PURDUE UNIVERSITY | Extension ENTOMOLOGY

Pest&Crop newsletter

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In This Issue

2019 Western Bean Cutworm Pheromone Trap Report

(John Obermeyer)

		WBC Trapped						
County	Cooperator	Wk 1 6/20/19-6/26/19	Wk 2 6/27/19-7/3/19	Wk 3 7/4/19-7/10/19	Wk 4 7/11/19-7/17/19	Wk 5 7/18/19-7/24/19	Wk 6 7/25/19-7/31/19	Wk 7 8/1/19-8/7/19
Adams	Roe/Mercer Landmark	0	0					
Allen	Gynn/Southwind Farms	0	0					
Allen	Kneubuhler/G&K Concepts	0	0					
Bartholomew	Bush/Pioneer Hybrids	0						
Boone	Emanuel/Boone Co. CES	4	2					
Clay	Fritz/Ceres Solutions/Clay City	0	3					
Clay	Mace/Ceres Solutions/Brazil	0	0					
Clinton	Emanuel/Boone Co. CES	0	2					
Clinton	Foster/Purdue CES	0	0					
Dubois	Eck/Dubois Co. CES	0	1					
Elkhart	Kauffman/Crop Tech Inc.	1	2					
Fayette	Schelle/Falmouth Farm Supply Inc.	0	0					
Fountain	Mroczkiewicz/Syngenta	9	1					
Fulton	Jenkins/Ceres Solutions	1	0					
Fulton	Randstead/Ceres Solutions	0	0					
Hamilton	Campbell/Beck's Hybrids	0	1					
Hamilton	Nicholson/Nicholson Consulting	0	0					
Hendricks	Tucker/Bayer	2						
Howard	Shanks/Clinton Co. CES	0						
Jasper	Overstreet/Jasper Co. CES	0	1					
Jasper	Ritter/Brodbeck Seeds	5	3					
Jay	Boyer/Davis PAC	0	0					
Jay	Shrack/Ran-Del Agri Services	0						
Jay	Temple/Jay Co. CES/Pennville	1	1					
Jay	Temple/Jay Co. CES/RedKey	3	3					
Jennings	Bauerle/SEPAC	0	0					
Knox	Clinkenbeard/Ceres Solutions/Freelandville	0	0					
Kosciusko	Klotz/Etna Green							
Lake	Kleine	0	1					
Lake	Moyer/Dekalb Hybrids/Shelby	0	1					
Lake	Moyer/Dekalb Hybrids/Scheider	1	0					
LaPorte	Rocke/Agri-Mgmt. Solutions/Wanatah	4	1					
Marshall	Barry							
Marshall	Harrell/Harrell Ag Services	1						
Marshall	Klotz/Nappanee							
Miami	Early/Pioneer Hybrids	0	2					
Montgomery	Delp/Nicholson Consulting	0	0					
Newton	Moyer/Dekalb Hybrids/Lake Village	1	0					
Porter	Tragesser/PPAC							
Posey	Schmitz/Posey Co. CES/Cynthiana	0	0					
Pulaski	Capouch/M&R Ag Services	6						
Pulaski	Leman/Ceres Solutions	2	0					
Putnam	Nicholson/Nicholson Consulting	1	1					
Randolph	Boyer/DPAC	0	1					
Rush	Schelle/Falmouth Farm Supply Inc.	0	2					
Shelby	Fisher/Shelby County Co-op							
Shelby	Simpson/Simpson Farms							
St. Joseph	Carbiener/Breman	0	0					
St. Joseph	Deutscher/Helena Agri-Enterprises	0	0					
Starke	Capouch	0						
Sullivan	Baxley/Ceres Solutions/Sullivan	0	0					
Sullivan	Baxley/Ceres Solutions/New Lebanon	0	0					
Sullivan	McCullough/Ceres Solutions/Farmersburg	0	0					
Tippecanoe	Bower/Ceres Solutions/Lafayette	0	5					
Tippecanoe	Nagel/Ceres Solutions	0	0					
Tippecanoe	Obermeyer/Purdue Entomology	0	0					
Tippecanoe	Westerfeld/Monsanto Research Farm	1	1					
Tipton	Campbell/Beck's Hybrids	0	0					
Vermillion	Lynch/Ceres Solutions/Clinton	0	0					
Wabash	Enyeart/Ceres Solutions		2					
White	Foley/ConAgra	0	1					
Whitley	Boyer, Richards/NEPAC/Schrader	0	0					
Whitley	Boyer, Richards/NEPAC/Kyler	0						

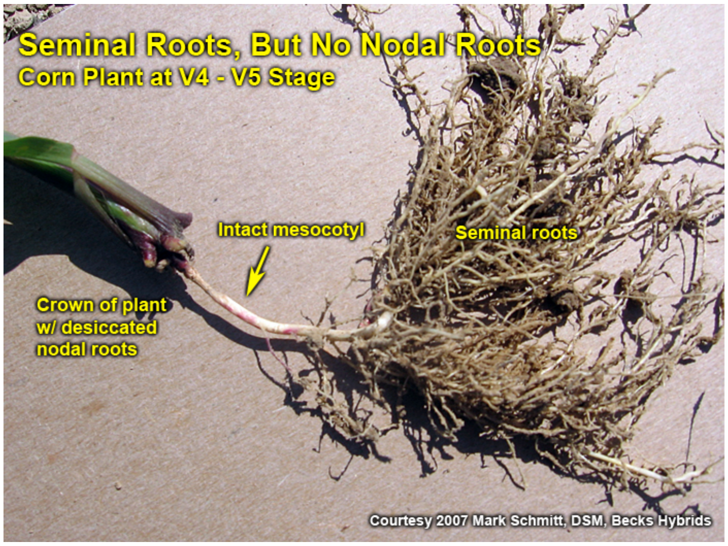
* = Intensive Capture…this occurs when 9 or more moths are caught over a 2-night period

"Rootless" or "Floppy" Corn Syndrome

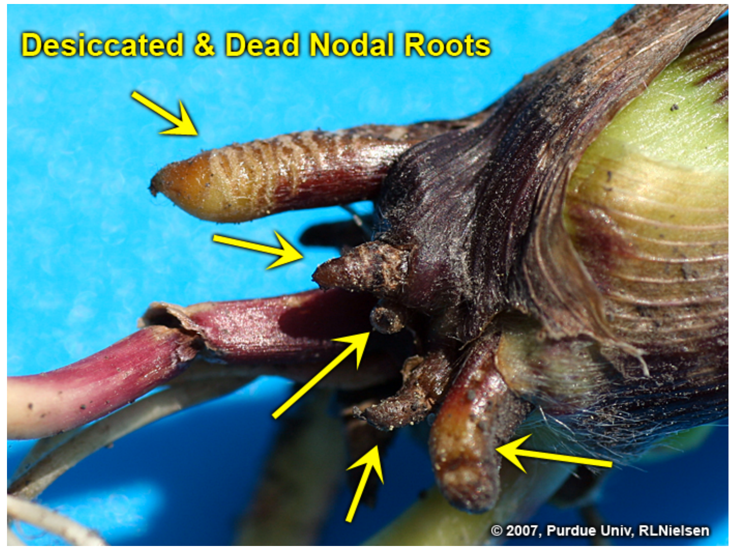
(Bob Nielson)

The combination of unusually young corn for this time of year (due to the unusually late planting season of 2019) and the recent spate of rain-free, sunny, hot days could result in the development of "rootless" and then "floppy" corn in some late planted fields.

Excessive drying of the upper soil profile is conducive for the development of what some of us affectionately call the "rootless corn" or "floppy corn" syndrome. The problem illustrates a classic example of the importance of the timing of stress relative to stage of plant development.



Seminal roots, but no upper nodal roots.



Desiccated and dead nodal roots.

The permanent (nodal) roots of a corn plant develop initially from near the crown area of the young plant (approximately 3/4 inch below the soil surface) and are often first visible between leaf collar stages V1 and V2 (Nielsen, 2013). The young roots develop sequentially in individual sets or "whorls" from individual nodes of the lower stalk, beginning with the lowermost node of the stalk. The main growing point or meristem of a root is located just behind the tip of the root and must remain alive in order for the root to develop normally.

Contrary to popular opinion down at the coffee shop, roots do not grow down toward moisture on purpose. They grow downward simply in response to gravity (i.e., a gravitropic response). If nodal roots begin their initial elongation in bone-dry surface soil and reach adequate soil moisture at deeper depths before the meristematic root tip desiccates, then the root will survive and proliferate.

If the root tip (and its accompanying meristem) desiccates prior to reaching soil moisture, the entire young nodal root often dies. This is particularly true if the axillary meristems along the length of the root (that eventually produce the adventitious branch roots) have not yet differentiated or become active.

The desiccating effect of bone-dry surface soils on young, newly elongating nodal roots is exacerbated by sunny weather and hot temperatures. Dry soil warms more quickly, and dramatically, than wet soil. On a warm, sunny day with air temperatures in the high 80s to low 90s F, soil temperature at the 3/4 inch or depth can exceed lethal levels for young roots. This is especially true for residue-free, conventionally-tilled fields.

The appearance of desiccated roots is what one would imagine; they are shriveled and discolored. This symptom is unlike that of any other lethal root stress, including salt injury from fertilizer. These symptoms are **NOT** like any associated with herbicide injury or insect feeding.

Entire sets or "whorls" of nodal roots sometimes die in this manner and the plant essentially survives on what's left in the kernel reserves and what the seminal roots offer in terms of moisture and nutrient uptake until the next set of nodal roots develop and become established. If subsequent sets of nodal roots die in the same manner, the plant continues its dependence on the kernel and seminal root support.

In fact, it is amazing to me how the aboveground appearance of a plant affected by the "rootless" syndrome can appear fairly normal up until the fateful windy day when the mesocotyl simply can no longer support the plant and it literally flops over to the ground. "Floppy" corn plants are **NOT** technically root-lodged; they are simply broken over at the mesocotyl below the crown area of the plant. Obviously, the health of the mesocotyl and the seminal roots determine whether an affected plant can "hang on" until a decent soaker occurs to replenish soil moisture levels.

I began this article by telling you that the "Floppy Corn" Syndrome is a classic example of the importance of the timing of stress versus stage of plant development. Rooting of young plants is most vulnerable to the effects of dry surface soils up until the nodal root system has been fairly well-established (about V5 or V6). Consequently, "Floppy Corn" is more likely to occur in a field of younger, recently-planted corn than an adjacent field of older, earlier-planted corn whose nodal root development is farther along.

Sometimes when several sets of nodal roots desiccate and die, the crown of the young plant may "appear" to be at or above the soil surface. That appearance is an optical illusion except in a few cases (Nielsen, 2004).

What Can Be Done to Alleviate the Problem? Unfortunately, very little can be done to prevent the situation from becoming worse. Row cultivation may encourage new nodal root development if moist soil is thrown around the base of the plants. However, if the soil is dry enough to be causing the problem in the first place, there's probably very little moist soil shallow enough to be brought up by row cultivation. The ultimate solution to the problem is a good soaking rain or at least enough of a rain to sustain new nodal root development long enough to allow the roots to reach deeper and hopefully wetter soil conditions before the upper soil dries again.

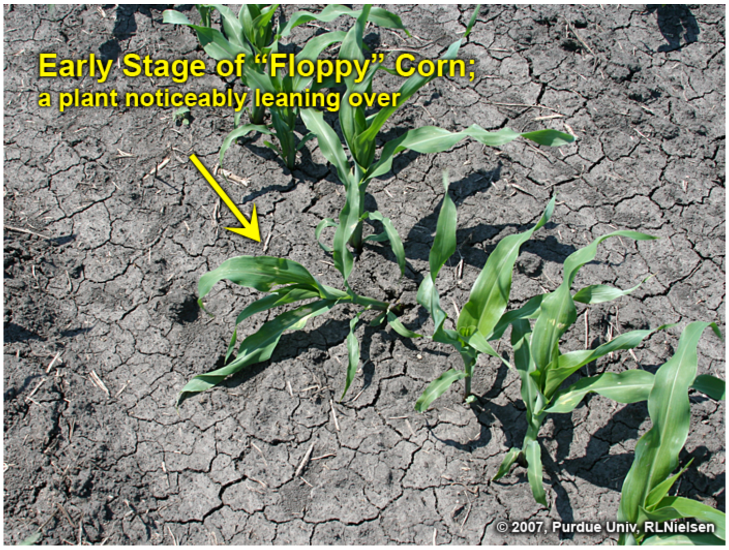
"Slightly shallow" seeding depth.

Corn at V5 to V6.

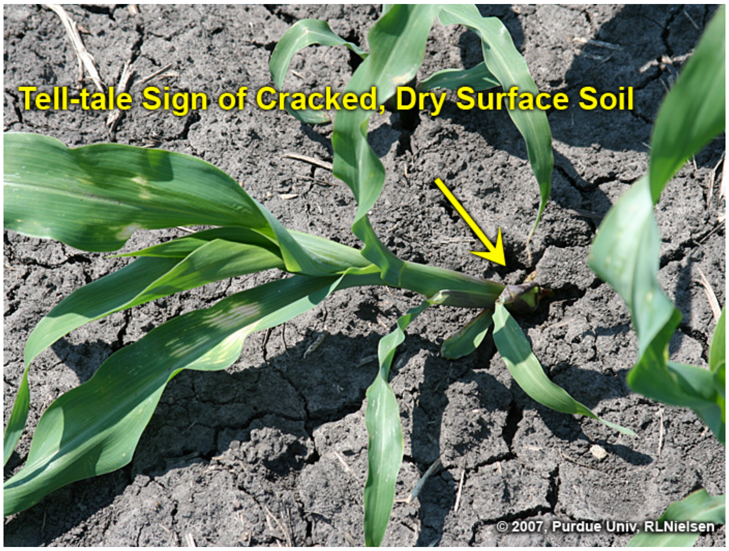
'Hindsight" Reminders or Foresight Advice.

- "Rootless" corn develops more easily with extremely shallow seeding depths that result in nodal root initiation to begin closer to the soil surface than at the usual approximate 3/4 inch depth. This is one of several reasons that growers should avoid choosing seeding depths shallower than about 1 to 1-1/2 inches.
- Conversely, unusually deep planting (more than 2 inches) does not result in unusually deeper initial root elongation because the light-mediated elongation of the mesocotyl during emergence results in the crown of the seedlings being at roughly the same depth (3/4 inch) below the soil surface.
- Furrow erosion after planting, as a result of heavy rains, can create "shallow planted" seed as a consequence of removing topsoil.
- Shallow soil compaction from shallow tillage of fields that are "just a little on the wet side" can restrict initial nodal root development in the shallow, and often dry, soil above the compacted layer.
- Open seed slots resulting from no-till planting "on the wet side" can contribute to the desiccation and death of initial nodal root development if the initial nodal roots desiccate before they successfully penetrate through the furrow sidewalls.

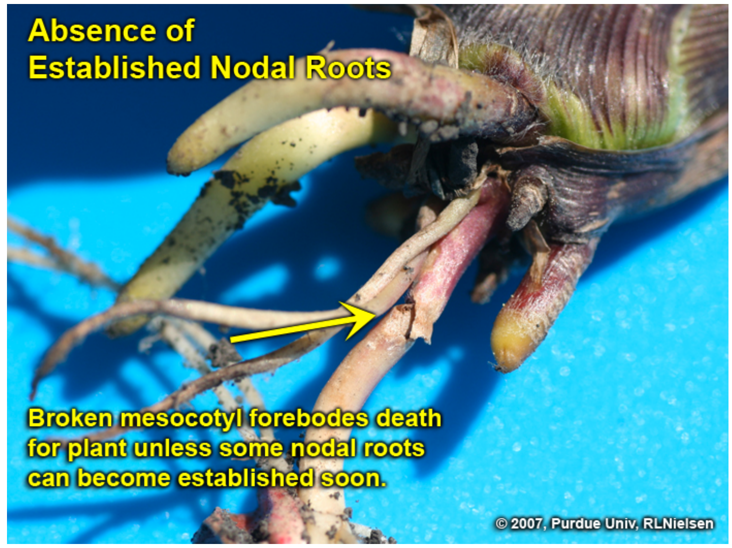
Root system of "normal" plant.



Early stage of "floppy" corn.



Early stage of “floppy” corn.



Broken mesocotyl.

Absence of established nodal roots.

Related References

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Irrigation Provides Option for Nitrogen Application Following Late Wet Spring

(Lyndon Kelley)

Irrigators have options for managing N application in wet conditions and late-planted crops.

Irrigated crop production has the advantage of fertigation as an option in nitrogen management. Fertigation is the process of applying fertilizer through irrigation water. Liquid 28% nitrogen is the most common product for applied through irrigation. Fertigation must be applied only when using the proper equipment.

Fertigation allows producers to evaluate nitrogen loss due to wet conditions or heavy rains, crop condition and the current market situation and adjust their nitrogen plan accordingly to meet crop needs and maximize profitability. The closer the nitrogen fertilizer is applied to the time of peak crop need, the lower the potential for nitrogen loss and the greater the return on your nitrogen investment.

Even if you never fertigate, irrigation still provides the opportunity to water in surface applied or knifed in nitrogen applications. Incorporation by irrigation reduces nitrogen loss to volatilization, increasing the amount of nitrogen available to the crop. In some situations, UAN is dribbled between rows in wet fields and if rain is not in the forecast, a small irrigation application can be used to reduce the volatilization loss to the air. This technique uses simple, readily available equipment and can cover acres very quickly. In dire situations, dry forms of N (Ammonium Sulfate or Urea) can be applied by air and a small irrigation application can be used to incorporate it if timely rains do not occur.

The inherent risk of injecting fertilizer into a water system dictates the requirement for backflow protection. Both Indiana and Michigan have resource protection rules that require the use of chemigation valves for the protection of both surface and ground water sources. A chemigation valve creates an air gap downstream from the pump when the pump is shut down. The air gap breaks the suction created by returning water and prevents contaminants from entering surface or ground water. Chemigation valves, for most irrigation, are available from local irrigation dealers for less than $700. Installation cost is much less at the time of pump construction and should be included in almost all new installations.

Detailed information on injection pumps, backflow protection, safety interlocks, and procedures for calibrating an injection system is available in bulletin E-2099 available from the Michigan State University Extension's bulletin system or electronically in the irrigation web page. https://www.canr.msu.edu/irrigation/index

The June 27 MSU Field Crops Team Virtual Breakfast Webinar contains information on N applications with aid of Irrigation and Irrigation Scheduling. If you missed the 7 a.m. webinar, a recording is available at the same website:
https://www.canr.msu.edu/field_crops/virtual-breakfast/

Special thanks to Eric Anderson, MSU Extension Field Crops Educator, Bruce MacKellar, MSU Extension Field Crops Educator, and Steve Miller MSU-BAE Irrigation specialist, for their input into this article.

Small amount of irrigation can reduce nitrogen loss due to volatilization.

Wet Year Irrigation Decisions

(Steve Miller), *(Eric Anderson)* & *(Bruce Mackellar)*

At some point in time, precipitation falls short of crop needs and the crop starts to deplete the soil moisture reserve signaling the start of irrigation season.

A huge variation in crop development exists in Michigan and Indiana in 2019. Near the state line, some irrigated fields will be at tassel by the second week of July while others are less than knee-high and will likely tassel closer to the end of July.

The sandy soils in Indiana and Michigan can quickly go from too much rainfall to drought conditions. The need for irrigation varies greatly across both states, but where crops were replanted or planted late, we have young plants struggling through longer days and hotter conditions than they would in a normal growing season according to Lyndon Kelley, MSU/Purdue Extension Irrigation Educator. With crop prices on the rise, irrigation water management can be very profitable.

To complicate irrigation management, the wet soil in many fields has inhibited root growth, leaving plants that lack the root structure to survive drought if rains end abruptly or high heat sets in. Producers with the option to irrigate need to be ready to use their irrigation investment. A 2-3 day delay in growth due to lack of water can be devastating in a year with decreased growing days due to late planting.

Irrigation managers may use checkbook style irrigation scheduling by applying irrigation water to make up the deficit between crop water use and rainfall from the previous week. Crops will have available the rainfall from the week plus the water stored in the soil that developing root systems are growing down into. From emergence to the crop's reproductive stages, the crop water needs continue to increase at the same time of the year that rainfall frequency and volume tend to decrease, resulting in a greater chance of rainfall not meeting the crop's water needs.

Watching for crop stress signs is another management technique used for deciding when to start irrigating. Both corn and soybeans have natural defense mechanisms to cut water loss from plants when their need for water is greater than what they can pull in from the soil in their rooting area. Corn plants will roll their upper leaves, forming a pineapple looking appearance, while soybeans will appear silver as the plants flip their upper leaves in an effort to reflect part of the light using shiny leaf undersides. Both of these signs are indictors that a producer is starting to irrigate too late and has reduced optimum growth. Good irrigation managers who work to minimize irrigation use will monitor the driest, most water sensitive areas of the field for these stress signs.

The closer a producer manages the soil moisture to the minimum amount needed, the greater his irrigation efficiency and the greater his risk of yield reduction. The greater the dependability, uniformity, and capacity of the irrigation system, the more likely a producer is to delay irrigating until soil moisture is depleted. Crops watered with irrigation systems that lack uniformity, are undependable, or have low capacity will require irrigation water sooner compared to crop needs to reduce the risk of not meeting crop water needs if there is a shortage of rainfall.

Several field crop diseases are associated with a wet crop canopy, further complicating irrigation decisions. Tar spot in corn and white mold of soybeans and green beans are good examples. Few irrigators have the capacity to totally avoid evening/early morning irrigation, the time most likely to keep the leaf canopy wet for an extended period. Timing irrigation application for late morning or early afternoon for the disease-troubled areas of a field is often achievable.

More doable for most producers is to provide the crop with fewer, but larger irrigation applications when the chance of disease is high. Producers that apply a single 1" application to a crop create a one-time leaf-wetting situation compared to an irrigator that uses two ½" applications and doubles the number of leaf wetting events in the same time period.

Reference Evapotranspiration (rET) – the amount of water used by a well-watered grass—is expected to be about 1.4" for most of northern Indiana and southern Michigan when corn is within 2 weeks of tasseling but can vary by as much as 0.5" per week depending on weather. In Indiana, rET estimates from ET gauges are available from the Purdue Agricultural Center stations at: (http://www.iclimate.org/). The Michigan Enviroweather network has links for rET estimates and related tools for each of the 87 sites found at: http://www.enviroweather.msu.edu/homeMap.php. This data can be used within 30 miles of the weather station as long as actual rainfall information from the producer's field is available. The Michigan Enviroweather network offers a daily rET text service to subscribers at the same website.

The rET needs to be adjusted for the water demand of the specific crop being grown. The crop ET of annual crops increases until full canopy is reached. Wheat and forage crops at full growth will have an ET about 20% higher than rET. Soybeans at V-3 stage will use 60% of the rET for a weekly water use of just over 0.75". Corn at V-6 stage will use 40% of the rET for a weekly water use of just over 0.5". Corn at V-10 stage will use 75% of the rET for a total water use of just less than 1" for the week. Some corn will be at V-12 stage by the end of this week and will have a water removal equal to an rET of 1.3" for the week.

Early season rooting depth of our crops limits our irrigation application volumes. Applications of 0.75" or less are common this time of year to avoid pushing water below the effective root zone. Corn at V-6 stage has an expected effective rooting depth of 20". At V-10 stage we would expect corn to have a 23" effective rooting depth. By VT-16, (tassel) stage corn is expected to have full effective rooting depth of 36" or more. Soybeans at V-3 stage have an effective rooting depth of 16" and at R-1 stage have almost all of their effective rooting depth of 24".

The June 27 MSU Field Crops Team Virtual Breakfast Webinar contained information on N applications with aid of irrigation and irrigation scheduling. If you missed the webinar, a recording is available at the same website: https://www.canr.msu.edu/field_crops/virtual-breakfast/

For more information on irrigation water use and when to irrigate see Fact Sheet #3 "Irrigation Scheduling Tools" at: https://www.canr.msu.edu/irrigation/upoads/files/FS03-IrrigationSchedulingTools07.19.pdf

If you are just getting started with irrigation scheduling, checkbook registry system forms are available at: http://msue.anr.msu.edu/uploads/235/67987/resources/SoilWaterBalanceSheet.03.05.15.pdf

Late planting and cool weather has resulted in crops prone to drought stress.

Hemp Production Field Day

(Marguerite Bolt, mbolt@purdue.edu)

Farmers interested in learning more about the potential challenges and opportunities of growing hemp are invited to a field day July 19th at Meigs Farm, part of the Throckmorton Purdue Agricultural Center, 9101 S. 100 E, about 10 miles south of Lafayette.

Currently, industrial hemp can only be grown with a research license in Indiana, however, we expect commercial production to begin in 2020. Purdue researchers have planted test plots to study production factors such as expected yield, optimal soil conditions, effective nutrients, and pest and disease management. Several Indiana hemp farmers working as part of a research cooperative will share their experience with production.

Field day topics include:

Licensing and regulations surrounding hemp

Processing and marketing

Planting and harvesting

Hemp agronomic practices

Pest management

The field day will run from 8:15-11:35 a.m., and be repeated from 1-4:20 p.m. Light refreshments will be served.

Cost is $30, payable before or at the event. Make checks payable to Purdue DTC, 915 W. State St., West Lafayette, IN 47907. Pre-registration is preferred by July 17. For more information or to sign up, go to https://bit.ly/2IZ8luY.

Hemp

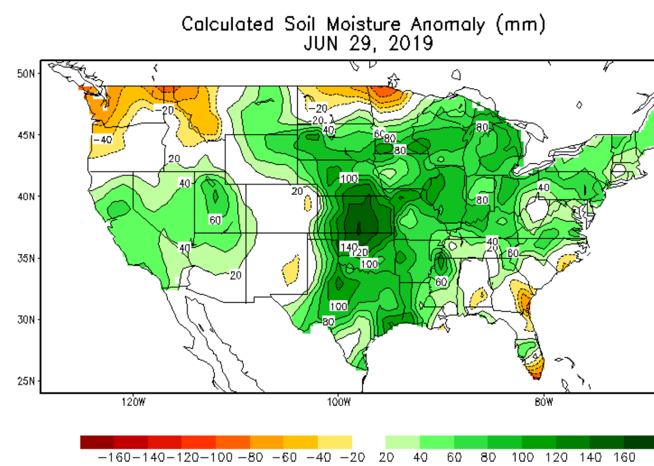
Indiana Climate and Weather Report 7/2/2019

(Beth Hall)

When I was very young, I remember my father talking about "knee high by the Fourth of July". As I got older I thought that expression was so strange for it seemed the corn was usually "man high" by the Fourth of July. Obviously, the excessive rains and cooler temperatures have had an impact this year! While the above-normal precipitation from April and May may have tempered in June, Indiana is still getting "normal" amounts of rain on relatively saturated soils (Figure 1). In fact, preliminary data from June suggests that most of Indiana was near normal for precipitation with the southern third well above normal. Average temperatures in June were also near normal to a few degrees below normal.

How will July end up? If it matches the climatological "normal" July, then average daily temperatures would be 70°F-75°F across the northern part of the state and above 75°F in the southern part. The national Climate Prediction Center's July outlook is showing confidence that temperatures will overall be below normal across northern Indiana with no confidence in either above- or below-normal temperatures for the southern counties. Precipitation amounts are expected to be above normal.

The 2-week outlook is showing confidence of above normal precipitation from July 8-14 and the 7-day precipitation forecast is predicting 0.75"-1.25" through July 8^{th}. In a nutshell, expect more rain and fewer oppressively hot days over the next few weeks.



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