Issue 809

K-STATE Research and Extension

Extension Agronomy

eUpdate

07/10/2020

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 | 07/10/2020 | Issue 809

1. Wheat streak mosaic: Early control of volunteer wheat is important

In some years, wheat streak mosaic virus (WSMV) can be a severe problem for Kansas wheat producers. Fields with very severe wheat streak mosaic can typically be traced back to a lack of control of volunteer wheat. Problems with wheat production the previous year can leave large amounts of seed on the soil surface. As this seed germinates, it creates a “green bridge”, allowing wheat streak mosaic and wheat curl mites to survive locally.

Challenges faced in 2020

This year, the wheat crop faced several challenges that might have increased the amount of seed left behind after harvest, which could also increase the amount of volunteer wheat (Figure 1). These problems included:

- Freeze damage during stem elongation (which caused many delayed wheat heads to emerge)
- Hailed out wheat
- Some reports of head scab (Fusarium head blight)
- Waterlogging conditions in parts of central Kansas
- Drought-stressed wheat

The presence of later-emerged heads due to the freeze damage to main stems can cause differences in maturity between tillers that survived the freeze and later tillers, which can increase harvest losses. One of the recommendations to manage fields affected by head scab is to increase the fan speed of the combine and “blow” the diseased kernels out of the harvested grain. Likewise, waterlogged conditions and drought stress both decrease wheat kernel weight and likely increase harvest losses of grain. These smaller kernels might germinate into volunteer wheat increasing the risk of severe wheat streak mosaic the following year.

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.

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 fall-planted wheat by making sure all volunteer is dead within ½ mile of wheat being planted in the fall. Wet weather through late summer often favors multiple flushes of volunteer wheat and also favors the growth of other grassy weeds that can also support moderate populations of the curl mites and virus. These weather patterns keep a lot more alternate host plants alive during the critical period when mites and virus would not have plants to survive on.

If volunteer has emerged and is still alive shortly after harvest in hailed-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, followup control will still be needed.

Other hosts for the wheat curl mite

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.

The K-State Research and Extension publication, MF3383 - *Wheat Streak Mosaic*, includes information about grassy weed hosts of the mite and virus, and the contribution of these 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. Wheat curl mite infestations of wheat often lead to wheat streak mosaic infections (Figures 2 and 3).

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

Genetic resistance to wheat streak mosaic can also reduce the risk of severe disease problems. There are currently a few varieties adapted to Kansas that have wheat streak mosaic resistance, including KS Dallas (red), Guardian (red), Oakley CL (red), Joe (white), and Clara CL. All of these varieties have the same resistance source (*WSM2*). This resistance helps, but does have some serious limitations. For example, this resistance is effective against wheat streak mosaic but does not cover triticum mosaic or high plains (two other viral diseases also spread by the wheat curl mites). The resistance conferred by WSM2 is also temperature sensitive and is much less effective at high temperatures, although the resistance in KS Dallas seem to endure greater temperatures before breaking down. If wheat is planted early for grazing or if high temperatures persist into October, the resistance is much less effective. KS Silverado (white) also has temperature sensitive resistance to wheat streak mosaic, although from a different source other than WSM2.

In addition, there are a handful of varieties with resistance to the wheat curl mite, including TAM 112, Byrd, Avery, Langin, KS Western Star, Whistler, Canvas, Guardian, Crescent AX, Incline AX, Fortify SF, TAM 115, TAM 204, and T158. These varieties are actually susceptible to the viral diseases, but they generally slow the development of the mite populations in the fall. This resistance can help reduce the risk of severe disease but will not provide enough protection if wheat is planted in close proximity to volunteer wheat or other hosts infested with large populations of the curl mites and virus.

Erick DeWolf, Wheat Pathologist
dewolf1@ksu.edu

Kelsey Andersen Onofre, Extension Wheat Pathologist
andersenk@ksu.edu

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

J.P. Michaud, Entomologist, KSU Agricultural Research Center-Hays
jpmi@ksu.edu

2. Herbicide applications and high temperatures

Summer temperatures have arrived, with expected high temperatures near 100°F expected for parts of Kansas in the coming days. If you are planning herbicide applications, here are some things to consider when applying herbicides during hot weather.

Heat or drought stress slows plant growth processes. This is especially important for systemic herbicides such as glyphosate and grass-killing herbicides like clethodim (Select) or quizalofop (Assure). As temperatures increase above 85°F, many plants begin to slow or stop metabolic processes that move herbicides throughout the plant. Notable exceptions to this rule are HPPD-inhibiting herbicides like Callisto or Balance Flexx. Palmer 'amaranth plants are able to overcome applications of these herbicides when applied at high temperatures (90°F and greater).

Management: In general, applying systemic herbicides early in the morning, after plants have had a chance to recover from heat stress, will give the best chance for the herbicide to reach the active site and effectively kill weeds.

Leaf surfaces change in response to heat. In order to prevent water loss, plant cuticles become waxier in response to heat or drought stress. The greater wax content makes it more difficult for water-based spray solutions to penetrate the plant.

Management*:* Using maximum labeled rates of herbicides and surfactants can help get more spray solution into the plant, increasing effectiveness.

Crop response to foliar applied, non-translocated herbicides is greater in hot temperatures. When applied in hot, humid conditions, contact herbicides, such as Cobra, Liberty, or Reflex will likely result in greater foliar injury to crops, but also greater weed control (Figure 1).

Management: If possible, postpone application of these herbicides if temperatures are over 90°F. If weed size requires immediate herbicide application, reduce the rate of herbicide and adjuvant, and apply later in the day, when the air temperature will decrease after application.

Figure 1. **Contact herbicides such can cause bronzing of soybean leaves when applied post-emergence. Photo taken 1 week after an application that included flumiclorac (Resource, Perpetuo, others) on June 30 near Manhattan KS. Photo by Sarah Lancaster, K-State Research and Extension.**

Herbicide volatility increases with high temperatures and low humidity. Herbicides in group four, such as dicamba and 2,4-D are prone to volatility, which means the herbicide becomes a vapor and can move long distances with slight breezes. Volatility of these herbicides increases as temperature rise above 60°F and is greatest at temperatures above 90°F.

Management: Avoid applying these herbicides when temperatures are over 90°F. This may occur during morning or late afternoon hours when temperature inversions are likely to occur. Herbicides should not be sprayed during inversions. During the first week of July, temperature inversions were recorded beginning as early as 5 pm and breaking up as late as 9 am at the Ashland Bottom Farm. Monitor temperature inversions using the Kansas Mesonet (mesonet.ksu.edu/agriculture/inversion/). Engenia, XtendiMax, FeXapan carry additional time of day restrictions on the labels. The labels for

Engenia, XtendiMax, FeXapan also instruct applicators to use larger spray droplets when temperatures are above 91°F, which can be accomplished by reducing spray pressure or increasing nozzle orifice will reduce evaporation.

Sarah Lancaster, Extension Weed Science Specialist
slancaster@ksu.edu

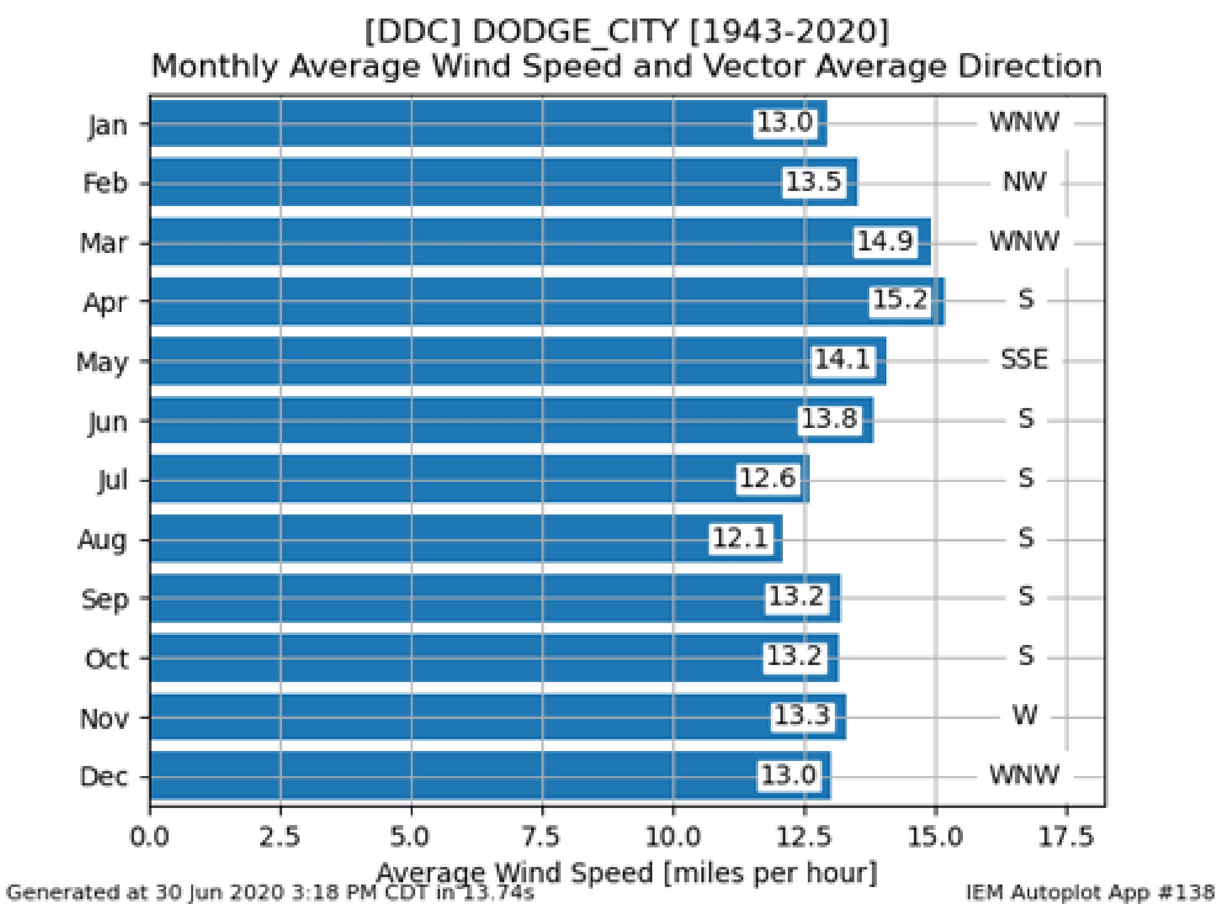
3. June 2020 in Kansas: One big hot wind

Highlights

- Sustained winds in western Kansas were above average for 24 of the 30 days in June at Dodge City.
- Further east, winds were still above average but notably less with eastward extent.
- These winds were driven by an anomalous weather pattern conducive to hot, dry, and windy conditions.
- Strong winds were a result of a strong pressure gradient between high pressure to the east of Kansas and low pressure in the western US.

A Glimpse at June Wind Climatology

June is historically one of the lighter wind months of the year for Kansas. This is usually a result of the summer high pressure building in, pushing the Jetstream further north. As a result, there are fewer storm systems traversing the state and winds are calmer - even more so later in the summer of July/August. No surprise, regardless of the time of year, western Kansas still averages stronger winds in part to less obstacles than that of central/eastern portions of the state (Figure 1). The average wind speeds for June are 13.8 mph (out of the south) and 11.1 (south) for Dodge City and Emporia, respectively. One point to mention is these are sustained winds averaged over the entire day. Typically, winds are strongest during the day and much lighter overnight - this averages over all of that and does not consider wind gusts.



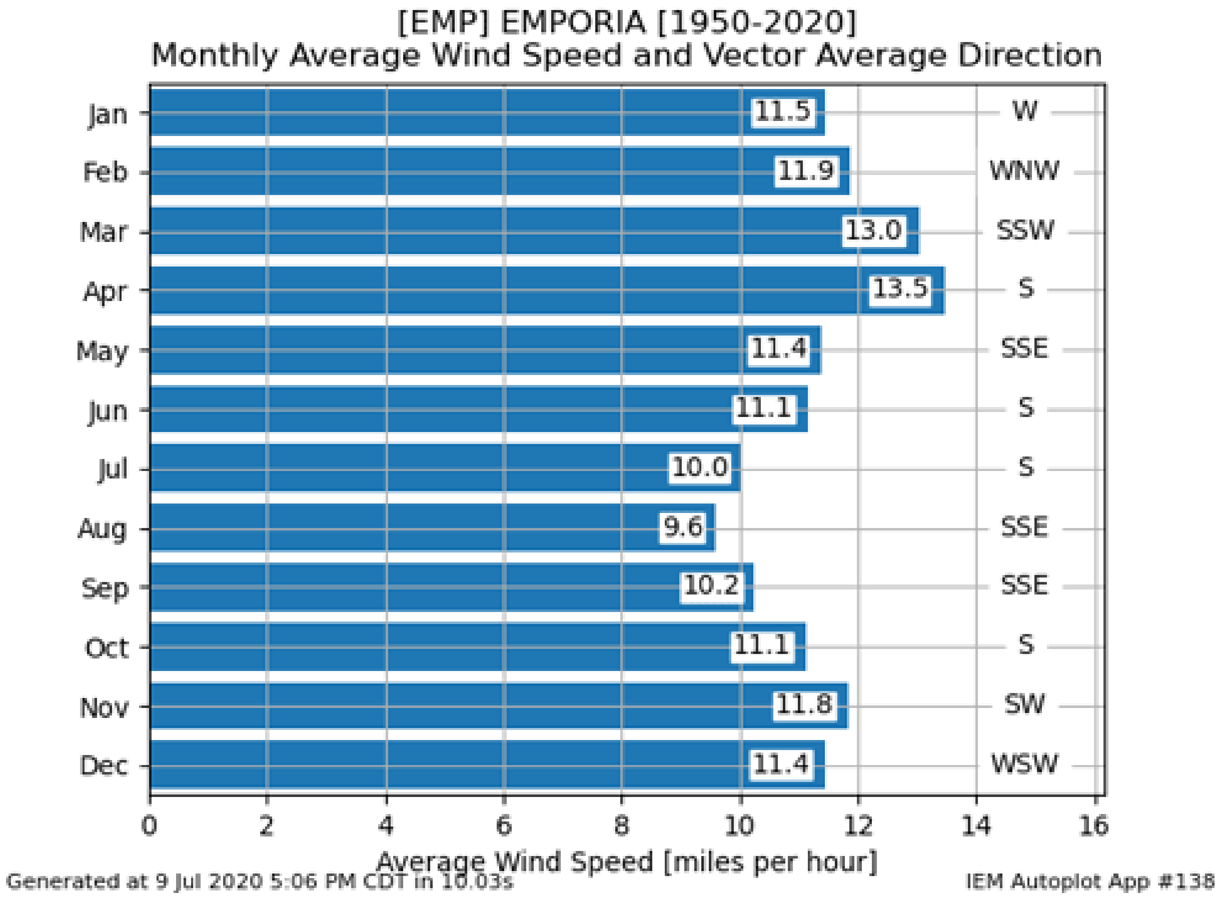


Figure 1. Average wind speed and direction for Dodge City (upper panel) and Emporia (lower panel) by month (https://mesonet.agron.iastate.edu).

How Strong were the Winds?

Several periods of sustained strong winds were observed in June, especially for western Kansas. Dodge City only saw six days with winds below average (13.8 mph). That means that the remaining observed sustained winds exceeding that through the entire day with gusts (not included) always higher (Figure 2). Of note was the June 6-9 period where sustained winds were observed exceeding 20 mph. That is very impressive and correlates with a very warm period of the month coming to an end with a wind shift associated with a cold front (Figure 2) and one of the only few temperature drops of June afterwards (Figure 3). Winds typically increase out of the south in advance of a cold front and can be quite gusty post-frontal.

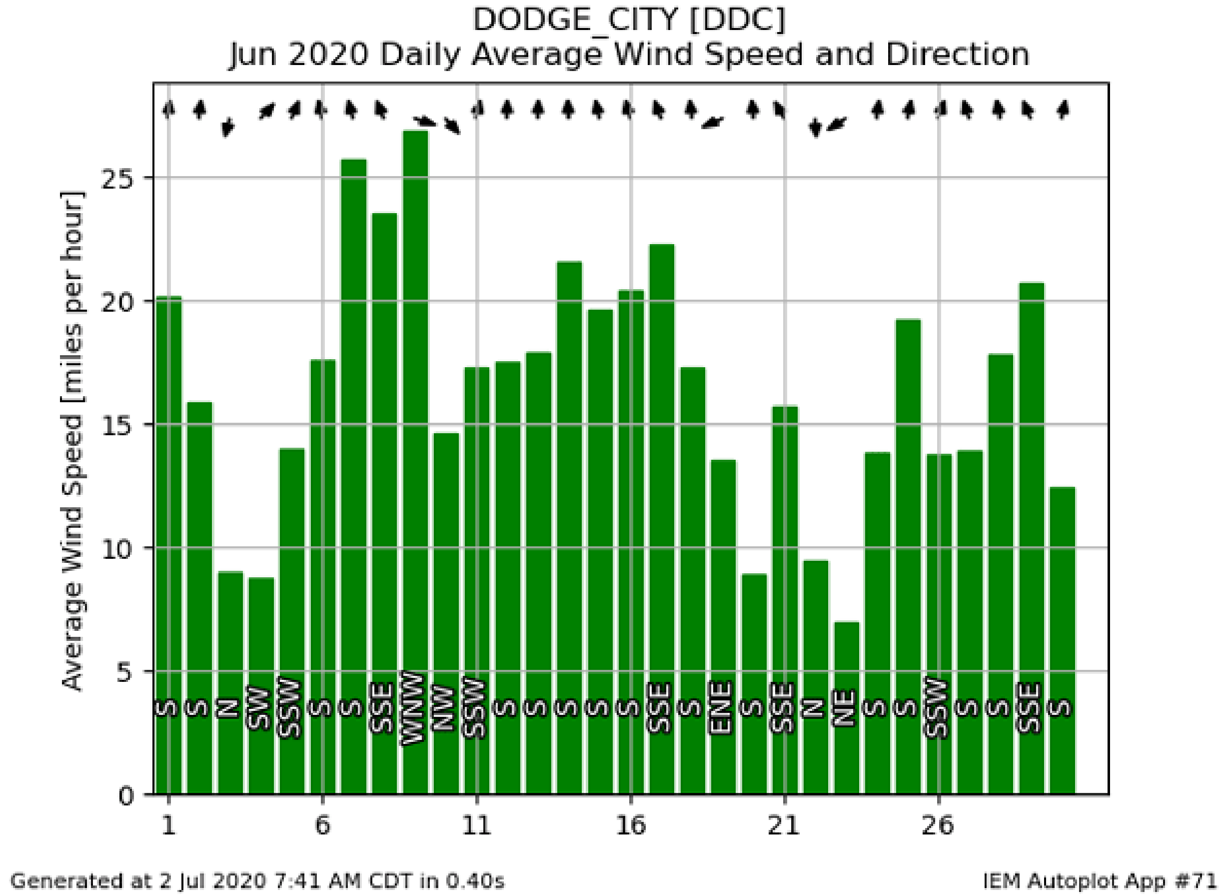


Figure 2. Average wind speed and direction by day for June at Dodge City in 2020 (https://mesonet.agron.iastate.edu).

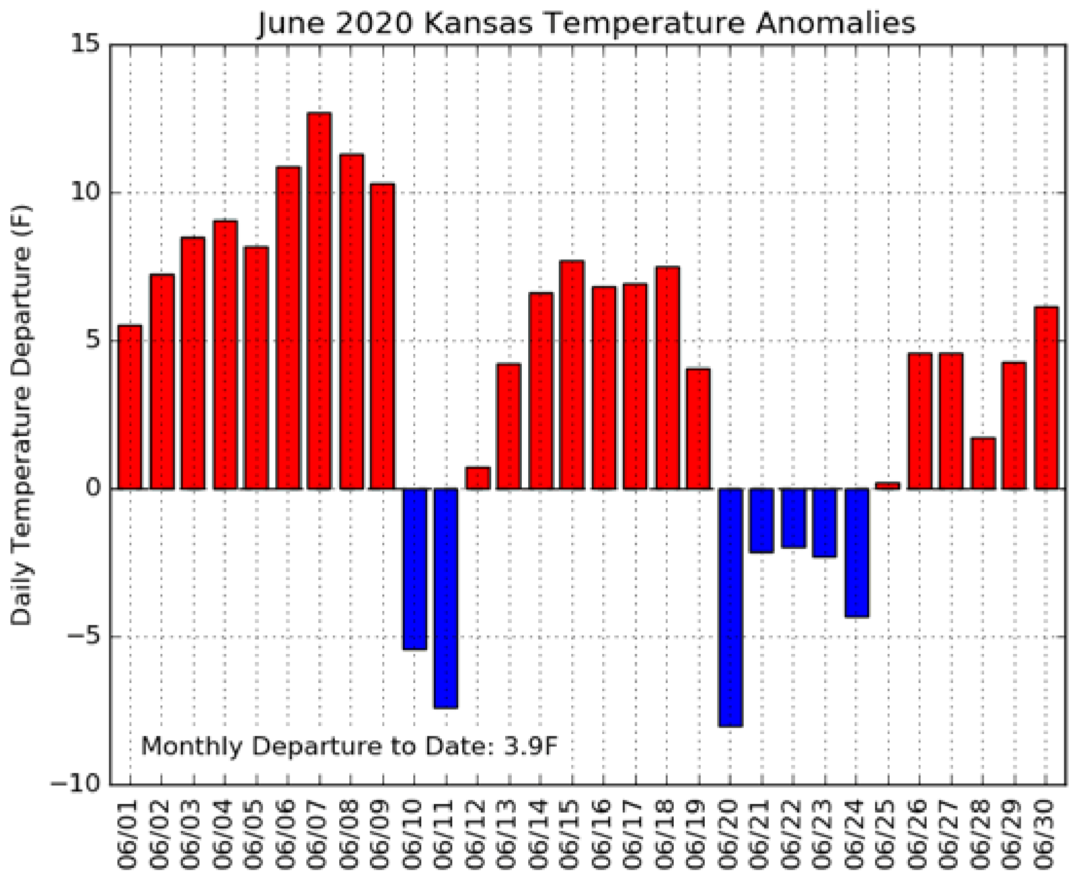


Figure 3. State-wide temperature anomaly from normal for the month of June (mesonet.ksu.edu).

Another period of interest was June 11-18 where the winds averaged over 15 mph each day (Figure 2). This also correlated with another warm period (Figure 3). This was a time of great concern with increasing drought and evaporative surface moisture loss. Hot and dry winds create significant agriculture and water stress as top soil moisture is lost much faster with strong winds. A week of those conditions can rapidly degrade drought conditions. The only exception in the state was north-central where several rain events eased these stresses. Emporia also observed similar winds (above the average of 11.1 mph) during this period (Figure 4) but at a lesser magnitude that those further west. Also of note, winds were much lighter at both Dodge City and Emporia during the brief cool down June 20-25.

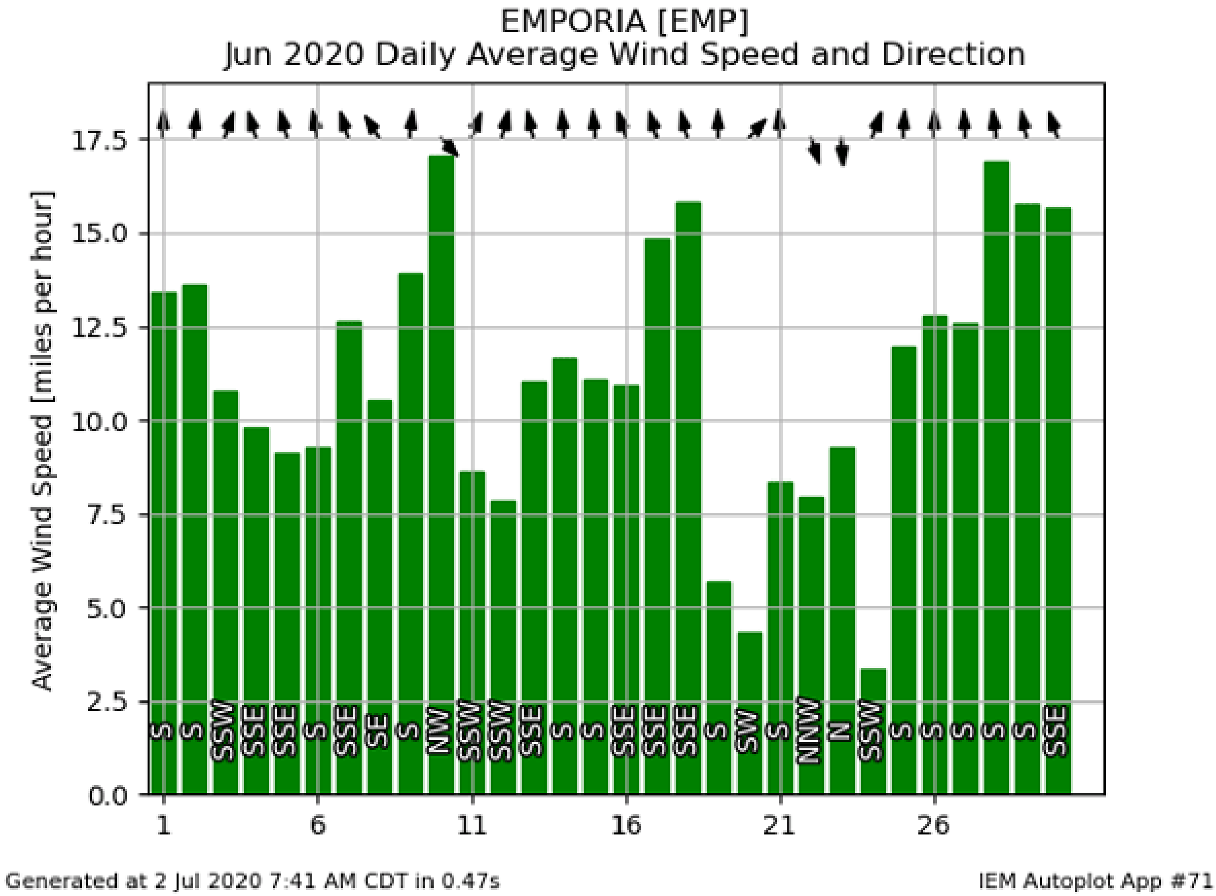


Figure 4. Emporia wind speed averages through the month, the historical average is 11.1mph from the south for June (https://mesonet.agron.iastate.edu).

Large Scale Pattern

So, what was the driving factor behind these endless hot/breezy days? As always with meteorology, we need to look above the surface at 500mb (17,000 - 20,000 feet). Upper level winds drive storm systems and the general pattern. During June 2020, we saw a "trough" of low pressure at 500mb over the western US (Figure 5). This places Kansas in southwesterly winds aloft, developing a strong surface pressure gradient between high pressure further east. As a pressure gradient increases across an area, winds increase. This south/southwesterly flow pushes downslope off higher terrain to our southwest. As a result, the air sinks and warms. The area most favorable for these hot winds under this pattern is highlighted as a light pink shaded box in Figure 5.

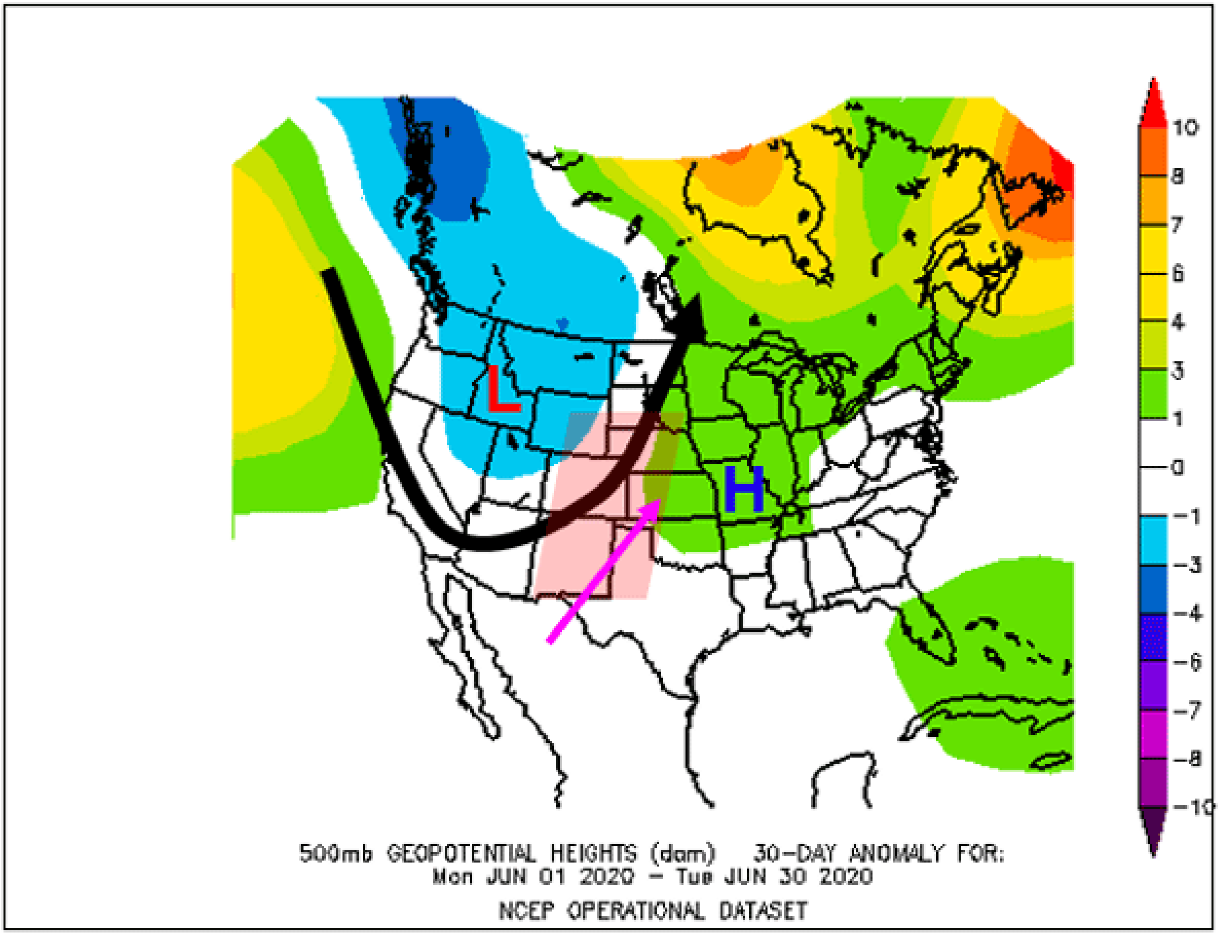


Figure 5. Upper weather pattern anomaly for June 2020. Low pressure (L) and high pressure (H) are marked accordingly. The black arrow represents the jet stream pattern across the west/central US. The pink arrow is the surface wind pattern. Shaded pink region is an area favorable for hot, dry, windy conditions under this pattern. (Source: Physical Science Laboratory, https://psl.noaa.gov).

The really interesting aspect about these winds is they were surface driven between the pressure differences of the high/low pressure. Many times during strong wind events, winds above the surface are stronger than those close to the surface. During the afternoon, vertical mixing in an unstable atmosphere (typical for the daylight hours) will mix these stronger winds down to the surface. In this case however, the winds with height actually decreased (Figure 6, pink highlighted box). In addition, any surface air that wanted to mix vertically would run into a "cap" (Figure 6, green highlighted box). Most known for its ability to prevent afternoon thunderstorm development, it also prohibits winds at higher altitudes from mixing to the ground.

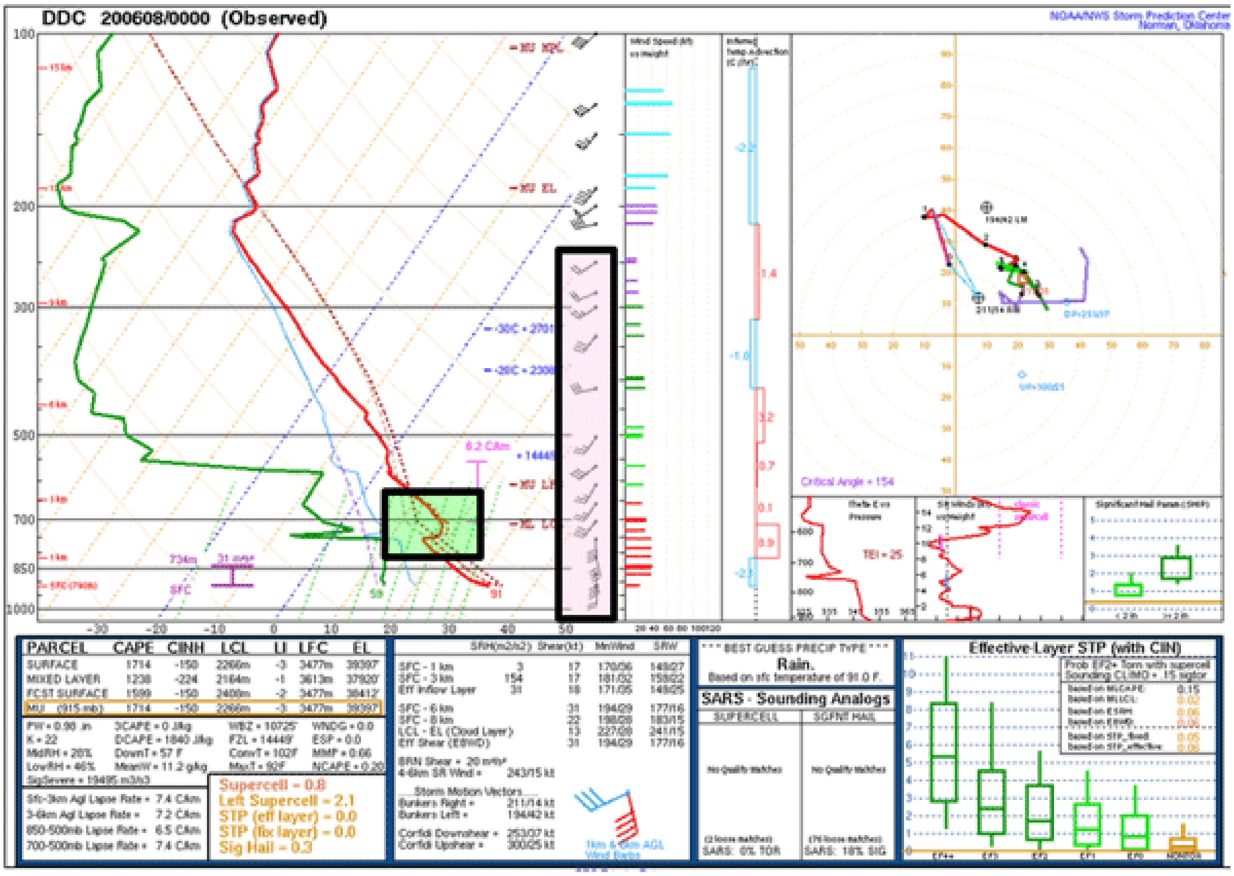


Figure 6. Atmospheric sounding showing winds with height at Dodge City (7pm) from Storm Prediction Center (www.spc.noaa.gov). Highlighted area shows four to five "flags" representative of 40+ knots of surface winds at the bottom. Note how winds decrease with height.

Are You Impacted?

As conditions rapidly change due to wet/dry conditions, we are always looking for in-field reports. Whether it is flooding, dry grass, dry rivers, or agricultural impacts we want to hear about them! Please don't hesitate to email one or both of us about it. These reports help us provide input into such things as the drought monitor, etc.

Christopher "Chip" Redmond - Weather Data Library Manager
christopherredmond@ksu.edu

Mary Knapp - Assistant State Climatologist
mknapp@ksu.edu

4. Ag-Climate Update for June 2020

The Ag-Climate Update is a joint effort between our climate and extension specialists. Every month the update includes a brief summary of that month, agronomic impacts, relevant maps and graphs, 1-month temperature and precipitation outlooks, monthly extremes, and notable highlights.

June 2020: Warm nights gained higher GDDs during wheat harvest

June 20th is the first day of summer. As would be expected, higher temperatures and low precipitation patterns continued through the month. June was warm and dry generally across the state. It ranked as the 17th warmest and 25th driest June since Kansas's available instrument records (1875 or 126 years). The heat was largely driven by warm minimum temperatures, many of which set records. Statewide there were 19 new daily record highs for the daily average temperature. In contrast, there were 48 new record warm minimum temperatures.

Across the state, dry soils (mostly driven by less precipitation) and high evaporative demands (driven by warmer temperatures) combined to create stress problems for early stages of corn's growth and development (Figure 1).

Figure 1. Leaf rolling in corn from the combined effect of heat and drought. Photo by Ignacio Ciampitti, K-State Research and Extension.

View the entire June Ag-Climate Summary, including the accompanying maps and graphics (not shown in this summary), at http://climate.k-state.edu/ag/updates/.