Issue 786

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eUpdate

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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. Evaluating a new soybean seed treatment to control Sudden Death Syndrome in Kansas

Sudden Death Syndrome (SDS) is a disease that affects soybeans and is caused by the soilborne fungus *Fusarium virguliforme* (Figure 1). This fungus prefers wet conditions and thus is usually most severe in irrigated fields. SDS tends to be most severe on well-managed soybeans with a high yield potential. It also tends to be more prevalent on fields that are infested with soybean cyst nematode (SCN) or planted early when soils are wet and cool. Historical yield losses from this disease are generally in the range of 1 to 25 percent. While there are differences in susceptibility between varieties, there are no varieties that are completely resistant to SDS. Fortunately for the past several years, ILeVO (Bayer CropScience) seed treatment has shown to be effective at reducing the severity and yield loss to SDS, especially when used in combination with more tolerant varieties. A new seed treatment for SDS, Saltro (Syngenta Crop Protection), will be available to farmers for the first time in 2020.

Figure 1. Soybean foliage with visual symptoms of Sudden Death Syndrome in the study plots located at the Kansas River Valley Experiment Field near Topeka, KS, in 2019. Photo by Eric Adee, K-State Research and Extension.

Testing different seed treatments to control SDS

A research study was started in 2019 to determine the effectiveness of different seed treatments, including Saltro, on SDS in soybeans. Irrigated soybeans were grown at Kansas River Valley Experiment Field near Topeka, KS. The field was Eudora silt loam with pH of 6.4 and organic matter at 1.6%. The previous crop was corn that was vertical-tilled prior to planting. The field had a history of SDS.

Two soybean varieties, NK S39-R9X (four reps) and NK S35-K9X (two reps), were planted at 160,000 seeds/acre on May 16, 2019. Seed in all the treatments had been treated with CruiserMaxx Vibrance seed treatment at 0.0945 mg ai/A. Saltro alone, Saltro with Avicta, Saltro with Clariva, and ILeVO were included in the study.

Soybean cyst nematode (SCN) population at planting was very low (43 eggs/100 cm^3 of soil). Rainfall was supplemented with two irrigation events consisting of 0.61 inches each in the last week of July. Plant populations were counted at V1-2 and V2-3, and severity of SDS foliar symptoms were rated every five to six days after onset of symptoms (August 16 through September 3). Disease intensity for the season was calculated using area under disease progress curves (AUDPC) from the four ratings and those values are reported in Table 1. Low AUDPC values indicate better control of SDS. Grain was mechanically harvested to estimate the yield.

Rainfall was above average every month of the growing season, with May (11.28 inches) and August (9.2) precipitation almost three and five times the average, respectively. July (88 ^oF) was the warmest month, especially during the last half, while August (85^oF) was four degrees below average. There were no differences between the soybean varieties for data collected, thus they were combined for analysis.

Summary of results

Foliar symptoms appeared relatively late (August 16) with soybeans at R4 growth stage. The progression of symptoms increased rapidly, however, with individual plots at 40% by August 22. The plant population at V1 to V2 was slightly lower with the ILeVO treatment, but there were no differences in population at V3. Higher yields were closely associated with lower AUDPC values and less severe SDS. Saltro (0.075 mg/A) and ILeVO (0.15 mg/A) seed treatments greatly reduced the severity of SDS and increased soybean yield compared to the control. The addition of the Avicta and Clariva Elite Soybean to Saltro did not alter the performance of Saltro on SDS and soybean yield.

Table 1. Effect of different seed treatments on Sudden Death Syndrome in soybeans from research conducted in 2019 at the Kansas River Valley Experiment Field near Topeka, KS.

Treatment	Plant Population V1 to V2	Plant Population V3	SDS severity[y]	AUDPC[x]	Yield
	(plants/acre)	(plants/acre)	(%)		(bu/acre)
Control (no seed treatment)	139,973 a[w]	112,966	46.2 a	395 a	59.5 c
Saltro 0.075 mg /A	141,167 a	111,514	12.6 b	66 b	71.8 ab
Saltro 0.075 mg /A + Avicta 0.242 mg /A	144,329 a	113,256	5.9 b	44 b	70.8 ab
Saltro 0.075 mg /A + Clariva Elite Soybean 0.119 mg /A	141,425 a	117,322	9.0 b	48 b	71.1 ab
ILeVO 0.15 mg /A	122,259 b	103,963	12.2 b	70 b	66.2 b
P-value	0.039	0.30	<0.0001	<0.0001	<0.0001
CV (%)	8.8	NS	57	77	8.2

[y] Disease severity estimated September 3 at R6.

[x] Area Under Disease Progress Curve from August 16 – September 3

[w] Data followed by the same letter or without letters within a column were not significantly different at $P \leq 0.05$.

Take home message

The addition of Saltro as another tool to combat SDS is great news for growers who need to manage SDS on a regular basis. It is not known from this study if Saltro will reduce Soybean Cyst Nematode as successfully as ILeVO has done in previous research. Regardless, this data indicates that both products can significantly reduce the severity of SDS and increase soybean yields. Incorporating either of these two seed treatments, in combination with a partially resistant variety, has the potential to greatly reduce the yield loss due to SDS, and increase the profitability of soybeans production.

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2. March weather outlook and looking beyond to Spring

February was a mixed pattern for both temperature and precipitation. What will the spring season bring to Kansas? The 6-to-10 and 8-to-14 day outlooks favor a continuation of the cooler-than-normal pattern into early March. The remainder of the outlook for March also favors a continuation of that trend (Fig. 1, lower right). The precipitation outlook (Fig. 1, upper right) is less certain, with equal chances of above- or below-normal precipitation, the exception being for the extreme eastern part of the state where there is a slight chance of below-normal precipitation. This pattern would be more favorable for spring fieldwork and calving than last year.

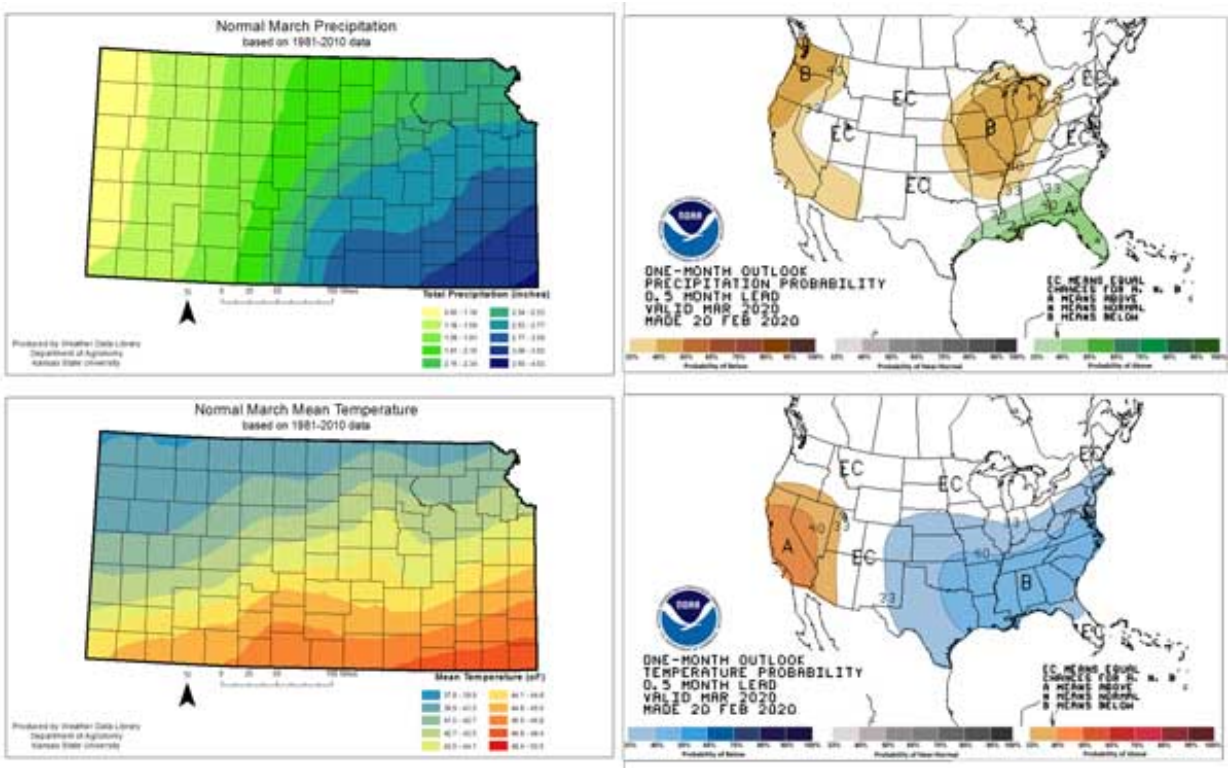

Figure 1. March outlooks for temperature and precipitation versus the 30-year normal for Kansas. Source: Kansas Weather Data Library and Climate Prediction Center

Looking towards the spring period (March through May), the temperature outlook is neutral across the state, with equal chances of above- or below-normal temperatures. However, this does not indicate how those temperatures may be distributed. A moderate start to the spring would allow for a gradual start to the growing season. That in turn would reduce vulnerability to any late frost event.

After a below-normal precipitation outlook for March along the eastern borders, equal chances of above/below normal moisture to slightly above-normal precipitation shows along these same areas for the spring according to the Climate Prediction Center (Fig. 2, lower right). Currently, the western third of the state has drier soil moistures at the surface and would benefit from a normal

precipitation pattern. A normal precipitation would especially assist fall-planted crops such as winter wheat and canola as they emerge from dormancy. Further east, with continued high rivers, reservoirs and soil moisture, a slightly drier pattern would be beneficial. Even with below-normal precipitation, flooding risks will remain elevated for east/central Kansas through the spring.

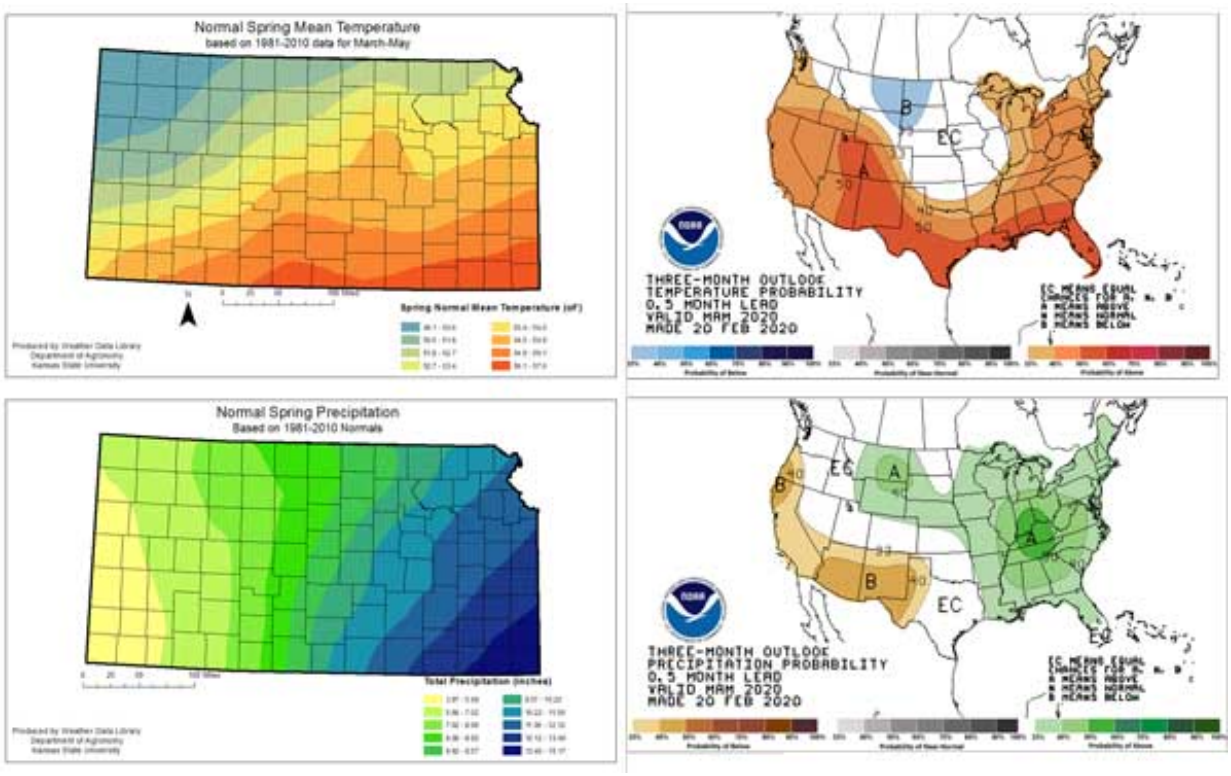

Figure 2. Spring outlooks for temperature and precipitation versus the 30-year normal during March, April, and May for Kansas. Source: Kansas Weather Data Library and Climate Prediction Center

The science behind the outlooks

The ENSO (El Niño-Southern Oscillation) is neutral. This means other factors, such as antecedent conditions, other patterns/oscillations around the globe, and placement/strength of the jet stream will be most dominant. Historically, spring is a period of strong steering winds and jet stream across the central U.S. resulting in conditions that are more active. Frontal passages become more common and are usually warmer/wetter. The pattern becomes more reliant on tropical conditions elsewhere and the location of any ridges of high pressure to our west.

Has the active period thus far in 2020 been a sign of things to come this spring? Possibly. The previous period observed very active sub-tropical jet stream contributions across the southern United States typical of ENSO neutral conditions. This was also driven by a combination of a highly anomalous Arctic Oscillation and a previously strong Indian Ocean Dipole. These conditions have seen recent trends downward toward more neutral conditions and are forecasted to continue. A neutral-to-negative Arctic Oscillation will allow colder air over the northeast U.S. and a storm track more eastward than previous seen. The March forecast from the Climate Prediction Center is very

similar to this pattern. However, persistence of warmer-than-normal conditions have occurred over the last decade with summer tending to arrive earlier. Therefore, warmer-than-normal conditions are highly favored as we enter April/May – typically as warmer overnight temperatures.

Precipitation-wise, a storm track further east would usually place most of Kansas in a drier pattern. While this may be welcomed for many – it could also influence severe weather, as well as increased fire weather. Early spring often provides a southwesterly trajectory across the state into Kansas with strong storm systems. The growing drought, with the below-average snow pack, in the southwest would mean this flow provides drier/warmer-than-normal conditions. This could also fuel drought further in the western portions of the state. Further east/north, these storm systems would provide a different impact with heavy rain and thunderstorms. Basically, a double edged sword of systems fueling drought and flooding simultaneously. Hence, the introduction of a gradient of expected precipitation for the three-month period across the state.

During the spring season, severe weather frequently accompanies the frontal passages. In addition to the severe components of tornadoes, hail, and high winds, heavy rainfall is climatologically increasing. The frequency of such events cannot be determined by current model outputs but will become more likely. As will conditions conducive for wildfires, since late February through mid-April are the climatological "fire season" in Kansas. This year, the concern for large wildfires is higher than 2019. This is a result of increased rainfall last year leading to a high grass yield and resulting fuel load. While these fires still require conducive weather conditions, increasing fire behavior and suppression issues have already been noted on recent smaller fires.

Key points

- A cold start is projected for March, then becoming warmer in April/May.
- Uncertainty dominates the outlooks.
- Flood risk still elevated for eastern Kansas.
- There is increased fire risk due to high grass loading.

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3. Summary of 2019 Kansas Corn Yield Contest

Kansas Corn, in conjunction with K-State Research and Extension, conducted a Kansas Corn Yield Contest for the 2019 growing season. This contest was free to enter and was open to all corn producers in Kansas that were active members of the Kansas Corn Growers Association. The objectives of the contest were:

- Recognize high-yielding Kansas corn farmers.
- Improve crop management practices and increase efficiency for greater sustainability and profitability.
- Share data collected among Kansas farmers and provide tips for improving management practices.

Field locations

A large concentration of the fields was located in northeast and northwest counties (Figure 1). Other fields were located in the remaining districts across Kansas.

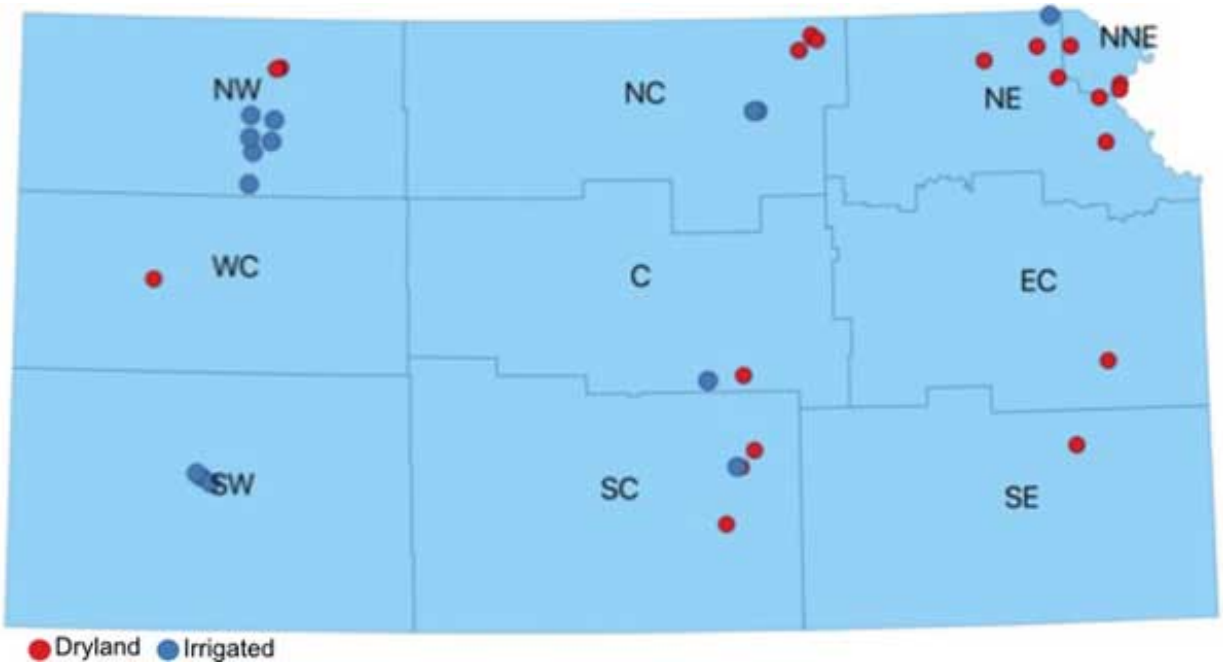

Figure 1. Field locations for high-yield corn contest entries. Dryland (23 entries), Irrigated (19 entries).

Summary of Results

- **Yield**
  - Average yield entry for the plot yields for dryland was 193 bu/acre, while for the irrigated group was 234 bu/acre (Table 1). Yields ranged from 132 to 295 bu/acre.

- Average yield of the entire fields was 166 bu/acre for dryland and 251 bu/acre for irrigated fields (Table 1).
- For dryland entries, yield increased with the decrease in longitude (from 102 to 94°W). This could be partially explained by the delay in planting date when moving from east to the west across Kansas. For yields <200 bu/acre, yield for the plot portrayed a larger yield than for the entire fields.

Table 1. Mean, minimum, and maximum grain yield of plot (area harvested for contest) and entire fields for irrigated and dryland corn fields (bu/acre). Graphic by KSU Crops, K-State Research and Extension.

		Plot Yield	Field		
			Mean	Min	Max
Dryland	Mean	193	166	206	219
	Min	132	95	155	30
	Max	281	240	303	303
Irrigated	Mean	234	251	279	279
	Min	159	164	250	250
	Max	295	304	325	325

- **Crop management**
  - Corn hybrids represented four different seed companies.
  - Average seeding rate was 28,955 seeds/acre varying between 16,000 and 40,000 seeds/acre.
  - 70% of the fields implemented 30-inch row spacing.
  - Soybean was the most frequent previous crop (+50%), followed by corn and wheat.
  - 62% of the farms conserved the residue of the previous crop, 35% grazed it, and 3% harvested residues.
  - 62% of the farms planted corn under no-till, 22% strip-tillage and 16% other tillage practices (e.g., disk, vertical, chisel).
  - From the irrigated farms, irrigation amounts when from 3 to 24 inches, with the most frequent amount placed on 6 inches (50% of all entries with irrigation).
  - A majority of the corn received (88%) received both pre- and post-emergence herbicide.
  - For pest management, 55% of the corn received both fungicide and insecticide applications, 41% received only fungicide application, and 4% only insecticide application.

Nutrient management

- 80% of the corn received starter fertilizer, N fertilization average 166 lb N/acre, P fertilization 39 lb P_2O_5/acre, and K fertilization averaged 30 lb K_2O/acre.
- Grain yield and N fertilization were positively related. with yields increasing 0.5 bu/acre per unit of N applied (lb/acre).

- None of the farmers reported iron deficiency.
- Lime was applied to fields (6%), manure application (4%), and a combination of lime and manure (4%).

Yield Environments Summary

- **Yield**
  - Average grain yield increased 30% from low (163 bu/acre) to medium (231 bu/acre) and 17% from medium to high (278 bu/acre yielding environments (Table 2).

- **Crop management**
  - Average seeding rate increased from 22,625 to 33,875 seeds/acre from low to high yielding environment (Table 2).
  - Irrigation adoption was clearly a factor for the medium and high yielding environments (ranging from 52 to 88%) versus a low level of irrigation adopted (8%) for the low yielding environment (Table 2).
  - Most of the low and medium yielding fields (~85%) used both pre- and post-emergence herbicides, while all of the entries reported to have used both pre- and post-emergence herbicides for the high yielding environments (Table 2).
  - A greater proportion of the fungicide was reported to be applied as the yield environment increased (39%, 52%, and 63% for low, medium, and high yield environments, respectively) (Table 2).
- **Fertilization**
  - A lower amount of P and K fertilizers were applied in low yielding fields (17 and 12 lb/acre of P_2O_5 and K_2O, respectively) compared to medium yielding fields (58 and 48 lb/acre of P_2O_5 and K_2O, respectively) (Table 2).
  - Average rate for fertilizer N application increased by 28% from low to medium yielding and by 13% from medium to high yielding corn contest-winner entries (Table 2).

Table 2. Summary of grain yield, crop management practices, and fertilizer strategies for different yield categories (low, medium, and high yield). Graphic by KSU Crops Lab, K-State Research and Extension.

Yield Category		Low (<214 bu/a)	Medium (214 - 257 bu/a)	High (> 257 bu/a)
Grain Yield (bu/a)	Plot	163	231	278
	Field avg	146	210	247
	Field min	95	116	220
	Field max	180	250	295
Crop management	Seeding rate (seed/a)	22,625	31,000	33,875
	Row spacing (in) 			
	Irrigation	8%	52%	88%
	Tillage 			
	Herbicide 			
	Fungicide	39%	52%	63%
	Insecticide	0	33%	75%
Fertilizers	Starter	46%	48%	75%
	P2O5	17	58	none reported
	K2O	12	48	none reported
	N	134	186	213
	Manure	11%	0%	17%
	Lime	0%	8.3%	17%

In summary, different management practices affect corn grain yield. Results from the 2019 Kansas Corn Yield Contest indicated that the use of irrigation, a balanced fertilization program (N, P, and K), seeding rate above 30,000 seeds/a, use of fungicides, and both pre- and post-emergence herbicides were all management practices implemented by farmers to maximize corn grain yields in Kansas.

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Josefina Lacasa, Undergraduate Research Scholar, KSUCROPS lab

Luciana Nieto, Graduate student, KSUCROPS lab

4. Prescribed burning workshops scheduled for 2020

The first Prescribed Burning Workshop of 2020 was held on February 6 in Kingman, KS. A total of 34 people, including presenters, attended. K-State, in cooperation with other agencies, are conducting some additional Prescribed Burning Workshops during February and into early March.

Each workshop normally lasts about 5 hours. There may be a charge for materials and lunch. Please contact the person listed in the table below to ask about charges and to get registered.

Date	Location	Address	Time	Contact
February 26	Hamilton	Hamilton Community Building	10 a.m.	Lindsay Shorter 620-583-7455 lindsayshorter@ksu.edu
March 4	Phillipsburg	4-H Building	10 a.m.	James Sweat 785-282-6041 Ext 112 james.sweat@ksnacdnet.net
March 5	Fredonia	Wilson County Old Iron Club	11:30 a.m.	Pam Walker 620-378-2128 pamela.walker@ksnacdnet.net Adaven Scronce 620-331-2690 adaven@ksu.edu

These workshops bring together presenters from state and federal agencies, including the Kansas Dept. of Wildlife, Parks, and Tourism, Kansas Forest Service, Natural Resources Conservation Service, Farm Service Agency, Great Plains Fire Science Exchange, county conservation districts, local fire departments and emergency management staff, and Kansas State University.

The smoke dispersal model should be active starting March 1, 2020 (see https://www.ksfire.org/).

Figure 1. The start of a prescribed burn near Pomona Lake in Kansas. Photo by Walt Fick, K-State Research and Extension.

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5. Don't miss the inaugural Great Plains Cotton Conference, Feb. 25-26 in Wichita

Did you know…300,000 acres of cotton was planted in northern Oklahoma (including the panhandle) and southern Kansas in 2019? Interest and enthusiasm is high again heading into the 2020 growing season!

Have you harvested a cotton crop in the past? Are you interested in growing cotton this next crop season? What is that insect in my field and is it a beneficial, neutral, or a pest? What insect pest populations are considered at threshold levels to require spraying? If and when should I apply a growth regulator? How do I prepare the crop for harvest? What weed management programs may work best for me? If you have any of these questions or others, plan on attending the first Great Plains Cotton Conference February 25 and 26 in Wichita, KS.

The conference is sponsored by Cotton Incorporated, Oklahoma State University, and Kansas State University, and will be held at the Red Roof Inn and Conference Center, 6815 W Kellogg (US 54), Wichita. Sessions will be geared to inform experienced, new and potential growers, consultants, and industry personnel. The program will run from 12:00 p.m. until 5:30 p.m. on February 25, with a sponsored meal at 6:30 p.m. for all attendees who pre-registered. The sessions will begin again at 7:45 a.m. on the 26th and will wrap up at 12:30 p.m.

Event organizers are asking everyone to please pre-register to allow for an accurate meal count. You can pre-register by calling Penny Adams at the Northeast Region Extension Office at 785-532-5833 or emailing at padams@ksu.edu. CCA and CEU credits will be available for some of the sessions.

For a detailed agenda, you can view a previous eUpdate article from Issue 784 – February 7, 2020 (http://bit.ly/2SpArJW) or contact your local County or District Extension Office.

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