Issue 920

K-STATE Research and Extension

## Extension Agronomy

# eUpdate

*08/18/2022*

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. Drought and heat stress in Kansas soybean fields

Since the end of June, precipitation has been inconsistent with temperatures consistently warmer than normal across Kansas (Figures 1 & 2). Similar to corn fields, dryland soybean fields have started to experience heat stress combined with long periods without rainfall. High temperatures have been more frequent since the first weeks of July, exacerbating the drought effects.

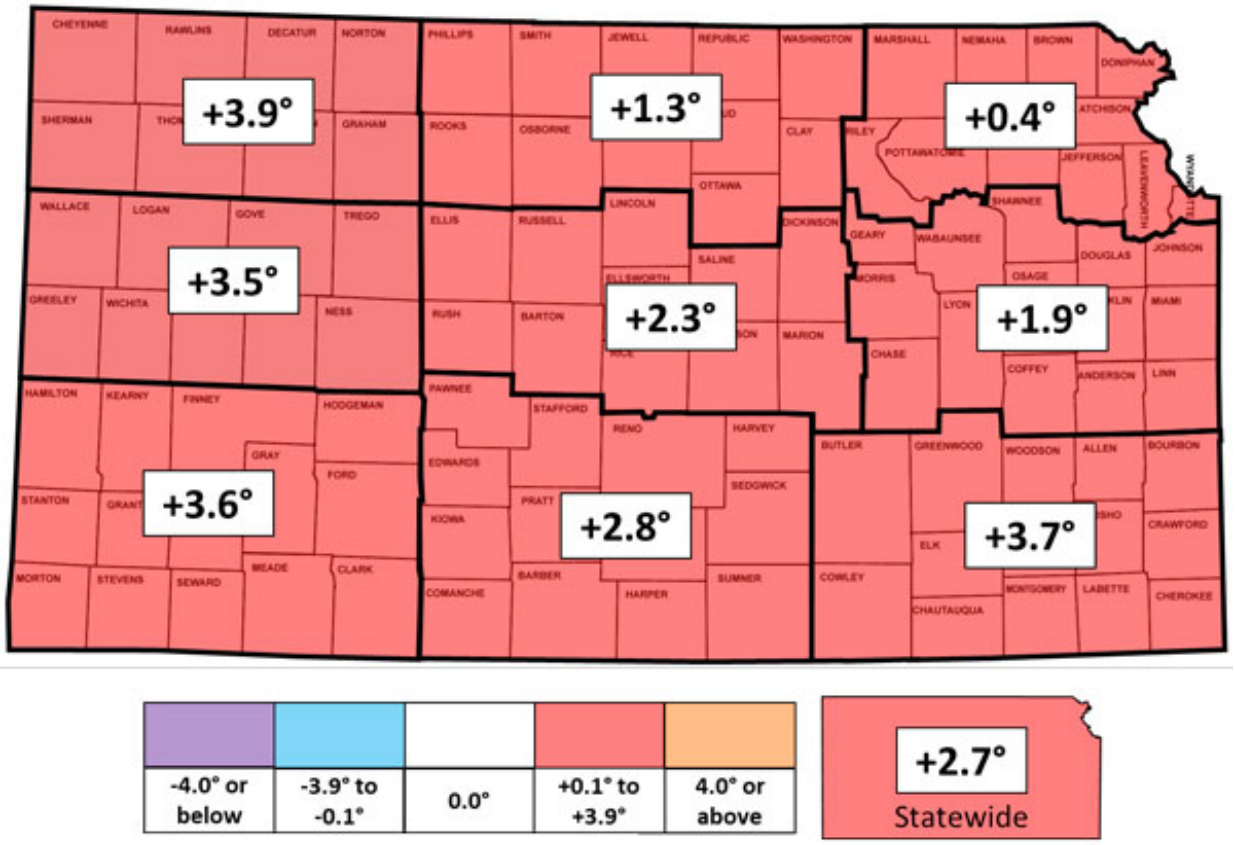


**Figure 1. Temperature anomalies by division for the period July 1-August 17, 2022. All divisions were above normal. Source: Kansas Weather Data Library.**

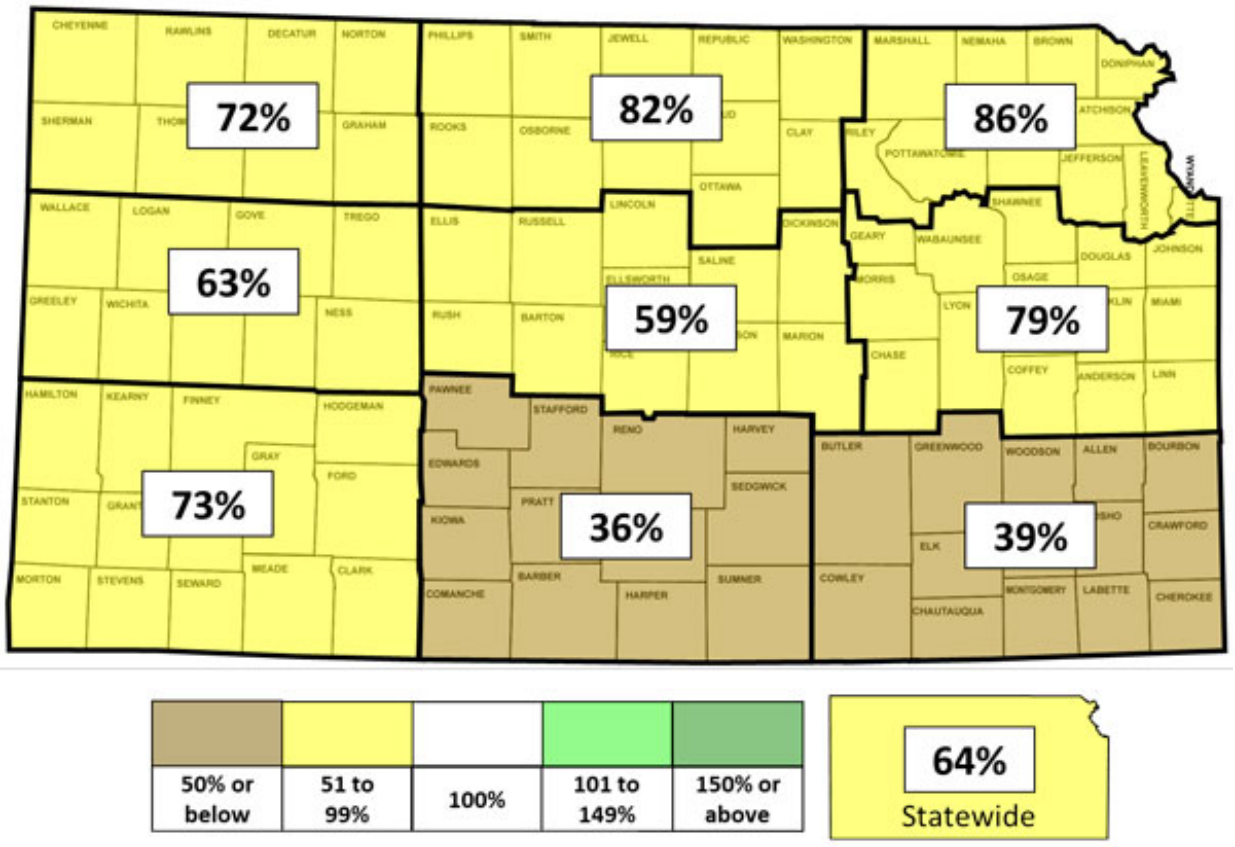


**Figure 2. Percent of normal precipitation by division for the time period July 1-August 17, 2022. Source: Kansas Weather Data Library.**

The latest USDA Kansas Crop Progress Report and Condition (August 14, 2022) rated the soybean crop condition as 31% poor or very poor, 33% fair, 33% good, and only 3% as excellent. In parallel, soils are running out of available water (Figure 3), with both topsoil and subsoil moisture reported as >40% very short, ~37% short, with only about 20% as adequate, and 0% under water surplus.

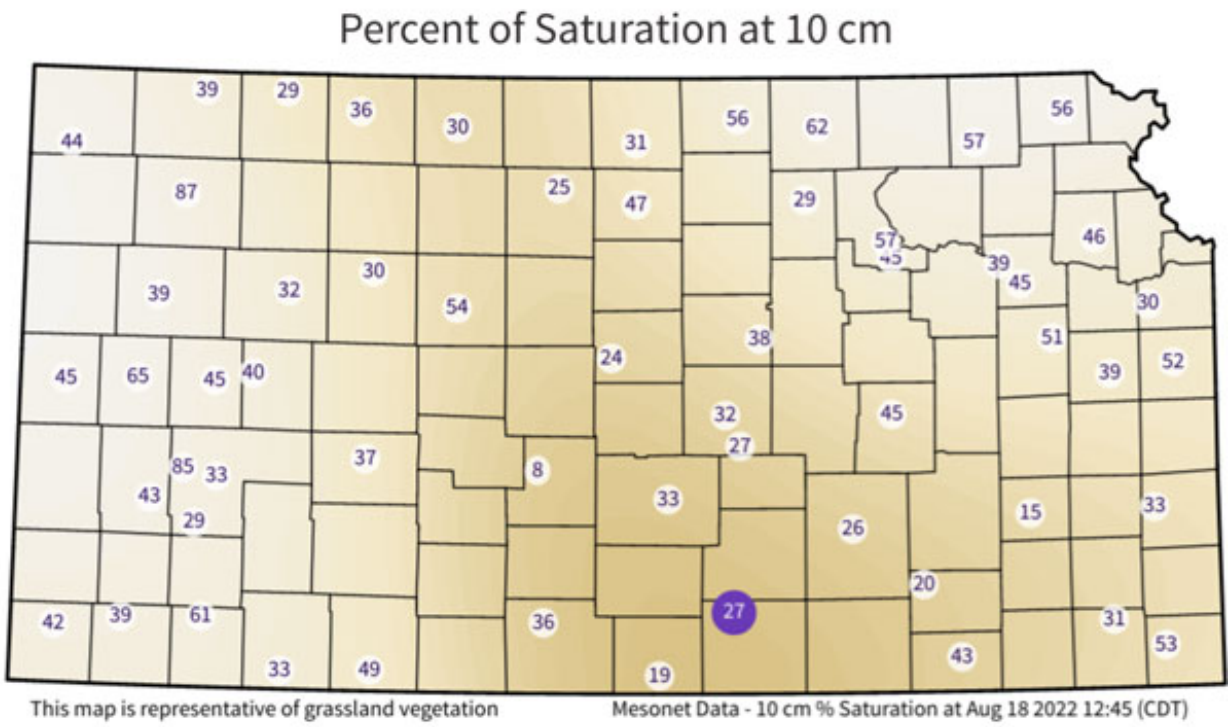


**Figure 3. Soil moisture measured as % of saturation at the 10 cm (4 inches) depth. Source: Kansas Mesonet.**

Entering the second half of August, most soybean fields have entered into the reproductive period (~85% flowering), with already more than half (~57%) of fields setting pods. The lack of moisture combined with warmer-than-normal temperatures will likely accelerate the growing season, moving crop phenology along much faster than the overall plant growth.

This article reviews potential symptoms of drought and heat stress on soybeans.

**Common drought and heat stress symptoms**

Typically, soybeans can withstand drought stress reasonably well during the vegetative phases and is normally less sensitive than corn crop until late reproductive stages (e.g., pod formation). However, the combined effect of water shortage and heat stress has been extreme in many parts of the state, with soybean leaves starting to flip, curl, or even drop, increasing the abortion of flowers and pods.

**Leaf flipping** is one of the first symptoms that occurs when soybean plants are experiencing drought stress. Leaves flip over, exposing their undersides (Figure 4). This defense mechanism will help reduce transpiration but ultimately reduce crop growth and productivity.

**Leaf curling/clamping** is a second mechanism to conserve water by soybean plants. This stress response reduces the leaf area exposed, thus compromising crop productivity.

**Leaf drop** is a third, and more extreme, mechanism involving leaves that wilt and drop, especially during very intense and prolonged periods of water stress. Soybeans that were planted in June or early July are probably still young enough to withstand drought stress for several more weeks without dropping leaves. Soybeans planted in May or early June (and with much larger plant size)

will be more vulnerable to rapid leaf loss at this time of year.

**Figure 4. Leaf flipping. Photo by Ignacio Ciampitti, K-State Research and Extension.**

**Flower and pod abortion -** When the crop is already at reproductive stages, a classic symptom is to show an increase in aborted flowers and small pods. Since indeterminate soybeans may produce flowers for about a month, the crop may be able to recover depending on the duration and intensity of the stress. The priority of the plants will be to provide resources to older pods, which may in turn increase the number of seeds per pod partially compensating for the flower and small pods abortion. If the drought and/or heat stress is intense, both the blooming and pod-setting periods could be shortened and compromise yields.

**Impact on yield components**

By the early reproductive stage, the effects of prolonged heat and drought are critical. As mentioned above, under drought conditions, soybeans in early reproductive stages will have increased flower and pod abortion. Soybeans can tolerate short periods of heat and drought at this time by aborting flowers and forming more later. But the crop will not bloom indefinitely and under prolonged heat and drought may be unable to recover. If no pods are set after the normal blooming period of three to six weeks, it is possible that the crop will not set any pods or make any seed yield. Determinate varieties have shorter blooming periods than indeterminate varieties.

Because of extremely high July and August temperatures, irrigated fields are not immune to the

effects of drought stress. With numerous days over 100 degrees, even irrigated plants can fail to set or fill pods. If stress continues during seed filling, the crop will have fewer possibilities to compensate yield reduction, with major impacts on final seed weight. The pod setting marks the beginning of the most critical period of the crop, when the main yield component is determined: the seed number. Any stress reducing biomass accumulation during this critical period will impact the number of seeds, and thus yield.

**Management considerations**

**Harvest -** Soybeans with 50 to 90 percent leaves and a good number of pods at the R6 stage have a good chance of producing a decent crop if allowed to mature -- especially if timely rains occur. In that case, it would probably best to harvest the crop as normal, even though some of the leaves and flowers have dropped due to stress. Good yields are not guaranteed even if the plants are in good shape at R6.

**Cutting for hay -** Prolonged heat and drought stress can cause considerable leaf area loss and soybean yield reduction. If the crop is so drought-stressed that it's losing leaves or not setting pods, it may be time to cut it for hay. This might have appeal for livestock producers who are facing dry pastures and supplemental feed costs. The decision depends on the stage of growth and condition of the plants. If possible, it's best to hold off on making any decisions about cutting soybeans for hay until the plants are moving into seed fill (the optimal time to cut beans for hay to retain digestible nutrients).

However, holding off until this stage of growth may not be possible if plants in the vegetative stage are dropping half or more of their leaves already. If too many leaves have dropped, the crop has a reduced value as a hay crop. Producers may need to make the decision to cut for hay while the plants are still in the vegetative stage, before the beginning seed fill stage, and before the soybeans lose too many leaves. Soybean plants that still have 30 percent of their leaves can produce 0.75 to 1.25 tons dry matter of hay per acre, with about 13 percent protein and 48 percent in-vitro dry matter digestibility. The more leaves a plant has, the more hay tonnage it will produce.

The "grey area" is where there are plants with 30 to 50 percent of leaves remaining since those leaves have the capability of filling pods if it rains and of making a soybean harvest that is worth more than the price of the hay.

**Final considerations**

Scout your acres for drought and heat stress so you can take timely decisions. Yield reductions can be expected also due to poor seed-filling conditions that may reduce the seed weight.

Finally, if you would like to report drought impacts to your region, anyone can submit Condition Monitoring Observer Reports (CMOR). You can submit reports here: http://go.unl.edu/CMOR and view other's reports here: http://go.unl.edu/CMORMAP. To learn more about the Drought Monitor process, please visit https://bit.ly/3Q2UUke.

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## 2. World of Weeds - Hemp dogbane

We have received several questions about controlling hemp dogbane (*Apocynum cannabinum*) in pastures this summer, with many farmers and ranchers saying the weed is becoming more common and troublesome. This World of Weeds article will provide some information about hemp dogbane and offer some suggestions for management.

**Ecology of Hemp dogbane**

Hemp dogbane is a perennial plant that is native to North America. In fact, some Native Americans used fibers from the hemp dogbane stems to make fishing line, rope, and clothing. It is found in crop fields, pastures, and roadsides throughout the continental United States. Hemp dogbane spreads by both seeds and horizontal roots, which enable the plant to form dense colonies. Hemp dogbane does produce chemicals that could be harmful to cattle, but cattle will rarely graze green plants.

**Identification**

Upright stems can reach up to 6 feet tall, but more commonly are 3 to 4 feet tall. Stems are reddish-brown and branched in the top half of the plant. They contain a milky, white sap. Stems may or may not be hairy. Leaves have short petioles and are 2 to 5 inches long. They vary in shape, ranging from lanceolate (Figure 1) to egg-shaped.

**Figure 1. Hemp dogbane leaves are oppositely arranged on the stem and can range from lanceolate, as shown here, to egg-shaped. Photo by Sarah Lancaster, K-State Research and Extension.**

Small, white flowers can be found at the end of stems and branches from late spring to late summer (Figure 2).

**Figure 2. Small, white flowers are found at the end of hemp dogbane stems and branches. Photo by Sarah Lancaster, K-State Research and Extension.**

Narrow brown seeds with a tuft of hairs are produced in a sickle-shaped pod called a follicle that hangs below the stem and can be up to 4 to 8 inches long. However, seedling hemp dogbane is rarely seen in the field. Mature plants will regrow from long rhizomes that spread horizontally to form dense patches (Figure 3).

**Figure 3. Hemp dogbane can be found in patches. Photo by Sarah Lancaster, K-State Research and Extension.**

Hemp dogbane is sometimes confused with milkweed species. The stems of milkweed species are typically green and thicker than hemp dogbane, and will usually not be branched. Seed pods of milkweed species are upright teardrops.

**Management options**

As with most perennial weeds, complete control will likely require more than one treatment. Mowing can provide suppression and prevent seed production. Effective herbicides include products that contain fluroxypyr, such as PastureGard, dicamba, and combinations of 2,4-D + triclopyr, such as Crossbow. However, these products are not likely to provide complete control with a single application. Combining spring and/or summer mowing with a fall herbicide application may increase control. In pastures, spot spraying may be the most economical option if hemp dogbane patches are relatively isolated.

*The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.*

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## 3. A wheat stem sawfly look-a-like and white grub biocontrol

A wasp commonly found during the summer in Kansas has recently caught the attention of some producers. In one instance, several wasps were mistaken for wheat stem sawfly (*Cephus cinctus*), a significant pest of wheat that has not yet established in Kansas. Large gatherings of this wasp in a corn field also raised concerns.

Sometimes referred to as flower wasps, the five-banded tiphiid wasp (*Myzinum quinquecinctum*), is a harmless solitary wasp found throughout most of the country. In Kansas, it is found statewide and is most common mid to late summer. These ¾ to 1 inch long, narrow bodied wasps have dark bodies, long antennae and smoky wings (Figure 1). Yellow markings are visible on their thorax and yellow bands are present on each abdominal segment. Subtle differences set apart males and females. Male wasps have yellow legs, while females have stockier orange-red legs and wider yellow bands on their abdominal segments.

**Figure 1. Male flower wasp. Photo by Anthony Zukoff, K-State Research and Extension.**

While similar looking, wheat stem sawflies are present earlier in the season, have fewer yellow bands on their abdomen and an all-black thorax (Figure 2). Wheat stem sawfly is also restricted to wheat fields, while flower wasps can be found anywhere.

**Figure 2. Wheat stem sawfly. Photo credit: Pat Beauzay, NDSU.**

Both male and female flower wasps visit flowers to feed on nectar. Females are parasitoids of various scarab beetle larvae, including a below ground pest common to many fields, white grubs. These wasps have been promoted as biocontrol tools in farm and turf settings and their presence is a good indicator that natural pest control is taking place. Female wasps seek out beetle larvae in the ground, digging for them with their stocky legs. She then deposits an egg on the body of the grub and injects a neurotoxin to paralyze it. As the wasp larva develops, it will consume the beetle larva. The wasp then overwinters as a pupa below the ground and emerges as an adult the following summer. Since the populations of both the wasp and its host fluctuate yearly, the level of parasitism changes from season to season. This results in some years where many wasps successfully overwinter and emerge in large numbers.

The female wasps are not commonly encountered. In fact, it is the male of this species that is most often noticed. This is due to the fact that the males tend to congregate together in large numbers on vegetation. The shade of corn fields (Figure 3) and, occasionally, large amounts of honeydew from aphid infestations in sorghum often attracts groups of these wasps. When approached or disturbed, the group of male wasps take flight and fly circles around the location, giving the appearance of an angry swarm of wasps. The males have no stinger and are harmless, however, the hooked appendage at the end of their abdomen is often mistaken for one, adding to the alarm. Despite their behavior and large numbers, these wasps are no threat to people or crops. As summer progresses, these groups of male flower wasps will slowly die off and eventually disappear.

**Figure 3. Male flower wasps congregating on corn plants. Photo by Anthony Zukoff, K-State**

**Research and Extension**.

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## 4. K-State Agronomy hires new Assistant State Climatologist

Matthew Sittel recently joined the K-State family as the new Kansas Assistant State Climatologist. He replaces Mary Knapp who retired in 2021 after 41 years of service at K-State.

Matt is a native of Kingsport, Tennessee. He earned his Bachelor of Science in meteorology with a statistics minor at North Carolina State University in 1992, and graduated with a Master's degree in meteorology from Florida State University in 1994. He spent 3 years working at the National Climatic Data Center (now NCEI) in Asheville, NC. Most recently, he spent 22 years working at Offutt Air Force Base near Omaha, Nebraska, with the last 14 of those years as a contractor through the University Corporation for Atmospheric Research (UCAR). Matt's specialty during his time at Offutt was forecast verification and statistical modeling of forecast and observational data.

Matt's role at K-State will involve all aspects of Kansas climate monitoring, from daily to longer-term data analysis. He will also be involved in efforts to expand observing networks statewide as well as to inspire the future generation of meteorologists through community outreach activities. Matt will be a frequent contributor to eUpdate with his assessment of current climatic conditions.

Matt is married to his husband, Tim. He has a son, Nathan, who is majoring in meteorology at the University of Nebraska-Lincoln. Matt is excited to be here and loves being closer to Kansas City to see the Royals play at home more often. He will be attending his first K-State football game this fall, and looks forward to watching K-State's other sports teams in action in the coming months.

Matt can be reached via e-mail at msittel@ksu.edu, via text or voice at 402-990-0197. You can also stop by his office in Throckmorton Hall, room 1707.

**Matthew "Matt" Sittel, Assistant State Climatologist**

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