Issue 934

K-STATE Research and Extension

Extension Agronomy

eUpdate

12/01/2022

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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

eUpdate Table of Contents | 12/01/2022 | Issue 934

1. Considerations for wheat fields prone to sulfur deficiency

In recent years, sulfur (S) deficiency in wheat has become more common in many areas of Kansas, particularly in no-till wheat. The likely reasons for this are a reduction in sulfur additions to the crop from atmospheric deposition (there is less S in the air now) and cooler soil temperatures as a result of no-till which slows S mineralization in the soil. Some crops in the rotation, such as soybean, can also take up significant amounts of S resulting in an S deficit for the following wheat crop.

During the current season, the wheat crop has likely taken up a very limited amount of S due to two main reasons. First, the majority of the S needs by the crop will occur after spring green up, when the crop goes through stem elongation. Thus, fall S needs by winter wheat are very small, which was exacerbated this year by small crop growth due to droughty conditions that limited crop emergence and tillering across most of the state. Second, the dry conditions also likely limited S movement into the root zone.

Historically, S deficiency was most common on high-yielding crops grown on irrigated, sandy soils that are low in organic matter and subject to leaching. However, due to reasons discussed above, an increasing number of finer-textured soils have shown S deficiency in recent years.

Identification of S deficiency

The photos below are good representations of S deficiency in wheat. Generally, S-deficient wheat is yellow and stunted and is observed in patches in the field, especially in areas where there has been previous soil erosion or soil movement (Figure 1). The patchy S-deficient areas of the field are often found on hilltops or sideslopes where erosion has occurred and soil organic matter is reduced, or where leaching is more pronounced. Wheat in areas where topsoil was removed or significant cuts were made (i.e. terraced or leveled fields) also commonly shows symptoms.

Figure 1. Patches of sulfur deficiency in a wheat field. Photo by Dave Mengel, K-State Research and Extension.

Sulfur deficiency in growing crops is often mistaken for nitrogen (N) deficiency. However, unlike N deficiency where older leaves show firing and yellowing, with S deficiency, the pale yellow symptoms often appear first on the younger or uppermost leaves. Wheat plants with S deficiency eventually become uniformly chlorotic (yellow leaf tissue; Figure 2).

Figure 2. Close-up of sulfur deficiency in wheat. The wheat is exhibiting yellowing (chlorosis) which is a sign of insufficient sulfur. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Sulfur deficiencies in wheat have been showing up early in the spring, shortly after green-up, before organic S is mineralized from soil organic matter, and before wheat roots can grow into the subsoil to utilize any available S (sulfate) accumulations. Deficiencies of S are often difficult to identify because

the chlorosis is not always obvious. Crops lacking S also may be stunted, thin-stemmed, and spindly. In the case of winter wheat, S deficiency delays stem elongation and early-spring maturity; however, it can hasten late-spring maturity and shorten the grain-filling period. In other cereal grains, S deficiency delays maturity. Winter annual weed competition is also enhanced due to the slower growth and lack of good tillering.

At present, many fields in north central and northeast Kansas have an established history of S deficiency for wheat. In this situation, rather than waiting for symptoms to appear in the spring, farmers may want to consider a winter topdress application of S as a preventive measure.

Forms of sulfur in soil

The majority of S in soils is present in organic forms in surface soils and as sulfate (SO_4^{2-}), an inorganic form. Sulfate is relatively soluble, so it tends to leach down into the subsoil. In many of our Kansas soils, it will accumulate in the B horizon (subsoil) in two forms. Clay surfaces and coatings will retain some sulfate, and sulfate will also be present in the subsoil of many Kansas soils as gypsum (calcium sulfate).

Testing soil for sulfur

There is a soil test for available sulfate-S in the soil profile. For proper interpretation of this test, soil texture, soil organic matter, , the crop to be grown, and the expected yield level all need to be considered. Accurate estimates of S needs cannot be made from a surface sample alone. Since sulfate is mobile, sampling to a **24-inch depth** is important. However, due to the relatively high demand for S during the rapid vegetative growth phase of wheat, and relatively shallow rooting by the wheat crop at this time, the S measured in the deeper, subsoil levels by the test may not be available to wheat in the early spring, especially where soils are cold. Now is a good time to collect soil samples and assess S levels as we plan for topdressing.

Testing leaves for sulfur

Leaf tissue tests can be a useful tool particularly when trying to determine the exact cause of yellow wheat. A representative sample can be made by collecting the newest mature leaves from 30+ plants throughout the area where deficiency symptoms are observed ("bad" areas). A similar sample from a "good" area (no deficiency symptoms) should also be collected. This will allow for direct comparisons between "good" and "bad" areas.

Choosing a fertilizer material

There are many S-containing fertilizer materials. Several dry materials are available that can be blended with dry phosphorus or nitrogen fertilizers for winter/spring topdressing. However, some of these products are best used in pre-plant applications.

Dry fertilizers

- **Elemental S** (typically 90-95 percent S) is a dry material marketed by several manufacturers. Before it becomes available for plant uptake, elemental S must first be oxidized by soil microorganisms to sulfate. This can be a slow process when surface-applied. As a result, elemental S is not well suited for spring topdress applications to S-deficient wheat due to the

time required for oxidation to sulfate.

- **Ammonium sulfate**, AMS (21-0-0-24S) is a dry material that is a good source of both N and S. However, it has high acid-forming potential and soil pH should be monitored. Ammonium sulfate is a good source to consider for either pre-plant or topdressing.
- **Gypsum** (analysis varies) is calcium sulfate and is commonly available in a hydrated form containing 18.6 percent S. This material is commonly available in a granulated form that can be blended with other materials. Since it is a sulfate source, it would be immediately available and is another good source for spring topdressing. However, gypsum is not as water soluble as many fertilizer materials such as ammonium sulfate.

- **New N-P-S products** such as Microessentials, 40-rock, MAP+MST, and others that are typically ammonium phosphate materials formulated with S, and in some cases micronutrients such as zinc. In most of these products the S is present as a combination of elemental S and sulfate.

Liquid fertilizers

- **Ammonium thiosulfate,** ATS, (12-0-0-26S) is the most popular S-containing product used in the fluid fertilizer industry as it is compatible with N solutions and other complete liquid products.

- **Potassium thiosulfate**, KTS, (0-0-25-17S) is a clear liquid product that can be mixed with other liquid fertilizers.

Topdressing with thiosulfate and UAN can be done early, before Feekes 5 growth stage (green up), and at temperatures below 70 degrees F. Be aware that some leaf burn may be expected with some of these liquid fertilizers. These products would be good sources for pre-plant application as well, although pre-plant applications would be more prone to leaching during the fall and winter when crop uptake is limited – especially in sandier soils where S deficiency symptoms are more common.

Supplemental resources

- Sulfur in Kansas *(*MF 2264), http://www.ksre.ksu.edu/bookstore/pubs/MF2264.pdf
- For estimations of required application rates of S - Soil Test Interpretation and Fertilizer Recommendations, (MF2586) http://www.ksre.ksu.edu/bookstore/pubs/mf2586.pdf

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

Romulo Lollato, Wheat and Forages Specialist
lollato@ksu.edu

Bryan Rutter, Soil Testing Lab Manager
rutter@ksu.edu

2. Corn planting and frost risk in central and eastern Kansas

More Kansas farmers are using late-planting dates to diversify production risks; however, final planting dates for crop insurance eligibility provide a limit for late planting. Planting corn later in the season increases the chances of receiving late-summer rains and reduces the effect of heat stress during flowering. The lack of information about late planting makes it difficult to make management decisions concerning this practice.

A recent study was conducted at Kansas State University with the following objectives:

- Define corn-yield environments based on grain-yield levels and stability over time.
- Explore different combinations of hybrid maturity by planting date and the effects of these combinations on final corn yields.
- Quantify the season-ending frost-risk effect of delaying planting dates on yield.

Two sources of information were summarized for this study: a field study conducted to obtain detailed life cycle (crop phenology) data for corn, and crop simulations to transfer the approach to other regions. Corn yield environments were defined by grouping the mean yield and its corresponding standard deviation based on 30 years of weather data (Figure 1).

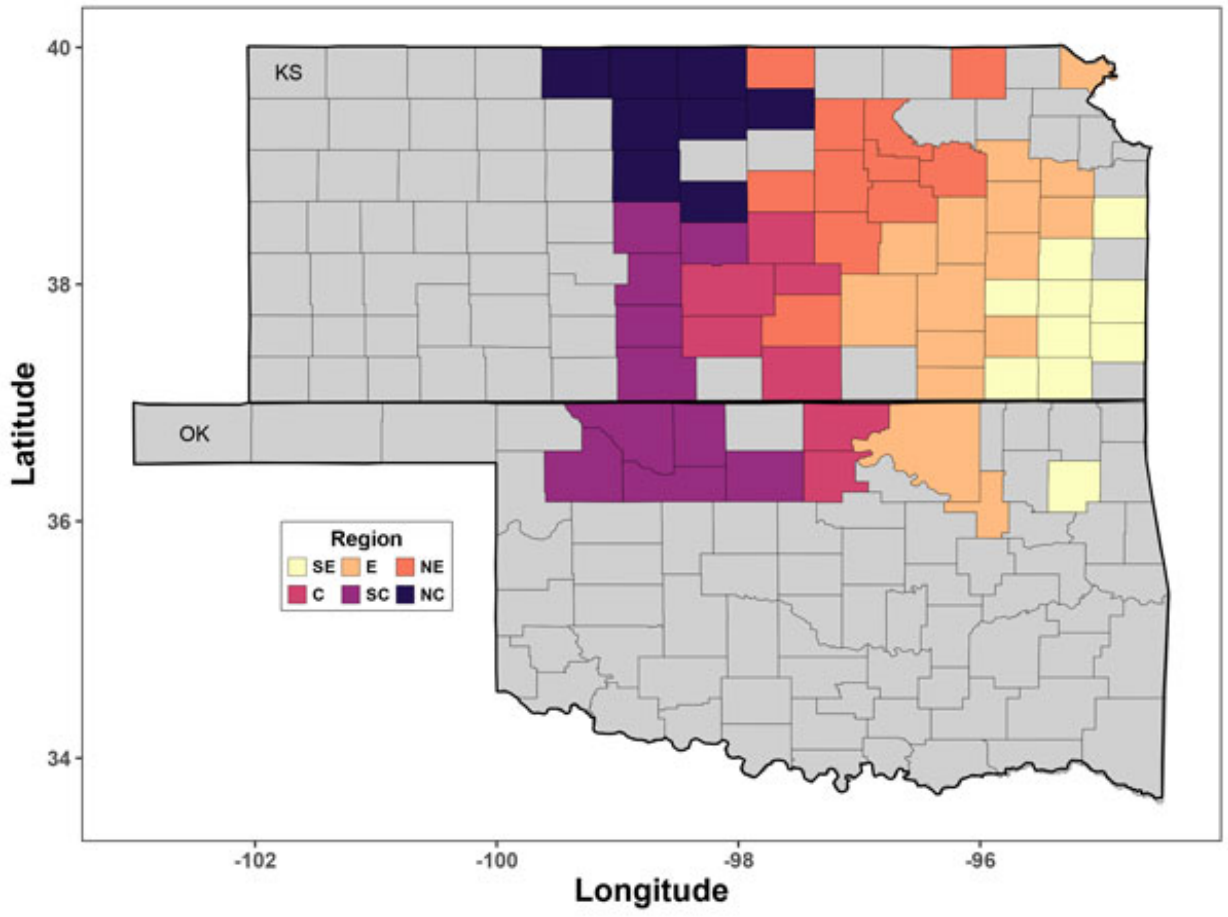

Figure 1. Corn productivity regions for counties across Kansas and Oklahoma. Map from KSRE

publication MF3610.

Results

Corn yield environments were defined across the state considering the optimal combination of hybrid maturity and planting date. The groupings were defined by clustering the mean yield and its corresponding standard deviation based on 30 years of weather data (Figure 1). Greater yields were attained with long-maturity hybrids (comparative relative maturity, CRM > 100).

Planting dates after mid-May decreased yields in eastern Kansas (Figure 2). In the central and south central regions, corn yields remained stable from early- to late planting dates (April 1 to July 1), but significantly increased the risk of frost damage, with effects on yields, after June 15.

The north central region presented similar corn yields for rain-fed conditions when planted early (April 1) until late-planted times. After June 1, the frost risk increased up to 25%. Thus, late May/early June dates combined both adequate yields with low frost risk.

Similar scenarios are reported for the northeastern area, with corn yields under rain-fed conditions remaining stable but increasing the risk of freeze damage for mid-June planting dates (20%).

Comparable to the northeastern area, in the southeast region, corn yields were reduced with delays in planting date, with the major frost risk defined after June 15.

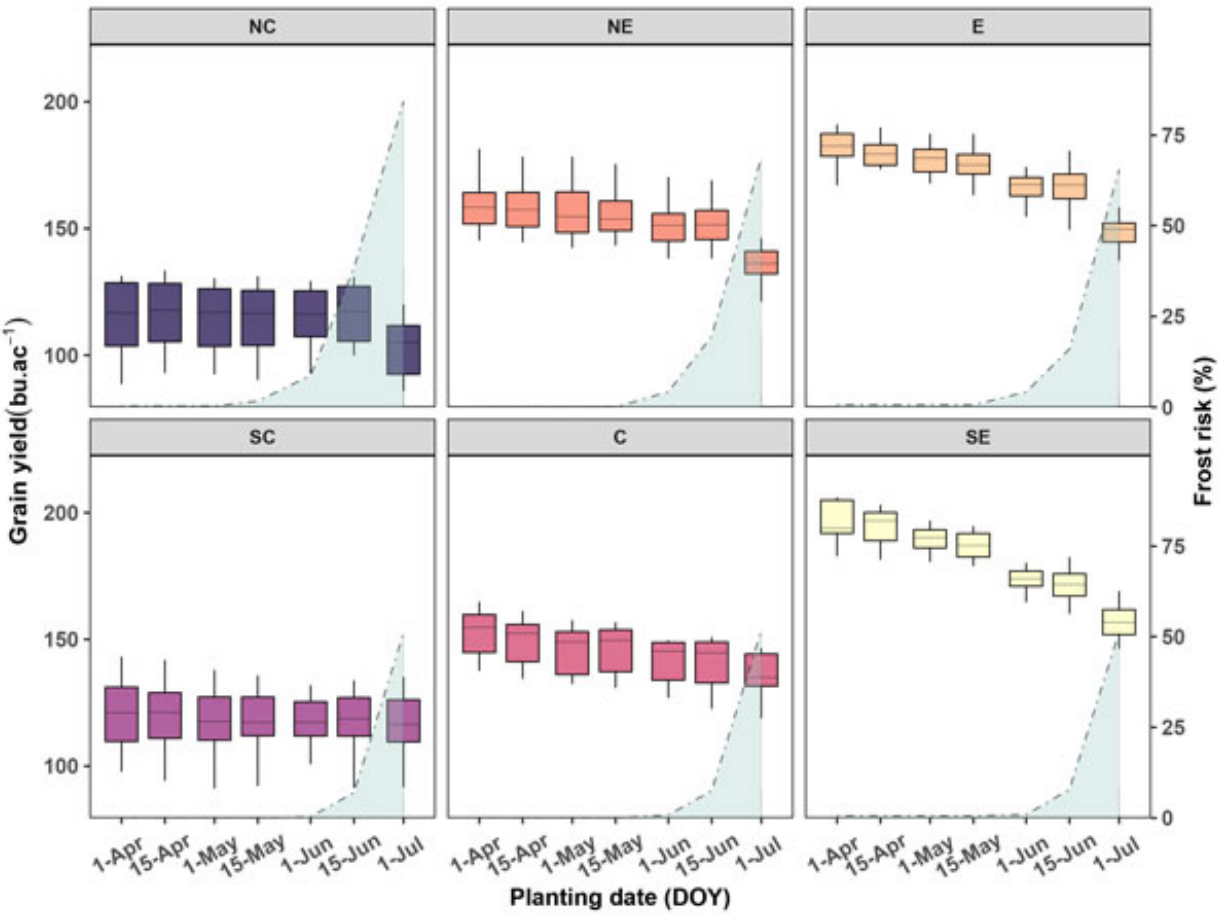

Figure 2. Corn grain yield (bu/a) and frost risk (i.e., risk percentage of having a frost (32°F) before physiological maturity for 30-year weather data) as a function of planting date (April 1, April 15, May 1, May 15, June 1, June 15, and July 1) for a hybrid comparative relative maturity of 101 in six regions across Kansas. Graphs from KSRE publication MF3610.

Summary

Opportunities for increasing yields and/or the number of crops per year were demonstrated mainly in the central and south central regions, either by:

- Delaying planting date to early- to mid-June (without any clear yield penalty) and including a cover crop for spring time (before the summer crop option), or
- Planting early (April), allows harvesting the crop by mid-September, following up with a winter crop option (e.g., winter wheat or canola).

This information is critical to re-evaluating the final planting dates and redefine the planting window for corn in Kansas.

This article was taken from the KSRE publication MF3610: Corn Planting Dates and Frost Risk in Central and Eastern Kansas. It is available online at: https://bookstore.ksre.ksu.edu/pubs/MF3610.pdf

This project is supported by Agriculture and Food Research Initiative Competitive Grant no. 2019-68012-29888 from the USDA National Institute of Food and Agriculture

Ignacio Massigoge, Graduate Student – Ciampitti Lab
imassigoge@ksu.edu

Ana Julia Paula Carcedo, Postdoctoral Fellow – Ciampitti Lab
carcedo@ksu.edu

Ignacio Ciampitti, Farming Systems
ciampitti@ksu.edu

3. Updated publications on a variety of crop pests in Kansas now available

Several K-State Research and Extension publications on crop pests in Kansas have been updated and are available to order or download for free.

A short introduction about each crop pest is listed below with a link to the corresponding publication.

MF2999 – Alfalfa Weevils - https://bookstore.ksre.ksu.edu/pubs/MF2999.pdf

The alfalfa weevil, *Hypera postica* (Gyllenhal), is the major perennial defoliator of early season alfalfa in Kansas. Alfalfa weevils originated in Asia but were probably introduced into the United States from southern Europe. First reported from Utah in 1904, they are now established in all contiguous states. There are thought to be two strains of the alfalfa weevil, an eastern strain that ranges as far west as Kansas, and a western strain that infests as far east as Nebraska and North and South Dakota.

MF2823 – Bird Cherry-Oat Aphids - https://bookstore.ksre.ksu.edu/pubs/MF2823.pdf

The bird cherry-oat aphid, *Rhopalosiphum padi* (L.), is a common inhabitant of Kansas wheat. It is more often associated with yield losses from barley yellow dwarf virus than any other aphid species. One of the largest aphids found on wheat, it is common in the fall and is the first aphid to be active in the spring. Aphids cause little direct feeding damage on wheat, but populations of 20 or more per tiller at the boot to heading stage may reduce yields.

MF3047 – False Chinch Bugs - https://bookstore.ksre.ksu.edu/pubs/MF3047.pdf

False chinch bugs, *Nysius* spp., occur in weedy pastures, fields, or other non-crop areas throughout Kansas. They typically feed on plants in the mustard family. When preferred foods dry up because they mature or are killed with herbicide, the insects migrate en masse to succulent plants nearby. They usually attack soybeans and sorghum but also feed on cotton, canola, and corn. In canola fields, nymphs can be found under decomposing wheat stubble during the day. Large numbers of insects present in or adjacent to agricultural crops can be problematic.

MF2954 – Black Cutworms - https://bookstore.ksre.ksu.edu/pubs/MF2954.pdf

The black cutworm, *Agrotis ipsilon* (Hufnagel), may infest field crops anywhere in Kansas. But economic infestations occur most commonly in eastern Kansas and especially in the southeastern fourth of the state — south of I-70 and east to Highway 177. Black cutworms have a wide host range but are of most agricultural concern to corn producers. They can also be problematic for vegetable growers and in turf grasses.

MF2582 – Soybean Aphids - https://bookstore.ksre.ksu.edu/pubs/MF2582.pdf

The soybean aphid (*Aphis glycines Matsumura*), native of China and Japan, was first identified in the United States during the summer and fall of 2000. By 2001, infestations were confirmed in several Midwestern states from Ohio to West Virginia, and west into Missouri and Iowa. In August and September of 2002, low numbers of aphids were confirmed in five eastern Kansas counties.

The soybean aphid has caused severe damage in some areas of the United States where it has

become established. Its detection in Kansas means soybean producers in eastern and central Kansas need to learn how to identify this pest and monitor fields for its presence and signs of damage.

MF2891 – Stink Bugs - https://bookstore.ksre.ksu.edu/pubs/MF2891.pdf

Kansas crops can be infested by several stink bug species, but it is usually the green stink bug, *Acrosternum hilare*, and to a lesser extent, the brown stink bug, *Euschistus servus*, that cause problems. Both immature (nymphs) and adults are polyphagous, meaning they feed on many types of plants including crops.

Jeff Whitworth, Extension Entomology Specialist
jwhitwor@ksu.edu

Holly Davis, former KSU entomology associate

Amie Norton, Nano-specialist – KSU Entomology

4. K-State/KARA Crop Production Update, Dec. 7-8 in Manhattan

The 2022 Crop Production Update, hosted by the Kansas Agribusiness Retailers Association (KARA) and in cooperation with K-State Research and Extension, will be offered in-person this year, with a virtual option. The two-day event will take place on December 7 and 8 at the Bluemont Hotel in Manhattan, KS. This course will provide a total of 12 CCA CEUS and one Commercial Applicator credit.

This training provides the latest research and technological advances in fertilizer and chemical recommendations, soil fertility, soil water and soil conservation, and much more. Confirmed topics include:

- Impacts of the Russia-Ukraine conflict on grain production and market
- Carbon credits: What do we know?
- New nitrogen recommendations for corn
- Weather update
- Sensor-based N management
- Economics of fertility management
- Corn and soybean production update
- Wheat and alfalfa production update
- Soil mineralogy review and applications
- Wind erosion and the Dust Bowl
- Disease management in wheat
- Phosphorus runoff in agroecosystems

Don't delay - get registered today! Registration information and cost options can be found here: https://www.ksagretailers.org/events-training/crop-production-update/

Registration costs differ depending on membership status and the program selected. For registration questions, please contact Clay Fagan at clay@kansasag.org or 785-234-0461.

Romulo Lollato – Wheat and Forages Specialist
lollato@ksu.edu

2022 KARA Crop Production Update

Kansas Agribusiness Retailers Association
K-State Research and Extension

8:30 a.m. – 4:40 p.m. December 7 and
8:30 a.m. – 2:50 p.m. December 8
Bluemont Hotel, 1212 Bluemont Ave, Manhattan KS 66502

Topics

- Russia-Ukraine conflict
- Carbon credits
- Sensor-based N management
- Weather outlook
- New corn N recommendations
- Wheat and alfalfa production
- Corn and soybeans production
- Wind erosion and the Dust Bowl
- Soil mineralogy
- Wheat diseases
- Phosphorus runoff
- Economics of fertility

Speakers

- Antonina Broyaka
- Peter Tomlinson
- Laila Puntel (UNL)
- Chip Redmond
- Nathan Nelson
- Romulo Lollato
- Ignacio Ciampitti
- Colby Moorberg
- DeAnn Presley
- Kelsey A. Onofre
- Lucas Haag

This event will offer 12 CCA CEUs and one Commercial Applicator credits.

Register online at https://www.ksagretailers.org/events-training/crop-production-update/
For registration questions, please contact Clay Fagan at clay@kansasag.org or 785-234-0461.
Prices differ depending on membership status and program selected.

Coffee breaks and lunch are included with registration and will be provided both days.

KANSAS STATE UNIVERSITY

KARA
Kansas Agribusiness Retailers Association

5. Registration is open for the 2023 Kansas Corn Schools

The Department of Agronomy and K-State Research and Extension, in partnership with Kansas Corn, are planning to host several Corn Schools in 2023. Registration is now open for the Corn Schools, which will be held in four locations starting on Jan. 12. An online session is also scheduled for Feb. 2.

Agendas will vary depending on the location of the school with topics ranging from production practices, weed and disease management to farm policy, markets, and cost-return.

Each school is free to attend and lunch will be provided for the in-person schools. Each in-person school will begin at 8:30 am with registration and morning refreshments. The program will start at 9:00 am and wrap-up at 1:00 pm. The online session on Feb. 2 will run from 6:00 to 8:00 pm using the Zoom online platform.

Please register online at https://kscorn.com/cornschool/. Agendas for each school will also be posted soon. Continuing education credits have been applied for.

January 12 – Oakley
Buffalo Bill Center
3083 US-83
Oakley, KS 67748

January 13 - Salina
Great Plains Manufacturing Conference Center
1569 E North St.
Salina, KS 67401

January 19 – Mayetta
Prairie Band Casino
12305 150th Rd.
Mayetta, KS 66509

January 20 – Parsons
KSU Southeast Research and Extension Center
25092 Ness Rd
Parsons, KS 67357

February 2 – Virtual
You must register in order to receive the Zoom link.

Ignacio Ciampitti, Farming Systems
ciampitti@ksu.edu

Josh Roe, VP of Market Development and Policy, Kansas Corn
jroe@ksgrains.com