Issue 743

K-STATE Research and Extension

Extension Agronomy

eUpdate

04/19/2019

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.

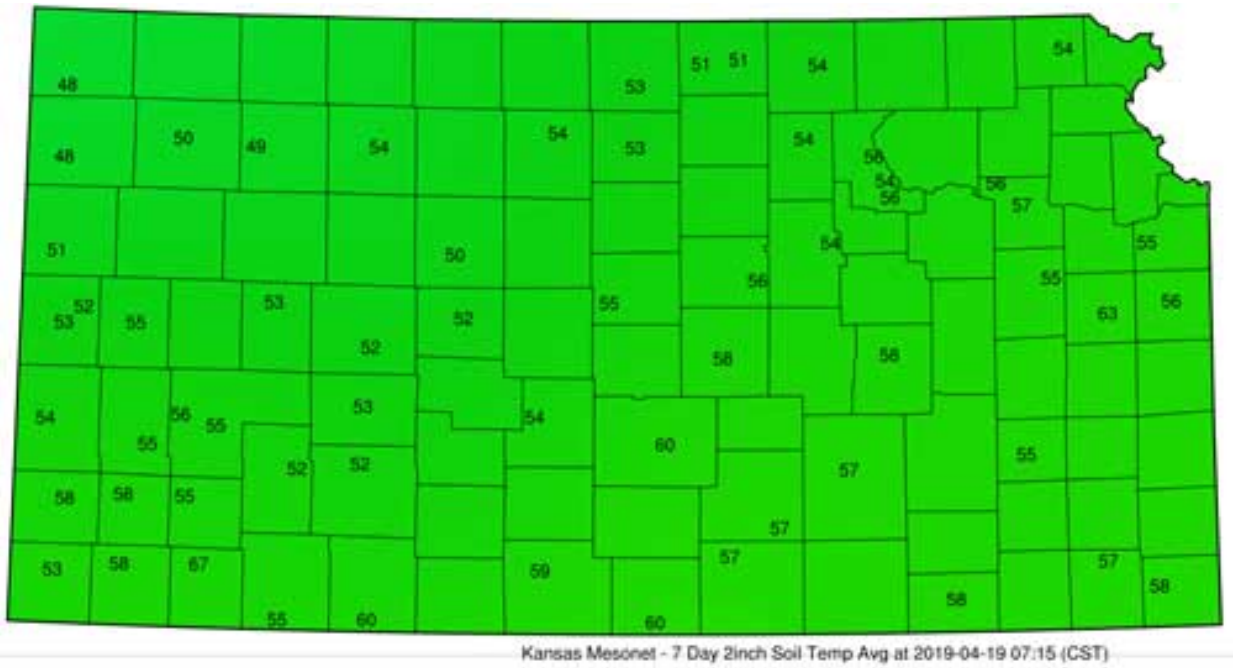
Subscribe to the eUpdate mailing list: https://listserv.ksu.edu/cgi-bin?SUBED1=EUPDATE&A=1

eUpdate Table of Contents | 04/19/2019 | Issue 743

1. Soil temperature and cold injury for corn

Selection of the optimal planting date is one of the most critical factors in the decision-making process for producers. In making this decision, producers should consider soil temperatures rather than just calendar dates. Soils have been slow to warm this year, due to the wetter-than-normal conditions during the fall and winter, as well as the cooler-than-normal temperatures that have lingered into April.

For this week (April 13-19), the average soil temperature at 2 inches ranged from 48 degrees F in northwest Kansas to 67 degrees F in the southwest. Temperatures at the 4-inch depth are not much different. Weekly average soil temperatures at the 4-inch depth ranged from 48 degrees F in the northwest to 60 degrees F in south central Kansas (Figure 1).



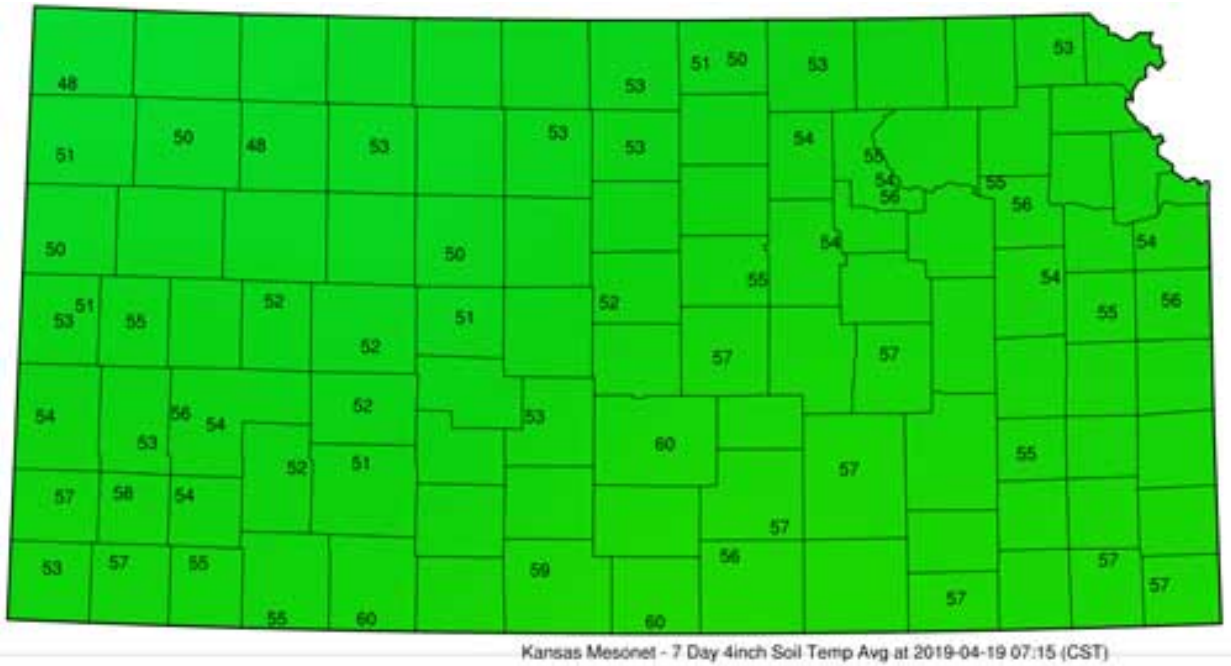


Figure 1. Average soil temperatures at 2-inch (upper panel) and 4-inch (lower panel) soil depth for the week of April 13 - 19, 2019.

Daily soil temperature variation within the last week (7-day report) was recorded across Kansas for several locations (Figure 2), presenting variations around 20 degrees F. There has been a fairly steady warming pattern across the state, with the steepest increase visible in northeast Kansas at the Hiawatha station. Soil temperatures were above 60 degrees F by Wednesday, April 17, in several locations, before dropping to at or less than 45 degrees F on Friday, April 19 (Figure 2).

Figure 2. 7-day soil temperatures (2- and 4-inch soil depth) for Hiawatha, Ottawa, Parsons, Mitchell, McPherson, and Garden City. 2-inch depth represented by yellow line; 4-inch depth represented by orange line. Graphs produced by the Kansas Mesonet.

Chilling injury to seeds

Cold temperatures can result in injury to the germinating seed as it is absorbing moisture – a problem called imbibitional chilling injury. Damage to germinating seeds can occur when soil temperatures remain at or below 50 degrees F after planting.

Soil temperatures at the 4-inch depth during the first 24-72 hours after planting are critical. It is during this window that the kernels imbibe water and begin the germination process. Kernels naturally swell when hydrating – taking in water. If the cell tissues of the kernel are too cold, they become less elastic and may rupture during the swelling process, resulting in "leaky" cells. Injury symptoms may include swollen kernels that fail to germinate or aborted growth of the radicle and/or coleoptile after germination has begun.

Chilling injury can also occur following germination as the seedlings enter the emergence process. Chilling injury to seedlings can result in:

- Reduced plant metabolism and vigor, potentially causing stunting or death of the seminal roots
- Deformed elongation ("corkscrewing") of the mesocotyl
- Leaf burn (Figure 3)
- Delayed or complete failure of emergence, often leafing out underground

Chilled seedlings may also be more sensitive to herbicides and seedling blights.

Before making any decisions, fields should be scouted 4-7 days after the cold occurred since the extent of the damage and potential for new growth will be evident during this time.

Figure 3. Leaf burn from freeze damage early after corn emergence. Photo by Ignacio Ciampitti, K-State Research and Extension.

Producers should consider all these factors when deciding on the planting time. More information about the planting status of summer row crops will be provided in upcoming issues of the Agronomy eUpdate. Stay tuned!

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
ciampitti@ksu.edu

Mary Knapp, Weather Data Library
mknapp@ksu.edu

2. First reports in Kansas of wheat rust activity for 2019

Wheat in Kansas is rapidly moving through the vegetative stages of growth. Wheat in the southeastern and south central region is likely at jointing and approaching flag leaf emergence. In other areas of the state, the crop is still tillering or just beginning to joint. These growth stages mean it is time to ramp-up efforts to monitor for disease.

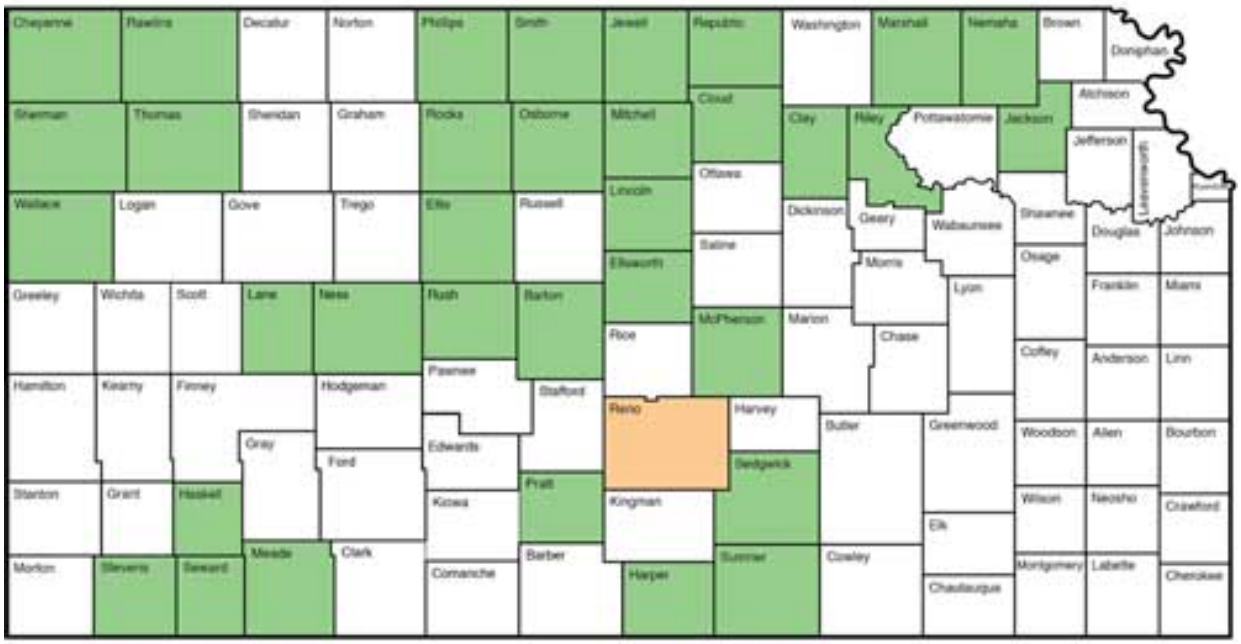
Survey work and field checks for this week indicate that diseases remain at low levels in most areas of the state. However, there are a few reports of rust activity that are cause for concern. In this case, both leaf rust and stripe rust (Figure 1) were discovered in research plots located in Reno county (Figure 2). The diseases were found in varieties of wheat known to be susceptible, meaning there is no evidence of changes in the populations of rust fungi to date. The disease was located in mid-canopy and still at low incidences (less than 1%).

Figure 1. Wheat with symptoms and signs of leaf rust and stripe rust. Images from Reno County near Hutchinson KS provided by Bob Bowden, USDA Wheat Pathologist.

The wheat at this location was just beginning to joint, which leaves plenty of time for these diseases build to damaging levels and move to the upper leaves where they can negatively affect crop yield.

Distribution of Wheat Leaf Rust

April 19, 2019



Disease Risk

- Leaf rust not observed
- Leaf rust observed on lower leaves
- Leaf rust observed on upper leaves

Disease observation map based on reports from: KSU E. De Wolf, R. Bowden, R. Lollato, L. Haag, S. Duncan, S. Campbell, J. Carr, J. Falk Jones, A. Esser, D. Hallauer, R. Horag, T. Huss, C. Long, M. Mackley, S. Marston, C. Miller, J. Sellen, C. Swanson, R. VanSickle, S. Wick; Growers: J. Blas, D. Folger, V. Ehmke

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

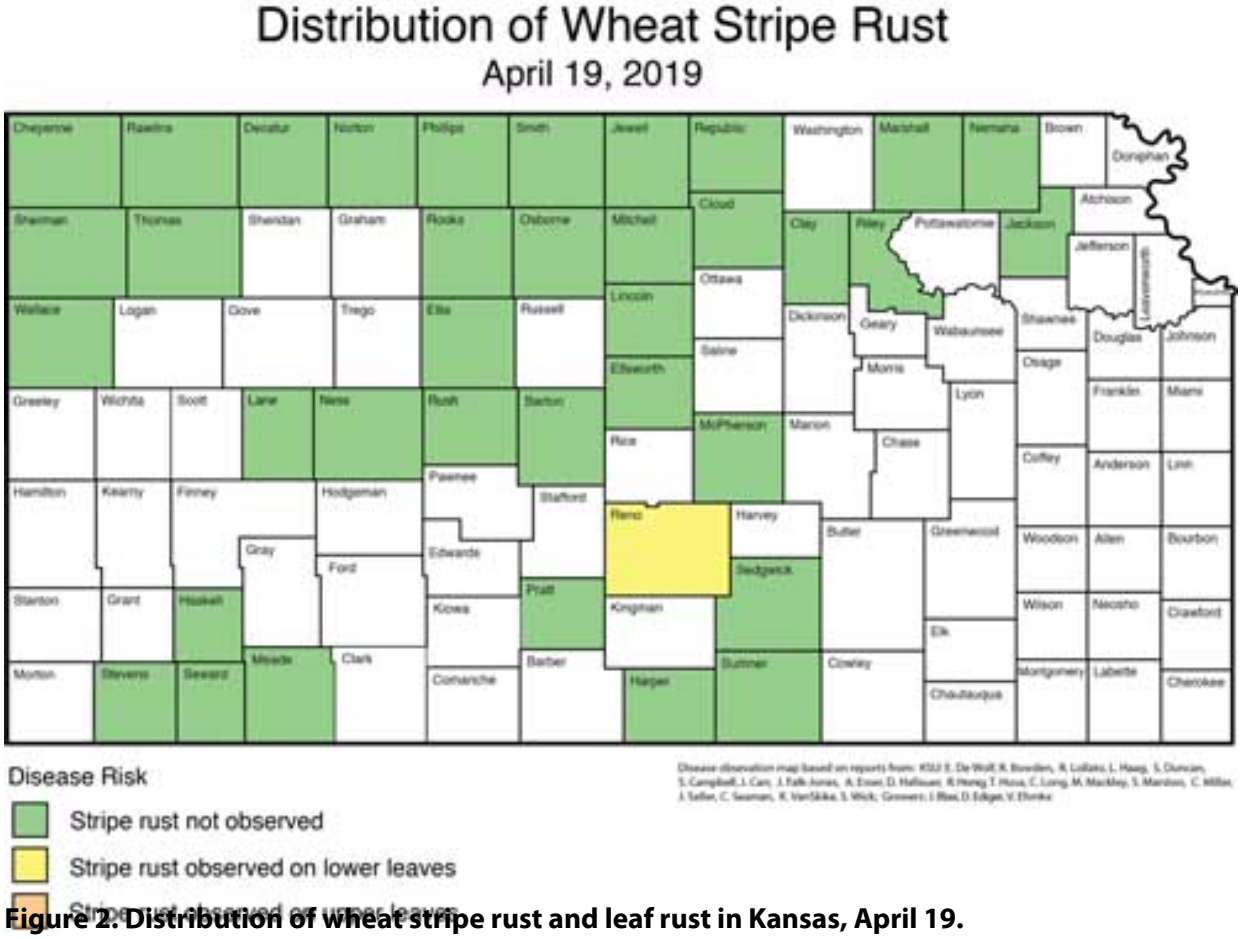


Figure 2. Distribution of wheat stripe rust and leaf rust in Kansas, April 19.

While there is no immediate need for management activities, these reports are a helpful reminder that it is time for growers to intensify their efforts to monitor for disease. If weather conditions are favorable, the crop may need a fungicide to help protect yield potential. Scouting efforts should focus on wheat varieties known to be susceptible to the rust diseases and seed production fields that have value.

K-State Research and Extension have already increased their efforts to track the progress of rust in this year's wheat crop. Stay tuned for more updates soon.

Erick DeWolf, Extension Plant Pathologist
dewolf1@ksu.edu

3. Wheat fungicide publication: Updated for 2019

Many wheat growers may be thinking about fungicide applications to control stripe rust and other leaf diseases this spring. K-State Research and Extension just released a newly revised publication that could help growers decide which products might a good fit for their needs.

The publication *Foliar Fungicide Efficacy for Wheat Disease Management* can be found at: http://www.bookstore.ksre.ksu.edu/pubs/EP130.pdf

This publication presents the results of years for testing of these fungicide products in head-to-head comparisons from Kansas and many other states. The publication is not intended to be an exhaustive list of all available options but does cover most of the products widely marketed in Kansas.

Research conducted by K-State indicates that a single fungicide application made to susceptible wheat varieties when the risk of disease is high will often result in a 4 to 13 percent yield increase, with an average increase of approximately 10 percent relative to untreated wheat. Important considerations when making fungicide application decisions include application timing, timely disease scouting, and knowledge of the vulnerabilities of different wheat varieties.

In general, growers have access to many products that can provide very good to excellent control of stripe rust, leaf rust, and other common leaf diseases. There are some important differences with respect to control of Fusarium head blight (wheat scab). In this case, fungicides belonging to the triazole class of fungicides are the best option, with Caramba, Miravis Ace, and Prosaro providing the best available suppression (only 40-50% control in many tests).

There are also significant differences in product price. With low wheat prices, it could be important for growers to do their homework before pulling the trigger on any possible fungicide application this year. Historically, the cost of fungicide products range from about $2 to $15 per acre, with generic tebuconazole (Folicur), and propiconazole (Tilt) products being the lowest-cost options.

Erick De Wolf, Extension Plant Pathology
dewolf1@ksu.edu

4. Alfalfa weevil update - Dramatic increase in activity

Alfalfa weevil populations seem to have "exploded" around north central Kansas in the past week. Tiny alfalfa weevil larvae were first detected in north central Kansas on April 5, but probably a few started hatching a day or two prior. However, the infestation levels that were detected on April 5 and 6 were all well below 10%, and mostly less than 1%. In contrast, fields sampled on April 16 all greatly exceeded 100% infested using the stem shake bucket method and large numbers of different stages of larvae were detected (Figure 1).

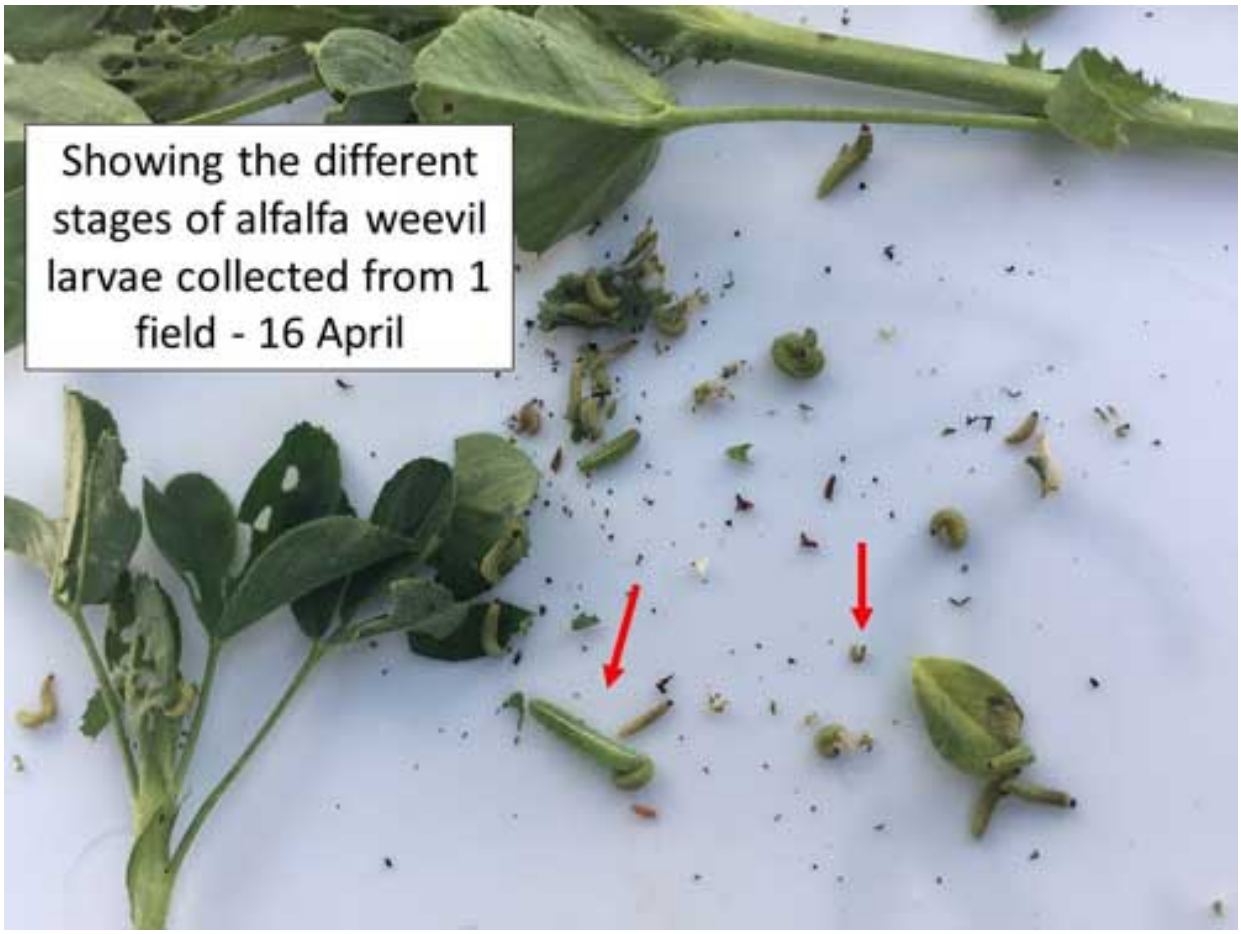


Figure 1. Different stages of alfalfa weevil larvae collected from a field on April 16, 2019. Photo by Extension Entomology, K-State Research and Extension.

To sample using the "shake bucket" method, randomly select individual alfalfa stems and quickly and vigorously shake them into a small white bucket. Then, count the number of dislodged larvae in the bucket and divide by the number of stems to get the infestation level. For example, 15 larvae from 10 stems = an average of 1.5 larvae/stem. Do this in several areas throughout each field to get a good indication of the alfalfa weevil infestation level and the stage of development of the weevil. One of the problems with the shake bucket method is that some stems have several larvae/stem while

others have none (yet). Thus, the infestation level may appear to be higher than the actual infestation.

However, in north central Kansas, with as many larvae as there are already (with more to come probably) and as much damage as we are starting to see in spots (Figure 2), it may be prudent to treat fields as soon as possible.

Figure 2. Visual signs of damage by alfalfa weevils. Photo by Extension Entomology, K-State Research and Extension.

For information on insecticides registered for use for alfalfa weevil control, please see the K-State Alfalfa Insect Management Guide: https://www.bookstore.ksre.ksu.edu/pubs/mf809.pdf

Jeff Whitworth, Extension Entomologist
jwhitwor@ksu.edu

Holly Davis, Entomology Research Associate

Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

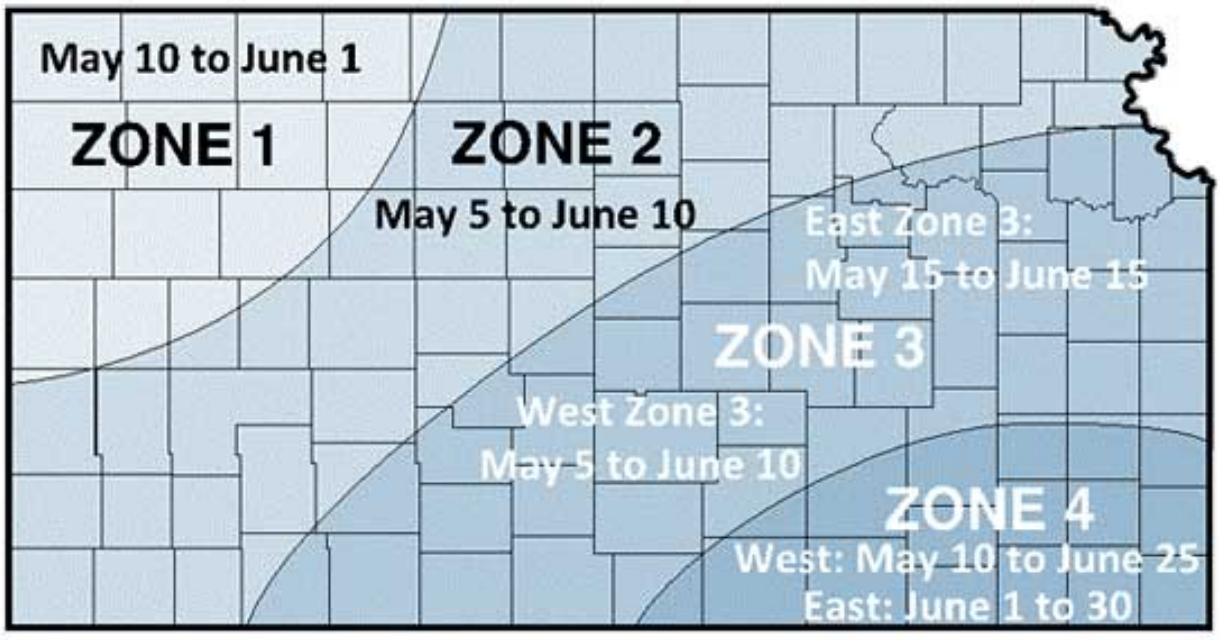
holly3@ksu.edu

5. Soybean planting dates and maturity group: K-State recommendations

After considering the effects of genetic yield potential and the environment, planting date is one of the primary management practices under the farmer's control that can highly influence soybean yields. In recent years, Kansas producers have been planting soybeans slightly earlier -- at the rate of about one third-of-day per year. The past growing seasons, however, the "50% planting date" mark was achieved at a similar time (first week of June) statewide.

Kansas planting dates and maturity groups

Soybeans can be planted over a wide range of dates (Figure 1, upper panel) with adequate soil moisture conditions, although germination and emergence could be reduced and/or delayed in cool soils (less than 60 degrees F). The recommended maturity varies across Kansas by area (Figure 1, lower panel).



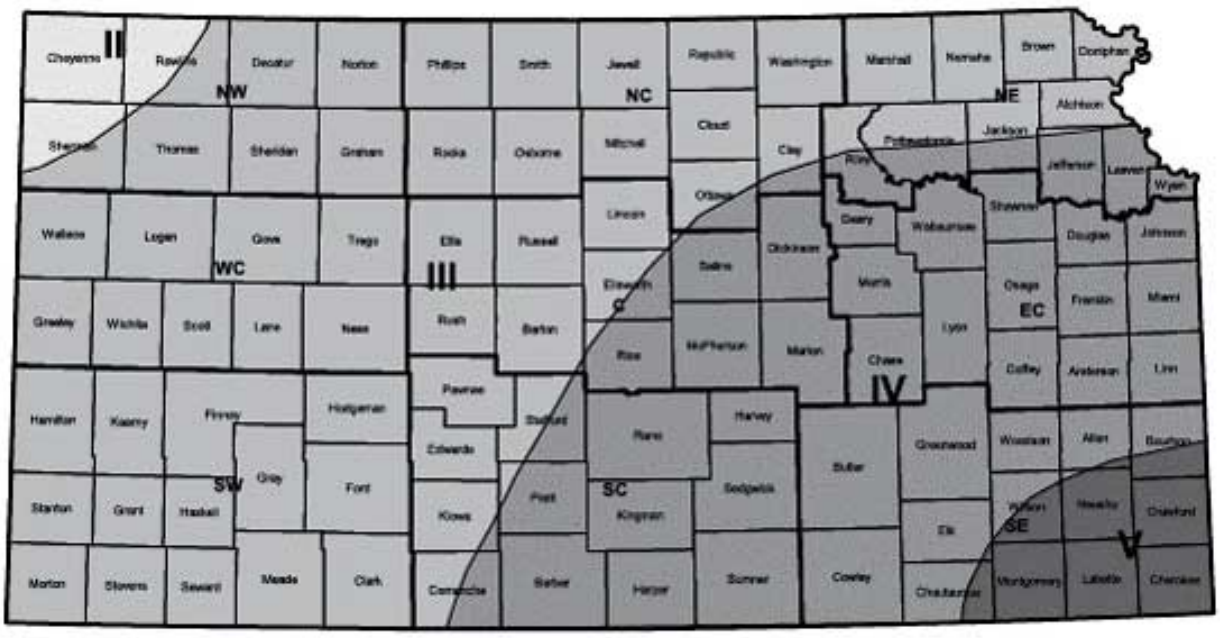


Figure 1. Recommended soybean planting dates (upper panel) and suggested maturity groups (bottom panel) across Kansas. Maps from K-State Research and Extension.

Recommendations

- Ultimately, weather patterns dictate soybean yields, especially under dryland conditions. There is no guarantee that any certain planting date will always work out the best when it comes to soybean yields in Kansas. In fact, the distribution and amount of rainfall and the day/night temperature variations around flowering and during the grain filling periods have large impacts on defining soybean yield potential. Thus, when the risk of drought stress during the growing season is high, diversifying planting dates may be a good approach to consider.

- When planting early, seed should be treated with a fungicide and insecticide. Selecting varieties with resistance to soybean cyst nematode and sudden death syndrome is advisable. Do not plant into soils that are too wet. Also, do not plant until soil temperatures are close to 60 degrees F. If planted into soils cooler than 60 degrees F, seedlings may eventually emerge but will have poor vigor.

- In drier areas of Kansas and on shallow soils, yields have been most consistent when planting soybeans in late May to early June. By planting during that window, soybeans will bloom and fill seed in August and early September, when nights are cooler and the worst of heat and drought stress is usually over.

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
ciampitti@ksu.edu

Compared to corn, wheat, and sorghum, soybeans remove significant amounts of nutrients per bushel of grain harvested. Nutrient uptake in soybeans early in the season is relatively small. However, as they grow and develop, the daily rate of nutrient uptake increases. Soybeans need an adequate nutrient supply at each developmental stage for optimum growth. High-yielding soybeans remove substantial amounts of nutrients from the soil (for example, approximately 0.8 lbs of P_2O_5 and 1.4 lbs of K_2O is removed per bushel of soybean). This should be taken into account in an overall nutrient management plan.

Nitrogen (N)

Nitrogen is supplied to soybeans mainly by nitrogen fixation, and fertilizer nitrogen application is not recommended if the plants are well-nodulated. Soybeans are heavy users of N, removing a total of 130 pounds per acre, and about 44 pounds with the stover, for a 40-bushel-per-acre soybean crop. Soybeans use all the N they can fix, plus N from the pool of available N in the soil. Nitrogen fertilizer application to soybean seldom results in any yield benefit. Instead, efforts should focus on ensuring proper inoculation.

Phosphorus (P)

Phosphorus applications should be based on a soil test. Responses to direct P fertilization is generally consistent in soils testing very low or low in soil test P. Response to starter P fertilizer application in soybeans can occur, but it depends on several factors. The most important factor is the soil test level. Generally, warmer soils at soybean planting, compared to corn, also may contribute to typically lower response to starter fertilizers in soybeans. However, starter fertilizer in soybeans can be a good way to complement nutrients that may have been removed by high-yielding crops in the rotation like corn. Banding fertilizer at planting is an efficient application method for soybeans. Keep in mind that soybean seeds are easily injured by fertilizer, therefore, no direct seed contact with fertilizer is advised.

Potassium (K)

Soybean seeds are relatively high in K and removal of K by soybeans is greater than for other crops on a per-bushel basis when only the grain is removed. As with P, a soil test is the best index of K needs. Soils testing very low or low should be fertilized with K, either as a banded starter at planting or broadcast and incorporated. Potassium should not be placed in contact with the soybean seed because of possible salt injury. Yield increases from K can be significant, and in some cases, more than yield responses to P for soils testing low or very low.

Sulfur (S)

Sulfur is a mobile nutrient in the soil (leaching is common), but fairly immobile in the plant. High soil test variability, along with significant uptake by crops, generates the need for proper S management, especially in sandier soils and fields with several different soil types. Recent studies in Kansas suggest

a low probability of soybean response to S application. However, S removal with soybeans can be significant, and more sensitive crops in the rotation, such as wheat, may require S fertilization.

Iron

Iron deficiency symptoms appear in irregularly-shaped spots randomly distributed across a field, primarily in fields with a previous history of iron deficiency. Different annual weather patterns can make iron chlorosis (yellowing of leaves) more or less prevalent. Iron chlorosis also differs under different soil conditions. In general, high soil pH and high carbonates (free lime) can increase the incidence of iron deficiency. Iron chlorosis can be a big limitation in some regions of western Kansas. Iron fertilizer using chelated sources, and in direct contact with the seed (in-furrow), has shown significant yield responses in soils with a history of iron deficiency. If iron chlorosis has been a common problem in the past, producers should select a soybean variety tolerant to iron deficiency. It may be beneficial to use a chelated iron in-furrow application. Foliar iron treatments seldom result in a yield increase.

Other nutrients

Zinc, manganese, and boron are other nutrients that can be limiting in soybeans. The need for zinc should be determined by soil tests. Zinc fertilizer can be either banded at planting or broadcast preplant with little difference in response when applied at an adequate rate. Both organic and inorganic zinc sources (chelates and non-chelates) can be used, but chelates are considered more effective than the inorganic sources.

Manure applications also are effective at eliminating micronutrient deficiency problems, including iron. Monitoring nutrient levels with tissue analysis along with soil tests conducted during the crop season should be used to diagnose potential nutrient deficiencies. Stresses such as drought, heat, and pest pressure can all influence tissue test results.

Some micronutrients also can cause phytotoxicity if prevalent in large quantities. Nutrient removal by soybean is very high in high-yielding environments, thus fertilizer application rates should be high or soil test levels will drop. Regular soil testing (every 2 to 3 years) is essential for optimum nutrient management. Soybeans take advantage of residual phosphorus and potassium, but keep in mind the total nutrient needs in the rotation.

See K-State Research and Extension publication *Soil Test Interpretations and Fertilizer Recommendations*, MF2586 for more complete soybean fertilizer recommendations: http://www.ksre.ksu.edu/bookstore/pubs/MF2586.pdf

For more information, see *Kansas Soybean Management 2019*, K-State Research and Extension publication MF3154: http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf

Dorivar Ruiz Diaz, Nutrient Management Specialist
ruizdiaz@ksu.edu

7. Environmental Microbiologist to Present International Agronomy Lecture, April 23

Renowned international environmental microbiologist James Prosser will present the 4th Chuck and Sue Rice International Agronomy Lecture at 3 p.m., April 23 in the McVay Family Town Hall, Leadership Studies building on the K-State campus. The title of the lecture is "Harnessing Soil and Plant Microbiomics for Agriculture: Hype, Hope, and Reality." The lecture is free and open to the public. A reception and poster session will be held in the Bluemont Room in the K-State Student Union at 4:30 p.m. following the lecture.

Dr. Prosser is also presenting this lecture as part of the National Academies of Sciences, Engineering, and Medicine Board on Agriculture and Natural Resources (BANR) 75th Anniversary. K-State University Distinguished Professor Chuck Rice serves as the BANR board chair.

Jim Prosser is Professor of Environmental Microbiology in the School of Biological Sciences at the University of Aberdeen. He was awarded a BSc in Microbiology by Queen Elizabeth College, University of London in 1972 and a PhD by the University of Liverpool in 1975. He then carried out postdoctoral research in Liverpool before moving to a lectureship at the University of Aberdeen, where he holds a Personal Chair.

Microorganisms have important positive and negative impacts on agricultural production. For example, nitrogen-fixing bacteria support crop growth, while microbial pathogens can devastate crops and livestock. Some of these specific interactions are well studied, but microbes play broader, equally crucial roles in agriculture. They establish and maintain soil structure, quality, and health and decompose dead plants and animals and break down pollutants. They also have detrimental environmental and economic effects like generating greenhouse gases and reducing fertilizer use efficiency. These broad functions are under-appreciated, in part because microbes are "invisible". In addition, they are performed by complex communities of microbes whose abundance, identity, function, and even existence were difficult or impossible to determine using traditional approaches.

The past 25 years has seen the development and application of a range of 'microbiomics' techniques that have dramatically increased our ability to study soil microbes. They have demonstrated previously unsuspected, enormous diversity and important soil functions for newly discovered, novel microbial groups. However, they are not perfect. They have their own limitations and, importantly, have highlighted fundamental issues regarding microbes and their communities that challenge the ways in which we study soil microbiology and arguably suggest a need for a more 'scientific' approach if the benefits for agriculture are to be realized.

Dr. Prosser's research focuses on the ecophysiology, diversity and ecosystem function of soil microorganisms, with particular emphasis on ammonia oxidizers, which play a central role in the global nitrogen cycle. His research has involved the development of molecular techniques to characterize natural communities of soil microorganisms, and their activities, and the use of model systems to address ecological questions.

He is a Fellow of the Royal Society, the Royal Society of Edinburgh, the Royal Society of Biology and the American Academy of Microbiology and was awarded an OBE for services to Environmental Science in 2013. He has an Honorary Degree from the University of Ljubljana, is a CAS Distinguished

International Professor and is Special Reviews and Commentaries Editor for ISME Journal and on the Editorial Boards of several other microbial ecology journals.

More information is available by contacting the Department of Agronomy at 785-532-6101 and lecture information can be found at https://bit.ly/2Ghpjc2.

Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

8. Cover crops morning field day, April 25 in Geary County

Cover Crops and Coffee

April 25 / Geary County, KS

8:00 / Registration starts (coffee and cinnamon rolls served)

8:30 / Welcome, Peter Tomlinson & Chuck Otte

8:45 / Cover crop updates

- Soil health / Laura Starr
- Water quality / Elliott Carver
- Corn and Soybean yields and economics / Nathan Nelson

9:45 / Questions and wrap-up

The **field day location** is at the intersection of Howard Rd and Clarks Creek Rd southeast of Junction City. Use the following link to open directions in Google Maps.
https://bit.ly/2JYevEZ

KANSAS STATE UNIVERSITY
Department of Agronomy

For more information:

Peter Tomlinson
ptomlin@ksu.edu
785-532-3198

Chuck Otte
cotte@ksu.edu
785-238-4161

K-STATE Research and Extension
Geary County