Issue 724

K-STATE Research and Extension

Extension Agronomy

eUpdate

12/14/2018

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. Update on winter wheat growth and development in Kansas

Compared to the historical sowing pattern for Kansas, about 65% of the wheat crop was sown late. Additionally, many acres intended for wheat were not sown, particularly those acres which were intended to follow a soybean crop. Excessive moisture from September through early November is the reason for both the delayed sowing and potential reduction in wheat acres. In the majority of the cases, this moisture led to a very good stand establishment which is extremely important in setting the crop's yield potential. However, some locations had excess moisture, resulting in flooding of newly emerged fields. Also, large rainfall events led to soil crusting and decreased stands in many conventional tilled fields. In fact, a large portion of the wheat growing region in Kansas (central Kansas) has received more than 11 inches of precipitation since September 1. To provide a historical perspective, this results in anywhere from – 4.5 to +12.5 inches departure from normal (Figure1).

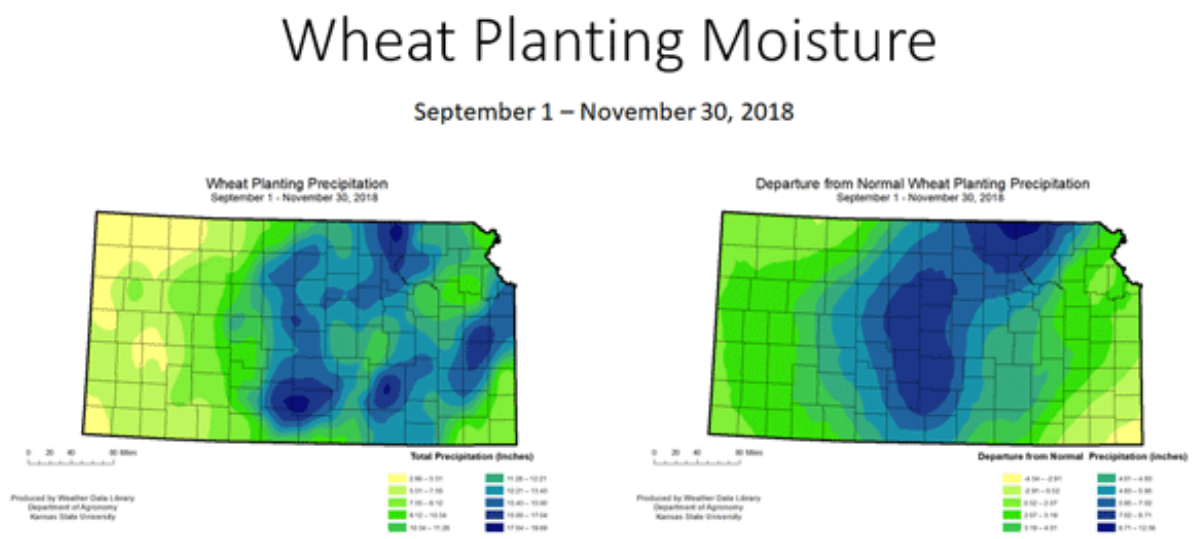

Figure 1. Planting season precipitation (left) and departure from normal (right) for Sep. 1 – Nov. 30 across Kansas.

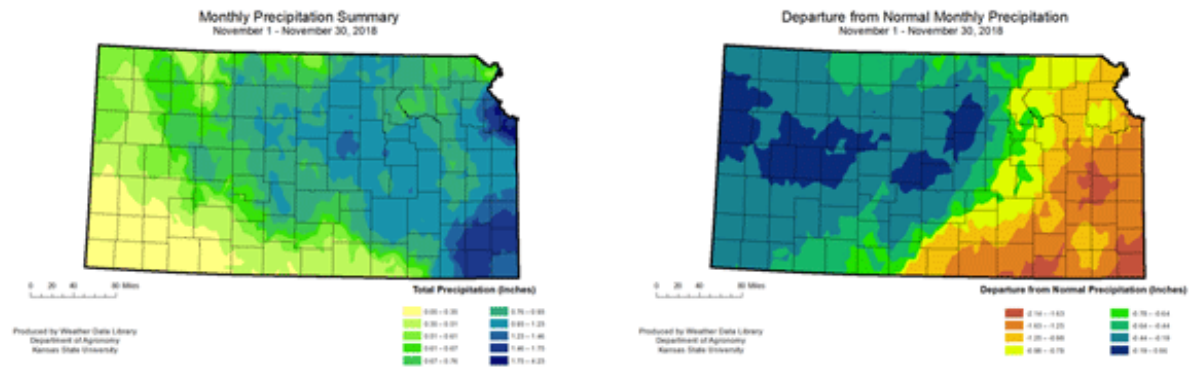

Figure 2. Total precipitation (left) and departure from normal (right) for November 2018 across Kansas.

Late sowing and cool fall implications

The late sowing coupled cooler-than-normal temperatures in a large portion of the Kansas wheat growing region might bring challenges to the wheat crop, especially for winter survival (Figure 3). Cool temperatures and saturated soils may reduce root development, which would render the crop less winter-hardy.

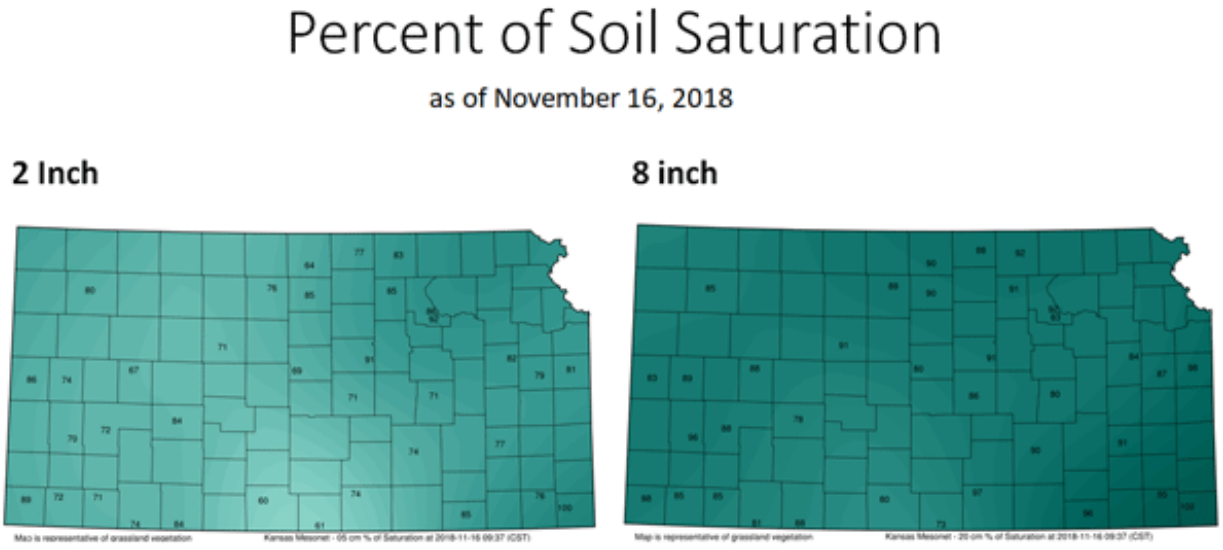

Figure 3. Percent soil saturation as of November 16, 2018. Source: Kansas Mesonet

In most regions of Kansas where wheat sowing was delayed due to excess precipitation, wheat development is lagging compared to the historical average. Many wheat fields in central and north central Kansas were delayed even further as producers finished summer crop harvest after the rainfall events. In these situations, it was not uncommon for producers to sow wheat after the first of November. This may not have provided the crop enough time to tiller during the fall. One example of such case is shown in Figure 4, where there is a comparison of fields planted late September, late October, and early November. All photos were taken in nearby fields near Hutchison. The better development of the late September sown fields is apparent when compared to the fields sown later. Wheat needs at least 4-5 leaves and 1-2 tillers prior to winter dormancy for maximum cold tolerance. Wheat that has fewer tillers and leaves, such as the later-sown crop, will be more susceptible to winter kill (Figure 5).

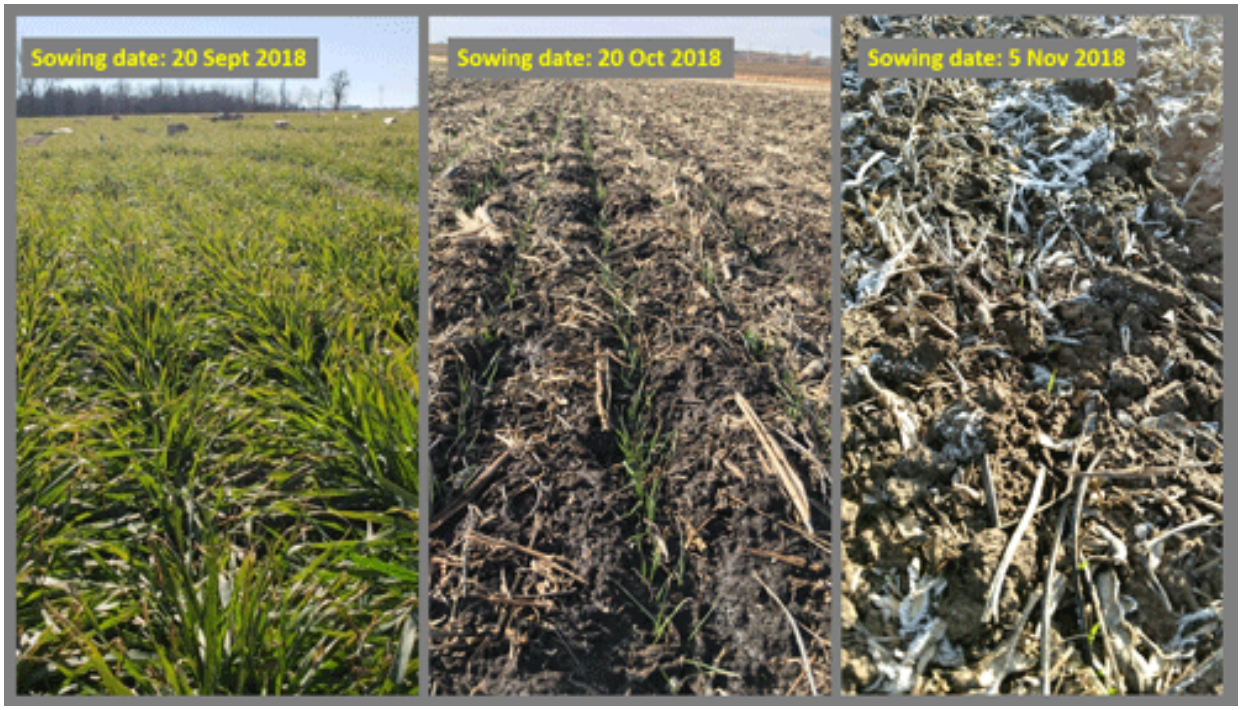

Figure 4. Late September (left) versus late October (center) versus early November (right) sowing dates and their effect on canopy development. Photos taken December 10 2018 in Hutchinson by Leonardo Molssato, Assistant Scientist, K-State Wheat and Forages Production Group.

Figure 5. Differences in wheat growth and development as affected by planting date. Wheat planted late October showing no primary tillers (left), while wheat planted early October has started to tiller (right). Both crops still need significant fall growth to properly prepare for winter dormancy. Photo taken at the Agronomy North Farm, Manhattan, Romulo Lollato, K-State Research and Extension.

What should producers look for?

Producers can assess the status of their wheat crop going into the winter in a few different ways. One important way is looking at the top-growth and counting leaves and tillers. As mentioned previously, wheat needs at least 4-5 leaves and 1-2 tillers prior to winter dormancy for maximum cold tolerance. Wheat that has fewer tillers and leaves will be more susceptible to winter kill (Figure 5).

It is important to also look at the root system development (Figure 5). Roots coming out from the seed are called seminal roots and are used to take up water and nutrients throughout the entire growing season. There are not very many of these roots so their contribution to overall water and nutrient uptake is limited. Crown roots are illustrated in Figure 6, right panel. Crown roots are the two

white protrusions coming out of the white area about an inch above the seed in the right photo. These roots take up most of the water and nutrients needed by the plant, and they are very important for the plant to survive the winter. If a cow were grazing on this wheat, she would probably pull the plant out of the ground as there are not many roots holding the plant in the soil yet. Consequently, this wheat crop still needs considerable fall growth prior to grazing or winter dormancy.

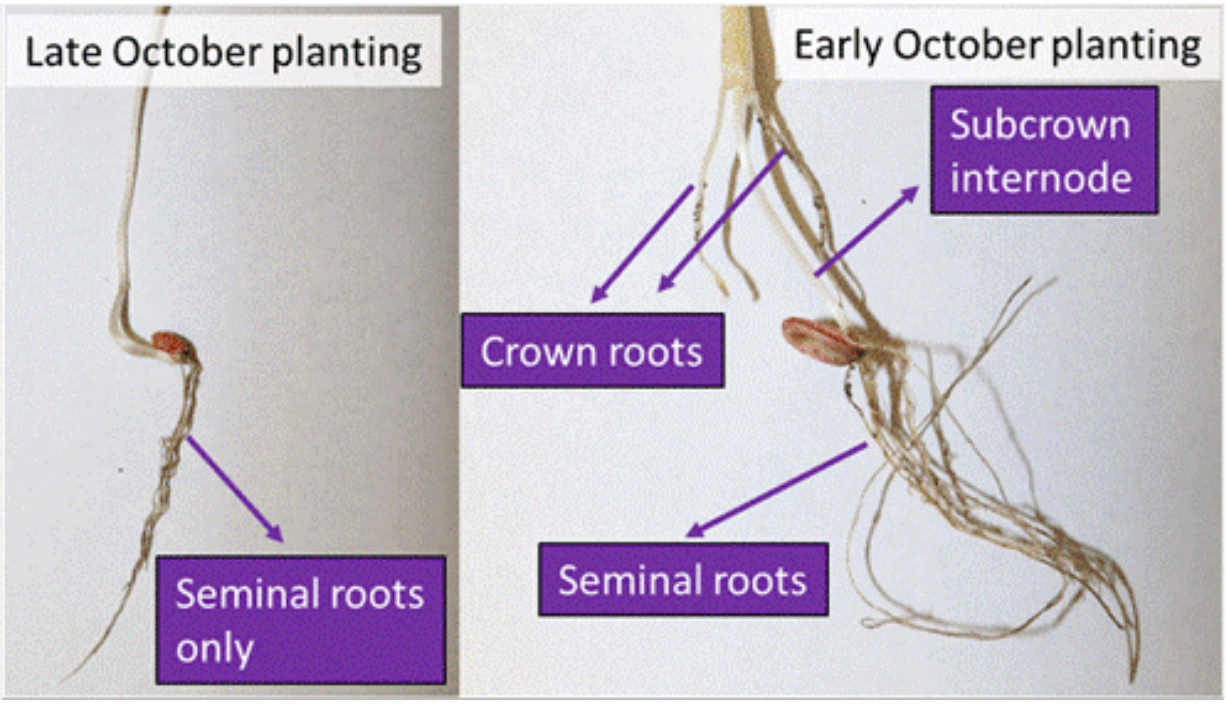

Figure 6. Seminal and crown roots development in wheat as affected by planting date. Both rooting systems are developed enough to be grazed, and may be susceptible to nutrient deficiencies or desiccation damage over the winter if the crown roots develop further. Photos taken at the Agronomy North Farm, Manhattan, Romulo Lollato, K-State Research and Extension.

The photos below illustrate various degrees of what you would like to see when you examine your wheat this fall. As expected, there is better canopy coverage with early-planted wheat for dual purpose (mid-September planting) as compared to wheat planted at the optimal planting time for grain only (mid-October planting). This does not necessarily mean the early-planted wheat is in better condition for winter. As long as the wheat planted in mid-October has 1-2 tillers and good crown root development (Figure 8B), the plants will have adequate growth going into winter. In addition to having adequate top-growth and root development, factors such as the extent of the plants' cold hardening, variety differences in winter hardiness, soil moisture and temperature, and snow or plant residue protection on the soil surface will ultimately have an impact on winter survival.

Figure 7. Fall growth and development of wheat as affected by planting date. Photos by Romulo Lollato, K-State Research and Extension.

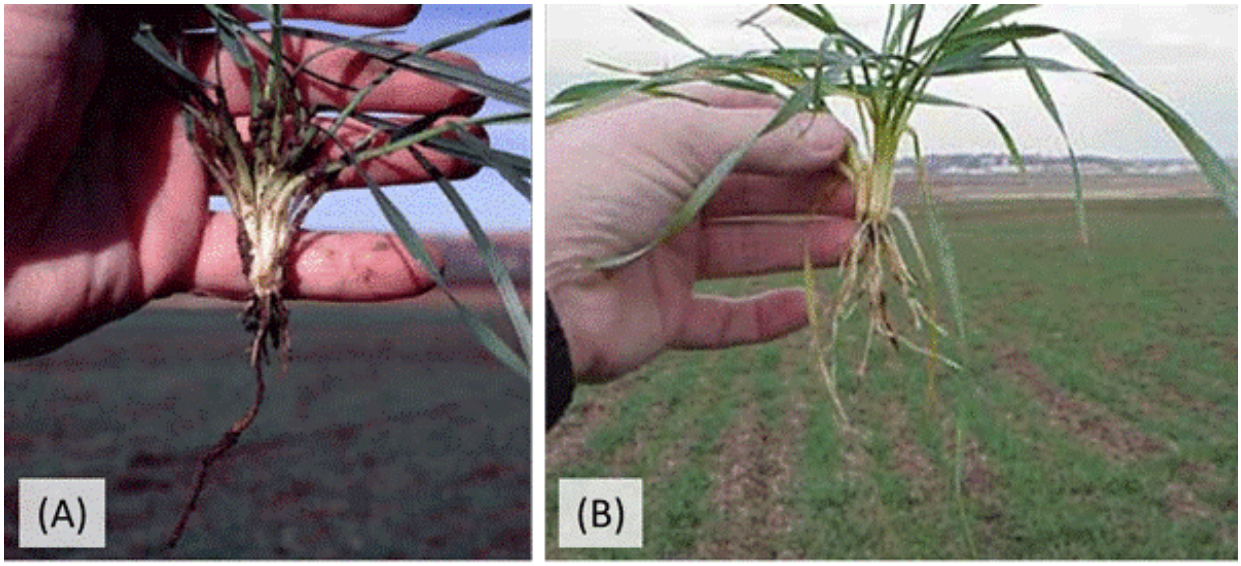

Figure 8. (A) Some of the crown roots are over one-inch long. For this plant, a couple additional weeks of mild weather would allow for more root growth which would be desirable. (B) Ideal wheat above- and below-ground development before winter dormancy, with crown roots fully developed and able to provide water and nutrients to the plant. With this amount of crown root development, wheat plants should be well anchored. If cattle were grazing this wheat, they couldn't pull the plants out of the ground. Photos by Jim Shroyer, professor emeritus, K-

State Research and Extension.

Stay tuned to future issues of the eUpdate for more information on the status of the wheat crop this year.

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2. Nutrient availability in poultry manure

Poultry litter can provide a significant and important supply of nutrients for crop production in areas of Kansas where a supply of litter is available. Although Kansas is not a major producer of poultry, there is an abundant supply of litter from the nearby states of Arkansas, Missouri, and Oklahoma, which rank among the largest producers of poultry in the U.S. The acreage available to receive poultry litter has been declining in Arkansas, Missouri, and Oklahoma in recent years because of environmental concerns and nutrient management regulations, thus the availability of litter to areas such as southeast Kansas has been on the rise.

Poultry litter should serve as an excellent complement to commercial nitrogen (N) fertilizers. Phosphorus content in poultry litter is usually high, and applications rates should be based on P levels to avoid potential surface water contamination.

Moisture content and nutrient concentration in poultry litter can be highly variable and depends mainly upon production conditions, storage, and handling methods. Therefore, laboratory analysis is the best way to determine the level of N and P in the material to be applied. Average values for the different types of poultry manure collected over a period of time are shown in Table 1. Actual laboratory analysis of 213 poultry manure samples from southeast Kansas are shown in Figure 1. There is a large range in nutrient values, likely due to the source of the litter. However, a good sample average to expect would be a 56-53-46.

Table 1. Types and nutrient content of poultry litter

Litter Source	**Typical moisture content**	**Typical nutrient content (lbs/ton)**		
		N	P_2O_5	K_2O
Layer	High	35	40	20
Pullet	Low	40	45	40
Breeder	High	40	60	40
Turkey	Low	60	60	55
Broiler	Low	60	60	55

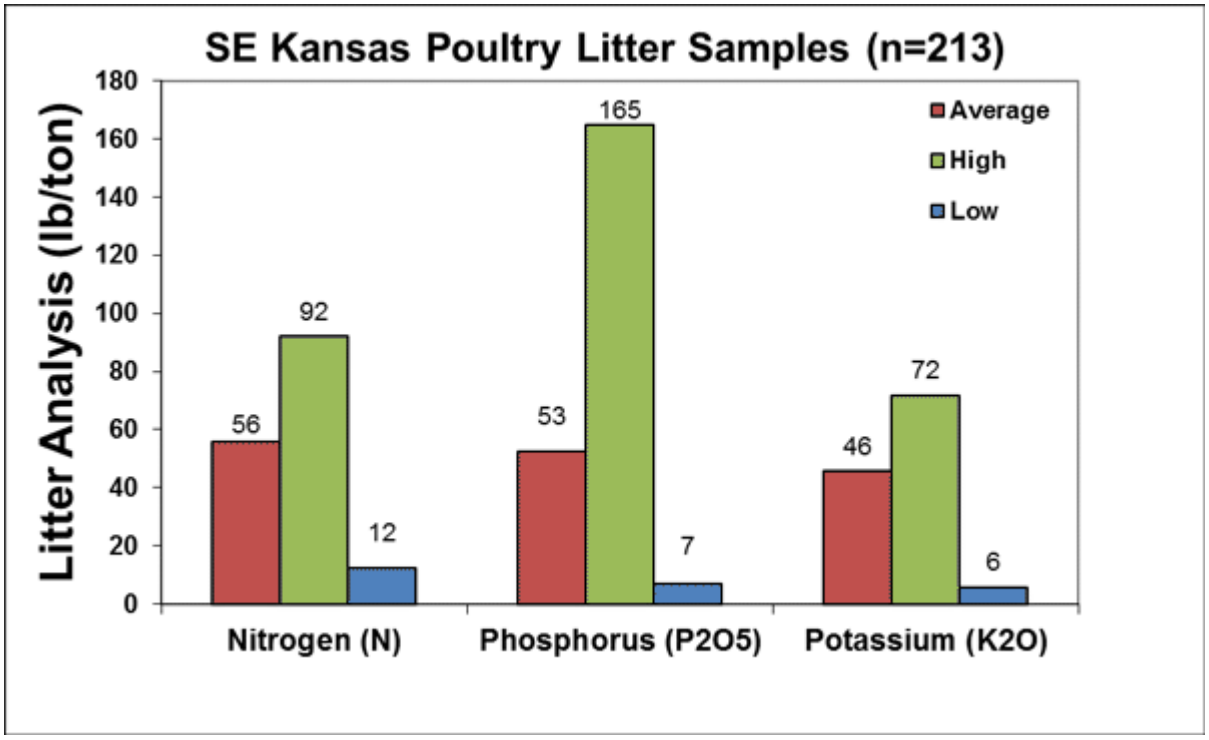

Figure 1. Results of analysis of 213 samples of poultry manure from southeast Kansas. Sources: Keith Martin, K-State Research and Extension, Wildcat Extension District and Doug Shoup, K-State Research and Extension.

For maximum efficiency of manure use, it is essential to know the nutrient content of the manure. A laboratory analysis should be done on the poultry litter before applying it to land. A laboratory analyses provides information regarding nutrient levels, as well as the chemical forms of these nutrients. This information is necessary for an adequate estimation of nutrient availability and application rates.

For more information, see K State Extension publication MF-2562, "Estimating Manure Nutrient Availability," at: http://www.ksre.ksu.edu/bookstore/pubs/MF2562.pdf

Nitrogen availability

What is the crop availability of N shortly following poultry litter application?

In the case of N, it is important to consider that this nutrient is primarily in the organic form in poultry litter (up to 75-80% organic N). Organic N needs to mineralize before becoming available to crops. A fraction of this organic N may become part of the soil organic matter pool and unavailable to crops in the short term.

Field and laboratory studies suggest the fraction of total nitrogen that becomes plant available the first year of application is approximately 45-55%, which includes both the inorganic N in the manure and a percentage of the organic N. This value varies depending upon components in the litter, and the method of handling and application. For example, poultry litter that contains a large fraction of

bedding material will tend to have lower N availability the year of application. Reduction in N availability may also occur when litter is aged, and has undergone some level of composting. Nitrogen lost from the volatile ammonium fraction at the time of application on the soil surface can also reduce plant available N. Ammonium volatilization is typically higher during windy and warm days. Incorporation of litter immediately after application will reduce volatilization and potential nutrient loss by water runoff in case of a rainfall event, in addition to reducing the odor of the litter.

If the manure is applied to pastures, the percentage of N utilized by the forage the first year will depend on whether the pasture consists of cool-season or warm-season grasses. For cool-season grasses, such as fescue pasture, N utilization will likely be less than 50% the first year. Most of the growth in cool-season pasture occurs early in the year. The microbial community will not mineralize as much N early in the spring as they will later in the summer. Fall applications may result in better N utilization for fescue than winter or spring applications. For warm-season grasses, such as bermudagrass pasture, nitrogen utilization from manure will likely be close to 50%. In both cases, producers should base application rates on the P and K needs of the grass, and supplement additional N fertilizer to meet the N needs of the grass.

Phosphorus and potassium availability

When manure is applied to the soil, what percentage of this phosphorus and potassium is available to the crop during the first year?

A large fraction of the P in manure is considered to be plant available immediately after application. The fraction that is not plant available shortly after application will become available over time.

Estimated values of P availability are from 50 to 100%. This range accounts for variation in sampling and analysis, and for P requirements with different soil test levels. Use the lower end of the range of P availability values (50%) for soils testing "Very Low" and "Low" (below 20 ppm). In these situations, large yield loss could occur if insufficient P is applied and soil P buildup is desirable.

On the other hand, use 100% availability when manure is applied to maintain soil test P in the "Optimum" soil test category, and when the probability of a yield response is small.

Several studies have shown that manure P is a valuable resource, comparable to inorganic fertilizer P for crop production. These two P sources are similarly effective when the manure P concentration is known and the manure is applied properly. Nevertheless, excessive application of manure P (e.g., applying manure at rates sufficient to meet the crop's N needs) often results in excessive soil P buildup over time, resulting in higher risk of surface water contamination.

This problem of excessive P buildup in the long-term can be minimized by:

- Applying manure to meet the P needs of the crop and using inorganic sources of fertilizer to complement nitrogen needs,
- Constantly monitoring soil test P levels, and
- Using the P-index to assess potential impact of P buildup on water quality.

Producers should think in terms of actual P application rates and not just tons per acre of manure being applied. Uniform application of manure at precise rates can also be difficult. Careful calibration of manure applicators is needed. If these aspects are not considered, the efficiency of manure P

compared with inorganic fertilizer P may be reduced. Careful management pays off.

Availability of potassium (K) is usually near 100% with proper application. Poultry litter can also provide significant amounts of secondary and micronutrients.

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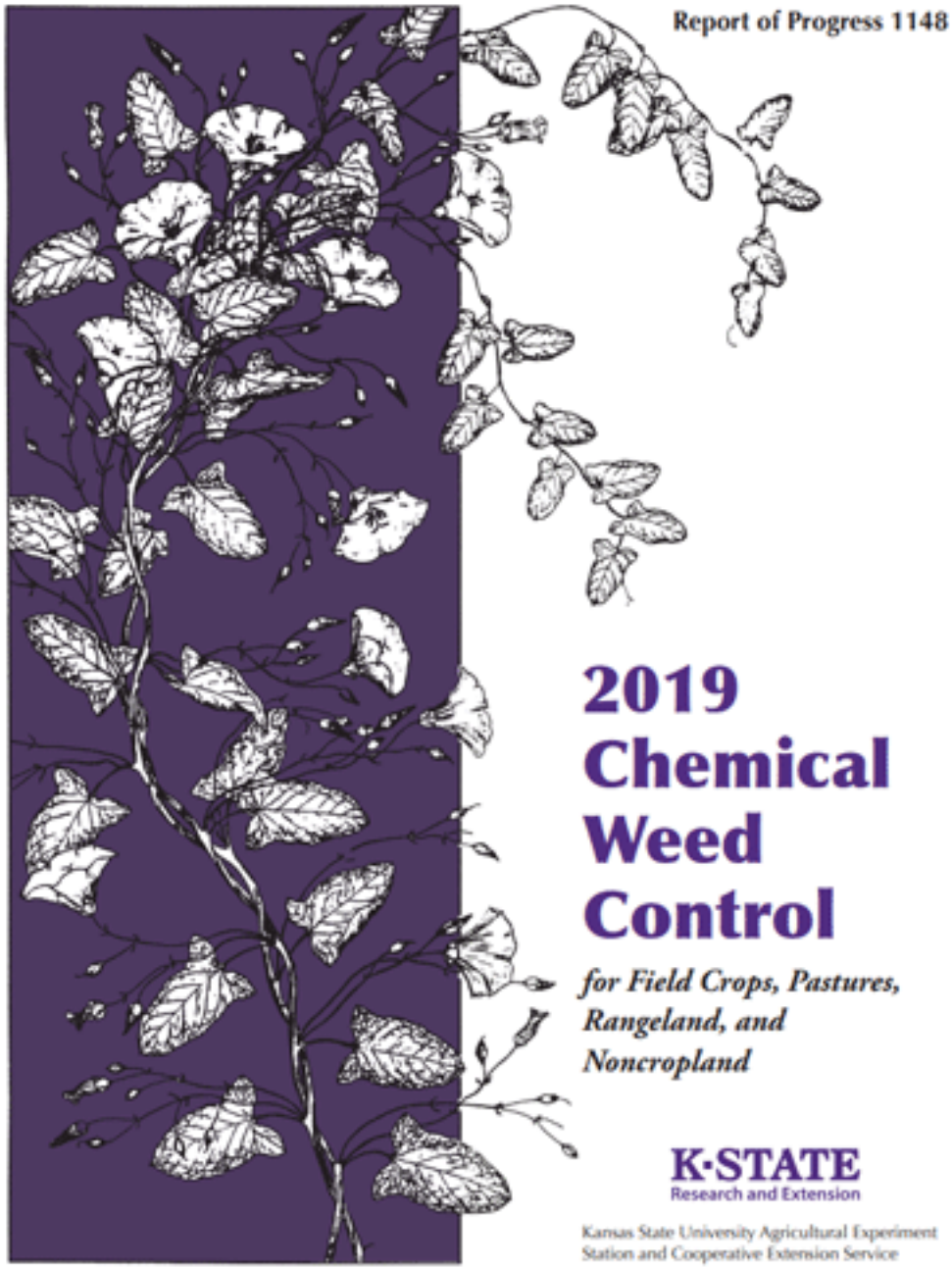
3. New K-State 2019 Chemical Weed Control Guide now available online

The new K-State 2019 Chemical Weed Control Guide is now available online at:

https://www.bookstore.ksre.ksu.edu/pubs/SRP1148.pdf

This publication provides suggestions for chemical weed control in several major crops, pastures, rangeland, and noncropland. For crops not listed, consult your local K-State Research and Extension agricultural agent.

Hard copies of this publication will be available starting January 2, 2019.



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4. Kansas Corn Management publication - Updated for 2019

A newly revised K-State Research and Extension publication, *Kansas Corn Management 2019*, is now available and can be accessed online at: https://www.bookstore.ksre.ksu.edu/pubs/MF3208.pdf

This publication offers advice to producers, crop consultants, and agronomists to manage Kansas corn crops as efficiently and profitably as possible. The recommendations provide guidelines and must be tailored to each producer's cropping conditions.

This comprehensive guide is written specifically for Kansas and includes valuable, up-to-date information on:

- Planting practices
- Plant density and yield gain
- Rate of dry down in corn before harvest
- Weed management
- Nutrient management
- Diseases
- Insect management
- Risk management and corn markets
- Machinery
- Irrigation

Contributors to the 2018 version of this publication include:

- Ignacio Ciampitti, Crop Production and Cropping Systems
- Dallas Peterson and Marshall Hay, Weed Management
- Dorivar Ruiz Diaz, Soil Fertility and Nutrient Management
- Daniel O'Brien, Agricultural Economics
- Danny Rogers, Bio and Ag Engineering – Irrigation
- Ajay Sharda, Bio and Ag Engineering – Planting Systems
- Doug Jardine, Plant Pathology
- Sarah Zuckoff and Brian McCornack, Entomology

5. 2019 K-State Corn Schools - Get registered now

The Department of Agronomy and K-State Research and Extension, in partnership with Kansas Corn, are planning to host three Corn Production Management Schools and three Corn Pre-Plant Schools in 2019. These schools are designed to provide in-depth training for corn producers across Kansas with targeted information for each location.

Each school is free to attend and will have lunch provided thanks to support provided by Pioneer. A range of topics will be covered and vary by location including: corn management, high-yielding corn factors, weed control, soil fertility and nutrient management, soil health considerations, insect management, corn market and policy perspectives, and grower panel discussion.

Corn Production Management Schools

- **January 7 – Salina, KS**
  Registration begins at 7:45 am, program from 8:30 am – 2:00 pm
  Hilton Garden Inn, 3320 S 9th Street, Salina

- **January 9 – Oakley, KS**
  Registration begins at 7:45 am, program from 8:30 am – 2:30 pm
  Buffalo Bill Cultural Center, 3083 US-83, Oakley

- **January 11 – Lawrence, KS**
  Registration begins at 7:45 am, program from 8:30 am – 2:00 pm
  Douglas County Fairgrounds, Flory Meeting Hall, 2120 Harper Street, Lawrence

Pre-Plant Corn Schools

- **February 11 – Parsons**
  Registration begins at 7:45 am, program from 8:30 am – 1:00 pm
  Southeast Research and Extension Center, 25092 Ness Road, Parsons

- **February 13 – Hesston**
  Registration begins at 7:45 am, program from 8:30 am – 1:00 pm
  Dyck Arboretum of the Plains, 177 W Hickory Street, Hesston

- **February 15 – Garden City**
  Registration begins at 7:45 am, program from 8:30 am – 1:00 pm
  Pioneer Garden City Research Station, 1455 East Parallel Road, Garden City

To register for any of the schools, please go online at https://kscorn.com/CornSchool/. Registration is requested one week prior to the event you wish to attend.

CCA and CEU credits have been applied for. Additional local sponsors include Ag Risk Solutions and the Andersons.

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6. K-State Soybean Schools scheduled for January 2019

A series of nine K-State Soybean Production Schools will be offered in late January to provide in-depth training targeted for soybean producers and key-stakeholders. The schools will be sponsored by the Kansas Soybean Commission.

The schools will cover a number of issues facing soybean growers including: weed control, crop production practices, nutrient management and soil fertility, insects, disease management, and market outlook. More information on specific speakers and topics will be provided in future eUpdate issues as agendas are finalized.

The dates are set and specific locations have been chosen with Schools located across the state.

January 15 – Tuesday

- **Wichita, KS -** 8:30 am to 1:00 pm
  Sedgewick County Extension Education Center, 7001 W. 21st Street North
  Contact: Jackie Fees, jfees@ksu.edu

- **Parsons, KS -** 3:00 to 7:00 pm
  25092 Ness Road
  Contact: James Coover, jcoover@ksu.edu

January 16 – Wednesday

- **Paola, KS -** 8:30 am to 1:00 pm
  401 Wallace Park Drive
  Contact: Katelyn Barthol, kbarth25@ksu.edu)

- **Holton, KS -** 3:00 to 7:00 pm
  Northeast Kansas Heritage Complex, 12200 214th Road

Contact: David Hallauer, dhallaue@ksu.edu

January 24 - Thursday

- **Hugoton, KS -** 8:30 am to 12:30 pm
  4-H Building, 1130 S. Trindle (Fairgrounds)
  Contact: Ronald Honig, rhonig@ksu.edu

- **Scott City, KS -** 3:00 to 7:00 pm
  Wm. Carpenter 4-H Building, 608 N. Fairground Rd
  Contact: John Beckman, jbeckman@ksu.edu

January 25 – Friday

- **Hoxie, KS -** 8:30 am to 12:30 pm
  Sheridan County 4-H Building
  Contact: Keith VanSkike, kvan@ksu.edu

- **Great Bend, KS -** 3:00 to 7:00 pm
  American Ag Credit, 5634 10th Street
  Contact: Stacy Campbell, scampbel@ksu.edu

January 28 – Monday

- **Beloit, KS -** 9:00 am to 1:00 pm
  NC Kansas Technical College Conference Room, 3033 U.S. Hwy 24
  Contact: Sandra Wick, swick@ksu.edu

Lunch will be provided courtesy of the Kansas Soybean Commission. There is no cost to attend, but participants are asked **to pre-register one week prior to the school they plan to attend**. Online registration is available at K-State Soybean Schools (http://bit.ly/KSUSoybean) or by emailing/calling the nearest local K-State Research and Extension office for the location participants plan to attend.

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7. K-State Sorghum Schools scheduled for early February 2019

A series of three K-State Sorghum Production Schools will be offered in early February to provide in-depth training targeted for sorghum producers and key-stakeholders. The schools are sponsored by Kansas Grain Sorghum Commission.

The schools will cover a number of issues facing sorghum growers: risk management, marketing opportunities, weed control, crop production practices, nutrient and soil fertility, and insect management.

The final dates and locations have been set focusing with Schools across the state. More details on speakers, topics, and specific locations will be in an upcoming eUpdate. Stay tuned!

Garden City, KS

February 5, Tuesday, 8:30 am to 1:00 pm
Jennifer Stoss - jstoss@ksu.edu

Hays, KS

February 6, Wednesday, 8:30 am to 1:30 pm
Stacy Campbell - scampbel@ksu.edu

Salina, KS

February 7, Thursday, 8:30 am to 1:00 pm
Carl Garten - cgarten@ksu.edu

Lunch will be provided, courtesy of the Kansas Grain Sorghum Commission. There is no cost to attend, but participants are asked to pre-register by **January 29**. Online registration is available at K-State Sorghum Schools (http://bit.ly/KSUSorghum) or by emailing/calling the nearest local K-State Research and Extension office nearest the location participants plan to attend.

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