Issue 898

K-STATE Research and Extension

Extension Agronomy

eUpdate

03/24/2022

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.

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1. First hollow stem update - March 24, 2022

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS). Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to the eUpdate article "Optimal time to remove cattle from wheat pastures: First hollow stem").

First hollow stem update

In order to screen for FHS during this important time in the growing season, the K-State Extension Wheat and Forages crew measures FHS on a weekly basis in 19 different commonly grown wheat varieties in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson.

Ten stems are split open per variety per replication (Figure 1), for a total of 30 stems monitored per variety. The average length of hollow stem is reported for each variety in Table 1.

Figure 1. Ten main wheat stems were split open per replication per variety to estimate first hollow stem for this report, for a total of 30 stems split per variety. Photo by Romulo Lollato, K-State Research and Extension.

Table 1. Length of hollow stem measured on 9, 15, and 21 of March 2022 of 19 wheat varieties

sown mid-September 2021 at the South Central Experiment Field near Hutchinson. The critical FHS length is 1.5 cm (about a half-inch or the diameter of a dime). Value(s) in bold indicate the highest FHS group. Values highlighted in yellow indicate varieties that have already passed the 1.5 cm first hollow stem threshold.

	First hollow stem (cm)		
Variety	**3/9/2022**	**3/15/2022**	**3/21/2022**
AP Exp#1	0.2	0.3	1.0
AP Roadrunner	**0.7**	**1.0**	1.9
AP18AX	**0.6**	0.6	**2.9**
AM Cartwright	0.3	0.5	0.8
Crescent AX	0.4	0.8	2.1
KS Ahearn	0.3	0.3	0.6
KS Hatchett	0.1	0.5	1.0
KS13DH0041-25	0.2	0.5	1.2
LCS Atomic AX	0.5	0.6	1.7
LCS Chrome	0.2	0.5	1.1
LCS Helix AX	0.3	0.4	1.1
LCS Julep	0.2	0.3	0.8
LCS Photon AX	0.4	0.5	1.3
LCS Revere	0.2	0.2	0.5
LCS Runner	0.2	0.2	0.8
LCS Steel AX	0.3	0.3	1.0
LCS Valiant	0.2	0.3	1.1
Plains Gold Ray	0.3	0.4	0.9
Zenda	**0.5**	**1.2**	**2.3**
Average	0.3	0.5	1.3
Min.	0.1	0.2	0.5
Max	0.7	1.2	2.9

The wheat varieties AP Roadrunner, AP 18AX, Crescent AX, LCS Atomic AX, and Zenda had all reached the critical first hollow stem value of 1.5 cm as of March 21, 2022, and all varieties had started to elongate the stem at different rates and there were statistical differences among the varieties evaluated. We will report first hollow stem during the next few weeks again until all varieties are past this stage. Additionally, first hollow stem is generally achieved within a few days from when the stem starts to elongate, so we advise producers to closely monitor their wheat pastures at this time.

The intention of this report is to provide producers an update on the progress of first hollow stem development in different wheat varieties. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to take the decision of removing cattle from wheat pastures.

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2. Optimal corn seeding rate recommendations

The optimal corn seeding rate is a management (M) variable that depends on the hybrid (genotype, G), and the interaction with the environment (E). Researchers termed this as the G x E x M interaction. To evaluate whether the corn seeding rate they have used was adequate, producers may look back to their corn crop from the previous growing season, or wait until the current growing season is nearly complete, which is also known as an *ex-post* approach. It is worth to also consider additional M factors that can interact on the yield response to corn seeding rate but are sometimes overlooked such as: planting date, nitrogen fertilization, row spacing, and crop rotation.

Although specific hybrids can respond differently, the following guidelines may help in deciding if the selected corn seeding rates need to be adjusted.

1. **Few kernels per ear**: if more than about 5% of the plants are barren or if most ears have fewer than 250 kernels per ear, the corn seeding rate may be too high.
2. **Too many kernels per ear**: if there are consistently more than 600 kernels per ear or if most plants have a second ear contributing significantly to grain yield, the corn seeding rate may be too low. Of course, the growing conditions will influence ear number and ear size as well, so it is important to factor in the growing conditions for that season when interpreting these plant responses.
3. **Tipping back**: don't be too concerned if a half-inch or so of the ear tip has no kernels. If kernels have formed to the tip of the ear, there may have been room in the field for more plants contributing to higher grain yield. Again, this "tipping back" will vary with the G x E x M interaction.
4. **Irrigation**: optimal corn seeding rates may need to be adjusted if fertilizer or irrigation rates are sharply increased or decreased. For example, research at the Irrigation Experiment Field near Scandia has shown that if fertilizer rates are increased, corn seeding rates also have to be increased to attain the maximum yield benefit.
5. **Nutrient status**: in addition to the growing conditions, nutrient status can also influence the final number of grains per ear. For example, severe nitrogen (N) deficiency will have a high impact on the final number of grains, ear size and ear number.

Keep in mind that the potential ear size and potential number of kernel (1,000-1,200 per ear) are set before silking, but the actual final number of kernels is not determined until after pollination and early grain fill due to relative success of fertilization and degree of early abortion.

Always keep the long-term weather conditions in mind. In a drought year, almost any corn seeding rate is too high for the available moisture in some areas. Although it's not a good idea to make significant changes to seeding rates based only on what has happened recently, it is worthwhile taking into consideration how much moisture there is currently in the soil profile and the long-term forecasts for the upcoming growing season.

For this growing season, if you think weather conditions will be more favorable for corn this year than the past years, stay about in the middle to upper part of the range of seeding rates in the table below. If not and you expect dry subsoils, you might want to consider going towards the lower end of the range of recommended seeding rates, with the warning that if growing conditions improve, you will have limited your top-end yield potential.

The recommended corn seeding rate and final plant population in the following tables attempt to factor in these types of questions for the typical corn growing environments found in Kansas. Adjust within the recommended ranges depending on the specific conditions you expect to face and the hybrid you plan to use. Of course, do not forget to consult seed company recommendations to determine if seeding rates for specific hybrids should be at the lower or upper end of the recommended ranges for a given environment.

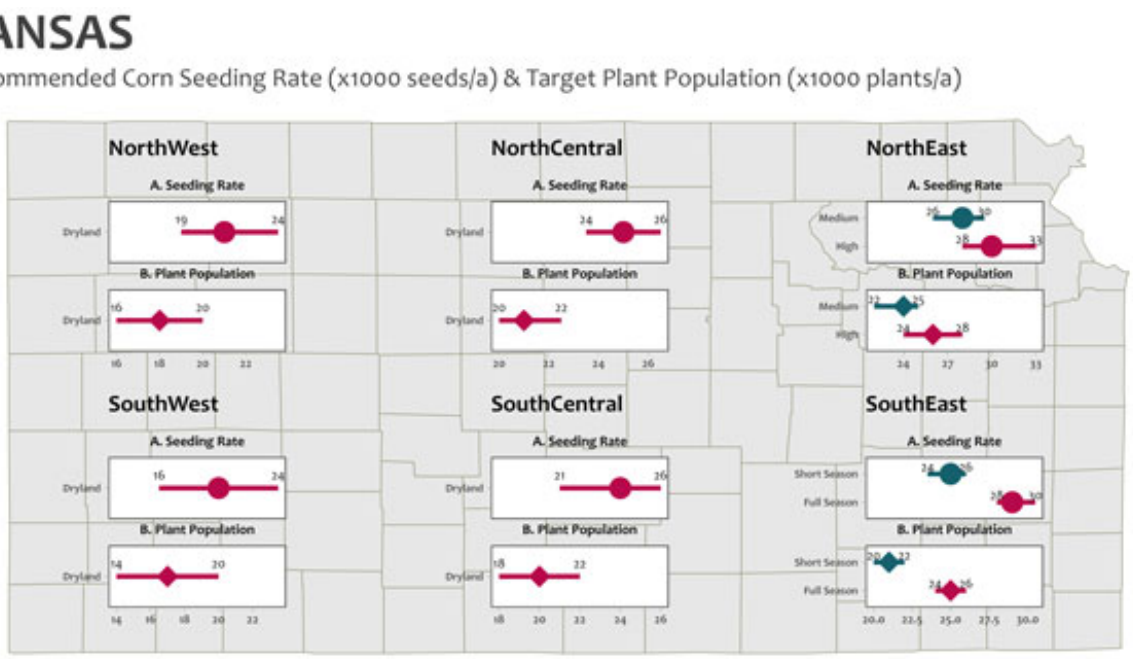

Figure 1. Suggested dryland corn final populations and seeding rates. Map created by A. Correndo, K-State Research and Extension.

Table 1. Suggested irrigated corn final populations and seeding rates

Environment	Hybrid Maturity	Final Plant Population (plants per acre)	Seeding Rate* (seeds per acre)
Full irrigation	Full-season	28,000-34,000	33,000-40,000
	Shorter-season	30,000-36,000	35,000-42,500
Limited irrigation	All	24,000-28,000	28,000-33,000

* Assumes high germination and that 85 percent of seeds produce plants. Seeding rates can be reduced if field germination is expected to be more than 85%.

K-State research on corn seeding rates

An intensive review of a large database from Corteva Agriscience (2000-2014 period) was utilized to

synthesize yield response to plant population under varying yield environments (<100 bu/acre to >200 bu/acre). Overall, yield response to plant population depended on the final yield environment (Figure 2). In yield environments below 100 bu/acre, yield response to plant population was slightly negative. Yield response to plant population tended to be flat when yield environment ranged from 100 to 150 bu/acre; positive and quadratic with the yield environment improving from 150 to 180 bu/acre; and lastly, increasing almost linearly with increasing plant populations when the yield environment was more than 200 bu/acre (Figure 2).

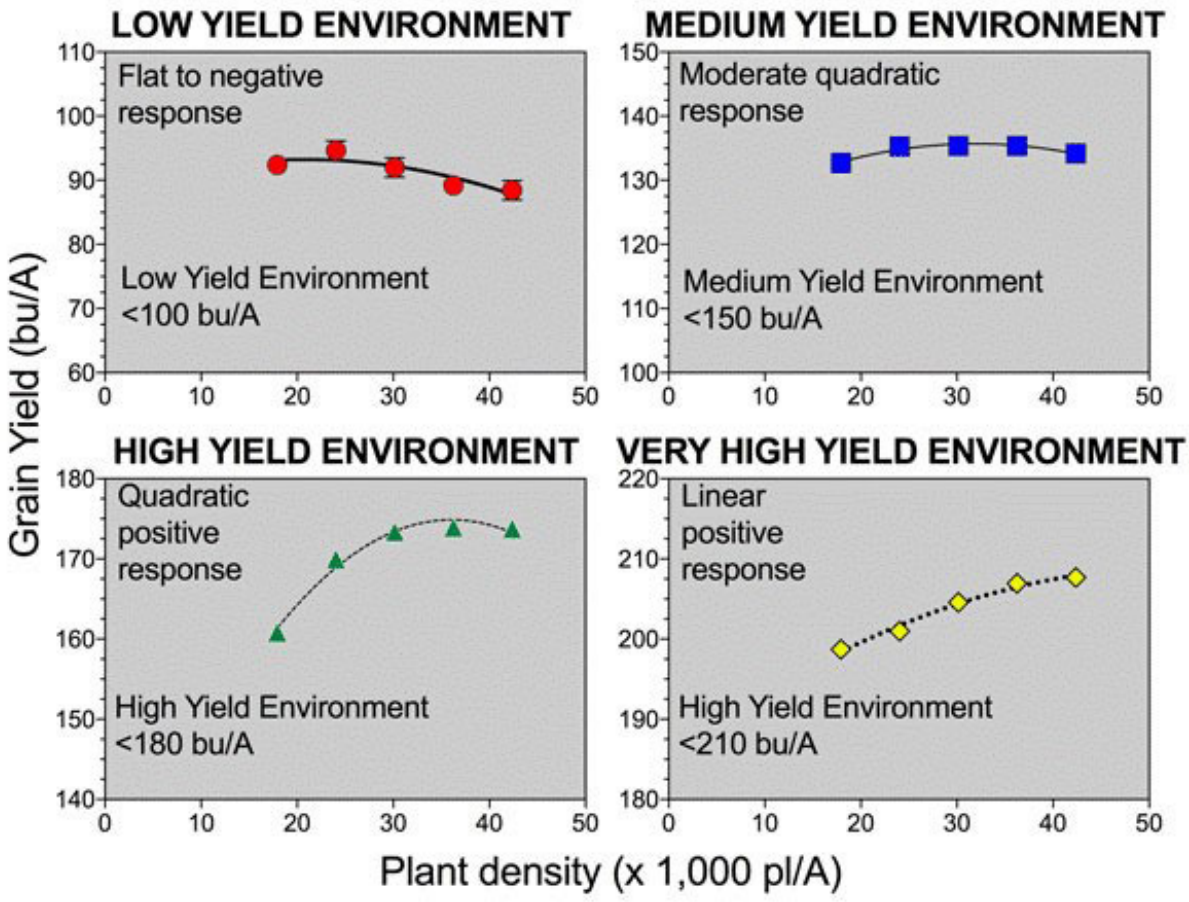

Figure 2. Corn grain yield response to plant density in four yield environments, a) <100; b) 100-150; c) 150-180; and d) > 180-210 bu/acre (Assefa, Ciampitti et al., 2016, Crop Science Journal).

As a disclaimer, "agronomically" optimum plant population does not always coincide with the "economically" optimal plant population. Lastly, final seeding rate depends on the environment, hybrid, and production practices (e.g., planting date, rotation, tillage). Also keep in mind the corn yield response to plant density curves also present an uncertainty level (error) based on many other unaccounted factors affecting yields.

A step-forward in our research study on yield response to plant density is taking advantage of progress in digital agriculture, which brings the opportunity to develop decision-making frameworks to manage risk and uncertainties of farmers when selecting critical inputs such as the seeds. Thus, we are working on tuning forecast models based not only on the yield environment (or an average of past yield data), but also considering type of soils, scenarios of available water at planting, and

weather forecasts for the growing season (Figure 3). Thus, we are committed on including the risk level taken by farmers when selecting plant density as a relevant point of investigation in our future studies.

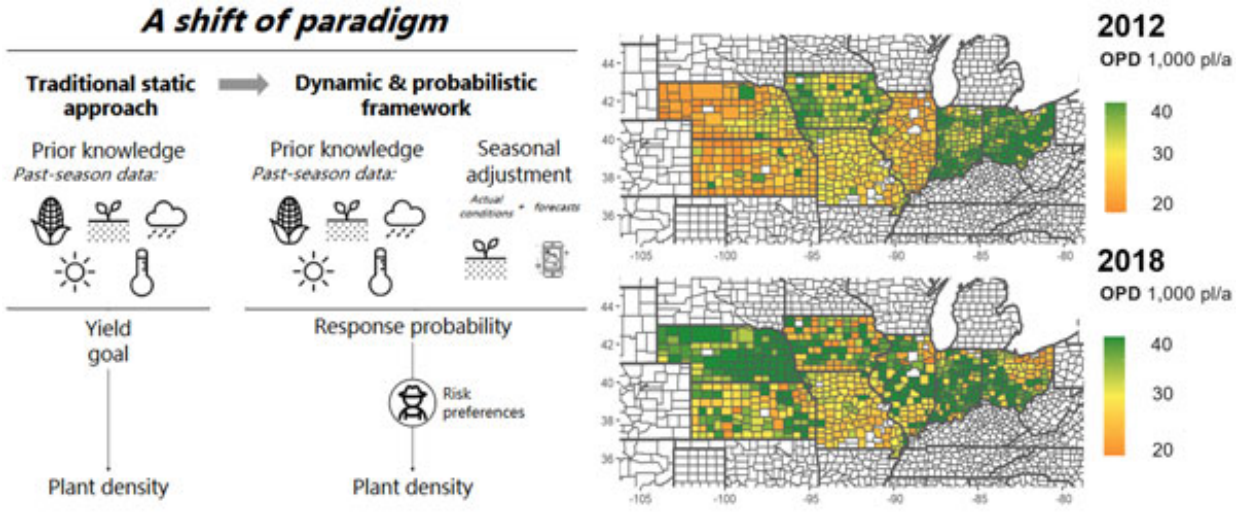

Figure 3. Optimal plant density forecast across the Midwest region considering two contrasting seasons: 2012 (dry) and 2018 (wet). Adapted from Lacasa et al. 2021.

Stay tuned to future eUpdate articles related to this and other relevant topics from our Farming Systems lab and Digital Agronomy consortium - https://ciampittilab.wixsite.com/ciampitti-lab

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3. Join the CoCoRaHS Network...because every drop counts!

Most people think basketball when they hear the phrase "March Madness". However, in the weather reporting world, March marks the annual recruitment drive for the national Community Collaborative Rain Hail and Snow network (CoCoRaHS). Every state vies for the chance to have the highest number of new recruits during the month of March.

What is CoCoRaHS?

CoCoRaHS is an acronym for the Community Collaborative Rain, Hail and Snow Network. CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds (Figure 1) working together to measure and map precipitation (rain, hail, and snow). By using a standardized, low cost rain gauge, you can measure precipitation the same way thousands of others do across the nation. The data collected fills weather data gaps across the region and is extremely useful to decision makers. In a recent example, Manhattan was able to document the highest rainfall amount during the Labor Day 2018 flood thanks to a CoCoRaHS observer (Figure 2). This data will shape the understanding of weather/climate in your backyard for decades to come and new observers are greatly needed!

Figure 1. Two young weather reporters in the making! Weed Science Specialist, Sarah Lancaster, sent in this photo of her two sons reading their CoCoRaHS rain gauge following a

rain event in late April 2020. Photo by Sarah Lancaster, K-State Research and Extension.

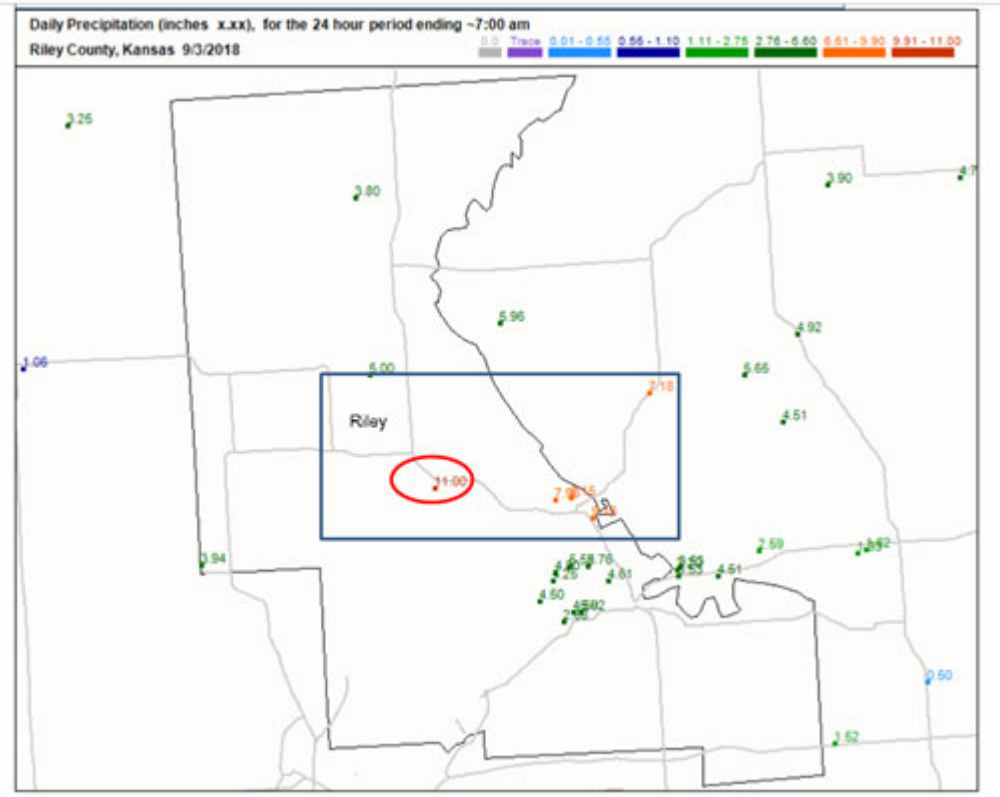

Figure 2. Riley County, KS CoCoRaHS reports for September 3, 2018.

No rain is still an important observation

Volunteers also report when it DOES NOT rain. Documenting the fact that a part of the county missed a precipitation event helps improve our understanding of drought conditions. That information is also useful in improving radar and satellite rainfall estimates. This also reflects the importance of placing your rain gauge in a representative location that adheres to CoCoRaHS siting requirements.

Who uses the CoCoRaHS data?

CoCoRaHS is used by a wide variety of organizations and individuals and accessed free through https://cocorahs.org/. The National Weather Service, hydrologists, emergency managers, city utilities (water supply, water conservation, storm water), insurance adjusters, USDA, engineers, mosquito control, ranchers and farmers, outdoor & recreation interests, teachers, students, and neighbors in the community are just some examples of those who visit the website and use the data.

Joining CoCoRaHS

One of the neat things about participating in this network is coming away with the feeling that you have made an important contribution that helps others. By providing your daily observation, you

help to fill in a piece of the weather puzzle that affects many across your area in one way or another.

To join CoCoRaHS, you need to apply at https://cocorahs.org/application.aspx and take the training (found here: https://cocorahs.org/Content.aspx?page=training_slideshows or here: https://www.youtube.com/user/cocorahs). **If you don't have a rain gauge, don't worry!** Just select the appropriate box on the application and we will send you one…**FOR FREE**.

March is our big push to gain new observers in the United States with a friendly competition. However, don't worry if you don't get signed up this month. New observers are welcome any time of the year. In fact, while Kansas hasn't won either trophy in a number of years, we have seen steady increases in observers with June actually being our top month for recruitment. We have also achieved a significant milestone – highest percentage of new recruits actually making their first observation. **It is important to take that second step: once you obtain your gauge, actually deploy the gauge and send in the observations.**

If you have questions about the program, contact Chip Redmond at Kansas State University by email at christopherredmond@ksu.edu or phone at 785-477-6204.

WANTED!

VOLUNTEERS OF ALL AGES
TO HELP SCIENTISTS STUDY STORMS

Measure precipitation in your own backyard with CoCoRaHS!

The Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) needs you! Everyone can participate, both young, old, and in-between. The only requirements are an enthusiasm for watching and reporting weather conditions and a desire to learn more about how weather can affect and impact our lives.

CoCoRaHS needs your help !

To learn more or to become a volunteer observer, please visit our web site at:

www.cocorahs.org

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Christopher "Chip" Redmond, Kansas Mesonet and Weather Data Library
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