriculture, as of May 2015. Asebedo is a native of Kansas, home grown in the Flint Hills. He received his B.S. degree in Agronomy from Kansas State University. He completed his Ph.D. in Agronomy from Kansas State University in 2015, where his research focused on developing nitrogen recommendation algorithms utilizing remote sensing technologies for winter wheat, corn, and grain sorghum.

Asebedo believes that precision agriculture is a system that integrates multiple disciplines, such as entomology, plant pathology, crop science, soil science, and engineering. Therefore, the precision agronomist is the integrator of all these disciplines to provide site-specific recommendations that optimize profit per acre and reduce environmental impact – with the goal of improving the sustainability of crop production.

Asebedo's research program will focus on developing precision farming systems that integrate technologies such as crop and soil sensors from ground platforms, sUAS, and satellites to provide effective precision agronomic systems to farmers.

His teaching program will focus on training the next generation of agronomists to think outside the box and be leaders in agriculture, advocating multi-disciplinary collaboration to create a sustainable future.

Typically, Asebedo says he does not really ever clock out from work. However, he is dedicated to his family and strives to pass on his love the land and agriculture to his two daughters. Asebedo can be reached at 785-410-7172 or by email at ara4747@ksu.edu. Also follow him on Twitter @KSUPrecisionAg.



Ray Asebedo, Precision Agriculture Agronomist

A.J. Foster

A.J. Foster is the new Southwest Area Extension Crops and Soils Specialist, as of August 17, 2015. Foster was most recently the Regional Agronomy Specialist with the University of Missouri's Southeast Region, commonly known as the Bootheel.

Foster is a native of Linstead, Jamaica. He earned an associates degree from the College of Agriculture, Science and Education in Portland, Jamaica and a diploma in secondary education from the University of the West Indies. He was then awarded a scholarship by Alcan Aluminum Corporation to attend Louisiana State University (LSU) to continue his education. He received his B.S. degree in environmental management from LSU. He has M.S. degrees in agronomy from Mississippi State University and in agronomy/soil chemistry from LSU.

He received his Ph.D. in crop science from Oklahoma State University in 2013, where his research focused on remote sensing application in bioenergy crop production system.

His goal as Southwest Area Crops and Soils Specialist will be to provide leadership for Extension educational programs in crops, soils, weeds, forage, and rangelands in southwest Kansas. Foster's main area of expertise is soil fertility, but he also has interests in cropping systems management in different environments.

Outside of work, Foster has a love for soccer. He has taught soccer, and follows the sport closely. He also enjoys spending time with his wife, college football, St. Louis Cardinals baseball, and reading. Foster may be reached at 620-275-9164 or by e-mail at anserdj@ksu.edu.



Romulo Lollato

Romulo Lollato is the new Wheat and Forages Extension Specialist, starting August 3, 2015. Lollato received his Ph.D. from Oklahoma State University in July 2015, where he worked under Jeff Edwards, the former OSU Small Grains Extension Specialist.

Lollato is originally from southern Brazil, where he received his B.S. in Agronomy from Londrina State University in 2009. After working for a year for the private sector, Lollato came to the U.S. in August 2010 to work toward his M.S. in Plant and Soil Sciences at OSU, focusing his research on strategies to ameliorate acidic soils for wheat production.

He received his Ph.D. from Oklahoma State University in July 2015, where his research focused on a mix of field work and modeling with the goal of estimating maximum attainable wheat yields in the southern Great Plains.

Lollato's goal as the new Wheat and Forages Extension Specialist is to have an applied research program that focuses on actual problems wheat producers face throughout Kansas, so he can support his Extension program with valuable applied research information that directly affects Kansas wheat producers' productivity and profitability. He intends to reach Kansas producers using traditional field days, Agronomy *e*Update articles, crop schools, news releases and Extension publications; as well as sending out information on Twitter, Facebook, and through the K-State Extension Wheat webpage.

Lollato can be reached at (785) 532-0397 or by email at lollato@ksu.edu. Also, follow Lollato on Twitter at @KSUWheat.



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7. July 2015 weather summary for Kansas: Near normal

Overall, July was very close to normal in July. Average precipitation was 4.61 inches or 125 percent of normal. The Northwest Division had the lowest average precipitation at 3.07 inches or 84 percent of normal. The other divisions with below-normal precipitation were the North Central and Central Divisions. In the Central Division, the average was 3.76 inches or 95 percent of normal, while the North Central Division averaged 4.10 inches or 98 percent of normal. Both the Southwest and South Central divisions had 176 percent of normal precipitation, but the average amount was quite different. The Southwest Division averaged 4.65 inches while the South Central Division average 6.02 inches. This ranks as the 25th wettest July on record. The greatest monthly precipitation was 13.80 inches at Sun City, in Barber County (NWS) and 12.78 inches at Topeka (CoCoRaHS). While 71 new daily precipitation records were set, none of these were new records for July.





Temperatures were very close to normal. The statewide average temperature was 78.8 degrees F, just 0.1 degree warmer than normal for the month. There were no new record high temperatures set, and only 4 records tied during the month. In contrast, there were 84 new record cold high temperatures, and 22 records that tied. On the low temperature side, the opposite prevailed with 16 new record warm low temperatures and 22 records tied. There was one new record low temperature for the month: 41 degrees F at Hoxie (Sheridan County) on the 28th. Not surprisingly, that was also the coldest reading across the state during July. The Southeast Division was the warmest, with an average of 80.0 degrees F, or 0.7 degrees warmer than normal. In contrast, the North Central Division was the coolest with an average of 78.4 degrees F, or 0.6 degrees cooler than normal. The Northeastern Division averaged 77.9 degrees F, exactly normal. The warmest reading was 108 degrees F and occurred at two different locations and dates: Lakin (Kearny County) on the 14th and Abilene (Dickinson County) on the 24th. While the temperatures weren't particularly outside the normal range, late-planted spring crops such as corn and soybeans that had limited root development, continue to show stress.





Tornado activity continued to decline. Preliminary data indicates there were 7 tornadoes, compared to 15 tornadoes reported during June and 99 in May. Hail reports were also fewer, with 55 reports this month versus 83 in June and 108 in May. There was an increase in damaging wind reports with 114 damaging wind reports this monthly, 65 reports in June and only 52 reports last May.

Drought conditions deteriorated slightly, which was not unexpected in portions of the Northwest, North Central, and Central divisions, where rainfall for July was less than normal. The only remaining moderate drought area is in Northwest and North Central Kansas, with an expanding area of abnormally dry conditions in the Central. Thirty seven counties in western Kansas remain in drought watch status according to the latest advisory from the Kansas Water Office. A return to normal or above-normal precipitation is needed to sustain improvements. Some long-term hydrological deficits are in place affecting some water supplies and reservoirs. For example, Norton, Cedar Bluff, Kirwin, and Webster reservoirs are all at less than 75 percent of conservation pool.



Richard Heim NCEI/NOAA



http://droughtmonitor.unl.edu/

July 28, 2015 (Released Thursday, Jul. 30, 2015)



Intensity:

D0 Abnom ally Diry

D3ExtremeDrought D1 Moderate Drought D4 Exceptional Drought

D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for July 16 - October 31, 2015 Released July 16, 2015



Table 1

July 2015

Kansas Climate Division Summary

	Precipit	ation (in	ches)				Temperature (°F)			
	July 201	ıly 2015			2015 Jan through July				Monthly Extremes	
Division	Total	Dep. ¹	% Normal	Total	Dep. ¹	% Normal	Ave	Dep. ¹	Max	Min
Northw est	3.07	-0.42	86	13.13	-1.03	93	76.4	-0.4	107	41
West Central	3.67	0.23	108	14.05	0.36	103	77.8	0.4	105	49
Southw est	4.65	1.88	173	18.34	5.61	143	79.4	0.5	108	49
North Central	4.10	-0.01	98	17.33	-0.68	94	78.4	-0.6	106	51

Central South Central	3.76 6.02	-0.18 2.49	95 173	17.66 23.42	-1.25 3.39	92 117	80.1 80.5	0.2 0.1	108 107	50 57
Northea st	6.08	1.70	138	26.01	4.24	119	77.9	0.0	101	56
East Central	4.88	0.58	113	23.65	0.14	99	78.6	0.2	101	57
Southea st	4.97	0.90	123	24.41	-1.26	94	80.0	0.7	100	60
STATE	4.61	0.88	126	19.85	1.18	107	78.8	0.1	108	41

1. Departure from 1981-2010 normal value Source: KSU Weather Data Library

Mary Knapp, Weather Data Library <u>mknapp@ksu.edu</u>

8. North Central Kansas Experiment Fields fall field day, August 18

The North Central Kansas Experiment Fields Fall Field Day will be held Tuesday, August 18 at the Scandia field approximately 2.5 miles west of Scandia on U.S. Hwy 36. The Field Day will start at 6 p.m. sharp.

Field Day Topics:

- The Year in Review and Weed Control Challenges
- Optical Sensor Based Nitrogen Management in Corn
- Soybean Response to Phosphorus Fertilization in corn
- Soil Water Depletion by Cover Crop Species and Mixtures

A meal, compliments of K-State Research and Extension, will follow the presentations. For more information, contact the North Central Kansas Experiment Field at 785-335-2836.

9. East Central Experiment Field fall field day, August 19

The East Central Experiment Field in Ottawa will host its fall field day on Wednesday, August 19. The field day begins at 9 a.m. with registration, coffee and doughnuts, and the program starts at 9:30 a.m. A complimentary lunch will be served.

Field day topics and K-State presenters include:

- Benefits of Grid Soil Sampling Dorivar Ruiz Diaz
- Cover Crops in Cropping Systems DeAnn Presley
- Doublecrop Soybean Management Ignacio Ciampitti and Doug Shoup
- High Yielding Wheat Romulo Lollato

From I-35 at the Ottawa exit, the East Central Experiment Field is south 1.7 miles on Kansas Highway 59, then east 1 mile, and south 0.75 mile.

More information, including Certified Crop Advisor Credits, is available by contacting the East Central Experiment Field at 785-242-5616.

10. Canola drill and planter calibration clinics, August 25 and 27

Two Canola Drill and Planter Calibration Clinics will be held in Kansas in late August.

August 25, 9-11 a.m. – Caldwell, Sumner County Fairgrounds (Caldwell Community Building)

August 27, 9-11 a.m. – Stafford County Extension office

Topics at the clinics will include:

- Overview of box grain drills, air seeders, and row planters
- Canola calibration kits and procedure materials
- Hands-on canola calibration exercises

Presenters are Heath Sanders, Great Plains Canola Association Field Specialist, and Josh Bushong, Oklahoma State University Canola Extension Assistant.

Contact your local Extension Office for more information.

Mike Stamm, Canola Breeder mjstamm@ksu.edu

11. Agricultural Research Center-Hays Fall Crop Seminar, August 26

The Agricultural Research Center-Hays is hosting its Fall Crop Seminar Aug. 26 in the auditorium at the center, located at 1232 240th Ave. in Hays.

Registration begins at 8:30 a.m., with presentations by K-State Research and Extension specialists on a variety of key production and economic topics through the morning, capped off by a barbecue lunch at noon.

Presentations and presenters include:

- Sugarcane Aphid: Insecticides, Plant Resistance, and Biocontrol J.P. Michaud, Entomologist, Agricultural Research Center-Hays
- Managing Iron Deficiency Chlorosis in Grain Sorghum Augustine Obour, Soil Scientist, Agricultural Research Center-Hays
- Cover Crops/Fallow Replacement in the Western Great Plains John Holman, Cropping Systems Agronomist, Southwest Research-Extension Center, Garden City
- Managing Glyphosate-Resistant Kochia and Palmer Amaranth Phil Stahlman, Weed Scientist, Agricultural Research Center-Hays
- On-Farm Research Trials: Science at Ground Zero Ignacio Ciampitti, Extension Crop Production Specialist, Manhattan
- Profit Variability Among Farm Operations: What Makes the Differences? Kevin Herbel, Extension Agricultural economist, Kansas Farm Management Association, Manhattan

12. Southwest Research-Extension Center, Garden City fall field day, August 27

The Southwest Research-Extension Center will host its Fall Field Day 2015 on Thursday, Aug. 27. The day starts with registration, coffee and donuts from 8 to 9:15 a.m. and features field tours, seminars, and agricultural product displays.

Field tour presentations by K-State Research and Extension specialists include:

- Summer Annual Forage Evaluation: A Revised Program at Kansas State University John Holman, Cropping Systems Agronomist, Southwest Research-Extension Center, Garden City
- Teff Forage Grass John Holman, SWREC
- Managing Iron Deficiency Chlorosis in Grain Sorghum Augustine Obour, Soil Scientist, Agricultural Research Center-Hays
- Mobile Drip Irrigation for Water-Limited Crop Production Isaya Kisekka, Research Irrigation Engineer, Southwest Research-Extension Center, Garden City
- Comparing Forage Sorghum and Corn Silage Under Full and Limited Irrigation Isaya Kisekka, SWREC
- Weed Control in Irrigated Corn Randall Currie, Weed Scientist, Southwest Research-Irrigation Center, Garden City
- Weed Control in Irrigated Sorghum Randall Currie, SWREC

A complimentary lunch will be served following the morning field tours, to be followed by seminars, including:

- Limited Irrigation Research Update Isaya Kisekka, SWREC
- The Value of Scheduling Jonathan Aguilar, Water Resources Engineer, Southwest Research-Extension Center, Garden City
- Corn and Sorghum Insect Update Sarah Zukoff, Entomologist, Southwest Research-Extension Center, Garden City
- Corn and Sorghum Insect ID Refresher Sarah Zukoff, SWREC

Pesticide applicator credits are available for participants of some of the tours and seminars. More information is available by calling the Southwest Research-Extension Center at 620-276-8286.

13. Comparative Vegetation Condition Report: July 28 - August 10

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 32: 07/28/2015 - 08/10/2015



Figure 1. The Vegetation Condition Report for Kansas for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the highest biomass production is in eastern Kansas. The Republican River Valley is clearly visible, as are the high NDVI values in Brown and Doniphan counties along the Missouri River Valley. Favorable soil moisture and moderate temperatures have favored biomass production in these areas.

Kansas Vegetation Condition Comparison



Late-Jul/Early-Aug 2015 compared to the Late-Jul/Early-Aug 2014

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows parts of southwest and south central Kansas have lower photosynthetic activity. These areas did not have as much moisture in recent weeks as counties farther west, and the sandy soils don't provide as much storage capacity. In contrast the North Central Division has had more favorable conditions this year. Last year, the divisional average precipitation was just 32 percent of normal in July. This year the division averaged 101 percent of normal for July, and is currently 114 percent of normal for the April-August 13th period.

Kansas Vegetation Condition Comparison



Late-Jul/Early-Aug 2015 compared to the 26-Year Average for Late-Jul/Early-Aug

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state has at or above-average photosynthetic activity. The North Central and Northeastern Divisions have the greatest activity. This is partly due to favorable growing conditions and partly due to delayed crop development. This delay means more of the vegetation is in the most active growth period, rather than the reduced activity that comes as the crop matures. The area of south central Kansas just south of the Arkansas River has the lowest photosynthetic activity. Crops in this area are slightly ahead of average development and field preparation for winter wheat has begun.





Figure 4. The Vegetation Condition Report for the Corn Belt for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that greatest photosynthetic activity is concentrated from northeastern Nebraska through Iowa, southern Minnesota and into Illinois. Favorable moisture conditions have resulted in increased photosynthetic activity. In Iowa, crops continue to be close to 80 percent in good to excellent condition.



U.S. Corn Belt Vegetation Condition Comparison Late-Jul/Early-Aug 2015 Compared to Late-Jul/Early-Aug 2014

Figure 5. The comparison to last year in the Corn Belt for the period for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much of the region has higher photosynthetic activity. This is partly due to a delay in development, with vegetation running later this year. Growing conditions have also been more favorable this year.



U.S. Corn Belt Vegetation Condition Comparison Late-Jul/Early-Aug 2015 Compared to the 26-Year Average for Late-Jul/Early-Aug

Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows most of the region has average to above-average biomass production. Favorable growing conditions have prevailed for most of the season. This is most noticeable in western South Dakota and the Nebraska Panhandle.



Continental U.S. Vegetation Condition Period 32: 07/28/2015 - 08/10/2015

Figure 7. The Vegetation Condition Report for the U.S. for July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the highest photosynthetic activity is centered in the Upper Midwest. Lower NDVI values are noticeable in the Southeastern U.S., particularly in Georgia and South Carolina, where drought conditions continue to intensify.



Continental U.S. Vegetation Condition Comparison Late-Jul/Early-Aug 2015 Compared to Late-Jul/Early-Aug 2014

Figure 8. The U.S. comparison to last year at this time for the period July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that lower NDVI values are most evident in Oregon and northern California. On the eastern side of the mountains in Northern California there is a slight increase in vegetative activity due to summer rains. This does not mark an end to the intense drought in this region.



Figure 9. The U.S. comparison to the 26-year average for the period July 28 – August 10 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the west continues to have lower than-normal photosynthetic activity, while the central and eastern U.S. have generally higher-than-average values. There is a distinct gradient in the southeast, particularly from Georgia through South Carolina. This marks an area of expanding drought.

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