Issue 734

K-STATE Research and Extension

Extension Agronomy

eUpdate

03/01/2019

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.

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1. Fertilization of tall fescue and smooth bromegrass pastures and hayfields

Much of the nitrogen (N) applied to tall fescue and smooth bromegrass hay meadows and pastures goes on in January or February in eastern Kansas, but there is still time to apply it now particularly given colder temperatures this year. The amount and timing of N depends on whether the field is hayed or grazed; how much, if any N was applied in the fall; the price of N and hay; and the growing conditions since last fall.

Nitrogen fertilization for hay production

Normal N fertilization rates for established fescue and bromegrass hay fields are 90 to 120 pounds actual N per acre, or about 30 pounds of N per ton of expected yield. A summary of K-State N response data shows the average yields for unfertilized brome and fescue were about 1.4 tons of hay per acre, while maximum yields averaged 3.2 tons of hay with 140 pounds of N (Figure 1).

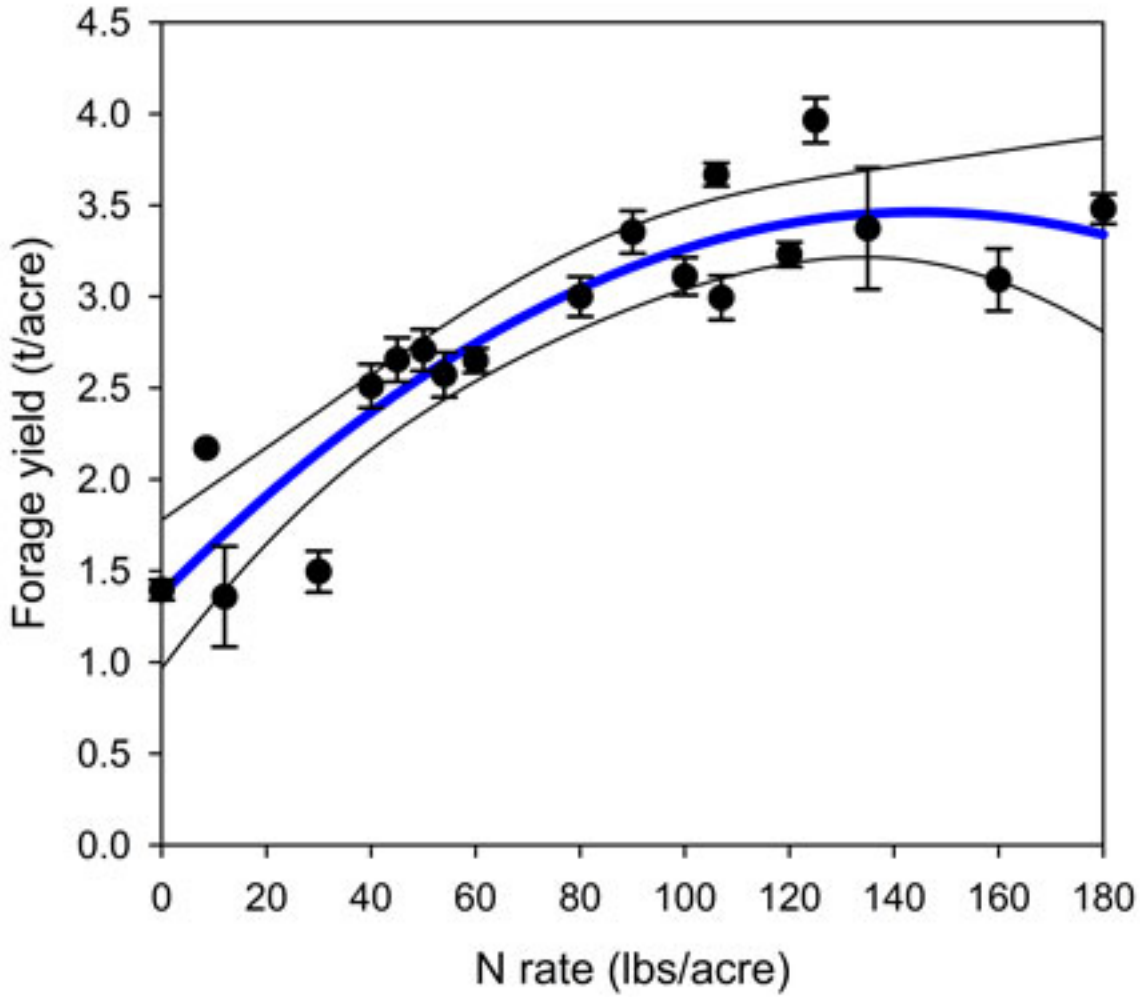

Figure 1. Forage response to nitrogen fertilizer application across multiple years in Kansas. Graph provided by Dorivar Ruiz Diaz, K-State Research and Extension.

Protein levels will also be increased at the higher N fertilizer rates, assuming timely harvest. In cases where producers are relying on high-quality hay as their primary protein source, they will want to push N rates to the upper end of the recommended range.

Timing of N application is another factor to consider. While most growers apply all the N and any needed P and K for hay production in a single application in the spring, research in Kansas has shown that applying all the fertilizer in the fall will normally result in slightly higher yields, though the protein values will normally be slightly lower. Fall applications of N and P stimulate root growth and produce more tiller buds, resulting in more stems the following spring.

Nitrogen fertilization for pastures

Under normal conditions, tall fescue and smooth bromegrass pastures that are grazed in both spring and fall should receive about 100 pounds total N per acre, with 60% applied in the winter or early spring and 40% of the N along with any needed P and K in late August or early September. So producers should plan on applying 60 to 70 lbs N per acre in late winter or early spring, starting as early as January in southeast Kansas or February in the central and northern parts of the state.

P and K fertilization

Both smooth bromegrass and fescue are efficient users of soil P and K. One of the reasons for this is the dense root system -- two to three times more roots per unit of soil volume than corn or soybeans. As a result, these crops can grow and thrive at lower soil test levels than other crops commonly grown in Kansas. But both smooth bromegrass and fescue do remove about 12 pounds of P_2O_5 and 40 pounds of K_2O per ton of hay, which will lower soil test values. Thus, these grasses will respond to P and K fertilization on soils with low or very low soil test levels. Recent work in northeast Kansas has shown response to applied P at soil test levels below 12-15 ppm. P and K application rates should be based on soil tests, as with most crops.

In any type of fertilizer management program for tall fescue and smooth bromegrass, whether for hay production or grazing, needed phosphorus and potash should be applied in the late summer or fall for best results, along with a light application of N. Research with smooth bromegrass and fescue production has shown that fall applications of N and P, while these cool-season grasses are still actively growing, will help the grass develop a good root system for the winter, and develop buds for new tillers the next spring. P and K applied in late winter or early spring won't provide the same benefits.

One option for hay production not widely used is to apply all the N, P, and K needed for the following year in late fall, rather than early spring. Research has shown that the yields from a late- fall application are actually higher than from an early spring application, but the protein levels in the hay are slightly lower (a dilution of the N due to higher biomass production). The increased production from a late fall application is due to the stimulation of root growth and production of additional tiller buds.

Other considerations

One additional nutrient producers should be aware of for tall fescue and smooth bromegrass pastures or hayfields is sulfur (S). If the pasture or hayfield is receiving adequate nutrients and precipitation, but is dropping off in production, it could be deficient in S. Sulfur deficiency will cause a general reduction in forage production long before it results in visual deficiency symptoms. An application of S to a tall fescue or smooth bromegrass pasture or hayfield that is deficient in S can result in forage yield increases up to 500 to 800 lbs per acre.

Sulfur is taken up by plants as sulfate. If a sulfur application is needed to correct a deficiency in a growing crop, a sulfate-S source should be used, such as ammonium sulfate or gypsum. Elemental sulfur sources can be used if applied far enough in advance of crop uptake needs to allow soil organisms to oxidize the S to sulfate. This will normally take several weeks to months, depending on soil temperature and moisture.

To determine whether P, K, S, and lime are needed on tall fescue and smooth bromegrass fields, producers should consider soil sampling. The best time to sample is in the fall, prior to fertilizer application. Samples for a P and K soil test should be taken to a 6-inch depth. A profile S test to a depth of 24 inches should be used to evaluate S needs.

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2. Palmer amaranth resistance to 2,4-D and dicamba confirmed in Kansas

Palmer amaranth is one of the most economically-damaging and difficult-to-control broadleaf weeds across the United States. Previously, Palmer amaranth in Kansas has developed resistance to group 2 (ALS), 5 (atrazine), 9 (glyphosate), and 27 (hppd – mesotrione, Huskie, Laudis, Impact, and Armezon) herbicides, leaving growers with very few postemergence options to manage this weed. Dicamba and 2,4-D (group 4) have been used for many years to help control Palmer amranth, but farmers have complained about poor control in recent years. Recent research at K-State has confirmed the occurrence of dicamba and 2,4-D resistance in a Palmer amaranth population collected from a long-term conservation tillage study at the K-State Agronomy Ashland Bottoms Experiment Field in southern Riley County. This is the first confirmed case of resistance to dicamba and 2,4-D in Palmer amaranth, further magnifying the challenge to manage this weed in conservation tillage systems.

To confirm 2,4-D resistance, plants that survived the field recommended rate (1X) of 2,4-D (0.5 lb ae/a) applied in the summer of 2018 were transferred to a greenhouse attached to the Department of Agronomy at K-State and were allowed to set seeds. Upon maturity, the seeds were collected, and Palmer amaranth progeny were raised. Using these progeny, a 2,4-D dose-response study was conducted to understand the level of resistance in the suspected resistant population relative to two known 2,4-D-susceptible populations. Results at 21 days after 2,4-D application showed that the resistant progeny survived up to a 16X (8 lb ae/a) dose of 2,4-D, while susceptible plants were completely killed with 1 lb ae/a or less (Figure 1). This population exhibits about 8- to 10-fold resistance to 2,4-D.

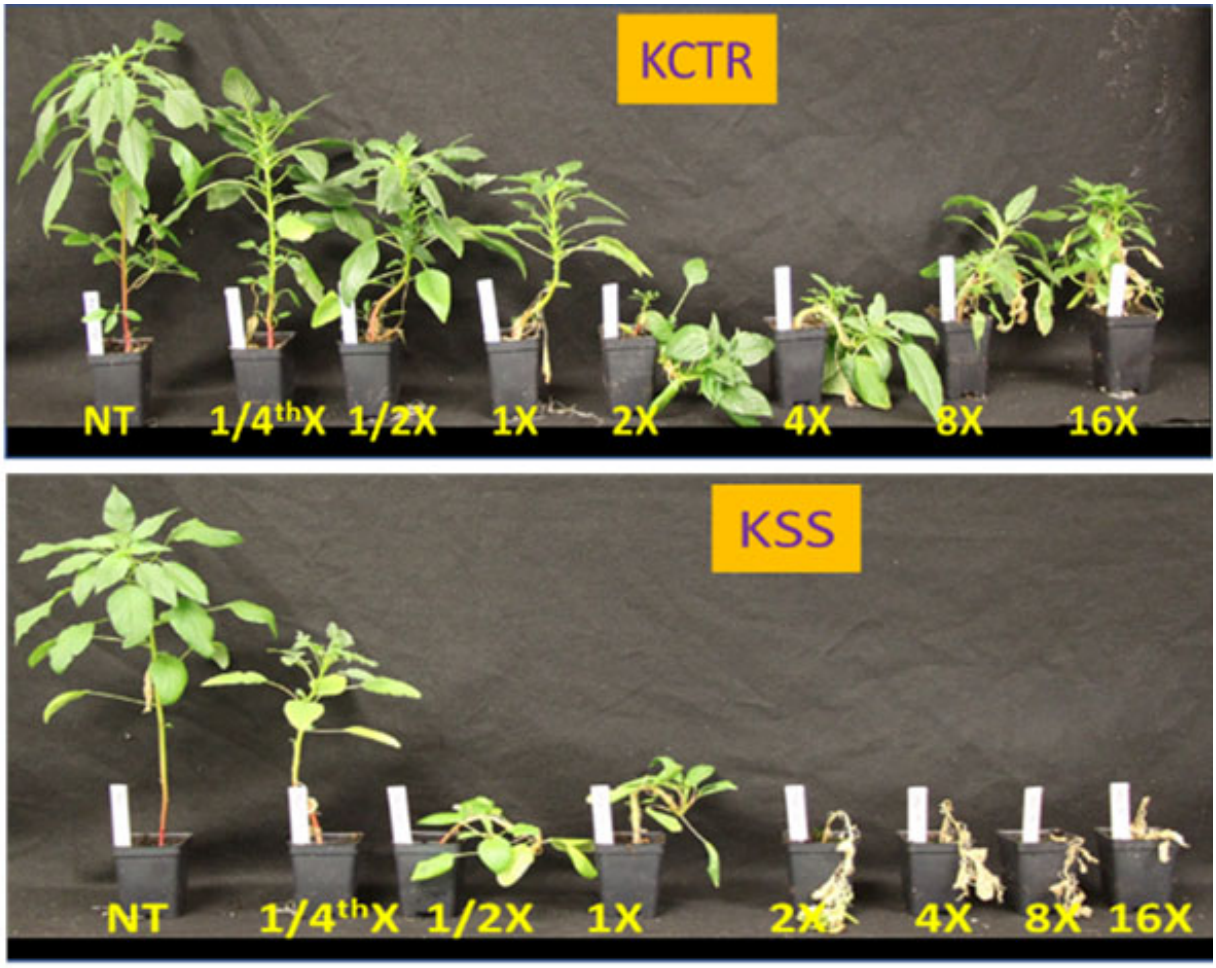

Figure 1. Palmer amaranth response to 2,4-D 21 days after treatment (1X = 1/2 lb. ae/a; NT = no treatment). Top panel: Resistant population from long-term no-till sorghum plots. Lower panel: Susceptible population harvested from nearby several years earlier. Photos provided Dept. of Agronomy, K-State Research and Extension.

The progeny of the same seed referenced above were also treated with a field-recommended rate of dicamba (0.5 lb ae/a) and showed a high rate of survival (81%), while the susceptible populations were controlled (Figure 2). Cross-resistance to different herbicides in group 4 herbicides has been reported in many other weeds. Experiments are in progress to determine the level of resistance to dicamba and other group 4 herbicides.

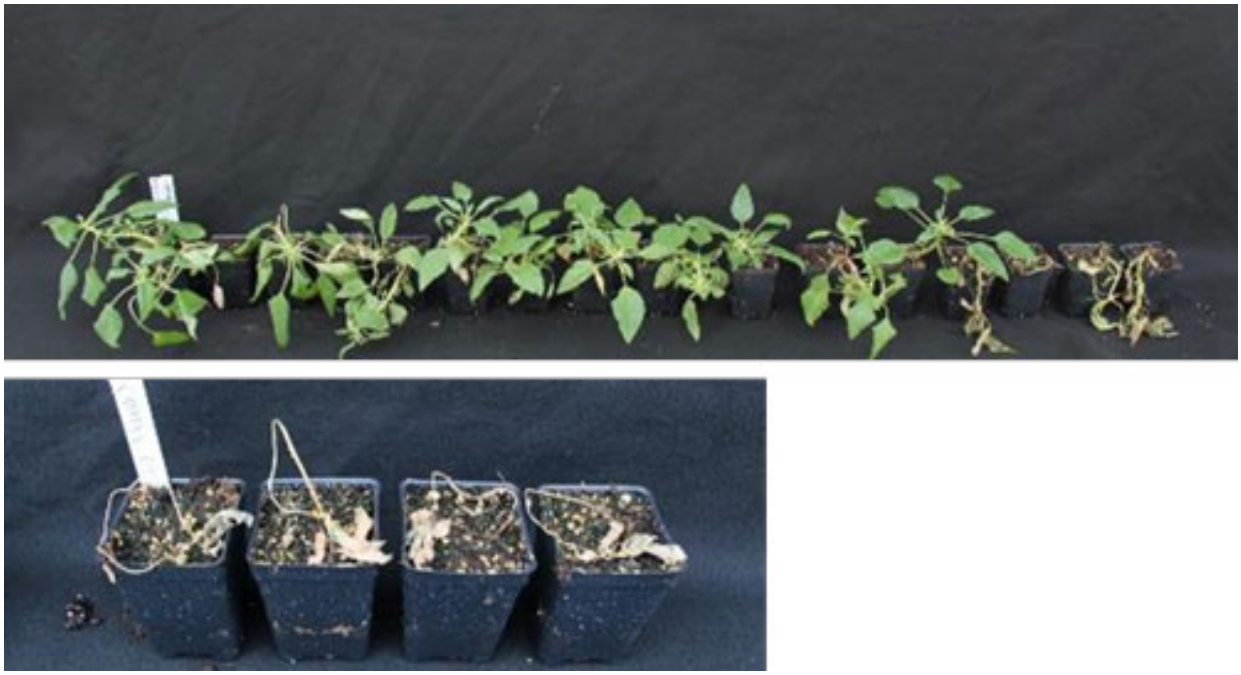

Figure 2. Palmer amaranth response to dicamba 21 days after treatment (0.5 lb. ae/a dicamba). Top panel: Resistant population from long-term no-till sorghum plots. Lower panel: Susceptible population harvested from nearby several years earlier. Photos provided Dept. of Agronomy, K-State Research and Extension.

Resistance to other herbicide sites of action

In addition to development of resistance to group 4 herbicides, preliminary research also indicates that this Palmer amaranth population survived application of group 27 (3 oz/a Callisto) and group 14 (10 oz/a Cobra) herbicides. Although resistance to group 27 herbicides in Palmer amatanth is increasing in KS, this population appears to have more survivors (88%) and a much higher level of resistance than previously reported. Resistance to lactofen is not yet officially reported in Palmer amaranth in Kansas. Our data suggests a high percentage of survivors (69%) in response to Cobra treatment compared to a known susceptible population that was completely controlled. Although group 14 herbicides can be effective in controlling pigweeds, thorough coverage on small weeds is essential for good control. We strongly suspect this population of Palmer amaranth is also resistant to atrazine, glyphosate, ALS herbicides, and perhaps s-metolachlor based upon field observations. Additional research will be conducted to further determine the extent of herbicide resistance in the Palmer amaranth.

This population of Palmer amaranth was found in a long-term conservation tillage experiment initiated over 45 years ago to compare different tillage systems and crop rotations. Palmer amaranth became increasingly difficult to control, especially in the continuous no-till grain sorghum systems. The plots were exposed to repeated use of herbicides labeled for grain sorghum, including group 5, 9, 14, 15, and 27 herbicides. These herbicides are known to be excellent options to control broadleaf species. Likewise, the adjacent plots were continuous no-till soybeans, with similar repeated herbicide programs in soybeans. These types of monocropping systems are the perfect scenario to develop herbicide resistance, but were established many years ago to compare the different

cropping systems prior to the time when herbicide resistance was much of a concern. This example further demonstrates the importance of a diversified crop rotation and weed control program utilizing multiple effective herbicide sites of action through time.

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3. Become a volunteer weather reporter in Kansas - Join CoCoRaHS

Have you wondered how much rain or snow has fallen? Have you noticed that what was reported at the official National Weather Service Cooperative site does not match what you observed at your location? There is a volunteer organization that is working to answer both questions: CoCoRaHS.

What is CoCoRaHS?

CoCoRaHS is an acronym for the Community Collaborative Rain, Hail and Snow Network. CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail, and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive website, the aim is to provide the highest quality data for natural resource, education, and research applications. CoCoRaHS has been active in Kansas since 2004. More observers are always very welcome.

Each time a rain, hail, or snow storm crosses your area, volunteers take measurements of precipitation from as many locations as possible. These precipitation reports are recorded on the website, https://cocorahs.org/. The data are then displayed and organized for the end users to analyze and apply to daily situations ranging from water resource analysis and severe storm warnings to neighbors comparing how much rain fell in their backyards. For example, Manhattan was able to document the highest rainfall amount during the Labor Day flood, thanks to a CoCoRaHS observer (Figure 1).

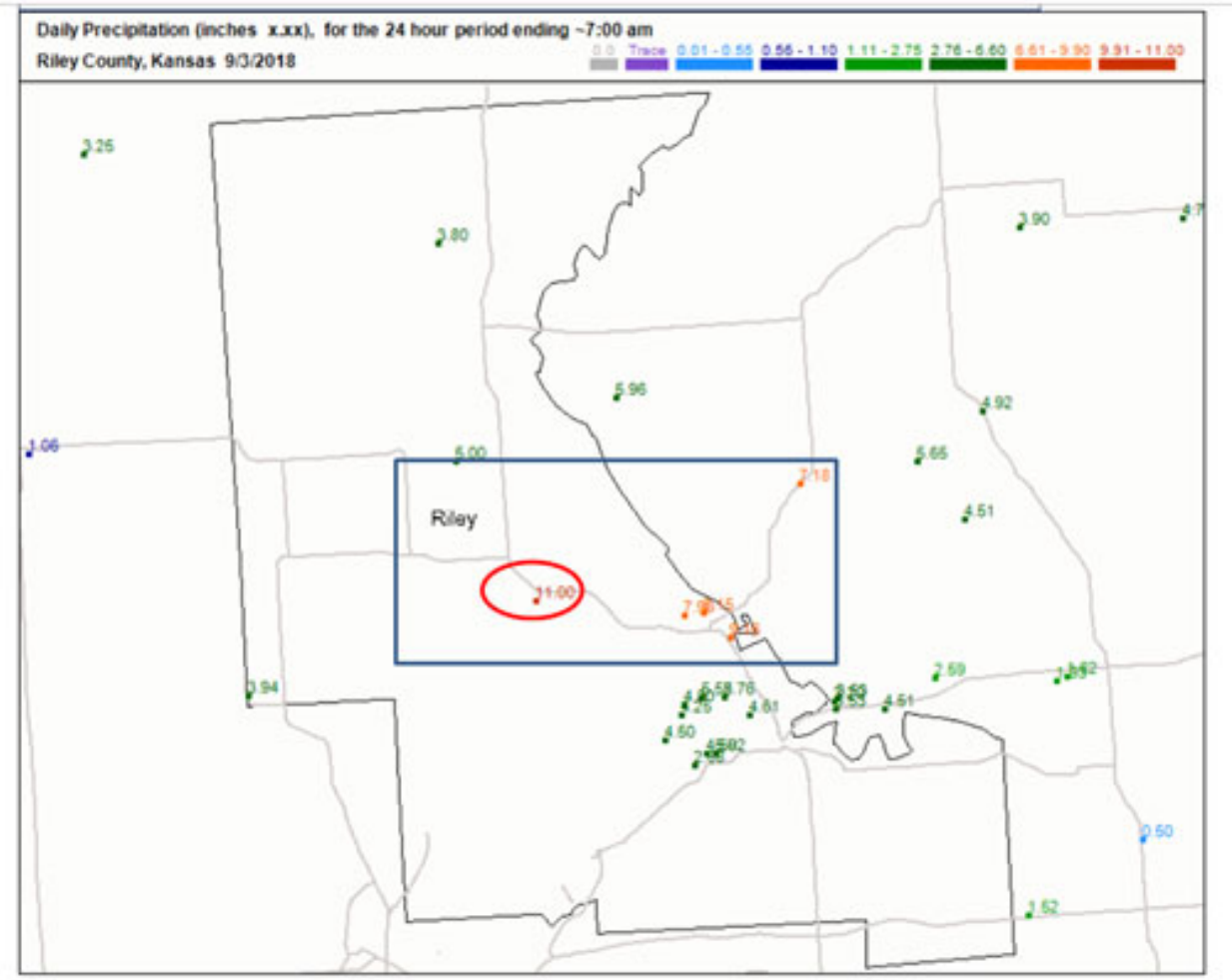

Figure 1. Riley County, KS CoCoRaHS reports for September 3, 2018.

Volunteers also report when it DOESN'T rain. Documenting the fact that a part of the county missed out on a precipitation event helps improve understanding of drought conditions. That information is also useful in improving radar and satellite rainfall estimates.

CoCoRaHS is used by a wide variety of organizations and individuals. The National Weather Service, other meteorologists, hydrologists, emergency managers, city utilities (water supply, water conservation, storm water), insurance adjusters, USDA, engineers, mosquito control, ranchers and farmers, outdoor & recreation interests, teachers, students, and neighbors in the community are just some examples of those who visit the website and use the data.

One of the neat things about participating in this network is coming away with the feeling that you have made an important contribution that helps others. By providing your daily observation, you help to fill in a piece of the weather puzzle that affects many across your area in one way or another.

March is the month during which the program focuses on recruiting new observers, but you are welcome to join at any time. To join CoCoRaHS, just go to the website CoCoRaHS.org and click "Join Now".

If you have questions about the program, contact Mary Knapp at Kansas State University by email at mknapp@ksu.edu or phone at 785-532-7019.

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4. 2019 Kansas dicamba training information: Frequently asked questions

The K-State Integrated Pest Management and Pesticide Safety Education program has compiled a short list of some frequently asked questions concerning the 2019 dicamba training protocols.

Do all dicamba product labels require the additional training?

You are required to have additional label-required dicamba training when applying the restricted use dicamba products: Engenia, FeXapan, or XtendiMax.

Where can I get the training for 2019?

- BASF - (webinars, online training and face to face)
  https://www.engeniastewardship.com/#/training
- Bayer/Monsanto - (online training and face-to-face)
  https://www.roundupreadyxtend.com/stewardship/education/Pages/default.aspx
- Corteva: (online training)
  https://www.corteva.us/products-and-solutions/crop-protection/fexapan.html

Do I need to attend training if I already did in 2018?

The labels of these products state that prior to applying this product in the 2019 growing season, all applicators must complete dicamba or auxin-specific training on an annual basis, so even if you attended in 2018 you will need to attend a training in 2019 prior to applying these products.

Do I need to be certified to use these products?

The new labels state that these formulations are for retail sale to and use only by certified applicators. In the state of Kansas, this means that everyone purchasing and using these products has to either obtain a private applicator license (application to agricultural lands owned or operated by individual) or a commercial applicator license (applicators applying to other people's land for compensation). If you have been applying under someone else's license in the past you will need to get your own

license if you are applying these products.

My hired hand and I both hold private applicators licenses. He will be doing all my spraying. I am taking the dicamba training, but does he also have to take the dicamba training?

Yes, anyone who applies one the RUP dicamba products must complete an approved dicamba training and hold either a private or commercial applicator license.

Do other states accept Kansas' state-approved RUP dicamba training? Does Kansas accept other state's dicamba training?

Nebraska accepts all other states' training so long as the applicator receives the Nebraska Department of Agriculture module with its state specific information. Oklahoma and Colorado will accept Kansas's state approved training. This year Missouri does not have any state specific rules so they will be accepting the registrants training, but applicators need to note they apply in MO so the training can be turned into that state. Kansas will accept training from other states if the application can provide proof of training.

This information is made available by the K-State Pesticide Safety and IPM Program. Contact your local Extension Office if you need additional information.

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5. 2018 Kansas Performance Tests with soybean varieties report now available

The *2018 Kansas Performance Tests with Soybean Varieties* report is now available. In this report, you will find a recap of the 2018 soybean crop, with a detailed discussion summarizing the statewide growing conditions. More importantly, the results of the 2018 soybean performance tests are also shown.

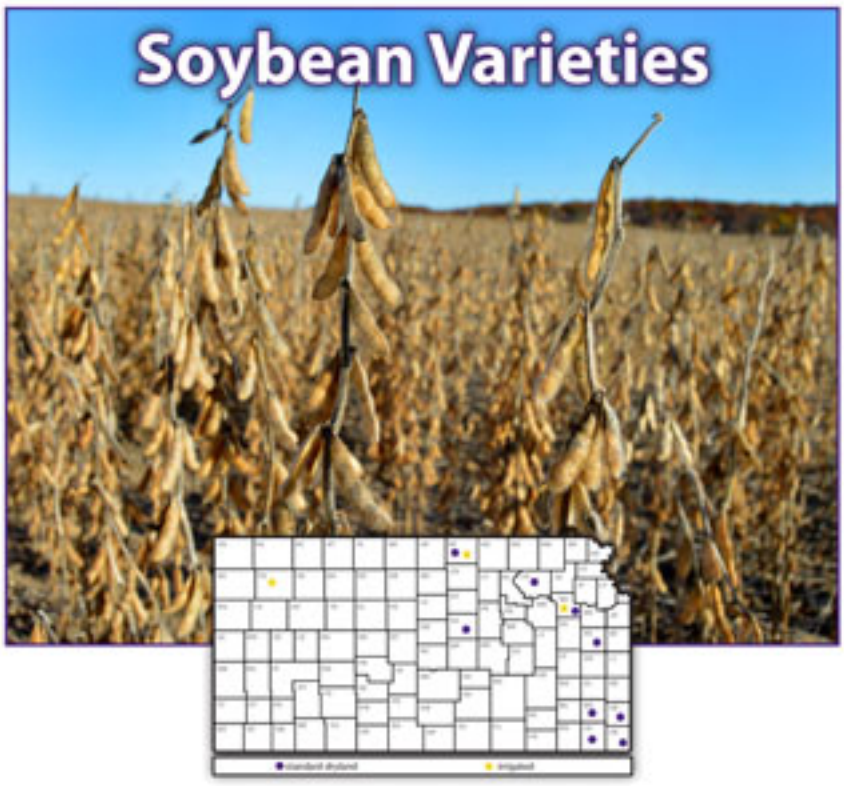
Soybean performance tests are conducted each year to provide information on the relative performance of new and established varieties and brands at several locations in Kansas.

The 2018 soybean season had a distinct weather pattern with a very challenging end of the season. Performance of soybean varieties or brands varies from year to year and from location to location, depending on factors such as weather, management practices, and variety adaptation. When selecting varieties or brands, producers should carefully analyze variety performance for two or more years across locations. Performance averaged over several environments will provide a better estimate of genetic potential and stability than performance based on a few environments.

The online version of the 2018 Kansas soybean performance tests can be found at: https://www.bookstore.ksre.ksu.edu/pubs/SRP1146.pdf. Hard copies can also be ordered from the KSRE Bookstore.

Test results can also be found online at: https://www.agronomy.k-state.edu/services/crop-performance-tests/soybean/

2018 Kansas Performance Tests with Soybean Varieties



Report of Progress 1146

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6. 2018 Kansas Performance Tests with grain sorghum hybrids report now available

The *2018 Kansas Performance Tests with Grain Sorghum Hybrids* report is now online. In this report, you will find a recap of the 2018 grain sorghum crop, with a detailed discussion summarizing the statewide growing conditions, diseases, and insects. More importantly, the results of the 2018 grain sorghum performance tests are also shown.

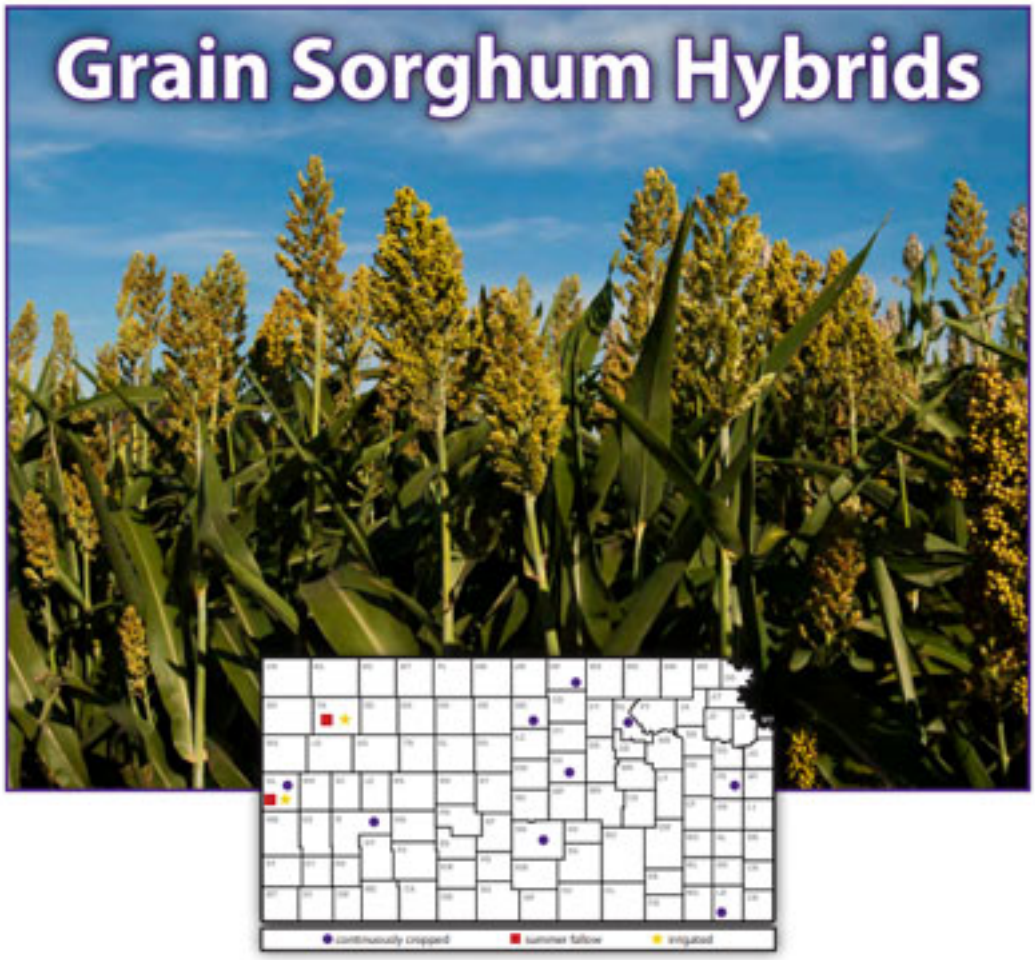
Grain sorghum performance tests, conducted annually by the Kansas Agricultural Experiment Station, provide farmers, extension workers, and seed industry personnel with unbiased agronomic information on many of the grain sorghum hybrids marketed in Kansas. Because entry selection and location are voluntary, not all hybrids grown in the state are included in tests, and the same group of hybrids is not grown at all test locations.

The online version of the 2018 Kansas grain sorghum performance tests can be found at: https://www.bookstore.ksre.ksu.edu/pubs/SRP1147.pdf.

Test results also can be found at: http://www.agronomy.k-state.edu/services/crop-performance-tests/grain-sorghum

2018 Kansas Performance Tests with

Grain Sorghum Hybrids



Report of Progress 1147

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7. Upcoming workshops on growing cotton in Kansas - Updated

K-State Research and Extension is hosting two workshops focusing on cotton production in Kansas.

Details of each workshop are provided below.

Workshop 1 – "Cotton Basics"

March 5 – Clark County, program begins at 6:00 p.m. with a meal.
Minneola Civic Connection
130 Main St.
Minneola, KS

Topics include:

- Cotton 101
- Heat units effect on yield potential and cotton irrigation strategies

Please RSVP for the free meal by Friday, March 1, by contacting Brice Gibson at the Clark County Extension office at 620-635-2811 or by email at begibson@ksu.edu.

Workshop 2 – "Cotton Clinic and School"

March 7 – Rice County, program begins at 3:00 p.m. with a steak dinner to follow at 5:30 p.m.
701 E. Main
Lyons, KS

Topics include:

- Planting Cotton in 2019 – "What you need to know"
- Economics of Cotton in Kansas
- Marketing your Cotton and how Cooperatives Work

Please RSVP for the free meal by Friday, March 1, by contacting the Rice County Extension office at 620-257-5131 or by email at drains1@ksu.edu.

Cotton Basics

March 5th
6:00 Meal
6:30 Meeting
Minneola Civic Connection
130 Main St
Minneola, KS

Cotton 101
Stu Duncan, Ph.D.
Northeast Area Crops and Soils Specialist, K-State Research and Extension

Heat Units Effects on Yield Potential and Cotton Irrigation Strategies
Lucas Haag, Ph.D.
Northwest Area Agronomist K-State Research and Extension

To RSVP for the free meal

Call Brice Gibson at the K-State Research and Extension-Clark County office at 620-635-2811or email at begibson@ksu.edu by March 1st.

K-STATE Research and Extension | Clark County

Cotton Clinic & School

March 7, 2019

3:00 p.m. Meal included

Rice County Extension 701 E Main Lyons

Featured Speakers: Stewart Duncan, KSU NE Area Agronomy Specialist

Rex Friesen, PhD Crop Consulting and Public Relations with Southern KS Cotton Growers Cooperative Inc.

Keith Lucas, VP of Marketing and Charley Triplett, VP of Member Services with Plains Cotton Cooperative Association

Clay Simons , Ag Economist from Kansas Farm Management Association

Kenny Tucker, Crop Consultant/ Agronomist with Heritage Farms in Sterling KS.

Topics to be covered:

- **Planting Cotton in 2019 "What you need to know"**
- **Economics of Cotton in Kansas**
- **Marketing your Cotton and how co-operatives work**

Steak Dinner @ 5:30

RSVP by March 1

Call or email

Rice County Extension

620-257-5131 or drains1@ksu.edu

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