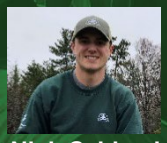
Agronomy Weekly Update

August 9th, 2021



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Field Update- Post-Pollination and Spider Mites

Welcome to August! This month seems like the calm before the storm with harvest just around the corner. August is a critical month for crop development because corn and soybean plants are allocating all their resources to the developing grain that will reach physiological maturity within the next 45-60 days. The information below includes further details on how stresses can impact yield over the next 2 months. The heat continues to push the crop along as well. Central MN has accumulated an average of ~1843 GDUs since April 26th, which is nearly 300 GDUs ahead of normal. Two top-of-mind items while walking fields recently (besides drought) include: 1) Canadian/western wildfires causing hazy conditions and 2) spider mites in soybean.

Location	GDUs Since April 26th	GDUs From Normal- 4/26	Projected GDUs- 7 Day
Wadena, MN	1717	+369	140
Little Falls, MN	1818	+332	138
Albany, MN	1861	+312	142
Buffalo, MN	1908	+227	156
Glenwood, MN	1923	+322	149
Cambridge, MN	1829	+231	155
Average	**1843**	**+299**	**147**

*Data collected from Pioneer.com GDU Calculator 4/26 - 8/5

Kernel Abortion from Drought

Why is the smoke from wildfire something to be mindful of? Essentially it comes down to quality of sunlight or solar radiation, which has been reduced by ~10-15% over the last 14 days compared to this time last year. Reduced solar radiation limits photosynthesis conducted by the plant = less carbohydrate accumulation for developing grain. Therefore, corn grain yield and standability at harvest can be impacted. Lastly, continue to monitor fields for spider mites. Damage will typically first appear near field edges and progress into the field. Affected plants will appear drought-stricken (which will be worse this year) and leaves will show "stippling" or gray/yellow spots that progresses up the canopy. If stippling is observed through the middle of the canopy and conditions are favorable for reproduction (hot/dry), then an insecticide application may be warranted.

Corn Grain Fill- Less Than 60 Days to Maturity

Pollination is nearly completed and the plant shifts all its resources to conserving and filling kernels. Stresses through the reproductive period can still impact final yield. The reproductive stages for corn are explained below as well as when/how stresses can impact yield during this time.

- **R1**- Begins when silks are visible outside the husks. Moist silks catch pollen grain, which take about 24 hours to move down the silk. This is a critical period when the number of ovules fertilized is determined. Moisture stress can disrupt kernel set by causing pollen to release before silks emerge or decrease pollen viability. Silk clipping by Japanese Beetles or Corn Rootworm Beetles reduce the success of pollination. Nitrogen and phosphorous demand are also high and can decrease total yield if limited.
- **R2 through R3** – Pollination has completed and silks are darkening and drying out. Starch accumulation is occurring in the watery endosperm that will first appear clear (R2) and turn a milky white (R3). Nitrogen and phosphorous demand is still high and are relocating from vegetative to reproductive plant parts. Lack of moisture/nutrients and decreased photosynthesis can result in low carbohydrate availability leading to kernel abortion, typically at the tip of the ear.
- **R4 through R5** – The endosperm is developing rapidly and the inner consistency turns doughy (R4) and kernel moisture starts to decrease causing kernels to dent (R5). Stresses during this period will not cause kernels to abort, but rather carbohydrate accumulation to be reduced. Kernels have accumulated 50% of their dry matter at the end of R4, meaning the other 50% will occur during R5. Freezing temperatures can prevent complete carbohydrate accumulation before maturity, reducing test weight.

Growth Stage	Days After Silking	Approx. Moisture
Blister Stage (R2)	10-12	85%
Milk Stage (R3)	18-20	80%
Dough Stage (R4)	24-26	70%
Dent Stage (R5)	31-33	60%
Maturity (R6)	64-66	35%

Abendroth et al., 2011.

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Expect the corn plant to progress through reproductive stages and reach physiological maturity (R6, black layer) in roughly 55-65 days after pollination occurs. This is the same regardless of maturity. Typically, corn plants will progress through each stage every 7-12 days from R1-R6. This can be helpful when tentatively planning harvest schedules for silage, high moisture corn, or dry grain.

Stressed Beans? Impact of Stress on Soybean Yield

Soybean fields throughout the region are progressing through R4 and into R5 (beginning seed set), which is a critical period in soybean development because plants have reached maximum height, node number, and leaf area. However, stresses can still impact yield until R7 (one pod on plant with mature color). Compared to corn, soybean plants can withstand stress reasonably well due to the wide flowering window. So the question is: how does stress impact the various yield components?

Plants/Acre: Soybean plants are able to compensate for lost stand, especially early in the growing season. A number of stresses can reduce final stand including seedling diseases/insects, lack of moisture at planting, cold shock, etc.

Pods/Plant: Flowering lasts over a period of 3-4 weeks under good conditions in indeterminate soybeans, before completeing during the R4 growth stage. The more flowers that survive = more potential pods. Under stress, flowers can be aborted anytime between R1-R4 and pods can continue to be aborted until R6 (full seed), with young pods most prone to abortion. Once the plant reached R6, pods are typically not aborted.

Seeds/Pod: The number of seeds/pod can be reduced with stress between R5-R6. Drought stress in particular during early seed fill can reduce the number of seeds/pod.

Seed Weight: Stress through R6 primarily impacts seed weight and cannot be impacted any more once the plant has reached R7 or physiological maturity. The soybean plant is able to compensate for earlier losses by producing larger seeds if resources become availabe after R5.

Vegetative Stages	Reproductive Stages
VE = emergence	R1 = beginning bloom
VC = cotyledon	R2 = full bloom
V1 = first node	R3 = beginning pod
V2 = second node	R4 = full pod
V3 = third node	R5 = beginning seed
V4 = fourth node	R6 = full seed
V5 = fifth node	R7 = beginning maturity
V(n) = nth node	R8 = full maturity

Yield losses are greatest when stress occurs between the middle of R4 to the middle of R5 because the soybean plant is no longer able to produce new flowers and pods. Therefore, minimizing overall stress load during this time is critical. The various yield components can be impacted by a number of stresses including lack of moisture, insect, disease, and nutrient availability.

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