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Research and Extension

Extension Agronomy

eUpdate

10/18/2019

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. Control annual weeds with fall-applied herbicides ahead of corn and sorghum.....	3
2. Rate of dry down in sorghum before harvest.....	6
3. Forecasting Kansas corn yields for 2019.....	10
4. Retirement reception for longtime Extension Weed Science Specialist Dallas Peterson.....	15

1. Control annual weeds with fall-applied herbicides ahead of corn and sorghum

Now that row crop harvest is underway and fall moisture has been received, it is time to start planning fall herbicide applications to control winter annual broadleaf weeds and grasses ahead of grain sorghum or corn.

Fall applications during late October and through November can greatly assist control of difficult winter annuals and should be considered when performance of spring-applied pre-plant weed control has not been adequate. Henbit and marestalk frequently are some of the most troublesome weeds we try to manage with these fall herbicide applications.

Fall applications have another side-benefit. While it is always important to manage herbicide drift, herbicide applications made after fall frost have less potential for drift problems onto sensitive targets.

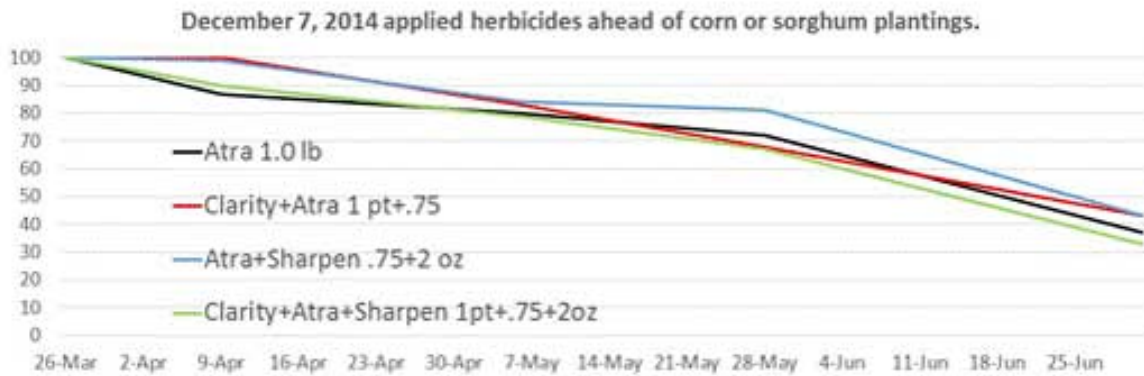
There are several herbicide options for fall application. If residual weed control is desired, atrazine is among the lowest-priced herbicides. However, if atrazine is used, that will lock the grower into planting corn or sorghum the following spring, or leave the land fallow during the summer and come back to winter wheat in the fall. If atrazine is applied too early, warm weather and moisture will reduce the length of residual. November is often the best time for atrazine applications.

Atrazine is labeled in Kansas for fall application over wheat stubble or after row crop harvest any time before December 31, as long as the ground is not frozen. Consult the atrazine label to comply with maximum rate limits and precautionary statements when applying near wells or surface water. No more than 2.5 lbs per acre of atrazine can be applied in a calendar year on cropland.

One half to two pounds (maximum) per acre of atrazine in the fall, tank-mixed with 2,4-D and/or dicamba can give good burndown of winter annual broadleaf weeds -- such as henbit, dandelion, prickly lettuce, pepperweed, field pansy, evening primrose, and marestalk -- and small, non-tillered winter annual grasses. Foliar activity of atrazine is enhanced with crop oil concentrate, which should be included in the tank-mix. Winter annual grass control with atrazine is discussed below.

Atrazine residual should control germinating winter annual broadleaves and grasses. When higher rates of atrazine are used, there should be enough residual effect from the fall application to control early spring-germinating summer annual broadleaf weeds such as kochia, common lambsquarters, wild buckwheat, and Pennsylvania smartweed -- unless the weed population is triazine-resistant. The two graphs (Figure 1 and 2) below show the residual control effects of December herbicide applications on kochia ahead of corn and sorghum planting.

Kochia control with Late Fall Herbicides.



Kochia control with Late Fall Herbicides.

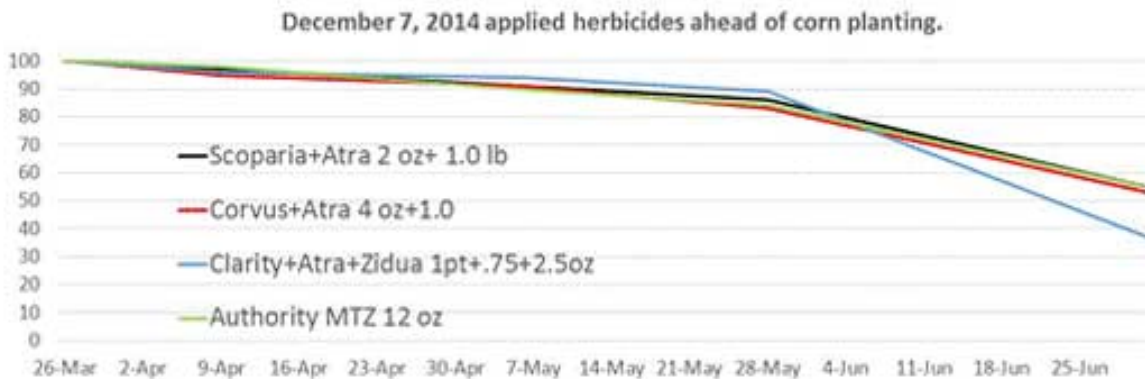


Figure 1 and 2. K-State trials measuring kochia control with late-fall herbicide applications. Source: Curtis Thompson, K-State Research and Extension.

Marestail is an increasing problem in Kansas that merits special attention. Where corn or grain sorghum will be planted next spring, fall-applied atrazine plus 2,4-D or dicamba have effectively controlled marestail rosettes and should have enough residual activity to kill marestail as it germinates in the spring. Atrazine alone will not be nearly as effective post-emergence on marestail as the combination of atrazine plus 2,4-D or dicamba. Dicamba is generally more effective than 2,4-D for marestail control. Sharpen can be very good on marestail, but should be tank-mixed with 2,4-D, dicamba, atrazine, or glyphosate to prevent regrowth.

If the spring crop will be corn, other residual herbicide options include ALS herbicides such as Autumn Super or Basis Blend. ALS-resistant marestail will survive an Autumn Super or Basis Blend treatment if applied alone. For burndown, producers should mix in 2,4-D, dicamba, and/or

glyphosate. Winter annual grasses can also be difficult to control with atrazine alone. Success depends on the stage of brome growth. For downy brome control, 2 lbs per acre of atrazine plus crop oil concentrate (COC) has given excellent control, whereas 1 lb per acre has given only fair control. Volunteer wheat and brome species that have tillered and have a secondary root system developing will likely not be controlled even with a 2-lb rate. Adding glyphosate to atrazine will ensure control of volunteer wheat, annual bromegrasses, and other winter annual grassy weeds. Atrazine antagonizes glyphosate, so if the two are used together, a full rate of glyphosate (0.75 lb ae) is recommended for good control. The tank-mix should include AMS as an adjuvant.

Where fall treatments control volunteer wheat, winter annuals, and early-emerging summer annuals, producers should then apply a pre-emerge grass-and-broadleaf herbicide with glyphosate or paraquat at corn or sorghum planting time to control newly emerged weeds. Soils will be warmer and easier to plant where winter weeds were controlled in fall.

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2. Rate of dry down in sorghum before harvest

The latest Crop Progress and Condition report from Kansas Agricultural Statistics, on October 13, stated that grain sorghum maturity was 75 %, near last year (78%) and the average (77%). Harvest is also lagging at 17% for this year but behind the 5-year average (25%). Nonetheless, wet conditions and mild temperatures will delay harvest in several regions across the state.

The weather conditions experienced from early-September to early-October are critical for sorghum as related to the grain-filling rate and determining final grain weight. Temperatures and precipitation have split across the state. Western and central Kansas had extremely cold conditions, with some readings in the teens. Even parts of eastern Kansas saw sub-freezing temperatures. Southeast Kansas had a small area of excessive moisture but much of the state had less than half of the normal precipitation for the period (Figure 1).

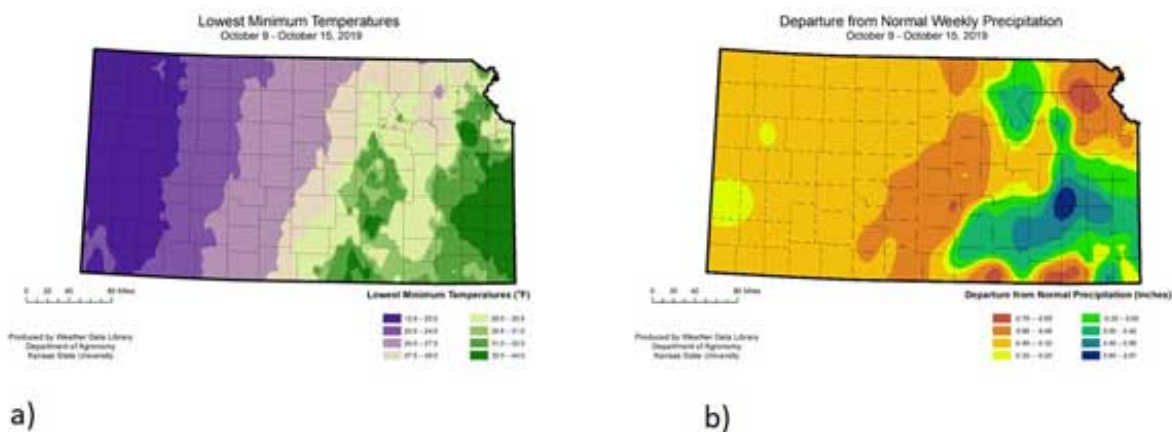


Figure 1. a) Lowest minimum temperatures; b) Departure from normal precipitation. Maps by Kansas Weather Data Library.

In recent years, a common question from producers is related to the dry down rate for sorghum when approaching the end of the season. Based on previous information, the average dry down rate depends on the weather, primarily temperature and moisture conditions – but data from modern hybrids is not available. The weather outlook for November calls for an increased chance of above-normal temperatures with chances for normal precipitation. Normal precipitation in November is much less than in October. This would favor a faster dry down rate than average but any sorghum impacted by freeze will present challenges in the final dry down rate.

From a crop perspective, the overall cumulative GDD from flowering to maturity is about 800-1200 (based on 50 degrees F as the base temperature), with the shortest requirement in GDD for short-season hybrids. Before maturity, from beginning of grain filling (soft dough until maturity), grain moisture content within a grain will go from 80-90% to 25-35% where black layer is usually formed (Figure 2). From maturity (seen as a “black-layer” near the seed base; Figure 2) to harvest time, sorghum grain will dry down from about 35 to 20 percent moisture, but the final maximum dry mass accumulation and final nutrient content will have already been attained at maturity.

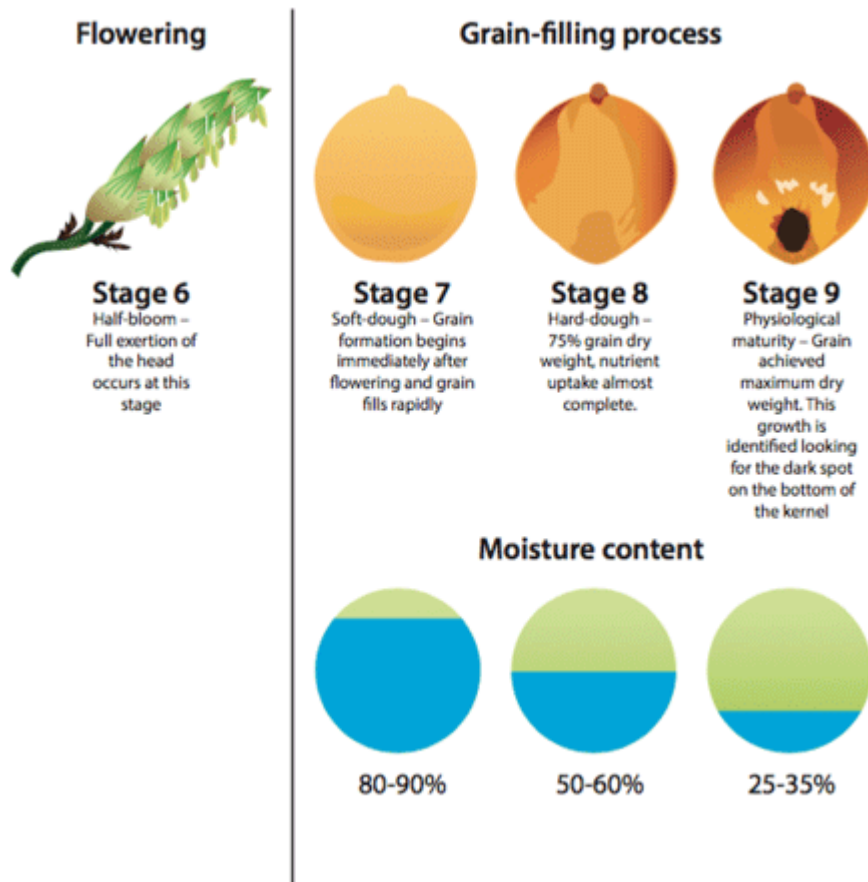


Figure 2. Sorghum growth stages from half-bloom and grain filling (including soft dough, hard dough, and physiological maturity). Infographic representing changes in grain coloration and moisture content during grain filling period until black layer formation, maturity. Graphic by K-State Research and Extension.

Grain water loss occurs at different rates but with two distinct phases: 1) before “black layer” or maturity (Figure 2), and 2) after black layer. For the first phase, the Figure 2 presents the changes in grain moisture from soft dough until physiological maturity of sorghum.

To answer the rate of dry down question from many of our producers, a study was conducted to investigate the effect of the grain dry down rate from the moment of “black layer” until commercial harvest grain moisture is reached. For the conditions experienced in 2019 (from early September until early October), the overall dry down rate was around 0.7% per day (from 34% to 17% grain moisture) – taking an overall period of 26 days (from September 9 to October 10).

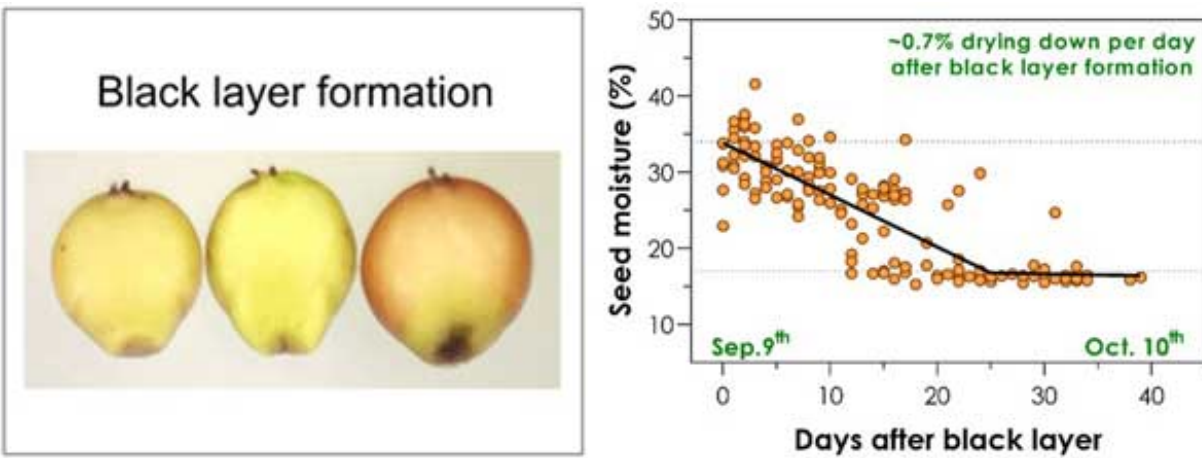


Figure 3. Grain moisture dry down across different sorghum hybrids for a study located near Manhattan, KS (2019 growing season). Horizontal dashed lines marked the 34% grain moisture at black layer formation and 17% grain moisture around harvest time. The infographic in the left panel reflects the different stages of the grain for sorghum from right to left – before to black layer formation. Graphics from K-State Research and Extension.

This dry down process can be delayed by:

- Low temperatures
- High humidity
- High grain moisture content at black layer (38-40%)

It is expected that the dry down rate will decrease to <0.5% per day for late-planted sorghum entering reproductive stages later in the growing season. A similar decrease is also expected for sorghum that was exposed to late-season stress conditions (e.g., drought, heat, and freeze). Under these conditions, maturity may be reached with high grain water content and the last stages after black layer formation could face lower temperatures and higher humidity. These main factors should be considered when the time comes to schedule harvest.

You can track temperature and humidity levels on the Kansas Mesonet web site at <http://mesonet.k-state.edu/weather/historical/> by selecting the station and time period of interest.

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3. Forecasting Kansas corn yields for 2019

Corn yields on target to USDA-NASS projections

The last crop yield forecast was released on October 10 by the USDA-NASS reporting a corn yield at the state level (+6 bu/acre, averaging 136 bu/acre) relative to the yield documented in 2018 (129 bu/acre), including the final statewide crop acreage (+1,000,000 acres, averaging 6.0 million acres total). For the full report published by USDA-NASS see:

https://www.nass.usda.gov/Publications/Todays_Reports/reports/crop1019.pdf

In a previous Agronomy eUpdate issue from 2018 ([Issue 712, September 28](#)), a new yield forecast tool was discussed for corn in the state of Kansas (project sponsored by Kansas Corn). This tool is primarily based on real-time satellite data, historical yield data at county-level, and prediction of current geo-location of cornfields across the state. To obtain more information about the K-State "Yield Forecasting Tool" (YFT), visit the eUpdate article related to this topic ([Issue 653, September 29, 2017](#)). The primary steps for this tool, presented in a simplified approach, are highlighted in Figure 1.

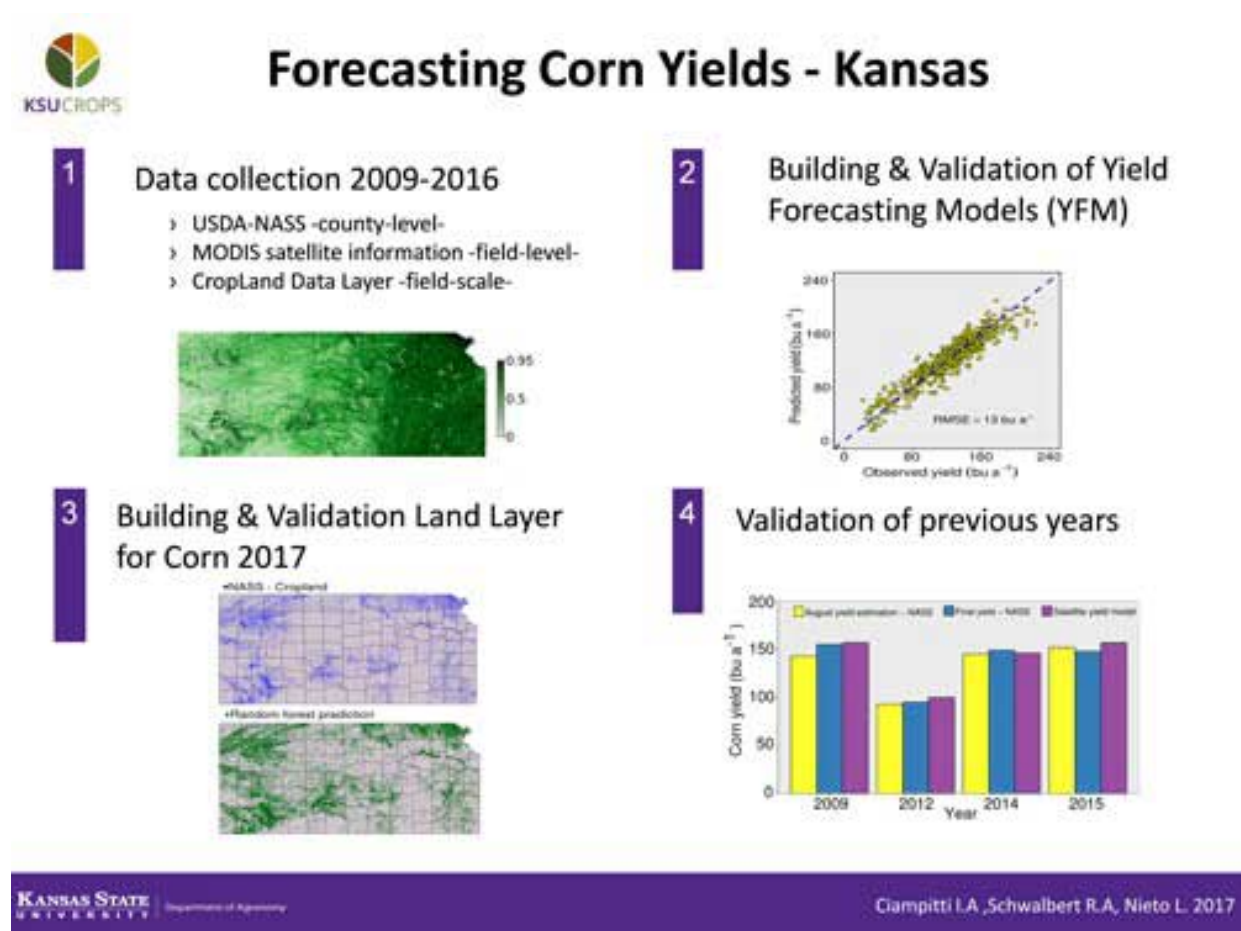


Figure 1. Theoretical framework portraying the main steps involved in the development of forecasting corn yields for the state of Kansas. Steps: 1- Data collection; 2- Building and validating yield forecasting models (YFM); 3- Building and validating land layer for corn 2017 (similar process was followed for 2019); and 4- validation of previous years. Infographic developed by Ignacio Ciampitti, Rai Schwalbert, and Luciana Nieto, K-State Research and

Extension.

One of the main complexities is the lack of knowledge on the current cornfield locations across the state; therefore, a complex statistical technique was employed (random forest prediction) to predict corn geo-locations across the state for the current season (Figure 2).

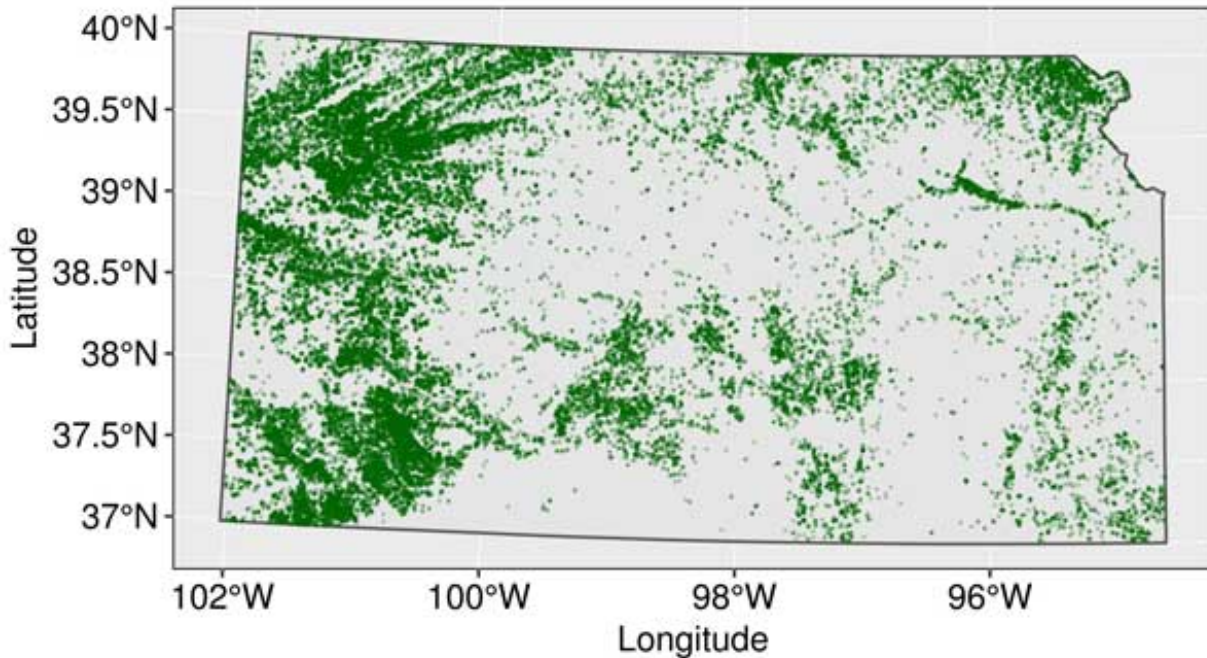


Figure 2. Geolocation for cornfields predicted by the Random Forest classification model for 2019. Graphic by KSU Crops, K-State Research and Extension.

An updated corn yield forecast was obtained for the state of Kansas via utilization of satellite imagery from planting until beginning of October for this current growing season. Based on the satellite yield model developed by our team, the state-level yield prediction is 137 bu per acre (Figure 3), one bushel higher than the yield prediction released by [USDA-NASS](https://www.nass.usda.gov/) (136 bu/acre).

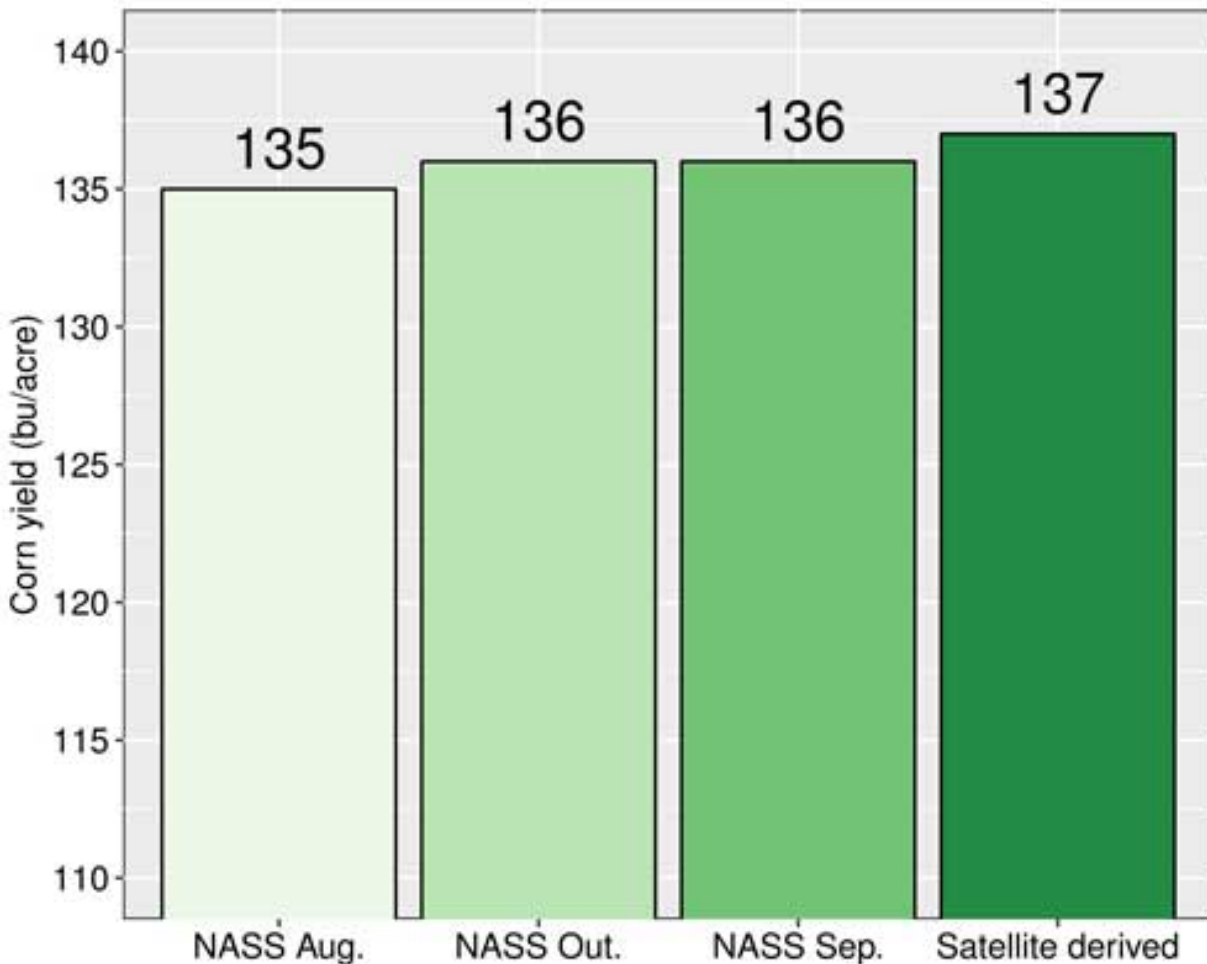


Figure 3. Forecasting corn yields derived from satellite data for the state of Kansas. Graph by KSU Crops, K-State Research and Extension.

A new step on the Yield Forecast Tool: County-yield prediction

Our team worked on developing a yield forecast at the county-level. Final validation of the county-yield data will be done once the county-yield information is released by USDA-NASS. Based on the yield forecast model, even when the model presents a degree of error close to 18 bu/acre, it is expected that yield trends should follow the expected projections. Overall, higher yields are projected for the eastern part of the state relative to the 2018 growing season. For 2019 season, corn yields improve as you move toward the western part of the state (Figure 4).

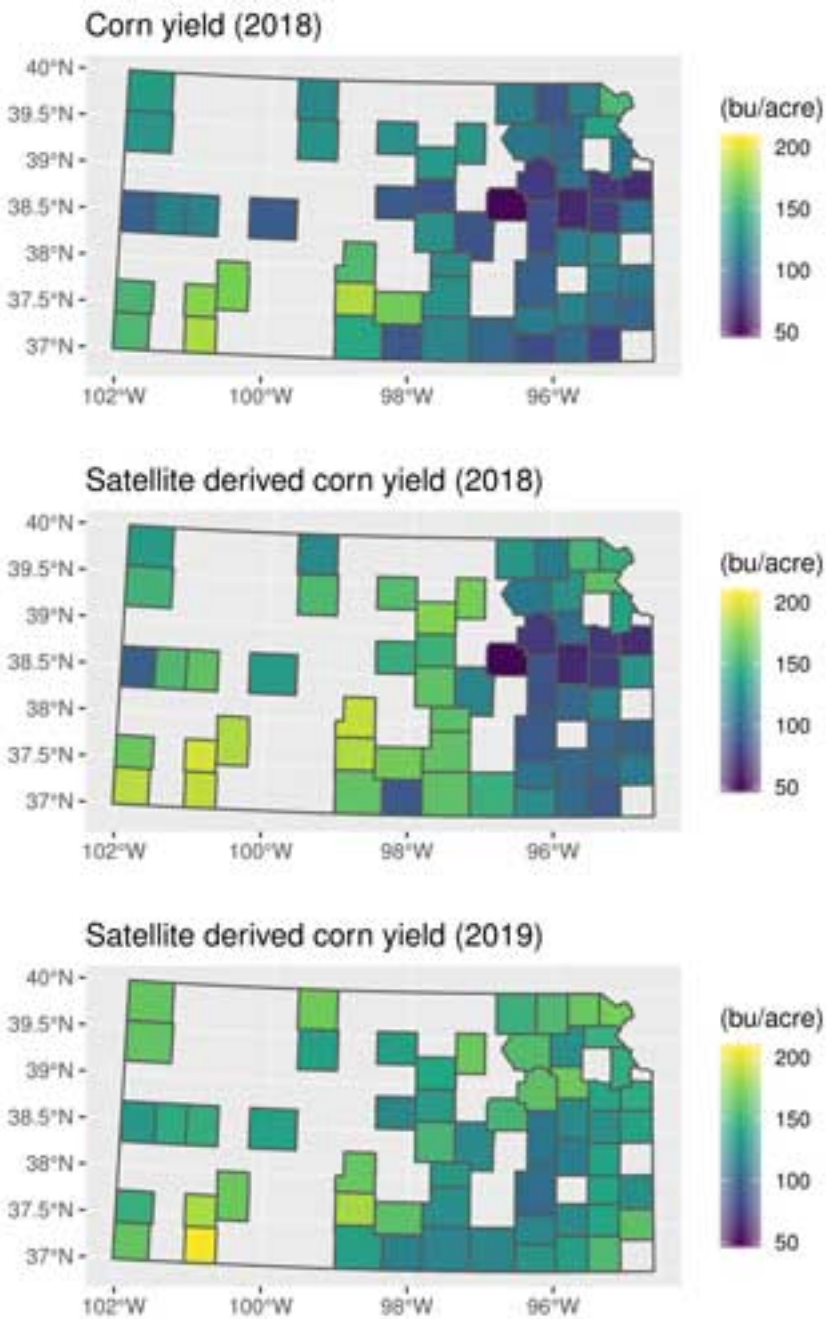


Figure 4. Average-county yield data from USDA-NASS for the 2018 growing season (panel A), average-county yield data estimated from satellite imagery for the 2018 growing season (panel B), and average-county yield data estimated from satellite imagery for the 2019 growing season (panel C) for the Kansas corn crop. Graphics by KSU Crops, K-State Research and Extension.

Summary

The Yield Forecasting Tool (YFT) predicted an average state-yield value of 137 bu/acre and lower yields for corn in eastern Kansas and higher yields for the western regions. At the state-level, the YFT was precise in predicting corn yields as related to the last forecast released on October 10, 2019 by USDA-NASS.

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4. Retirement reception for longtime Extension Weed Science Specialist Dallas Peterson

The Department of Agronomy at K-State is hosting a retirement reception for Dr. Dallas Peterson, Extension Weed Science Specialist. The reception is scheduled for Wednesday, October 30, from 4:30 p.m. to 6:00 p.m. It will be held at the new Agronomy Education Center located on the grounds of the Agronomy North Farm (across from Bill Snyder Family Stadium) in Manhattan.

All are invited to attend this casual gathering to celebrate the exceptional career of Dr. Peterson. Light refreshments will be served. Interim Agronomy Department Head, Dr. Mickey Ransom, will offer remarks at 5:00 p.m., with plenty of time afterwards to visit with Dallas.

A full retirement announcement detailing Dr. Peterson's background and career will be featured in an upcoming eUpdate article.

Join us in celebrating Dallas's many contributions to Kansas agriculture throughout his 30 years of professional service at Kansas State University.



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