Summer 2018 Agronomy Newsletter

From the desk of: Alex Emenhiser

Topics:

- Corn Water Use and Peak Demand
- Effects of High Nighttime Temperatures on Corn Yield
- Soybean Fungicide Application Timing
- Crop Health Imagery and Encirca Pro
- Product Highlights: P0688AM and P33A24X
- Local Testing

Thank You! All of us here at Max Delagrange INC. would like to thank you for your business and the friendships we have with each one of you. It has been another challenging spring for many of you, but we appreciate allowing us to work through these challenges together.

– Max, Dane, and Alex

-Corn Water Use and Peak Demand

The limiting factor for maximum corn yield can often be tied to the availability of water at peak demand times throughout the growing season. Water is necessary for many reasons in crop growth and development, but peak demand occurs while the plant is determining max kernel number, during silk and pollen development, and throughout early kernel development. Stress at these key times can have a large impact on final yield by reducing the total number of kernels on each ear. Corn plants respond to water stress during early kernel set by aborting kernels at the tip of the ear in order to get the plant to an ear size it feels is sustainable. The majority of kernel abortion occurs within 10-14 days of complete pollination, or up to R3 (Milk Stage).

Crop water use is measured by evapotranspiration (ET), the total amount of water used by either evaporation (water loss from the soil to the air) or transpiration (plant uptake and use of water). There are many factors that affect total ET through the growing season. Some of those factors include, crop growth stage, relative maturity of the hybrid (full season hybrid will use more water), weather conditions, and soil type/tillage system. We will focus mainly on two of these, crop growth stage and weather conditions.

Growth stage	*Average water use rate (in/day)*	*Duration[1] (days)*	*Water needed to reach stage (inches)*	*Water needed cumulative (inches)*
Emergence (VE)	0.08	0-10	0.8	0.8
4-leaf (V4)	0.10	11-29	1.8	2.6
8-leaf (V8)	0.18	30-46	2.9	5.5
12-leaf (V12)	0.26	47-55	1.8	7.3
Early tassel (R1)	0.32	56-68	3.8	11.1
Silking (R2)	0.32	69-81	3.8	14.9
Blister Kernel (R3)	0.32	82-88	1.9	16.8
Beginning Dent (R4.7)	0.24	89-104	3.8	20.7
Full Dent (R5.5)	0.20	105-125	3.8	24.5
Maturity (R6)	0.10	126-140	1.4	25.9

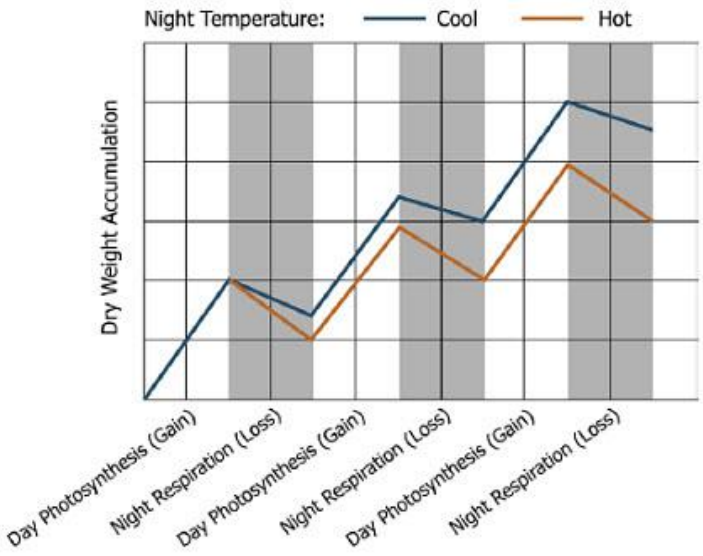
The chart to the left shows the water usage per day for a typical 113 day hybrid, as well as the cumulative water needs over a growing season. Notice the peak need occurs between the V12 stage (when the plant is determining ear length), and R3.

These were the important growth stages mentioned earlier.

Weather conditions through these growth stages have a large impact as well. Hot, dry, sunny, and windy conditions favor more water loss through evaporation. This means that even though the plant may be taking up the same amount, the total water need per day is higher due to evaporation losses. It is worth noting that the corn plant requires water through blacklayer, or R6, to reach maximum yield potential. Up through full maturity, the corn plant is adding kernel depth, and a water stress during late kernel fill will certainly decrease yield. The recent bout of hot and dry weather has many growers thinking what kind of damage has been done to their crop. There were many local fields showing rolled leaves and water stress symptoms on the hot dry days. It is still too early for most fields to determine any true losses, but unless the corn was severely stressed during the R1-R3 stages, there has not been a significant effect on yield yet. In the fields we have been walking, the rains have calmed the water stress in time to avoid major kernel abortion in the early pollinated corn, and the stress was not enough to affect the late planted corn just reaching pollination.

-<u>Effects of High Nighttime Temperatures on Corn Yield</u>

Modern corn as we know it traces its roots back to Central Mexico. Bred from a wild grass called Teosinte, corn was adapted to grow in the predominate climate of that area. Warm daytime temperatures (80s and 90s) and cool nights (60s) are the normal in Central Mexico. It is well known that high nighttime temperatures are a yield killer, and this is a common occurrence in the North American Corn Belt. There are two main ideas as to why high temperatures at night reduce yield. The first is that respiration increases, using up energy reserves that could have been used for kernel growth. Less energy available for kernel growth could then result in fewer and or smaller kernels. The second idea is that higher than average nighttime temperatures speed up the plants maturity, meaning a shorter grain fill period.



The graph to the left shows what happens to grain yield (Dry Weight Accumulation) during hot nights vs. cool nights. During a hot night, there is far more energy wasted in respiration. This energy is being used to simply maintain the plant, when it could be used at a later time to add grain yield. The graph shows that after a period of time, the cool nights will have accumulated more grain yield due to less waste and a more efficient grain fill period.

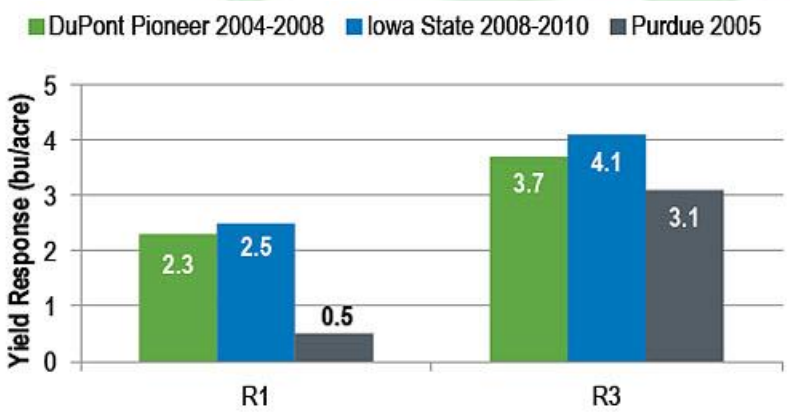
The maturity of a corn plant is determined by heat units (GDUs), and heat units are figured based on an equation that factors in high temperature and low temperatures

inside a range that the plant grows. With daytime high temperatures equal, warmer nights will lead to more GDUs accumulated in a single day. As an example, a day with a high temperature of 87 degrees and a low of 65 degrees would equal 26 GDUs. A day with the same high temperature of 87, but a low of 75 degrees would equal 31 GDUs. If this weather occurred over a span of 3-4 weeks, the high nighttime temperatures would lead to an extra 100-140 GDUs above normal. With average GDUs per day of roughly 25, this would essentially be shortening the grain fill period by 4-5 days. Both of these situations emphasize the importance of nighttime temperatures on corn yield, and I believe a combination of the two ideas is the driving force behind the yield loss seen in corn production. The high yields in 2017 were greatly influenced by the cool nights during the grain fill period. It is still too early to say what this year's weather will be, but so far we have had a mix of hot nights and cool nights.

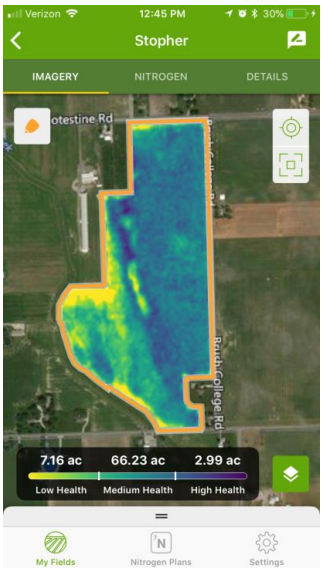
$$GDU = \left(\frac{Daily\ Max\ Temp\ ^\circ F\ +\ Daily\ Min\ Temp\ ^\circ F}{2}\right) - 50\ ^\circ F$$

-<u>Soybean Fungicide Application Timing</u>

With much of the soybean crop nearing the optimal time for a fungicide application, it is a good time to discuss the proper growth stage and timing. The optimal growth stage for an application is agreed upon in the industry as R3, or beginning pod. R3 is defined as having a pod 3/16" in length on one of the 4 uppermost nodes of the plant. The graph below shows the difference in yield between an application at R1 vs. an application at R3.



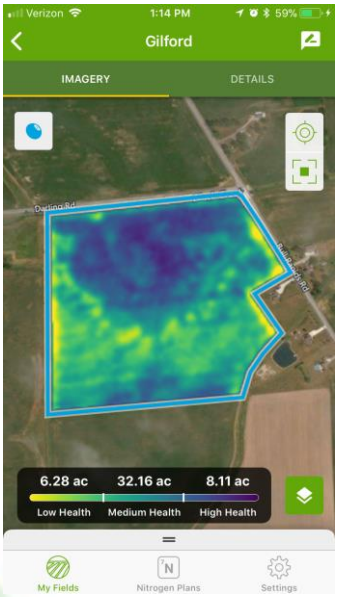
Protecting the soybean plant in the late pod fill stages leads to the largest yield gain. Since fungicides have a limited residual activity, an early application could lead to the plant becoming exposed to diseases during the critical time of pod fill when it is determining seed size. In a time of tight margins, growers can't afford to miss timing windows.



-<u>Crop Health Imagery and Encirca Pro</u>

In the last several years, Pioneer has made great strides in digital crop imagery. Encirca Pro Crop Health imagery is useful as a way to scout fields or find problem areas from your phone or IPad. Once identified, scouting can be targeted to those areas. It allows you track changes in field health throughout the growing season, and it can alert you to areas that may be going backwards. The app gives you a color scale of crop health from low to medium to high, as well as the number of acres in each. These images

proved to be very strongly correlated to yield maps when compared last year, so they could be used as a way of forecasting yields. However, without boots on the ground scouting, it is difficult to judge yield based solely on the images.



We are excited about the offers we will have with Encirca Pro next growing season, which will also include access to mobile Nitrogen monitoring as well as field by field weather data. If you are interested in learning more about this, please get ahold of us and we would be happy to answer your questions.

-Product Highlights

P0688AM:

P0688AM is a new 106 day hybrid that we have out in our test plots, and in a few split planters vs. P0506AM and P0574AM. It brings many positives to our lineup, including excellent stalks and roots, along with great stress tolerance. It was one of the most impressive hybrids during early emergence observations this spring. It will be a diverse option to compliment P0574AM, and it brings a significant yield advantage over P0506AM. It also tops P0506AM in grain quality, and is similar in dry down and moisture. It has shown consistently high yields over several years, and across environments and yield levels. We are looking forward to seeing the results from our tests this fall!

P33A24X:

P33A24X is a new 3.3 maturity soybean in the RR2 Xtend platform. It is in our soybean test plots this summer. It is an excellent emerger, and it can handle wet soils well. It has an impressive look and has been a standout in every test plot this summer. It brings an excellent agronomic package, and is very strong on disease resistance. This will be a high yielding, versatile variety for us. It also fits well into the maturity range in our area

-Local Testing: Below is a list of the local tests we are carrying out this year on our customers' farms

- **20:** Corn Test Plots, including 8 with competitive hybrids, and 3 conventional vs. traited
- **5:** Split Planter Tests with new hybrids vs. current hybrids
- **6:** Soybean Test Plots
- **3:** Sulfur Trails (AMS on Soybeans)
- **3:** Soybean Cyst Nematode Race Typing samples
- **6:** Pest Traps: 2 Corn Rootworm, 3 Western Bean Cutworm, and 1 European Corn Borer

As always, if you have any questions about these topics or any other agronomic issues, please give us a call! **Max:** 260-413-1065 **Dane:** 260-515-9118 **Alex:** 260-580-8033