



Extension Agronomy

eUpdate

07/26/2019

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. Effect of environmental factors on corn yield	3
2. Corn harvest efficiency - getting the most from your crop.....	7
3. Plant analysis for testing nutrient levels in soybeans.....	14
4. Liming prior to fall seeding of alfalfa	17
5. Summary of 2019 winter canola yields in Kansas	20
6. Insect activity update for late July - Sorghum and soybean pests.....	25
7. Subsurface Drip Irrigation Technology Field Day in Colby, August 7	28
8. 2019 Range Management Schools scheduled for August at two locations.....	30
9. North Central Experiment Fall Field Day, August 20, Scandia.....	31
10. Kansas River Valley Fall Field Day - August 13.....	33
11. East Central Experiment Field fall field day - August 21.....	35

1. Effect of environmental factors on corn yield

Corn is entering reproductive stages in many parts of the state, particularly in eastern Kansas. One of the main challenges presented last week was the high temperatures, particularly the total number of hours with air temperature above 95 degrees F (Figure 1).

High nighttime temperatures during the reproductive period (at or after flowering) can reduce kernel number, and if later in the season, kernel weight. This effect can be explained as an increase in the rate of respiration, increasing the demand for sugar (energy) and diminishing its availability for supplying the growing kernels.

In addition, as experienced in many areas of Kansas, high nighttime temperatures tend to accelerate plant phenology (growth), but with overall lower plant efficiency in using available resources.

The effect of high nighttime temperatures will be exacerbated as corn is entering into the most critical growth period (a few days before flowering to grain filling). The consequence of high night temperatures will be reflected in reductions in kernel number (if timing of the stress was around flowering) and/or kernel weight (if timing of stress coincided with the grain filling period).

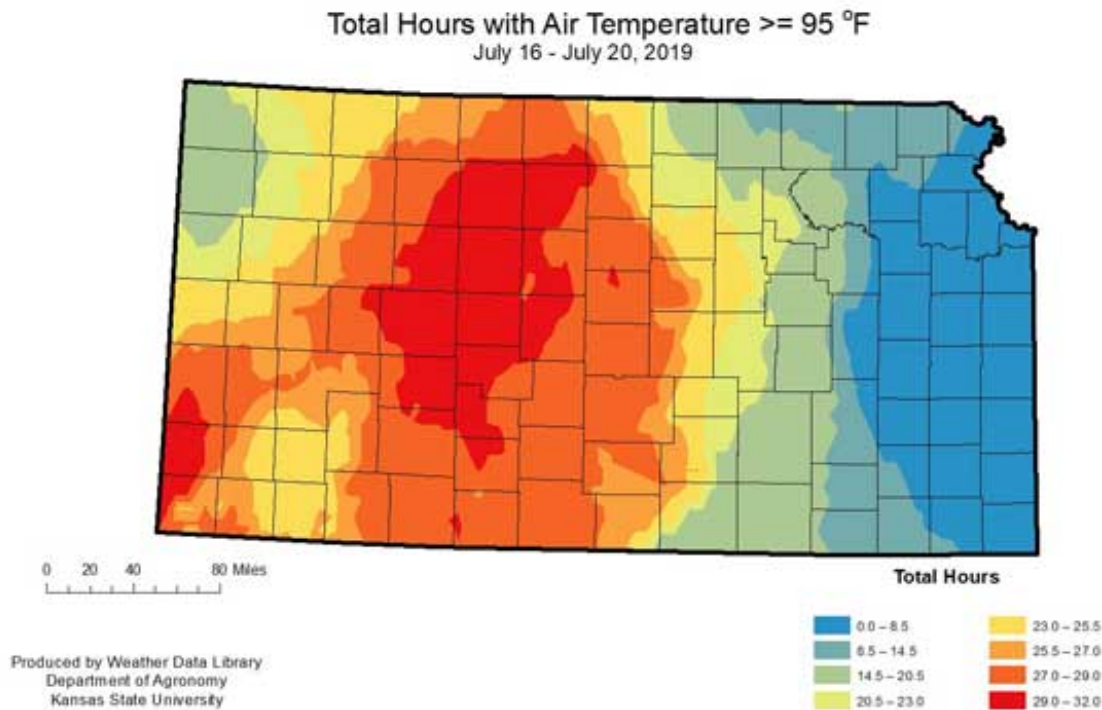


Figure 1. Total hours with air temperature greater than or equal to 95 degrees F. Map by Weather Data Library.

After a week of warmer and drier-than-normal conditions, the last four days have averaged much cooler than normal (Table 1).

Table 1. Summary of temperatures during the last 4 days, ending on July 25, 2019, organized by divisions for Kansas.

25-Jun-19	1 Year Analysis								
	Kansas Climate Division Temperature Summary (in)								
	4 Day Summary ending on 7/25/2019								
	Degrees Fahrenheit								
Divisional Avgs.	Max	Min	Ave	Dep	High	Date	Low	Date	Diurnal
Northwest	84.8	60.3	72.5	-4.7	92	25	56	24	36
West Central	84.3	57.3	70.8	-6.9	88	24	52	23	36
Southwest	87.0	58.7	72.9	-6.4	95	22	52	24	43
North Central	82.1	58.2	70.1	-9.2	88	24	52	23	36
Central	85.0	58.3	71.6	-8.5	94	22	52	23	42
South Central	87.6	59.8	73.7	-7.2	97	22	51	23	46
Northeast	79.9	59.6	69.8	-8.5	83	23	54	23	29
East Central	82.3	61.1	71.7	-7.1	91	22	55	23	36
Southeast	86.3	62.8	74.5	-5.3	96	22	53	23	43
State	84.4	59.6	72.0	-7.1	97	22nd	51	23rd	46

These cooler temperatures would be especially favorable for any corn that is in the pollination/silking stage. Lower temperatures (in the 50s) are less favorable for the warm-season crops, such as sorghum, as these temperatures would further delay crop development. Temperatures are expected to warm back to seasonal levels over the weekend and progress to warmer-than-normal conditions for the first week in August (Figure 2).

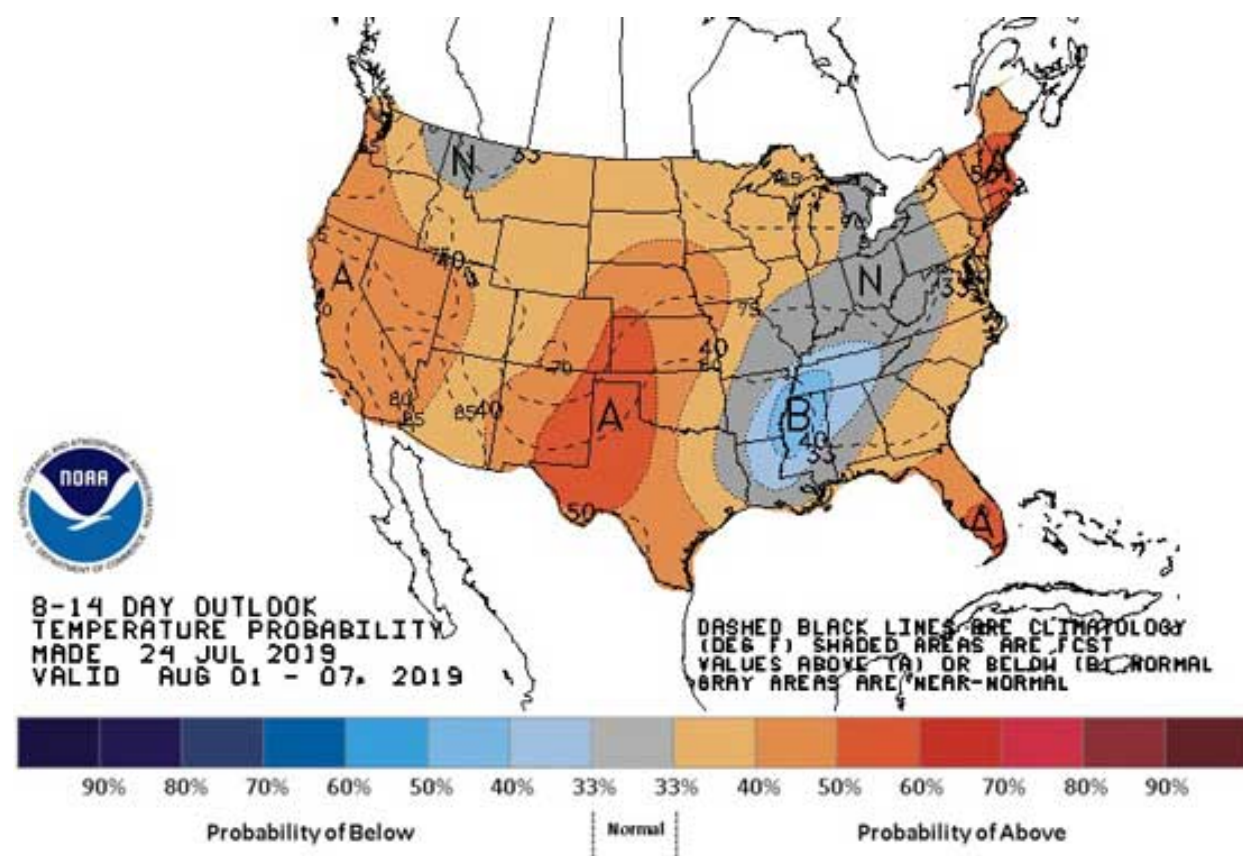


Figure 2. The 8-to-14 day temperature outlook for the period ending on August 7, 2019 (CPC).

Soil moisture is another factor that can potentially impact corn in the next week(s) since corn is approaching the peak of water demand when it reaches flowering stage.

Unfortunately, the precipitation outlook favors a continuation of the drier-than-normal pattern through the same period (Figure 3).

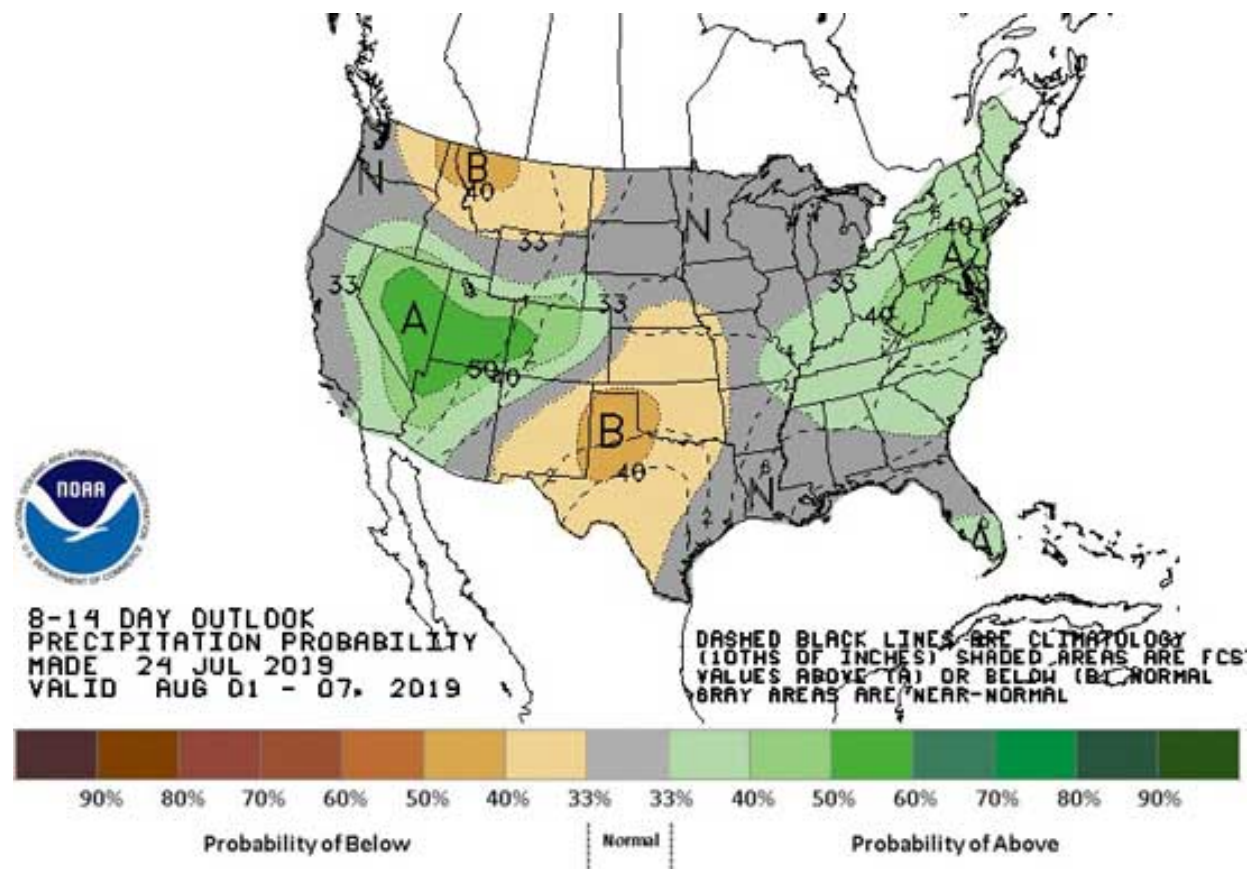


Figure 3. The 8-to-14 day precipitation outlook for the period ending August 7, 2019 (CPC)

Combined with the drying soils (Figure 4), stress is most likely in the central part of the state. Warm temperatures, little precipitation, shallow rooting, and dry surface soils will combine to form an unfavorable environment for corn and soybeans in the critical reproductive stages.

Percent of Soil Saturation

as of July 25, 2019

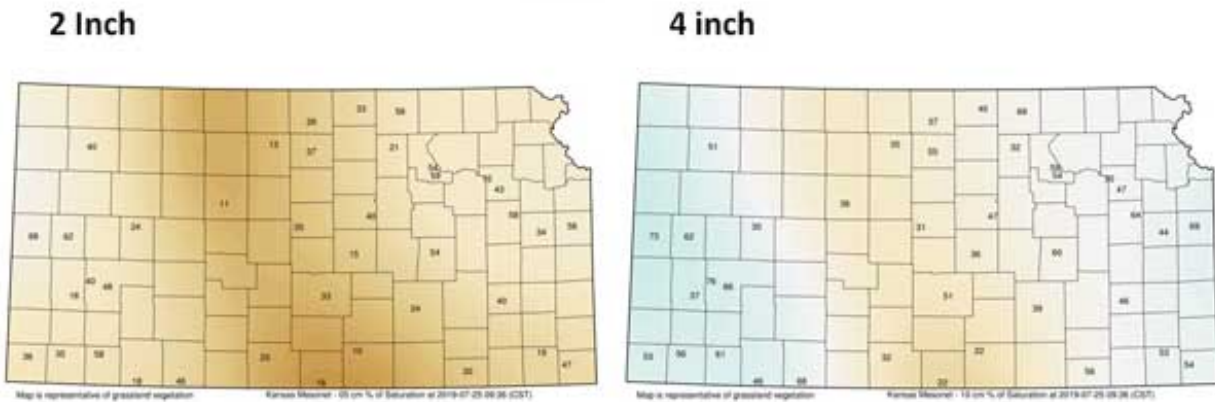


Figure 4. Soil saturation (%) at 2-inch and 4-inch depths (Kansas Mesonet).

In summary, temperature will be a less relevant factor for negatively impacting corn yields and pollination time. However, quickly drying of soils, combined with the less positive precipitation forecast for the next 8-14 days, will impose potential drought stress conditions around flowering and during the beginning of the grain filling period. The effect of a “timing drought” during these development stages in corn could be reflected in reductions in kernel number and/or final kernel weight.

Scout your corn fields and stay tuned for more information in upcoming eUpdate issues!

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2. Corn harvest efficiency - getting the most from your crop

2019 has been a challenging year for crop production, especially corn. The record-breaking rainfall amounts in May created havoc for corn production – flooding fields and delaying planting or replanting. While much of Kansas is in the pollination stage of corn, corn in southern Kansas that was planted timely and did not get flooded is in the midst of grain fill, so harvest is not far off (Figure 1). Producers spend considerable time and money to protect their corn yield. However, some of the biggest yield losses can occur during harvest operations.



Figure 1. Corn that was planted on time and was not flooded has a good stand, with silking beginning in late June in southeast Kansas. Grain filling in 111-day corn in Labette County Kansas, July 12, 2019. Photo by Gretchen Sassenrath, K-State Research and Extension.

Harvest inefficiency reduces overall yield and can cause future problems because of volunteer corn (Figure 2). Volunteer corn may have some value by increasing the soil organic matter, providing cover to reduce soil erosion, or providing potential forage for grazing livestock. However, volunteer corn may cause problems for wheat planting after corn harvest, or in a wheat-corn-fallow cropping system by using valuable soil moisture and nutrients needed to promote fall tillering in wheat.

Volunteer corn can also provide a “green bridge” of vegetation for insects that can carry viral diseases in wheat.



Figure 2. Extremely thick stand of volunteer corn, resulting from grain lost during harvest operations. Photo by Gretchen Sassenrath, K-State Research and Extension.

The biggest problem with having a dense stand of volunteer corn is that it indicates a significant loss of corn grain during the harvest operation. It will never be possible to harvest 100% of the grain. However, it is possible to improve the efficiency of harvest and increase the yield by paying careful attention to harvest operations. By taking steps to improve the harvest efficiency, grain loss can be reduced.

Several factors may contribute to poor harvest efficiency in corn. Most of the kernel loss that occurs at harvest time is due to mechanical limitations with combine settings. A combine performs three major actions during the harvest operation: picking, threshing, and cleaning. Grain loss can occur at each of these stages. A detailed description of harvesting efficiency can be found in the KSRE publication “Corn Production Handbook” beginning on page 36. The Handbook is available online at <https://www.bookstore.ksre.ksu.edu/pubs/c560.pdf>.

Estimating yield loss

Yield loss estimates are made by counting the number of kernels per square foot and dividing by 2 (Figure 3). The number of kernels per square foot is approximately twice the bushels per acre lost. To estimate the yield loss, count the number of kernels in a square foot, and divide by 2 (or multiple by 0.5). For example, a count of 20 kernels per square foot would indicate 10 bu/acre lost during harvest.

While it may be time-consuming to count kernels over a large area, it is important to get a good estimate of yield loss by counting kernels and ears from several locations in the field, and also to include both header and thresher losses. Changes can then be made in the harvest operation and to the combine to improve the harvest efficiency. It is also important to check for field losses at different times of the day when harvesting and on different fields. Changes in weather conditions (moisture and temperature) or other factors may impact harvest efficiency.



Figure 3. Estimate corn loss during harvesting by counting the number of kernels in a square-foot area. The number of kernels per square foot is approximately twice the number of bushels per acre lost. Count the number of kernels and divide by two – this is the bushel/acre yield loss. Several areas in a field should be checked. Photo by Gretchen Sassenrath, K-State Research and Extension.

Combine settings

Ground speed is one of the most important factors that a combine operator can control to improve harvest efficiency. By matching combine ground speed to crop throughput and harvest conditions, the operator can improve harvest efficiency. Excessive ground speed results in greater losses at almost all stages of the harvesting operation. Ground speed that is too slow may fail to keep the combine operating at full capacity, decreasing the threshing efficiency, and increasing the specific fuel consumption (gallons/bu).

Header loss

Header loss occurs when kernels do not make it into the machine. Both biological and mechanical factors contribute to header loss. Corn that has lodged or is too dry may shatter, causing whole ears to be lost. Deck plates that are set too widely may cause excessive butt shelling of the ears. Adjusting both the header speed and relative ground speed can reduce header loss; slower may be better.

To measure header loss, harvest a portion of the field and then place a marker toward the rear of the combine and in front of the tailings discharge. Back the machine up so that the front of the header is even with the marker. Grain on the ground in the area between the header and the unharvested portion of the field is due to header loss. To determine the loss per acre, count the number of kernels or ears on the ground between the front of the combine and the unharvested corn and estimate the yield loss.

Adjustments to minimize header loss

1. Adjust the gathering snouts so that the center snout is just touching the ground when the gathering chains are 2 inches above the ground. Working out from the center, each successive snout should be about 1 inch lower than the adjacent snout. Drive with the center snout just touching the ground. This will insure that all snouts float at ground level when combining over rough ground.
2. Gathering chains should extend at least $\frac{1}{4}$ inch beyond the snapping plate when measured at the front of the plate. Control chain speed so that stalks are guided into the rolls without uprooting.
3. Snapping rolls should be set according to stalk thickness with speed correlated closely to ground speed so that the ear is snapped in the upper third of the roll. This helps reduce ear loss.
4. Deck plates should be set as wide as possible without losing ears or shelling corn off the ear. This reduces the amount of trash taken into the machine. The spacing between the plates should be $\frac{1}{8}$ to $\frac{3}{16}$ inch tighter at the front of the plates than at the rear. In highly variable crop conditions, paying close attention to deck plate spacing has one of the largest potentials for payback. Newer headers with automatic or hydraulically actuated deck plates have the potential to significantly reduce header losses.
5. Trash knives should usually be set as close to the rolls as possible to prevent wrapping.

Threshing loss and kernel damage

As with most other crops, cylinder or rotor adjustment has a great effect on corn quality. As much as 80% of corn kernel damage occurs during the shelling process, so careful management at this point

will produce dividends throughout storage and drying. Moisture content has a large effect on the amount of damage, with fines increasing rapidly at high moisture. If possible, delay harvest delayed until moisture is between 20-25%.

Concave clearance and cylinder or rotor speed require careful adjustment, and although a great variation in hybrids exists, a few rules of thumb have been developed. Over-shelling the grain (by having the cylinder or rotor speed too high, or the clearance too tight) not only produces excess fines, but also consumer excessive power and fuel. A good way to adjust the cylinder or rotor is to begin with the clearance and speed recommended by the manufacturer (or in the middle of the suggested range), then make small changes after checking the discharge of the machine.

Adjustments to minimize threshing loss and damage

1. Concave clearance should be set so that cobs fracture into halves or pie-shaped segments. If the cobs are broken into smaller halves or quartered pieces, higher cylinder or rotor speeds will be necessary to remove the grain, which in turn can contribute to grain damage, loss, and decreased sample quality.
2. Reduce cylinder or rotor speed to the point that an occasional kernel is left on the cob. Several studies have shown that the best compromise between unshelled grain and excessive kernel damage occurs when about 0.2% of the kernels remain on the cob.

Keep in mind that the most significant contributing factor to grain damage is cylinder or rotor speed. In addition to grain damage, excessive cylinder or rotor speed can lead to increased levels of foreign material in the grain sample.

Sieve and chaffer settings

Machinery settings can affect grain losses at the sieve and chaffer. Grain losses may be reduced by adjusting fan speed. If there is too much trash, the kernels stay in the trash through the straw walkers in a conventional combine or over the cleaning shoe in a rotary design. The kernels are then thrown out of the machine in the tailings. This can result in a windrow effect when the corn kernels germinate (Figure 4).



Figure 4. Windrowing effect from grain loss directly behind the combine. Photo by Gretchen Sassenrath, K-State Research and Extension.

Careful adjustment of the combine can improve this. If the air speed is too high, too many kernels are lost. Conversely, if air speed is too low, unnecessary foreign material is retained in the grain resulting in quality dockage at the point of delivery. Adjust chaffer and sieve to minimize grain losses in the tailings. Yield losses from cleaning operations can be measured by counting kernels behind the combine. Especially look for windrowing effects if an adequate spreader is not used.

Summary

Efficiency at each stage of the production cycle is important for growing and harvesting the best yield possible. In challenging years such as 2018, it is especially critical to be aware of equipment calibration to increase the harvest efficiency.

In addition to the combine losses described here, additional losses can occur during transfer events. While this may look substantial, it is usually not very high across the entire field.

There is a free mobile app from Ag PhD available to estimate harvest losses based on the kernel count per square foot. The download link is here: [iOS](#). The app allows the user to select the crop and input the number of seed or kernels counted from an area on the ground. Harvest loss is calculated

from this count.

While harvest efficiency will never be 100% and it is important to complete the harvest in a timely fashion, paying attention to details during harvest can increase profitability. A normal harvest loss rate to aim for is 1 to 2%. Careful attention to equipment, harvest conditions, and harvest operations can minimize yield losses at harvest time and put more corn in the bin. Now is the time to prepare for harvest by getting equipment in optimal operating conditions.

Additional information is available in the KSRE publication "Corn Production Handbook" (<https://www.bookstore.ksre.ksu.edu/pubs/c560.pdf>).

A final consideration is to examine efficiency of all crop harvesting operations. Because we have a long period of warm temperatures and adequate fall rain, we can see the corn harvest losses as volunteer corn. Similar losses can occur during wheat and soybean harvests. However, these losses are often not as apparent as the losses during corn harvest. Improving crop harvest efficiency means more grain in the bin and less on the ground.

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3. Plant analysis for testing nutrient levels in soybeans

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

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

Plant analysis as a routine monitoring tool

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

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

The sampled leaves should be allowed to wilt overnight to remove excess moisture, placed in a paper bag or mailing envelope, and shipped to a lab for analysis. Producers should not place the leaves in a plastic bag or other tightly sealed container, as they will begin to rot and decompose during transport, and the sample won't be usable.

Which nutrients should you request analysis?

In Kansas, nitrogen (N), phosphorus (P), potassium (K), sulfur (S), zinc (Zn) and iron (Fe) are the nutrients most likely to be deficient in soybeans. Normally the best values are the “bundles” or “packages” of tests offered through many of the labs. The packages can be as simple as N, P and K, or can consist of all the mineral elements considered essential to plants. K-State offers a package that includes N, P, K, Ca, Mg, S, Fe, Cu, Zn, and Mn for \$32.00.

The data returned from the lab will be reported as the concentration of nutrient elements, or potentially toxic elements in the plants. Units reported will normally be in terms of “percent” for the primary and secondary nutrients (N, P, K, Ca, Mg, and S) and “ppm,” or parts per million, for the micronutrients (Zn, Cu, Fe, Mn, B, Mo, and Al). Most labs/agronomists compare plant nutrient concentrations to published sufficiency ranges. A sufficiency range is simply the range of concentrations normally found in healthy, productive plants during surveys. A diagram explaining this concept is shown in Figure 1.

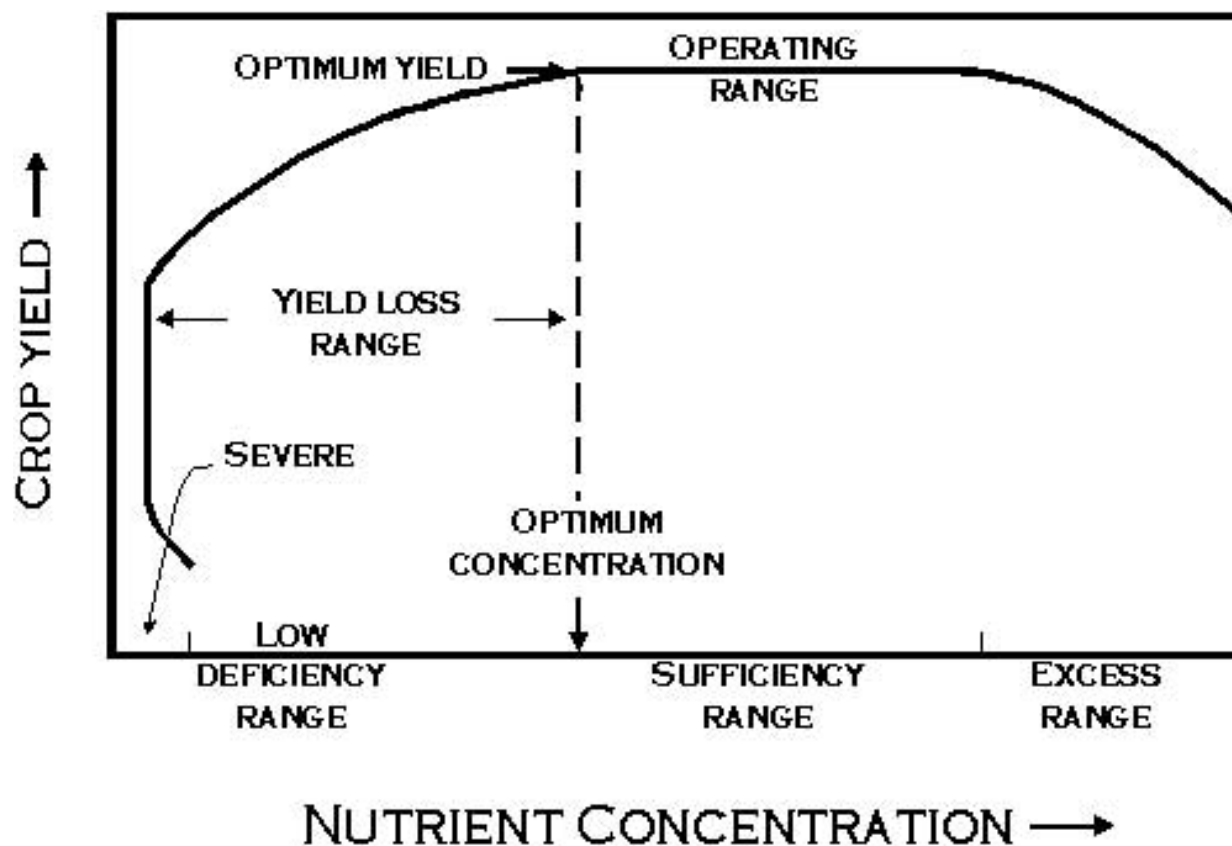


Figure 1. Example of plant analysis interpretation using the concept of a sufficiency range.

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

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

Nutrient	Units	Growth Stage (Top, fully-developed leaves at pod set)
Nitrogen	%	4.25-5.50
Phosphorus	%	0.25-0.5
Potassium	%	1.70-2.50
Calcium	%	0.35-2.00
Magnesium	%	0.26-1.00
Sulfur	%	0.15-0.50
Copper	ppm	10-30

Iron	ppm	50-350
Manganese	ppm	20-100
Zinc	ppm	20-50
Boron	ppm	20-55
Molybdenum	ppm	1.0-5.0
Aluminum	ppm	<200

Plant analysis as a diagnostic tool

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

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

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

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

For more information on plant analysis testing, including available tests, forms, and costs, please visit the K-State Soil Testing Lab website at:

<http://www.agronomy.k-state.edu/services/soiltesting/index.html>

Summary

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

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4. Liming prior to fall seeding of alfalfa

Correcting acidic soil conditions through the application of lime can have a significant impact on crop yields, especially for alfalfa. Since seeding alfalfa is expensive and a stand is expected to last for several years, getting lime applied and acidity corrected before seeding is critical. Liming is one of the most essential, but often overlooked, management decisions a producer can make for alfalfa production. Acidic soils can significantly reduce nodule establishment and activity in alfalfa, affecting nitrogen status and overall nutrient and water uptake (Figure 1).

Unfortunately, lime is not always available close to where it may be needed. In many cases, trucking and spreading costs may be more than the cost of the lime itself. Lime quality can also vary widely and no one wants to apply more than is necessary. So to make the best decisions on how much and what kind of lime to apply, it is useful to know how lime recommendations are made.



Tissue N=2.59% (pH=5.2)



Tissue N=3.92% (pH=6.1)

Figure 1. Soil pH affects nodule formation and activity for N fixation in alfalfa, in addition to nutrient availability and uptake. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

How lime recommendations are made by K-State

A routine soil test will reveal the pH level of the soil, and this will determine whether lime is needed on the field. Generally, east of the Flint Hills, lime is recommended for alfalfa if the pH drops below 6.4, with a target pH for liming of 6.8. In the Flint Hills and west, lime is recommended for alfalfa and all other crops when the pH drops below 5.8, with a target pH of 6.0. Target pH is simply the pH goal once the lime reacts with the soil.

Why is the target pH different for the two areas of Kansas?

They differ because of the pH of the subsoil. East of the Flint Hills, especially south of the Kansas River, the subsoil tends to be acidic, and a higher target pH is used to assure adequate pH conditions in the root zone, and provide sufficient amounts of calcium and magnesium. From the Flint Hills west, most soils have high-pH, basic subsoils that can provide additional calcium and magnesium to meet crop needs.

Determining the soil pH is the first step in determining if lime is needed. However, it does not tell you the amount of lime you need to apply. Soils with more clay and organic matter will have more acidity at a given pH, and will require more lime/ECC (effective calcium carbonate) to reach a target soil pH, than will a sandy soil. This is why two soils may have the same soil pH but have quite different buffer pHs, and different lime requirements.

To make that rate determination quickly in the lab, we use a buffer solution and measure the soil's buffer pH. A buffer is simply a strong salt solution designed to resist change in pH. The buffer is added at a high pH, 7.5, and calibrated so that when it reacts with an acid soil, the pH drops. The lower the buffer pH drops, the more lime will be needed to bring the pH up to the required target pH.

Calculating lime rates

Lime rates are given in pounds of effective calcium carbonate, ECC, per acre. How does that relate to agricultural lime and how much lime to apply? Lime materials can vary widely in their neutralizing power. All lime materials sold in Kansas must guarantee their ECC content and dealers are subject to inspection by the Kansas Department of Agriculture.

The two factors that influence the neutralizing value of aglime are the chemical neutralizing value of the lime material relative to pure calcium carbonate, and the fineness of crushing, or particle size, of the product. The finer the lime is ground, the greater the surface area of the product, the faster it will react, and the faster the neutralizing of the acidity will occur. These two factors are used in the determination of ECC. Expressing recommendations as pounds of ECC allows fine-tuning of rates for variation in lime sources, and avoids under- or over-applying lime products.

Lime sources

Research has clearly shown that a pound of ECC from agricultural lime, pelletized lime, water

treatment plant sludge, fluid lime, or other sources is equal in neutralizing soil acidity. Therefore, under most circumstances, the cost per pound of ECC applied to your field should be a primary factor in source selection. Other factors such as rate of reaction (fineness), uniformity of spreading, and availability should be considered, but the final pH change, and subsequent alfalfa growth, will depend on the amount of ECC applied.

Application methods

All lime sources have a very limited solubility. When planting alfalfa, the best performance occurs when lime is incorporated and given time to react with and neutralize the acidity in the soil. When surface-applied and not incorporated, as in no-till systems, the reaction of lime is generally limited to only neutralizing the acidity and raising the pH in the top 2 to 3 inches of soil. Surface applications are adequate in slightly acidic soils, but may not provide as good a soil environment for nodulation and nitrogen fixation in the extremely acid soils.

In no-till or limited-till systems, where no incorporation of lime is planned, lower rates of lime application are normally recommended to avoid over-liming and raising the pH higher than needed in the surface 2-3 inches of soil. Over-liming can also reduce the availability of micronutrients such as zinc, iron, and manganese, and trigger deficiencies in some soils. Current K-State lime recommendations suggest that “traditional” rates designed for incorporation and mixing with the top 6 inches of soil should be reduced by 50 percent when surface-applied in no-till systems, or when applied to existing grass or alfalfa stands.

What about the calcium and magnesium contents?

Most agricultural limes found in Kansas contain both calcium and magnesium, with calcium exceeding magnesium. The exact ratio of these two essential plant nutrients will vary widely. Dolomitic lime (magnesium-containing) and calcitic lime (low-magnesium, high-calcium) provide similar benefits for most Kansas soils.

For more information, see K-State publication *Soil Test Interpretations and Fertilizer Recommendations*, MF-2586: <http://www.bookstore.ksre.ksu.edu/pubs/MF2586.pdf>

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5. Summary of 2019 winter canola yields in Kansas

Canola yields at most K-State Research and Extension trial sites were greater than average in 2019. As canola weathered the wettest May on record, ideal flowering and grain filling temperatures produced dense canopies filled with numerous pods. As a result, canola trial yields were quite high even though the deck was stacked against the crop for the tail end of the growing season.

Canola trials were seeded into optimum soil moisture conditions following early September rainfall. After emergence, several rounds of October rainfall thinned plant stands but overall they were more than adequate going into the fall and winter months. Winter temperatures were mild in the southern parts and cold in the northern parts of the state. The winter was characterized by several periods of cold temperatures followed by warming trends. There was very little winterkill observed in the variety trials.

Nonetheless, some unseen damage was done to plants by the repeated freeze/thaw cycles. As plants began to add flowers and then pods and seeds, it became apparent that a few trial sites and producer fields were dealing with severe crown damage. The freezing and thawing caused physical damage to the plant crown (base of the stem at the soil line) allowing fungicide to enter and rot out the interior of the stem. These weak stems then succumbed to lodging. The lodging was worsened by overly saturated soils in May. In some cases, the lodging was so severe that crops could not be harvested because producers couldn't get in the field quick enough.

The lodging appeared to be the worst in south central Kansas and was field, and often, variety specific. One observation was that hybrids handled the saturated soils better than the open-pollinated (OP) varieties. This is likely due to the hybrids being larger, more robust plants with greater rooting mass and stiffer stems. Certain trial sites, such as Hutchinson, did not see any lodging despite receiving over 50 inches of precipitation from July 1, 2018 to June 30, 2019. The plants at this site were smaller going into the winter months and may not have been affected by the overwintering damage to the crown. In general, because of the lack of winterkill and optimum grain filling, the hybrids out yielded the OP varieties.

Trial sites for the canola breeding program were harvested at Belleville, Garden City, Hutchinson, Kiowa, Manhattan, and Norwich. Cultivar averages ranged from the upper 20s at Belleville to nearly 80 bushels at Garden City. The Belleville site was affected negatively by winter weather, saturated soils, and a slow spring green up. At Garden City, only 1.29 inches of irrigation water was applied, with 19.3 inches of precipitation falling during the growing season. Kiowa, Manhattan, and Norwich saw moderate to severe lodging in the open-pollinated trials. Hutchinson provided the highest yields recorded in the long history of testing winter canola at the trial site.

The high yields were obviously a positive outcome in 2019 as we were reminded what the yield potential of winter canola can be when planting conditions are favorable, moisture is plentiful, and temperatures are mild during the reproductive stages. We have better knowledge of what the lodging tendencies are of winter canola when soils are saturated. This information provides us with a means for making better variety recommendations and advancements. Canola does not like "wet feet" so planting on soils that are well-drained and not prone to ponding or flooding is important.

The 2019 National Winter Canola Variety Trial (NWCVT) entries are provided in Table 1. Trial yields for

Kiowa, Hutchinson, and Norwich (central Kansas) are summarized for the OP and hybrid entries in Figures 1 and 2, respectively. Yields for the Garden City OP and hybrid trials (southwest Kansas) are summarized in Figures 3 and 4, respectively.

Table 1. Entries for the 2018 National Winter Canola Variety Trial

Name	Source	Type[†]	Trait[‡]
CWH190D	Bayer Crop Science	H	Semi-dwarf, Clearfield
CWH249D	Bayer Crop Science	H	Semi-dwarf, Clearfield
CWH189D	Bayer Crop Science	H	Semi-dwarf, Clearfield
CWH317D	Bayer Crop Science	H	Semi-dwarf
CP115WRR	CROPLAN by WinField	OP	Roundup Ready/SURT
CP225WRR	CROPLAN by WinField	OP	Roundup Ready/SURT
CP320WRR	CROPLAN by WinField	OP	Roundup Ready
KS4670	Kansas State University	OP	
KS4719	Kansas State University	OP	
KSR4723	Kansas State University	OP	Roundup Ready
KSR4767	Kansas State University	OP	Roundup Ready
Surefire	KSU / Spectrum Crop Development	OP	SURT
Riley	Kansas State University	OP	
Sumner	Kansas State University	OP	SURT
Wichita	Kansas State University	OP	
QUARTZ	KWS-MOMONT / Photosyntech	OP	
HARMOUR	KWS-MOMONT	H	
MH 15AY085	KWS-MOMONT	H	
MH 15HT229	KWS-MOMONT	H	
MH 14ES125	KWS-MOMONT	H	
MH 15HT227	KWS MOMONT	H	
Advocat	Limagrain Cereals	H	
Architetc	Limagrain Cereals	H	
Torrington	Ohlde Seed Farms	OP	
Phoenix CL	Rubisco Seeds	H	Clearfield
Plurax CL	Rubisco Seeds	H	Clearfield
Popular	Rubisco Seeds	H	
Star 915W	Star Specialty Seeds	OP	Roundup Ready/SURT
Star 930W	Star Specialty Seeds	OP	Roundup Ready

[†]OP=open pollinated; H=hybrid

[‡]SURT: sulfonylurea herbicide carryover tolerant

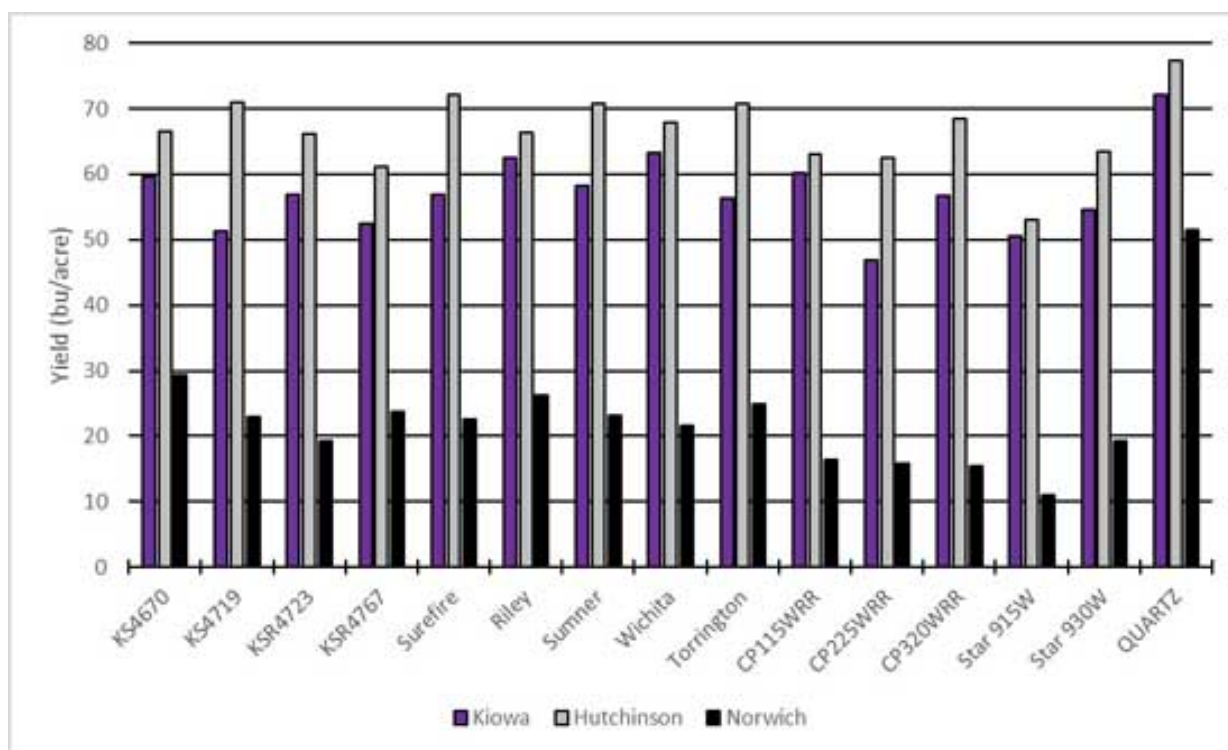


Figure 1. Yield results for the Kiowa, Hutchinson, and Norwich OP NWCVT in 2019. Yields were reduced at Norwich due to significant lodging. Kiowa LSD (0.05) = 10.8; Hutchinson LSD (0.05) = 6.7; Norwich LSD (0.05) = 6.1.

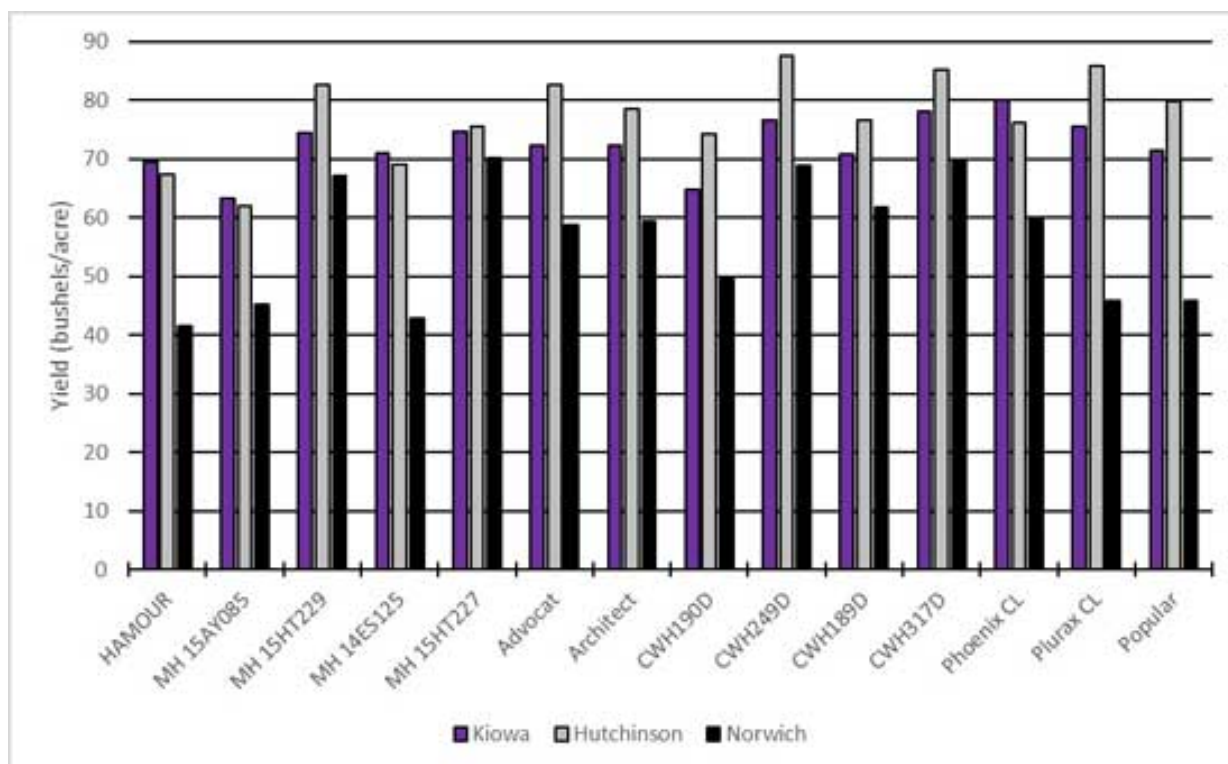


Figure 2. Yield results for the Kiowa, Hutchinson, and Norwich Hybrid NWCVT in 2019. Kiowa LSD (0.05) = 6.7; Hutchinson LSD (0.05) = 7.2; Norwich LSD (0.05) = 10.6.

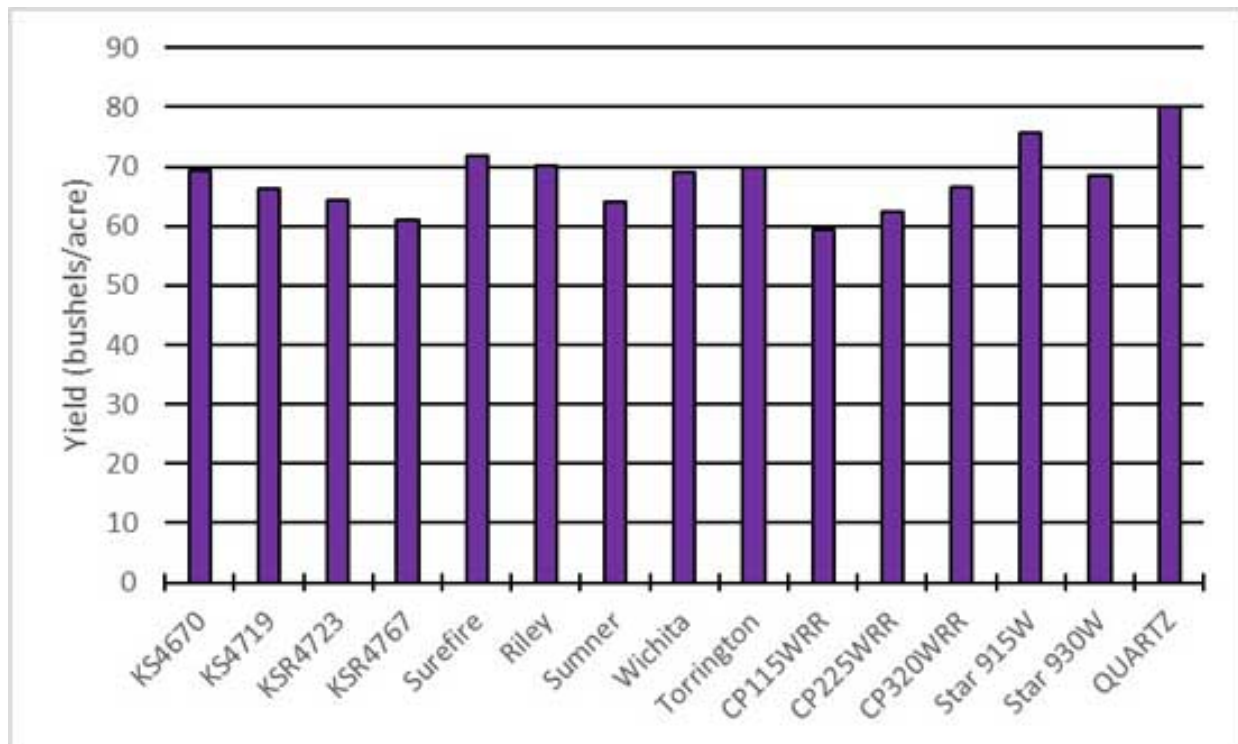


Figure 3. Yield results for the Garden City OP NWCVT in 2019. There is no statistically significant difference between varieties for yield.

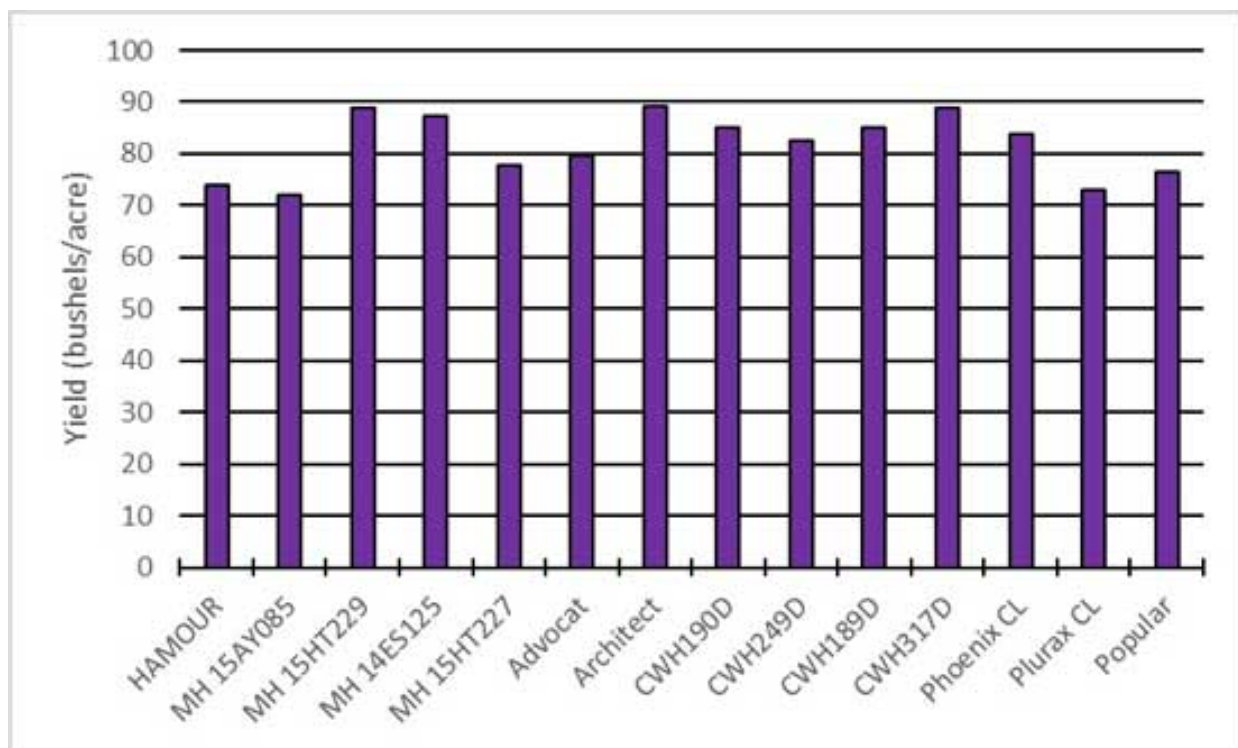


Figure 4. Yield results for the Garden City Hybrid NWCVT in 2019. LSD (0.05) = 8.9.

Careful variety selection is very important for successful winter canola production. Watch future Agronomy eUpdates for additional trial site results and a discussion to help with variety selection. We will also discuss the progress on converting a portion of the K-State canola breeding program to hybrid parent line development.

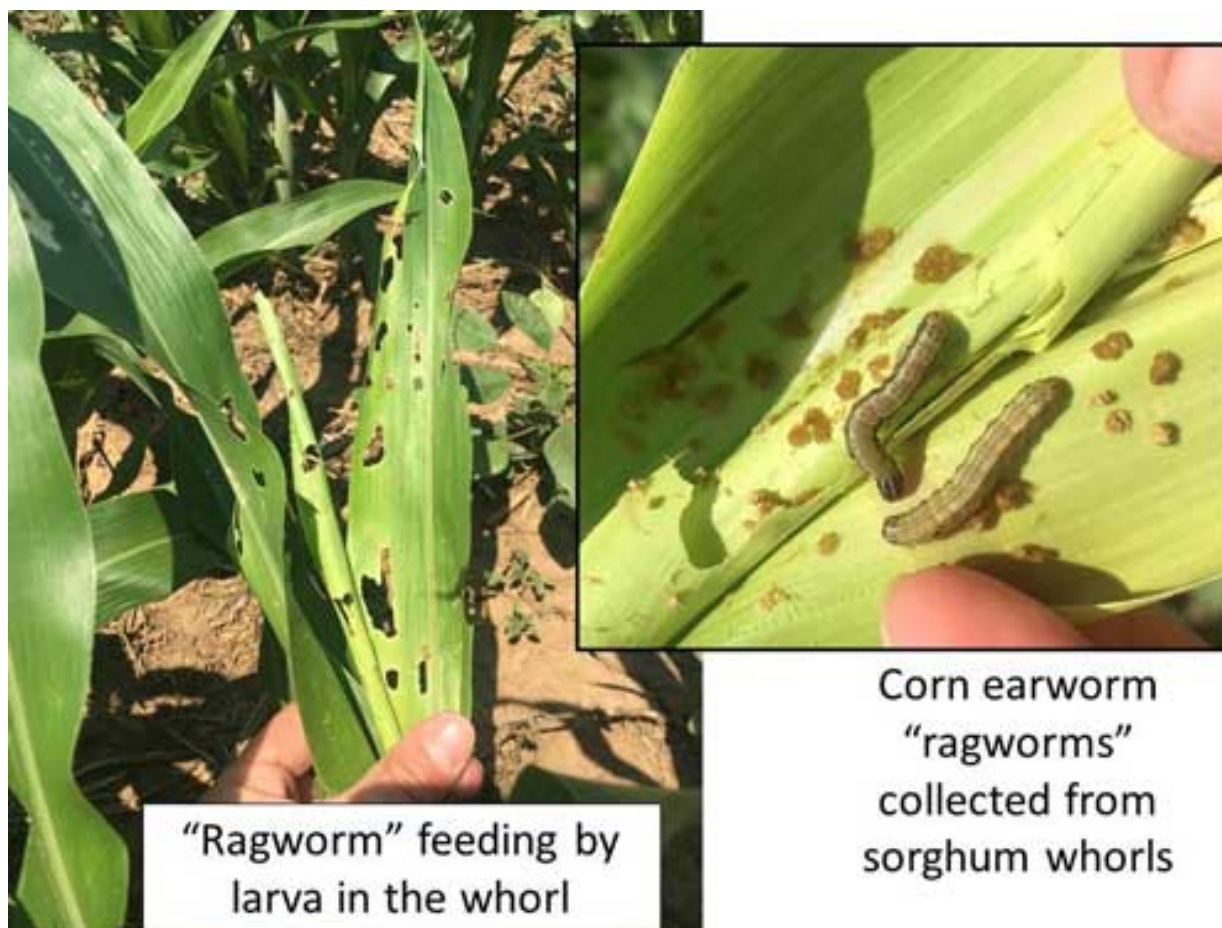
Mike Stamm, Canola Breeder
mjstamm@ksu.edu

John Holman, Cropping Systems Agronomist, Southwest Research-Extension Center
jholman@ksu.edu

6. Insect activity update for late July - Sorghum and soybean pests

Sorghum "Ragworms"

Much of the sorghum around north central Kansas is at, or just coming into, the whorl stage. As the leaves unfurl and grow out of the whorls, a pretty high number of plants are showing large holes that have been chewed in leaves. These holes are from smaller larvae (most that we have sampled are corn earworms) that feed on the leaves while they are still furled. When leaves grow out of the whorl they have showy, ragged looking feeding that may cause concern.



Larvae sampled this week still have about one additional week of feeding within these whorls, then they will exit and crawl down the plant to pupate in the soil.

Larvae in the whorl are rarely worth spraying for four reasons:

- 1) By the time the leaves unfurl making feeding damage visible, most larvae have already accomplished most of their development and thus feeding.
- 2) Insecticides usually can't penetrate far enough down into the whorl to actually impact the larvae.

3) A general insecticide will kill most beneficial insects.

4) Ragged-looking leaves during this stage have little to no effect on yield, and no, you cannot eliminate the next generation by spraying this generation.

Soybean Pest Update

Soybeans appear to be relatively pest free at the present time – but looks can be deceiving. There are a few small green cloverworms, thistle caterpillars, soybean podworms (corn earworms) and webworms, along with stink bugs and spider mites.





These pests are probably only going to increase in the next few weeks. Bean leaf beetle adults will also likely be emerging and showing up in fields soon. As the beans continue to develop so will the pests, thus monitoring should continue until beans senesce.

Jeff Whitworth, Extension Entomology
jwhitwor@ksu.edu

Holly Davis, Extension Entomology Research Associate
holly3@ksu.edu

7. Subsurface Drip Irrigation Technology Field Day in Colby, August 7

Come celebrate 30 years of K-State's progress with subsurface drip irrigation (SDI) for field crops. The event will take place at the Northwest Research and Extension Center in Colby on Wednesday, August 7, from 2:30 to 7:30 p.m.

Much has been learned these past 30 years and we would like to share our thoughts with you and also hear about your successes and challenges. The focus will be on strategies to make SDI last, make it pay, optimize crop production, and make wiser use of our limited water resource.

In addition to research and extension presentations, there will be a panel discussion by SDI producers from around the region. A continuously running trade show is also planned. The afternoon field tour will begin at 3:00 pm. Everyone should plan to be present for the 4:30-7:30 slot that will be the trade show, free meal, poster displays, and SDI producers' panel.

The event is free and open to the public. Pre-registration by July 30 is required to get an accurate meal count. You can register online at <https://www.ksre.k-state.edu/sdi/events> or by contacting Vicki Brown at vbrown@ksu.edu or 785-462-6281.

SDI Technology Field Day *Thirty Years of Progress*



Schedule of Festivities

Registration, Refreshments, and Tradeshow 2:30 – 3:00 pm
Field Tour, 3:00 - 4:30 pm
Concurrent Poster Talks and Tradeshow, 4:30 – 6:00 pm
Free Meal, 6:00 - 7:00 pm
SDI Producers' Panel, 7:00 – 7:30 pm
Closing comments, 7:30 pm

Field Tour Stops

Comparison of SDI with Alternative Irrigation Methods
Using Wastewater with SDI
Reducing Water Losses with SDI
Enhanced Water and Nutrient Management with SDI
Research Facilities and SDI Wetting Pattern

Featured Speakers (Tentative)

Jonathan Aguilar, Extension Water Resources Engr., K-State
Steve Evett, Research Soil Physicist, USDA-ARS-CPRL
Paul Colaizzi, Research Irrigation Engr., USDA-ARS-CPRL
Todd Troopien, Water Resources Engr., South Dakota State Univ.
Dan O'Brien, Extension Ag. Economist, K-State
Freddie Lamm, Research Irrigation Engr., K-State

Poster Presentations

What is SDI?
SDI, Pros and Cons
Minimal System Requirements with SDI
Steps to a Successful SDI System
Using Pressure and Flowrate Records to Diagnose SDI System Problems
Water Quality Considerations for SDI
Can We Make It Work and Can We Make It Pay?
Filtration for SDI Systems
Spacing of Driplines for Corn Production
Effect of Emitter Spacing on Corn Production
Installation Depth Considerations for SDI
Slope Considerations for SDI
Chemical Injection Systems for SDI
The Ogallala and the Potential for SDI
SDI with Time Temperature Threshold (TTT)
Application of Biological Effluent with SDI
KSU Bed Management System for SDI

For more information or preregistration, please contact
Vicki Brown, KSU Northwest Research Extension Center,
105 Experiment Farm Road, Colby, Kansas 67701
Phone :785-462-6281 Fax :785-462-2315 Email: vbrown@ksu.edu
Register online at <https://www.ksre.k-state.edu/sdi/events/>

Preregistration required
by July 30
for meal planning



Greetings:

I would like to invite you to attend our SDI Technology Field Day at the KSU Northwest Research-Extension Center to celebrate 30 years of K-State's efforts with this technology for field crops.

We have learned much these past 30 years and we would like to share our thoughts with you and also hear about your successes and challenges as well. We will focus on strategies to make SDI last, make it pay, optimize crop production and make wiser use of our limited water resource.

In addition to the research and extension presentations, we will feature a panel discussion by SDI producers from the region. A continuously running trade show is also planned.

To better serve your needs, an afternoon field tour is scheduled beginning at 3:00 pm. Everyone should plan to be on hand for the 4:30-7:30 pm slot which will cover the trade show, free evening meal, poster displays and SDI Producers' Panel.

The event is free and open to the public but preregistration is required for meal planning purposes. I hope you will attend.

Sincerely,
Freddie Lamm
Research Irrigation Engineer



Kansas State University is committed to making its services, activities and programs accessible to all participants. If you have special requirements due to a physical, vision, or hearing disability, contact Vicki Brown, 785-462-6281 or Michelle White-Godinet, Assistant Director of Alternative Action, Kansas State University, (TDD) 785-532-4807.

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Subsurface Drip Irrigation (SDI) Technology Field Day

*30th Diamond Anniversary
of K-State's Efforts
with SDI for Field Crops*

Kansas State University
NW Research-Extension Center
105 Experiment Farm Road
Colby, Kansas

Wednesday,
August 7, 2019
2:30 pm - 7:30 pm

8. 2019 Range Management Schools scheduled for August at two locations

Two adult range management schools organized by the Kansas Grazing Lands Coalition will be offered in 2019. The first school will be held August 6-8 at Ringneck Ranch near Tipton, KS. The second school, the Tallgrass School, will be August 20-22 at Camp Wood, near Elmdale, KS.

Although topics are similar from year to year, the theme changes. For 2019, presenters will emphasize managing outside of “normal” conditions. An invited speaker and a rancher panel will discuss the theme. Other topics covered will include plant physiology, soil health, plant identification, measuring and monitoring, stocking rates, adaptive management, and prescribed burn associations.

To enroll go to <http://www.kglc.org> or contact Barth Crouch at 785-452-0780 or barth.crouch@gmail.com.

Walt Fick, Rangeland Management Specialist
whfick@ksu.edu

9. North Central Experiment Fall Field Day, August 20, Scandia

All interested individuals are invited to attend the **2019 North Central Experiment Field Day** on **Tuesday, August 20, at 6:00 p.m.** The event will be held at the South Unit experiment field located approximately 2.5 miles west of Scandia on Hwy 36.

This is a free event and no pre-registration is required. There will be a catered meal at the end of the program. CCA/CEU credits will be available. Topics and speakers will include:

Corn planting date considerations – Stu Duncan, K-State Northeast Area Agronomist

In-furrow fertilizer with soybeans and soybean stand issues – Dorivar Ruiz Diaz, K-State Soil Fertility and Nutrient Management Specialist

Long-term fertility research and trends – Dorivar Ruiz Diaz and Andrew Esser, Agronomist-in-charge, North Central Kansas Experiment Field

For questions about the event, please call Andrew Esser at 785-335-2836



KSU NCK Experiment Field Fall Field Day

August 20, 2019

KSU Experiment Field South Unit Location

2.5 miles west of Scandia on Hwy 36

6:00 P.M. Sharp

Tour Topics:

-Corn Planting Date Considerations

Dr. Stu Duncan, KSU Northeast Regional Agronomist

-In-furrow Fertilizer with Soybeans and Soybean Stand Issues

*Dr. Dorivar Ruiz-Diaz, Soil Fertility and Nutrient Management
Professor K-State*

-Long-Term Fertility Research and Trends

*Dr. Dorivar Ruiz-Diaz and Andrew Esser, Agronomist-in-Charge
NCK-Exp. Fields*

Free Event

No registration required

Catered Dinner to Follow Program

Questions Call: 785-335-2836

Andrew Esser, Agronomist-in-Charge

Meeting sponsored by:



****CCA CEU's
available***

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Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

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10. Kansas River Valley Fall Field Day - August 13

All crop producers are invited to attend the **2019 Kansas River Valley Experiment Field Day** on **Tuesday, August 13 at 5:00 p.m.** The field day will be held at the Rossville field located 1 mile east of Rossville on Hwy. 24 on the south side of the road.

This is free event for all and will included a barbeque meal sponsored by Wilbur-Ellis. Presentations will be geared to having a more profitable and efficient crop production operation. Topics and speakers will include:

- **Dr. Stu Duncan and Dr. Dallas Peterson – Weed management in soybeans**
- **Dr. Dorivar Ruiz Diaz – Effect of split late N application in corn on yield and nitrogen use efficiency**
- **Malynda O'Day – Cover crop management for weed suppression**
- **Chip Redmond – Making the most of the Mesonet: A resource to aid herbicide application**

To pre-register for the catered meal sponsored by Wilbur-Ellis, please call Jolene Savage at the Shawnee County Extension office at 785-232-0062, Ext. 100, by **5:00 p.m. on Monday, August 12.** Additional field day sponsorship includes the Kansas Corn Commission. Certified Crop Advisor and Commercial Pesticide Applicator credits have been applied for.

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Kansas State Research & Extension

KSU Agronomy



Kansas River Valley Experiment Field 2019 Fall Field Day

Tuesday, August 13 - 5:00 p.m. Sharp!

Rossville Field — 1 mile east of Rossville on U.S.
Highway 24 on the south side of the road

Dr. Dallas Peterson and Dr. Stewart Duncan- Weed management in soybeans.

Dr. Dorivar Ruiz Diaz – Effect of split late N application in corn on yield and nitrogen use efficiency.

Malynda O'Day- Cover crop management for weed suppression.

Chip Redmond- Making the most of the Mesonet: a resource to aid herbicide application.

To pre-register for the catered BBQ meal sponsored by Wilbur-Ellis, call Jolene Savage at the Shawnee County Extension Office at 785-232-0062 — Ext. 100 by 5:00 p.m. on Monday, August 12. Additional Field Day sponsorship in-part by the Kansas Corn Commission. **Certified Crop Advisor and Commercial Pesticide Applicator Credits have been applied for.**

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11. East Central Experiment Field fall field day - August 21

The East Central Experiment Field in Ottawa will host its fall field day on **Wednesday, August 21**. The event will begin at 9:00 a.m. with registration, coffee, and doughnuts. The field day program will begin at 9:30 a.m. A complimentary lunch will be served at noon to conclude the event.

Field day topics and speakers include:

- **Dr. Dallas Peterson – Dicamba injury to non-Xtend soybeans**
- **Dr. Dorivar Ruiz Diaz – Effect of split late N application to corn on yield and nitrogen use efficiency**
- **Malynda O'Day – Cover crop management for weed suppression**
- **Chip Redmond – Making the most of the Mesonet: A resource to aid herbicide application**

The field day is located at the East-Central Experiment field near Ottawa. From I-35 at the Ottawa exit, go south 1.7 miles on Hwy 59, then east 1 mile, and south 0.75 mile.

Certified Crop Advisor and Commercial Pesticide Applicator credits have been applied for. Please contact the East-Central Research Station at 785-242-5616 at least two days prior to the event if accommodations are needed for persons with disabilities or special requirements. The field day is sponsored in part by the Kansas Corn Commission.



Kansas State Research & Extension



KSU Agronomy Ottawa Field Day

Wednesday, August 21th, 2019

East-Central Experiment Field

Ottawa, KS

**From I-35 at Ottawa: South 1.7 miles on
59 Hwy, East 1.0 mile, South 0.75 mile**

9:00..... Registration, coffee, and doughnuts

9:30..... Program begins

Dr. Dallas Peterson- "Dicamba injury to non-Xtend soybeans".

**Dr. Dorivar Ruiz Diaz – Effect of split late N application in corn on yield
and nitrogen use efficiency.**

Malynda O'Day- Cover crop management for weed suppression.

**Chip Redmond- Making the most of the Mesonet: a resource to aid
herbicide application.**

12:00..... Lunch

**Certified Crop Advisor and Commercial Pesticide Applicator Credits have been applied for.
Please contact the East-Central Research Station at 785-242-5616 at least two days prior to
this event if accommodations are needed for persons with disabilities or special requirements.
Field Day sponsored in-part by the Kansas Corn Commission.**

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