



Extension Agronomy

eUpdate

06/23/2017

These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update 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 Steve Watson, 785-532-7105 swatson@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. New Enlist corn will be available for 2018 growing season

Enlist corn, which confers resistance to both 2,4-D and aryloxyfenoxypionate (the “fop” grass herbicides), will be available for the 2018 growing season, according to the Dow Chemical Company. For use on Enlist corn, Dow AgroSciences has developed a new formulation of 2,4-D, which is a 2,4-D choline salt. This formulation is lower in volatility than 2,4-D amine or ester. Trade name “Enlist Duo” is a premix of 2,4-D choline plus glyphosate, using proprietary Colex-D technology by Dow AgroSciences. Enlist Duo has been approved for application to Enlist corn and preplant burndown treatment on conventional corn.

Enlist corn traits were actually deregulated by the U.S. Department of Agriculture in 2016. However, certain export markets had not been approved at that time, so commercial availability of Enlist corn was put on hold until those key markets were approved. The Ministry of Agriculture of the People’s Republic of China has now approved the import of grain produced from corn containing the Enlist trait, according to a June 14, 2017 news release from Dow AgroSciences.

Enlist corn will be widely available in the U.S. and Canada, and will be sold as both SmartStax Enlist and PowerCore Enlist hybrids, the according to Dow AgroSciences news release. The Enlist technology will also be licensed to other seed companies.

Using Enlist Duo on Enlist corn will allow producers to help manage glyphosate-resistant pigweeds and many other broadleaf weeds, including velvetleaf and morningglory.

K-State research has generally found that Enlist corn has excellent tolerance to Enlist Duo. Enlist Duo will be most effective when weeds are small and should be used in conjunction with preemergence corn herbicide programs. Enlist Duo will not be effective on glyphosate-resistant kochia without an addition of a dicamba-type product or other herbicides that are more effective on kochia than 2,4-D.

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2. Wheat streak mosaic: The importance of early control of volunteer in hailed-out wheat and other ma

The severe problems wheat producers had with wheat streak mosaic virus this year can be traced back in most cases to a lack of control of volunteer wheat – especially the volunteer wheat that got started early after widespread hail damage to wheat just before harvest in 2016. It is important to keep that from happening again. Where wheat has been hailed out this year, volunteer wheat control should start immediately.

Producers often like to wait several weeks after harvest before making their first herbicide application to control volunteer wheat. This allows as much volunteer as possible to emerge before spraying it or tilling it the first time. Often, a second application or tillage operation will be needed later in the summer to eliminate the green bridge to wheat by making sure all volunteer is dead within ½ mile of wheat being planted in the fall. Green bridge elimination can be more difficult to accomplish when wet weather prevails through late summer because this tends to keep a lot more alternate host plants alive during the critical period when mites are host-limited. As with most plant diseases, the earlier infection occurs, the more impact on the plant and the greater the yield loss, so infections of wheat in early growth stages in the fall are most damaging.

Where wheat was hailed out and volunteer has already emerged at the time of harvest, control should begin immediately after harvest if possible. This is true even for fields that got hailed out relatively early during grain filling, as wheat grain at soft dough or later stages of development already has the potential to germinate. Hailed out fields may require one more field pass than normal to control volunteer wheat, but will help prevent even bigger problems down the road. It should be noted that grazing volunteer is not an effective option because there is green wheat material left and the mites can be living in that material.

Why the need for early control of volunteer in hailed-out wheat? Where wheat suffered hail damage after heading, volunteer often emerges even before the existing field is harvested – as much as two to three weeks or more earlier than it would normally emerge after harvest. This volunteer wheat is especially likely to become infected with wheat curl mites and lead to problems later in the season if left uncontrolled.



Figure 1. Thick stand of volunteer wheat after wheat harvest. Photo by Stu Duncan, K-State Research and Extension.

Wheat curl mites will move off growing wheat as the green tissue dries down and dies. After moving off the existing wheat at or near harvest time, the mites need to find green tissue of a suitable host soon or they will die of desiccation.

Research has found that the mites can live quite a few hours off the plant, and up to 24 hours or more under low temperature conditions, so significant numbers of mites may be blown in from farther away than previously thought.

If there is young, volunteer wheat growing at the time the current wheat crop is being harvested in the nearby region, the mites can quickly infest those volunteer plants and survive.

If volunteer has emerged and is still alive shortly after harvest in hauled-out wheat, wheat curl mites could easily build up rapidly and spread to other volunteer wheat that emerges later in the season. On the other hand, if this early-emerging volunteer is controlled shortly after harvest, that will help greatly in breaking the green bridge. However, if more volunteer emerges during the summer, follow-up control will still be needed.

Volunteer wheat is not the only host of the wheat curl mite. Over the years, multiple research studies have evaluated the suitability of wild grasses as hosts for both the curl mite and the wheat streak virus. There is considerable range in the ability of a grassy weed species to host the mite and the

virus. Barnyardgrass is among the more suitable hosts for both virus and mites, but fortunately it is not that common in wheat fields. In contrast, various foxtails, although a rather poor host, could be an important disease reservoir simply because of their abundance. These grasses may play an important role in allowing the mites and virus to survive during the summer months particularly in the absence of volunteer wheat.

A new K-State Research and Extension publication, [Wheat Streak Mosaic](#) MF3383, is now available. This publication includes information about grassy weed hosts of the mite and virus, and the contribution of these grassy weed hosts to the risk of severe wheat streak mosaic infections. Take note of significant stands of these grasses in marginal areas and control them as you would volunteer wheat.

If volunteer wheat and other hosts are not controlled throughout the summer and are infested with wheat curl mites, the mites will survive until fall and could infest newly planted wheat at that time. Wheat curl mite infestations of wheat often lead to wheat streak mosaic infections.



Figure 2. Volunteer wheat on the edges of a sunflower field were infested with wheat curl mites and caused a wheat streak mosaic infection in the adjacent wheat crop that fall. Photo by Stu Duncan, K-State Research and Extension.



Figure 3. Closeup of wheat showing symptoms of a wheat streak mosaic virus infection in the fall. Photo by Jeanne Falk Jones, K-State Research and Extension.

Another tool producers can use to help control or reduce the impact of wheat streak mosaic is the use of varieties with resistance to the disease. There are currently three varieties adapted to Kansas that have wheat streak mosaic resistance:

Clara CL (white)
Joe (white)
Oakley CL (red)

All have the same resistance source (WSM2). Temperature sensitivity varies a bit among these, but all will tend to lose wheat streak mosaic resistance at high temperatures.

In addition, there are a handful of varieties with resistance to the wheat curl mite, including TAM 112, Byrd, Avery, and T158. These varieties are actually susceptible to the wheat streak mosaic virus itself, but since they have resistance to the wheat curl mite vector of the disease, they can escape the

disease pressure in many cases -- depending on the severity of wheat curl mite pressure. Under light to moderate wheat curl mite pressure, these varieties held up relatively well this year against wheat streak mosaic infections. Under severe pressure, such as on fields adjacent to a field with volunteer wheat, these varieties did not generally hold up any better than other varieties that are susceptible to wheat streak mosaic.

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3. Dry heads on green stems in wheat: A source-sink issue

Some producers have reported that the grain is dry in their wheat crop, but green stems are keeping them from being able to harvest smoothly (Fig. 1). A few different factors may be playing a role in maintaining green stems on a dry wheat head, and they relate back to the plant's source-sink relationship. The source (or machinery) is the sugar factory (leaves and stems), while the sink is the developing grain responsible for pulling those recently produced sugars from the leaves and stems.



Figure 1. Green stems on mature wheat heads. Photo taken June 23, 2017 by Melanie Schlatter, Lebanon, Kansas.

1. Good management practices: greater “source”

When crop management strives to provide good grain filling conditions, the crop remains green for longer periods of time as compared to a crop that is not well managed. Examples include greater nitrogen rates and foliar fungicides, which will often delay plant maturity (Fig. 2).

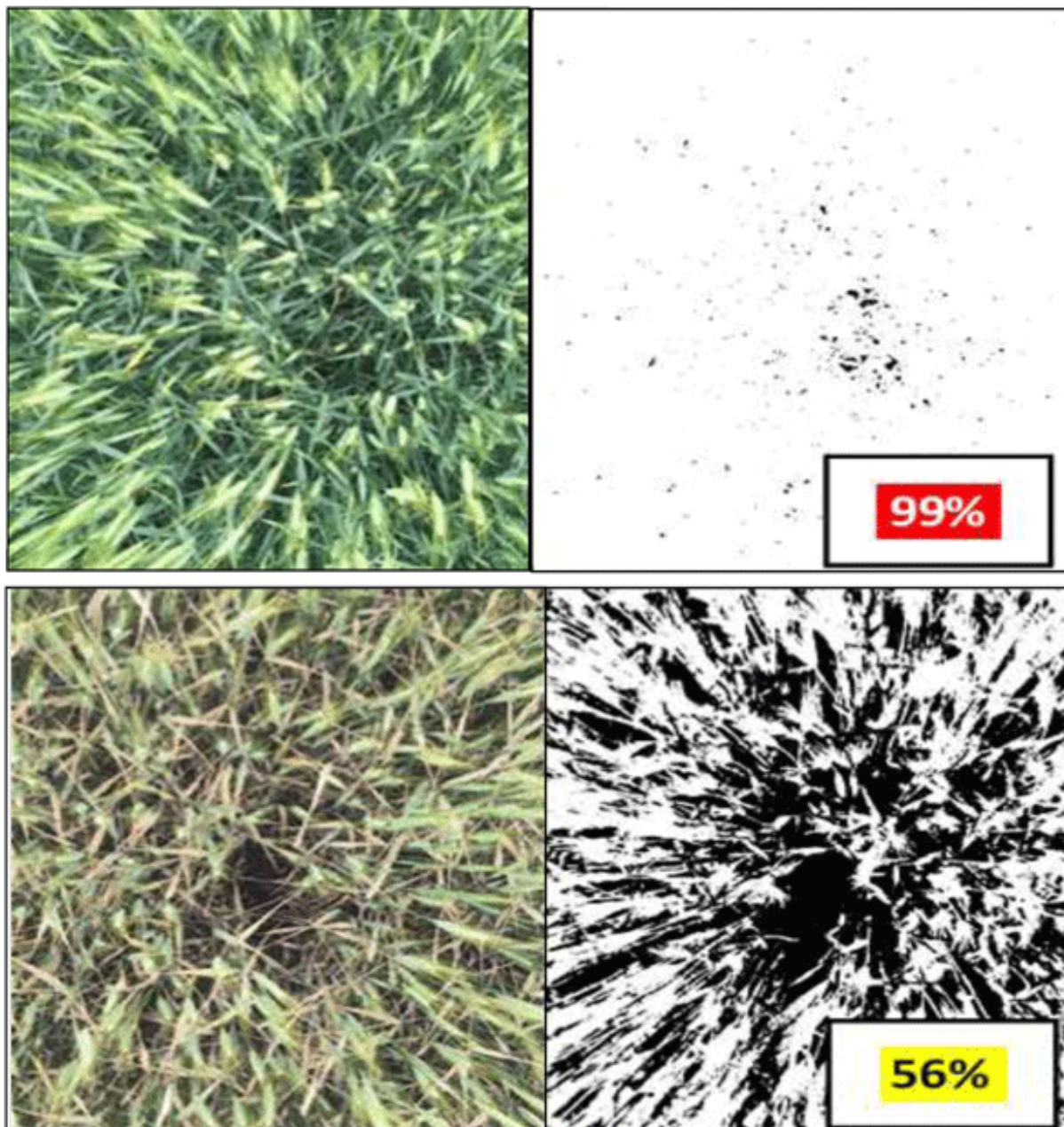


Figure 2. Maintenance of green leaf area due to an additional 40 lbs N/acre and two foliar

fungicides (upper panel) versus no extra fungicide (lower panel). Photos by Romulo Lollato, K-State Research and Extension.

2. Late-moisture, cool conditions

Grain filling conditions for most of April, May, and early June were very favorable with above-average precipitation and below-average temperatures. These conditions will favor the maintenance of the photosynthetic machinery of the plant for a longer period of time as compared to hot, dry conditions, which hasten crop development.

3. Frozen or hailed-out crop: lower “sink”

If the number of kernels is decreased by environmental factors such as a spring freeze that damaged floret fertility and development, or by hail damage that physically removed spikelets from the spike, the sink strength of the crop is decreased proportionately to the number of grains decreased. With less strength to pull the sugars from leaves and stems, there is a chance that stems might remain green while grains are ripe and ready for harvest.

Another reality in many fields this year is late-developing tillers that also have green heads at this time. Areas of Kansas that received significant rainfall in late May might show growth of late-developing tillers. Where this has occurred, there is essentially a second canopy of green heads usually slightly below the main canopy of ripe heads (Figure 3).

Typically, heads that form this late in the season add very little to the overall yield of a field. If these late, green heads are not close to being ready to harvest when the majority of the crop has dried down, then it's best to start harvesting the field anyway. Waiting for the green heads to mature would risk grain losses due to shattering or hail damage.

Most of the immature grain and green plant parts will go out the back of the combine when the crop is harvested, but enough green material may go into the bin to increase the dockage and overall moisture level of the load of wheat to some extent. Combine settings can help minimize problem, but not eliminate it.

Producers who are harvesting wheat with some green heads present should take special care to measure the moisture content of the grain if they plan to store it on farm, and dry the grain aggressively if the moisture content is high.



Figure 3. Green heads from late-developing tillers interspersed with mature heads nearing harvest in Ellsworth County. Photo by Brent Goss, former agent, K-State Research and Extension.

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4. Green snap in corn

Some of the storms and extremely high winds this spring have caused significant stalk breakage in corn fields. In these kinds of storms, it is not unusual to have up to 40% of stalks in some fields broken off at ground level. We see this type of damage somewhere every year. It is usually referred to as "green snap," "brittle corn," or "brittle snap."

Green snap occurs when rapidly elongating corn stalks are subjected to high winds. Corn stalks are elongating rapidly between about V8 to tassels. Typically, corn is most susceptible to green snap in the two- or three-week period from late vegetative until silking. The stalks are growing rapidly and have enough height to catch more wind. These high winds will cause stalks to break in the section close to the lower nodes.

A number of factors can affect the severity of green snap. Anything that contributes to rapid, vigorous growth may make corn more susceptible to this problem. Such contributing factors include high nitrogen fertilizer rates, rotation after soybeans, higher plant densities (promoting early competition and elongation, and thinner stalks) and early planting. Unfortunately, these are all recommended best management practices for corn production.

Timing has a huge impact on the severity of green snap, with much less damage usually evident in younger corn (Figure 1) or in fields that have tasseled and silked. The factor that can be addressed most readily is hybrid selection. Although no hybrid is immune to the problem, some hybrids are more susceptible to green snap than others.



Figure 1. Corn showing effects of wind damage, “green snap,” early during the vegetative period. Photo by Ignacio Ciampitti, K-State Research and Extension.



Figure 2. Green snap in corn at a later, more vulnerable vegetative stage of growth. Photo by Kraig Roozeboom, K-State Research and Extension.

What are the implications of all those broken plants for the current crop? Damaged plants are broken completely in two, so there is no hope for recovery. Even so, the yield loss in an affected field usually will be much less than the stand loss. Before tasseling, surviving corn plants can respond to the additional resources made available by the removal of damaged plants by maintaining larger ears or setting additional ears, or increasing final kernel weight. With 10% or fewer broken stalks, it may be hard to detect a significant yield loss if stands were adequate before the storm.

Yield losses will increase with “patchy” stand losses because surviving plants are too far apart to compensate for lost plants. If large patches are damaged, or if stand losses are significant, there may still be an opportunity to cut the worst areas with a swather or crimper to salvage some forage if it can be utilized. It is not too late to plant sunflower, soybeans, or grain or forage sorghum if the stand is a total loss, depending upon the herbicide program used on the damaged corn crop.

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5. Field studies: Setting up a trial

Higher yields, greater efficiency, reduced environmental impact! This may sound like a sales pitch for snake oil, but it could also represent the legitimate objectives for a sustainable farm operation.

Increasingly, farmers are generating on-farm research data on a wide range of practical topics.

However, the proper methods of setting up on-farm experiments so that the data is statistically valid are not necessarily common knowledge.

The first step in setting up an on-farm trial is to choose the specific topic to be tested. While this may seem simple, it is important that the topic not be too complex. For example, a producer may be interested in how different corn hybrids react to increasing rates of fertilizer at different plant populations and planting dates. While this sounds like an interesting experiment, it is simply too complex for an on-farm trial. With three different options for each factor (e.g. three hybrids, three fertilizer rates, etc.) there would be 81 different treatment combinations in a single replication. In this case choosing one of the factors to study (i.e. plant population) would be recommended.

The next step is to choose an area of a field with limited variability. To successfully do this, prior knowledge of the field is a must. Laying out an experiment in an area of a field known to have a lot of variability weakens the data generated from the experiment. The underlying variability could make it almost impossible to detect treatment differences if they exist. If variability in the field is not accounted for, you would not be able to tell if any yield differences were due to the treatment or simply differences in soil type, drainage, or some other factor unrelated to the treatment. However, if a field has a uniform pattern (i.e. increasing productivity north to south) laying out the plots so that the treatments follow this pattern is acceptable. In the illustration below (Figure 1), the plots should be laid out as shown in the field at left rather than the field at right.

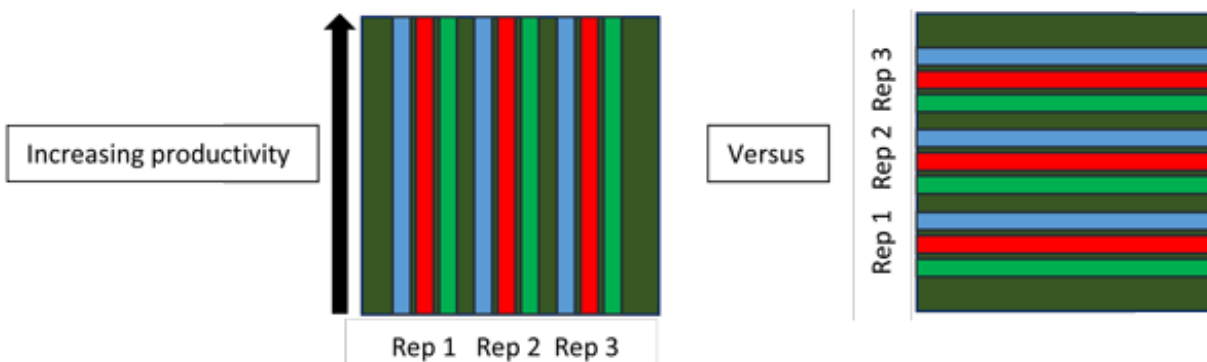


Figure 1

As discussed in our previous Agronomy eUpdate article ([Replicated Comparisons vs. Side-by-Side Comparisons](#)), replication is vital, as is randomization of treatments within a replication. Replication and randomization will help you determine if any differences you see are due to chance, error, or variability for which you otherwise can't account. The actual experimental design will depend on the

variables to be studied. Thankfully, Extension personnel in your state will likely be able to help set up the experiment for you.

Figure 2 shows an example of a 36-acre field taken from the Web Soil Survey. This field has two different soil types, although many fields across the North Central Region have much more variability than this. Soil type A is a fairly productive silt loam while soil type B is a much less productive silty clay loam. If the field was simply split vertically down the middle into two different treatments, the results would be very misleading. However, if treatments were laid out in replicated blocks running from left to right, the variability would be nearly equally distributed across treatments, making for a valid comparison.

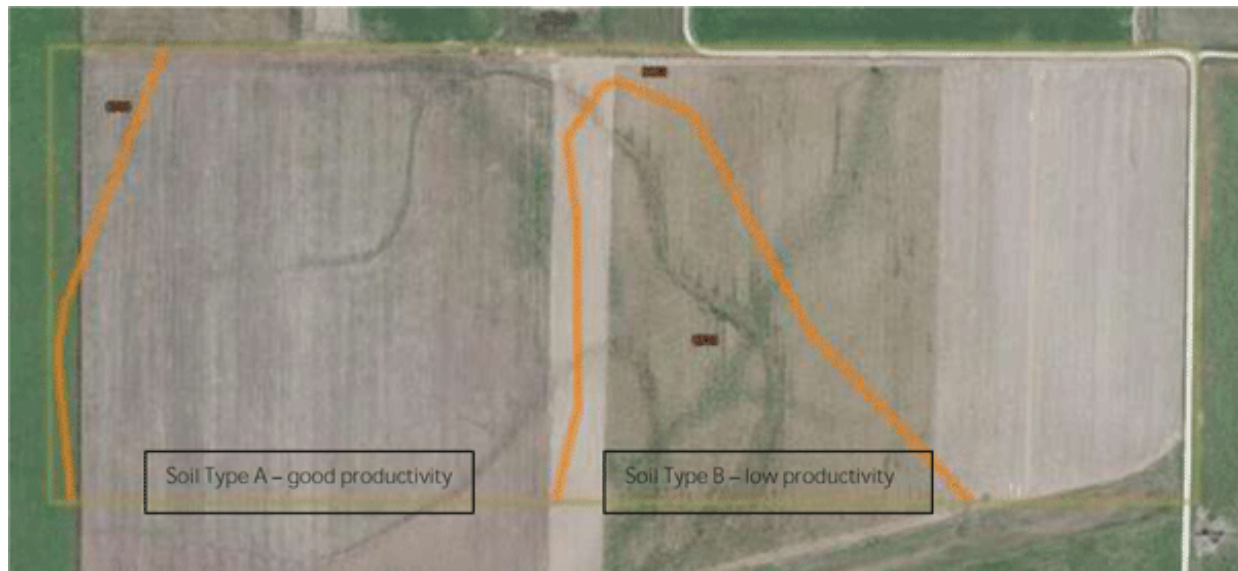


Figure 2

On-farm research can be a valuable tool for farmers. As new products and technology emerge in our ever-changing field, new questions and methods arise. Considering the current economics of production agriculture, producers are finding more value in answering questions using on-farm research methods in their own fields. Choosing a topic of interest, setting up the test on a uniform field area, and using proper experimental design and replication, are key parts of a successful on-farm experiment. Following these steps can greatly assist in generating broadly applicable data. If you have interest in doing research on your farm, contact your local extension office.

This article is part two in a four-part series of articles on agricultural research and interpretation by University Extension Educators in the North Central Region.

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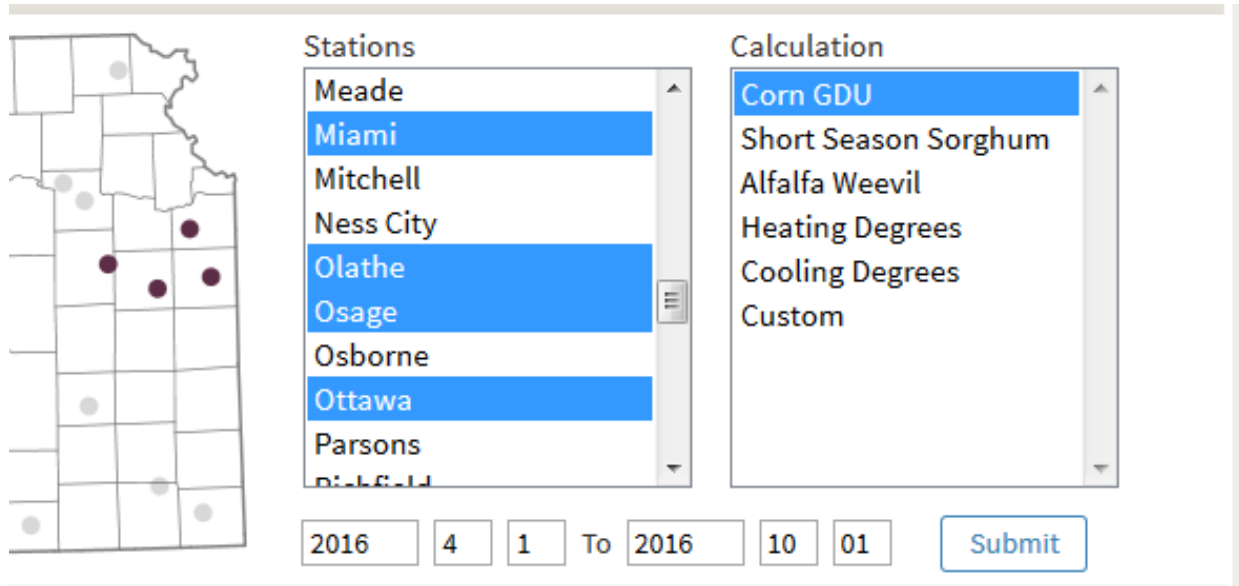
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6. Using the Mesonet Degree Day Calculation Webpage: A case study for corn

Degree days have been featured on the Kansas Mesonet page since the beginning. However, the reports were limited to the growing season (April-October) and to corn and sorghum. The new Degree Days page – <http://mesonet.k-state.edu/agriculture/degreedays/> – is designed to provide greater flexibility to our users, including options to select the time period and more built-in calculations. Because of the flexibility, it is somewhat more complicated than the old version. Here's a run-down of the new features.



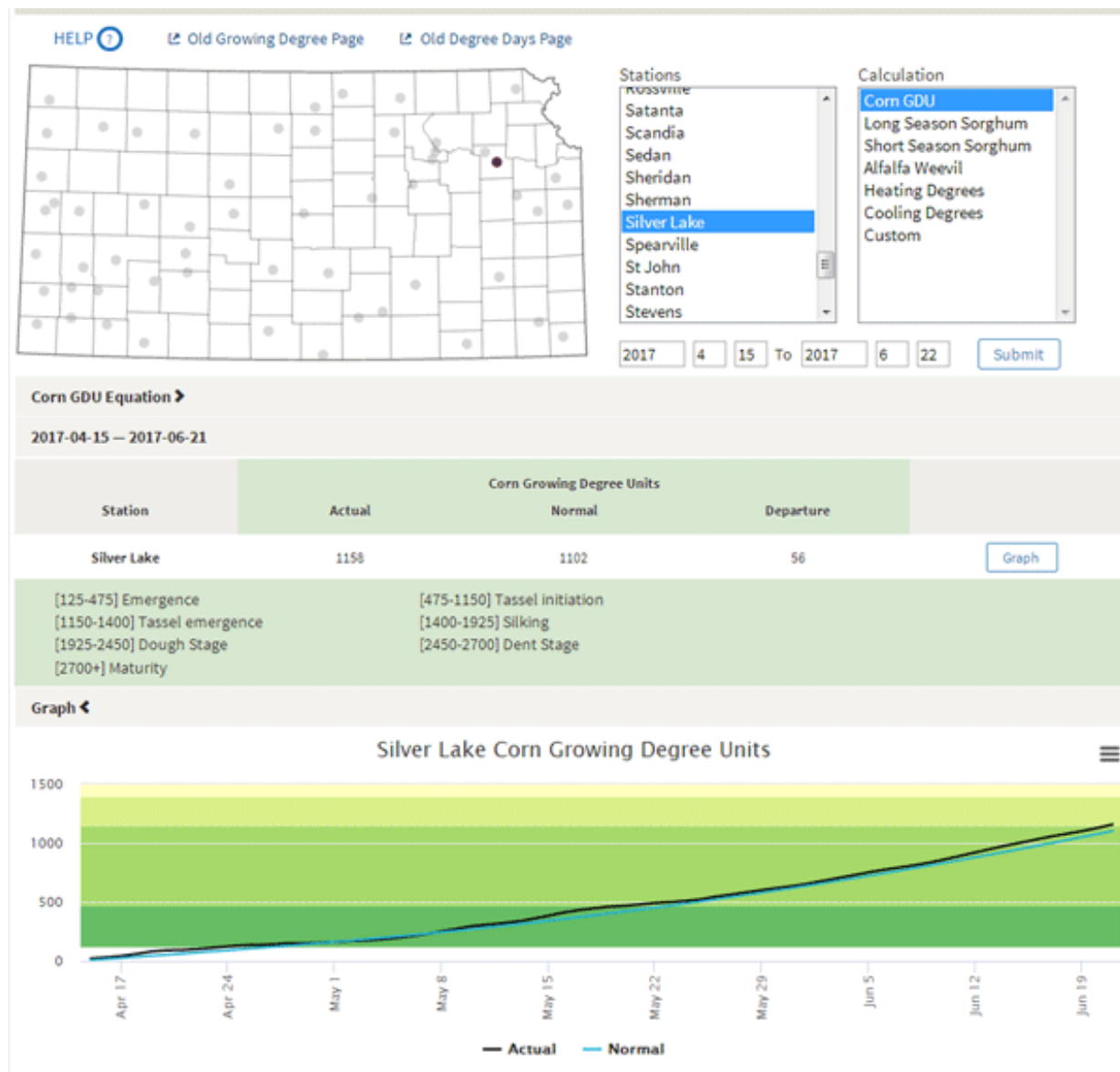
The screenshot shows the Mesonet Degree Day Calculation Webpage interface. On the left is a map of Kansas with several stations marked by dots. In the center is a 'Stations' dropdown menu with a list of station names: Meade, Miami, Mitchell, Ness City, Olathe, Osage, Osborne, Ottawa, Parsons, and Topeka. Several names are highlighted in blue. On the right is a 'Calculation' dropdown menu with a list of calculation types: Corn GDU, Short Season Sorghum, Alfalfa Weevil, Heating Degrees, Cooling Degrees, and Custom. Below these menus are input fields for the start date (2016, 4, 1) and end date (2016, 10, 01), followed by a 'Submit' button.

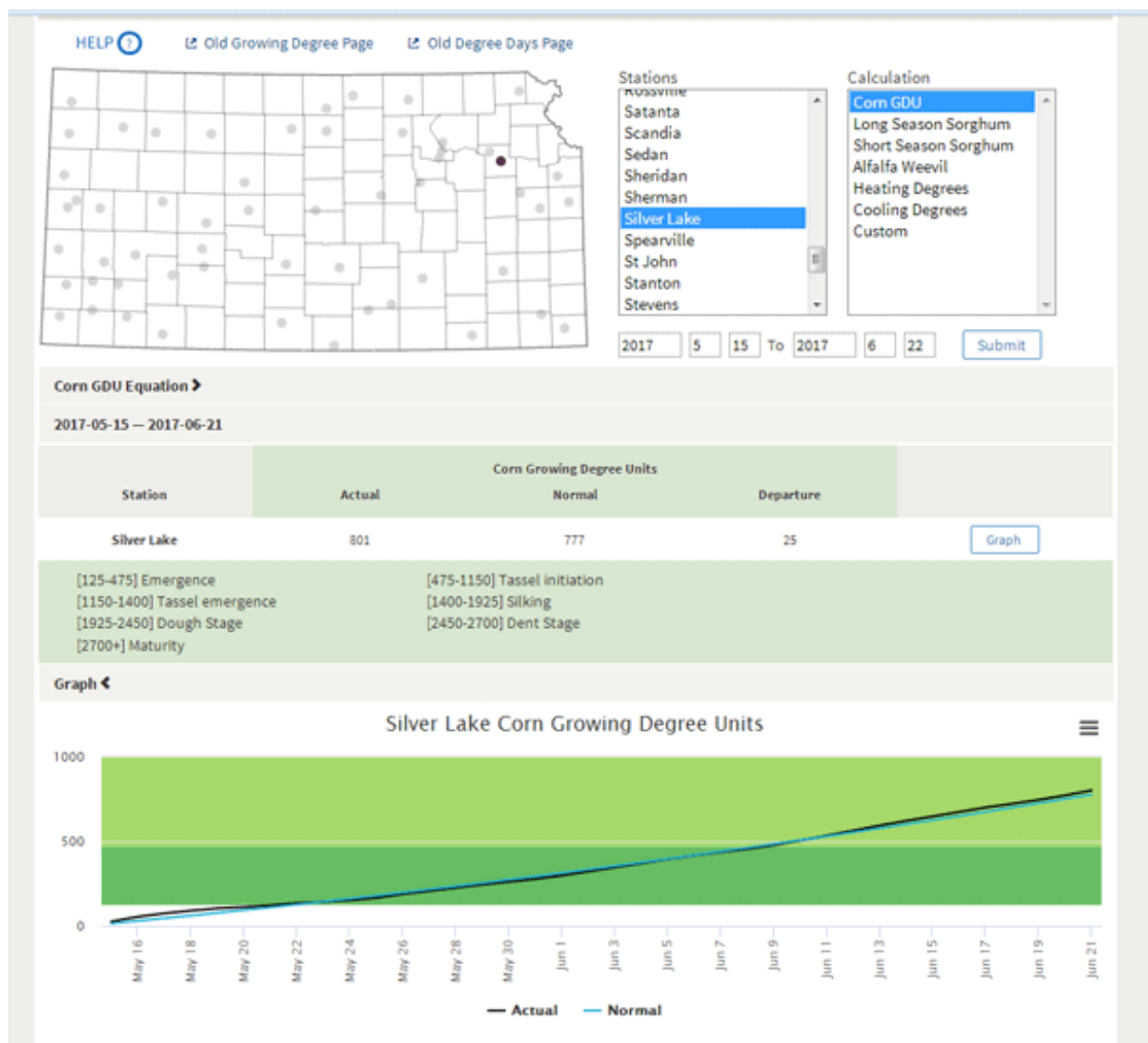
Inputs

- **Station selection:** Instead of the old “select by region” scheme, stations can now be selected by name from the selection menu. On desktop computers, a map is also displayed and can be used to select stations. From this menu, the option is also available to select multiple stations. On desktop computers, use ctrl-click to highlight the stations wanted.
- **Calculation selection:** We have expanded the list of possible degree days or growing degree units we can calculate. If none of these quite fit your need, you can select ‘Custom’ to enter your own parameters for the equation (more on that later). We are accepting additional equations/considerations to add to this menu.
- **Beginning/Ending dates:** Producers can now enter the exact day of interest as the beginning date. The end date defaults to the current date. Dates from previous years can also be selected.
- **Submit Button:** Click to request data for the given time period.

Comparisons

If you have different fields with different planting dates, you can adjust the time frame to match the timing of your operations. For example, using the Silver Lake station below is a comparison of an April 15th planting date versus a May 15th planting date:





- **Table:** As before, the table displays the actual degree units, the normal degree units, and the departure from normal, but adds some new features:
 - **Sorting data:** When pulling data for several stations, clicking on the Actual/Normal/Departure headers will sort records according to the header.
 - **Missing data:** An asterisk (*) beside a station name indicates that the station had an incomplete data set for the requested time period. Hovering the mouse over the station name will display how many records are missing. To examine the data more closely, see 'CSV' below.
- **Graph:** Day-by-day data can be graphed for each station as well, by clicking the 'Graph' button. The graph is fully interactive and can be saved or printed (see menu in upper right corner of graph). Clicking and dragging across the graph allows the user to zoom in on a time period.

- **CSV Data:** All data is available for download in Comma Separated Value (CSV) format. The CSV data section gives the option of downloading the Summary Data (shown in the table) or the Full Data Set (including normal and max/min temperatures for each day). Clicking 'Display' will show the data in a new browser window. Clicking 'Download' will download the CSV file.
- **References:** Shows a list of publications from which the equations are drawn.

Applications of the Mesonet Degree Day Calculation webpage

Taking corn as an example, this information can be useful to gauge the likelihood of a killing frost (high probability for frost by mid-October), which would result in a low test weight and high grain moisture content due to the shortening of the grain filling and drying down period. When planting too late (late May or June), utilization of a short corn maturity (CRM) hybrid will help the crop reach maturity at about the same time as a later-maturing hybrid planted early in the season. Thus, changing to a shorter CRM hybrid would reduce the risk of the corn being impacted by an early fall freeze.

Other potential applications include more precise estimation of crop phenology -- flowering and important growth stages -- for application of nutrients or chemicals, or for implementation of more timely management practices.

The tool presents very useful features and is quite user-friendly. Give it a try and use the tool to make informed management decisions in your operations:

<http://mesonet.k-state.edu/agriculture/degreedays/>

If you have questions about the product, please don't hesitate to contact us.

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7. Do you graze or hay annual forages or cover crops? We'd like your help!

Many annual forages /cover crops are known to accumulate nitrates in dry or cool conditions. We'd like to get a better handle on how often producers run into nitrate issues when using these forages so that we can help cattle producers through our research and extension programming. Fresh and dry forages act differently in the rumen, and the incidence of nitrate toxicity may reflect these differences in grazed verses hayed forages. The short survey (estimated time to answer these questions is 5 minutes) will be used to direct future research and extension programing.

Please consider completing the short survey by following the link below.

Annual Forage Nitrate Survey https://ssp.qualtrics.com/jfe/form/SV_2mek8zeFxbJU0Sh

This survey is a collaboration of the University of Nebraska and K-State Research and Extension. Your answers will remain anonymous and confidential. We know your time is valuable and appreciate your help.

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8. Impact of hail and winds on corn in Kansas

A variety of weather events have recently affected Kansas summer row crops. Wind and hail damage in various areas of the state have presented a challenge primarily for the standing corn crop.

Wind damage

During June 14-20, winds more than 60-70 mph were reported in many areas across the state (Fig. 1). In some places, depending on the growth stage of the crop and the speed and duration of the winds, the damage was seen as corn plants leaning (Fig. 2). This effect can be exacerbated if the plants have not developed proper root systems due to the wet planting conditions experienced during late April and May planting time.

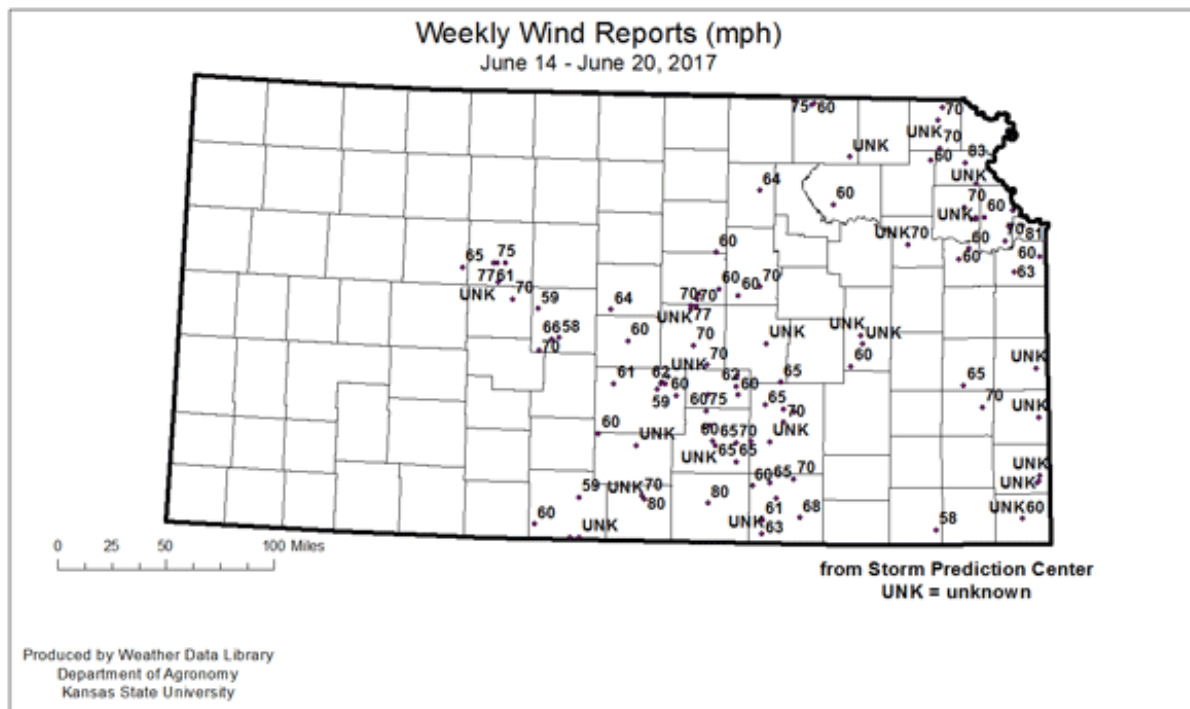


Figure 1. Weekly report of wind damage, storms from June 14-20 across Kansas.



Figure 2. Fields with corn with leaning effect from the storms, potentially exacerbated by the lack of proper root development. Photo by Ignacio A. Ciampitti, K-State Research and Extension.

Hail damage

Another factor that could concern producers this growing season is hail damage. The storms from June 14-20 brought hail to several places across the state (Figure 3). If defoliation from hail damage occurs before V5, the likelihood of losing yield is very small, even under severe defoliation. A report from the east central part of the state indicates some small damage to the leaves place in the upper section part of the canopy (Figure 4) but potential yield should not be impacted in this case. One of the most severe reports of hail damage came from the southwest part of the state, showing impacts on plants (Figure 5).

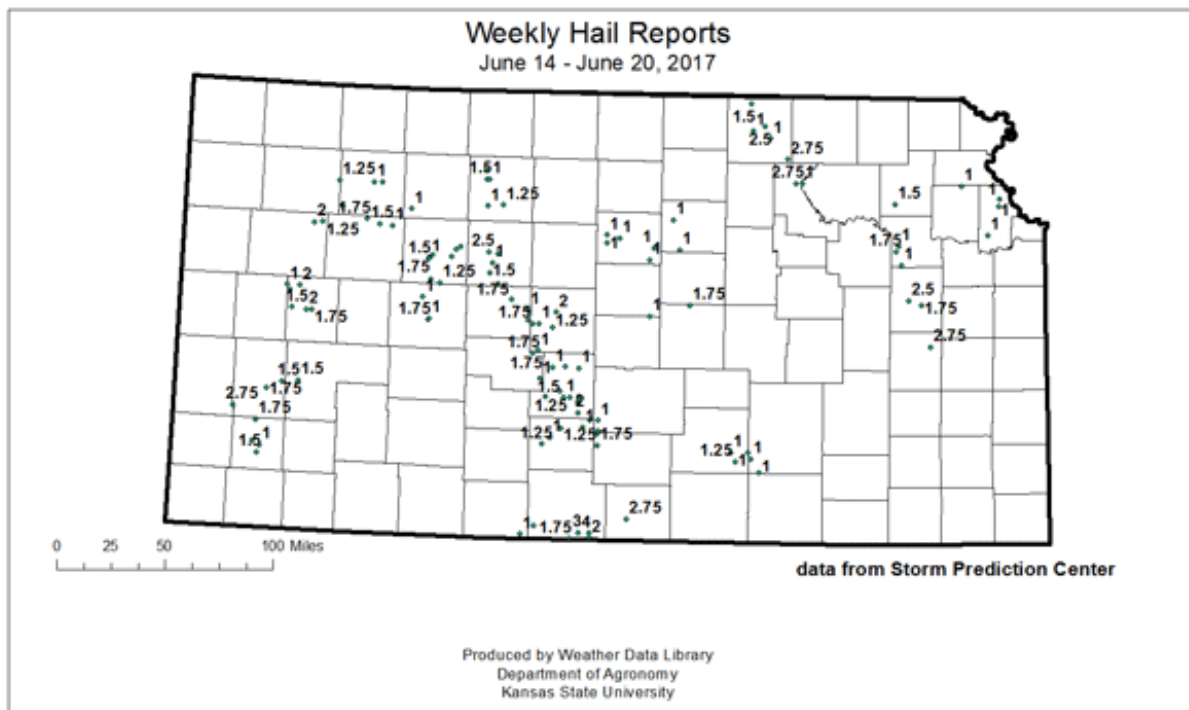


Figure 3. Weekly report of hail damage, storms from June 14-20 across Kansas.





**Figure 4. Hail damage showing up in corn after storms from last week, east central Kansas.
Photo by Ignacio A. Ciampitti, K-State Research and Extension.**



**Figure 5. Hail damage showing up in corn after storms from last week, southwest Kansas.
Photo by Kaitlin Donovan, Western Corn Rep, Kansas Corn.**

An accurate estimate of plant survival should be done in the coming days to more precisely determine damaged plants that will survive vs. missing plants – causing stand reductions. Young corn has a great capacity to recover from early-season hail damage.

Scout your fields and check for final number of plants and potential problems associated with these weather events.

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