PURDUE UNIVERSITY Extension ENTOMOLOGY

Issue: 2020.15
July 10, 2020

Pest&Crop newsletter

Purdue Cooperative Extension Service and USDA-NIFA Extension IPM Grant
This work is supported in part by Extension Implementation Grant 2017-70006-27140/ IND011460G4-1013877 from the USDA National Institute of Food and Agriculture.

In This Issue

Think Through Feed Provision Options Now for Livestock if Dry Weather Limits Pasture Growth

(Keith Johnson)

Successive days of 90-degree plus high temperatures and very spotty rainfall is limiting pasture growth for livestock grazing in Indiana. It is important to develop a strategy of how to feed your livestock now in case the abnormally dry weather continues.

This pasture photo was taken in July 2012, a very dry summer. Overgrazing pasture should be avoided if dry weather limits pasture growth this year.
Photo credit – Brad Shelton, Feldun-Purdue Agricultural Center Superintendent

The two-minute video clip link below is from the June Beef Monthly recording, a cooperative effort between Purdue University and the Indiana Beef Cattle Association. It provides concepts to keep good pasture health and to feed beef cattle. While beef is the emphasis within the video clip, the comments may have value for other livestock species, too.

https://www.ansc.purdue.edu/DD/BM-ClipA7.mp4

2020 Western Bean Cutworm Pheromone Trap Report

(John Obermeyer)

County	Cooperator	WBC Trapped Wk 1 6/18/20-6/24/20	Wk 2 6/25/20-7/1/20	Wk 3 7/2/20-7/8/20	Wk 4 7/9/20-7/15/20	Wk 5 7/16/20-7/22/20	Wk 6 7/23/20-7/29/20	Wk 7 7/30/20-8/5/20
Adams	Roe/Mercer Landmark	0	0	0				
Allen	Anderson/NICK	0	0	2				
Allen	Gynn/Southwind Farms	0	0	0				
Allen	Kneubuhler/G&K Concepts	0	0	4				
Bartholomew	Bush/Pioneer Hybrids	0	1	2				
Boone	Emanuel/Boone Co. CES	2	1	1				
Clay	Mace/Ceres Solutions/Brazil	0	0	1				
Clay	Fritz/Ceres Solutions/Clay City	0	1	0				
Clinton	Emanuel/Boone Co. CES	0	3	0				
Dubois	Eck/Dubois Co. CES	0	0	0				
Elkhart	Kauffman/Crop Tech Inc.	0		2				
Fayette	Schelle/Falmouth Farm Supply Inc.	0	0	0				
Fountain	Mroczkiewicz/Syngenta	0		10				
Fulton	Jenkins/Ceres Solutions/Talma	0						
Hamilton	Campbell/Beck's Hybrids	0	0	0				
Hendricks	Nicholson/Nicholson Consulting	0						
Hendricks	Tucker/Bayer	1	0	0				
Howard	Shanks/Clinton Co. CES	0	0	0				
Jasper	Overstreet/Jasper Co. CES	0		15				
Jasper	Ritter/Dairyland Seeds	3	7	25				
Jay	Boyer/Davis PAC	0	0	2				
Jay	Shrack/Ran-Del Agri Services	0		1				
Jennings	Bauerle/SEPAC	0	0	0				
Knox	Clinkenbeard/Ceres Solutions/Freelandville	0	0	0				
Lake	Kleine/Rose Acre Farms	0	0	1				
Lake	Moyer/Dekalb Hybrids/Shelby	0	8	8				
Lake	Moyer/Dekalb Hybrids/Scheider	0	8	17				
LaPorte	Rocke/Agri-Mgmt. Solutions	0	0	38				
Marshall	Harrell/Harrell Ag Services	0	0	0				
Miami	Early/Pioneer Hybrids	0	0	3				
Montgomery	Delp/Nicholson Consulting	0	0	0				
Newton	Moyer/Dekalb Hybrids/Lake Village	0	1	0				
Porter	Tragesser/PPAC	1	0	0				
Posey	Schmitz/Posey Co. CES	0		0				
Pulaski	Capouch/M&R Ag Services	1	4	4				
Pulaski	Leman/Ceres Solutions	0	0					
Putnam	Nicholson/Nicholson Consulting	0	0					
Randolph	Boyer/DPAC	0	0	3				
Rush	Schelle/Falmouth Farm Supply Inc.	2	4	0				
Shelby	Simpson/Simpson Farms	0	0	0				
Starke	Capouch/M&R Ag Services	1	0	9				
St. Joseph	Battles/Mishawaka	0	0	0				
St. Joseph	Carbiener/Breman	0	1					
St. Joseph	Deutscher/Helena Agri-Enterprises, Trap 1	0	0					
St. Joseph	Deutscher/Helena Agri-Enterprises, Trap 2	0	0					
Sullivan	Baxley/Ceres Solutions/New Lebanon	0	0	0				
Sullivan	McCullough/Ceres Solutions/Farmersburg	0	1	4				
Tippecanoe	Bower/Ceres Solutions	0	32	61				
Tippecanoe	Nagel/Ceres Solutions	0						
Tippecanoe	Obermeyer/Purdue Entomology	0	0	0				
Tippecanoe	Westerfeld/Bayer Research Farm	0	0	2				
Tipton	Campbell/Beck's Hybrids	0	0	0				
Vermillion	Lynch/Ceres Solutions/Clinton	0	0	0				
White	Foley/ConAgra	0	0	1				

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

Time to Scout Field Crops: What to Look for in Corn

(Darcy Telenko) & (John Bonkowski)

Yes, we have found tar spot in Indiana.

Early planted corn in Indiana is reaching late vegetative stages and tasseling in the south. Therefore, it is time to start monitoring for diseases to make an informed decision if a fungicide is necessary. As a reminder for disease to occur three things need to be present; 1. Virulent Pathogen, 2. Susceptible Host, and 3. Favorable Environment. **Hot, dry weather is generally not conducive for many of the**

foliar diseases in corn that we monitor in Indiana such as, gray leaf spot, northern corn leaf blight, northern corn leaf spot, and tar spot (figure 1 and 2). This week we have found a low incidence of tar spot, gray leaf spot, northern corn leaf spot, Anthracnose, and common rust in the lower canopy.

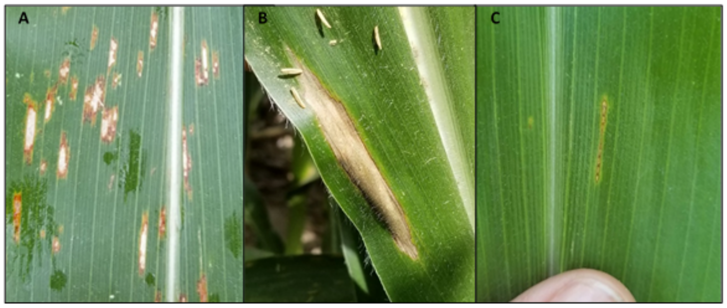


Figure 1. Examples of A- gray leaf spot, B-northern corn leaf blight, and C-northern corn leaf spot lesions on a corn leaf. Photo Credits: Darcy Telenko

A few questions to think about when scouting and looking for disease:

1. What is the disease history in the field? How much residue is still present? (What happened in 2018, if you have a 2-year rotation?)
2. What growth stage is the field? Early planting vs. late
3. Is irrigation being applied? How much and how often? If water is being applied, it can change the environmental conditions and disease risk in a field.

Tar spot of corn continues to be a concern this season after the localized epidemics we experienced last year in Indiana. In our scouting rounds this week we did find tar spot. We suspect the infection happened early June as it was located on the lowest leaves of the plant in both fields. The disease has not progressed and the current hot and dry condition **DO NOT** favor tar spot. The fields were located in Porter and LaPorte Counties in Indiana (see map Figure 3). Michigan has also had a positive confirmation in Gratoit County. In the Indiana fields, the corn was between V12 and V14, had a history of tar spot in 2018 or 2019, and was under irrigation. The disease was found in some of the lowest leaves in the canopy. We will continue to monitor the disease progression in these fields and will provide updates on any significant spread in the field or increases in disease severity. Again, the hot and dry conditions are not favorable for tar spot. See the forecast from the Tarspotter App under development (Figure 4). Early June was when there was favorable temperature and moisture conditions, and most likely when these first few leaves were infected. The risk as of today, July 7, 2020, is low (blue) at all our sites in Indiana (Figure 4).


Figure 2. Corn leaves infected by tar spot. Infection can range from mild to severe on a leaf. The spots will be raised (bumpy to the touch) and will not rub off. In addition, they may be surround by a tan or brown halo, and high severity can lead to a rapid blighting of the leaf. Photo Credits: Darcy Telenko

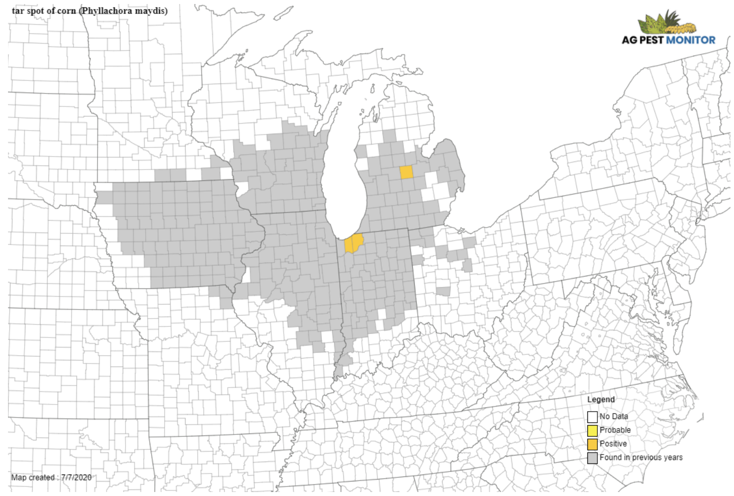


Figure 3. Tar spot map for 2020. Source: EddMaps at https://corndev.ipmpipe.org/tarspot-2/

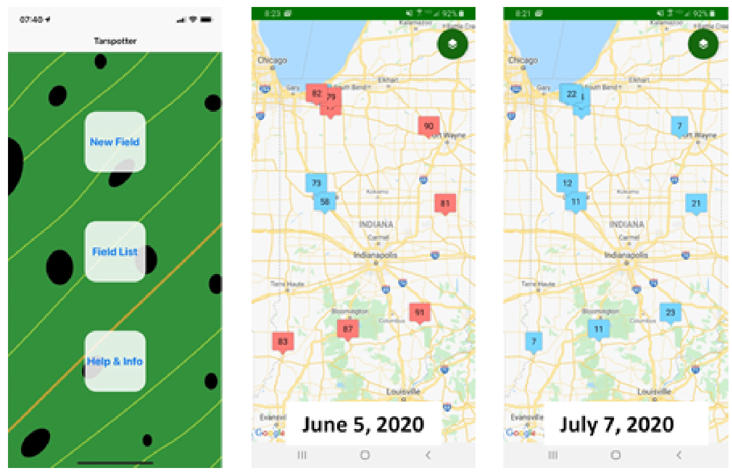


Figure 4. Tarspotter App forecast from June 5, 2020 and July 7, 2020. Red color indicates favorable environmental conditions for tar spot if corn at V5 or larger, blue color indicates unfavorable environmental conditions for tar spot. Source: Tarspotter App v. 0.47 Smith, D., et al. ©2020 Board of Regents of the University of Wisconsin System.

After hearing this news we know the next question – should I be putting out a fungicide?

Research has shown the best return on investment in making a fungicide application in corn occurs when the fungal diseases are active in the corn canopy. Most of our corn sites across the state are quite clean and disease pressure is minimal, so far this season. It is important to keep scouting.

Based on our 2019 research, to minimize the impact of tar spot on crop yield we need to be protecting the ear leaf and above until the corn reaches black layer. In our fungicide timing trials applications made at VT/R1 (tassel /silk) did a good job controlling tar spot, but we did see that once the fungicide ran out of steam (3-week window) tar spot began to pick up. A **well-timed, informed fungicide application** will be important to reduced disease severity when it is needed, and we recommend holding off until the diseases become active and corn is nearing VT/R1 (tassel/silk) or even R2 (blister). This is especially important if the hot and dry conditions continue.

If you suspect tar spot in your fields, please consider submitting samples for confirmation. We are interested in documenting the disease in Indiana, similar to last year. Research funding from the Indiana Corn Marketing Council is supporting sample processing, therefore there will be no charge for corn tar spot samples submitted to the clinic.

What to look for: Small, black, raised spots (circular or oval) develop on infected plants, and may appear on one or both sides of the leaves, leaf sheaths, and husks. Spots may be found on both healthy (green) and dying (brown) tissue. Sometime, the black spots may be surrounded by a tan or brown halo; this is especially obvious on healthy leaves (see Figure 2).

I want to ask before you submit a sample you do a quick and dirty "scratch test" to see if you can rub the spot off the leaf, especially if you have leaves with just a few small spots. I have been successful in detecting these false spots by using my nail to scratch as the suspect lesion. This is a quick way to check, but as always if you are unsure send an image or the sample to the Purdue Plant Pest Diagnostic Lab. Please collect several leaves showing the symptoms and send them with a PPDL form https://ag.purdue.edu/btny/ppdl/Documents/Forms/PPDL-Form_13MAY15FILLABLE.pdf.

Please wrap the leaves in newspaper, ship in a large envelope, and ship early in the week. If you are sending samples from multiple locations please label them and provide the date collected, variety of corn, field zip code or county, and previous crop.

Mail to: Plant and Pest Diagnostic Laboratory, LSPS-Room 116, Purdue University, 915 W. State Street, West Lafayette, Indiana 47907-2054.

The lab is operating and the building is open, but the lab door is remaining locked. If dropping off a sample is more convenient than shipping, please call or email the lab prior to stopping by: Phone – 765-494-7071; Email – ppdl-samples@purdue.edu.

In addition, the 2020 tar spot and southern rust maps are live that will be updated when a positive county confirmation is detected. If you are interested in up-to-date information on the current detection of these diseases, the maps are available on the front page of our Extension website https://extension.purdue.edu/fieldcroppathology/ or at https://corn.ipmpipe.org/

If you have any question please contact Darcy Telenko (dtelenko@purdue.edu/764-496-5168) or PPDL (ppdl-samples@purdue.edu/765-494-7071)

Take Time to Self-Evaluate Your Hay Production Management System

(Keith Johnson)

This information is in honor of Fred Lloyd and Garland Frey, cash crop hay producers that understand how to make excellent hay.

Managing forages for hay production requires much skill. Excellent hay producers understand that yield, quality and persistence are key for a perennial forage production system to be successful.

The following table includes several statements that are essential for a very successful hay program. Take the time to do a self evaluation of how good a job **you** are doing with each statement given. Rankings "Strongly Disagree" or "Disagree" require some attention to have a topnotch hay production system.

If you have not developed a team of resource people that can help you with your questions about forage management, a good starting point is to contact your county's Purdue Extension Agriculture and Natural Resources Educator and Natural Resources Conservation Service personnel. These individuals have a network within their own organizations and know local-regional agribusinesses and producers that will be able to help you with your questions.

Developing excellent hay management skills require much effort, but improving your knowledge and using it will improve profitability.

Hay Management Considerations

What are you doing right; what can be done better?

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I soil test at least every third year and add lime and fertilizer based on the test results.					
I can produce hay profitably "on paper" with reasonable assumptions about yield, quality and input costs.					
I scout my fields for the presence of weeds, insects and diseases.					
I know the proper moisture levels to ted, rake and bale hay to retain top quality.					
I utilize available technologies to reduce the amount of rain-damaged hay.					
I really try to harvest first cutting hay before the grass begins pollination.					
I protect high quality hay from weather damage.					
I have a marketing plan to sell hay.					
I harvest perennial forages for the last time six weeks before a killing freeze occurs.					
I use forage testing to determine what hay should be fed to different livestock types and how it is best supplemented.					

Silk Development and Emergence in Corn

(Bob Nielsen)

The corn plant produces individual male and female flowers (a flowering habit called monoecious for you corny trivia fans.) Interestingly, both flowers are initially bisexual (aka "perfect" flowers), but during the course of development the female components (gynoecia) of the male flowers and the male components (stamens) of the female flowers abort, resulting in unisexual tassel (male) and ear (female) development. Tassel emergence and function are discussed in a separate article (Nielsen, 2020).

The silks that emerge from the ear shoot are the functional stigmas of the female flowers of a corn plant. Each silk connects to an individual ovule (potential kernel). A given silk must be pollinated in order for the ovule to be fertilized and develop into a kernel. Up to 1000 ovules typically form per ear, even though typically only 400 to 600 actual kernels per ear survive until harvest.

By definition, growth stage R1 (Abendroth et al., 2011) for an individual ear is defined when a single silk strand is visible from the tip of the husk. An entire field is defined as being at growth stage R1 when silks are visible on at least 50 % of the plants. This whole field definition for growth stage R1 is synonymous with the term "mid-silk".

Silk Elongation and Emergence

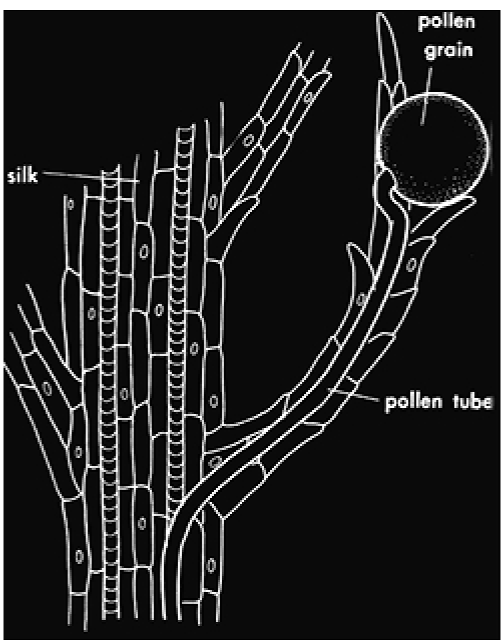
Silks begin to elongate from the ovules 10 to 14 days prior to growth stage R1 or approximately at the V12 leaf stage. Silk elongation begins first from the basal ovules of the cob, then proceeds sequentially toward the tip of the ear. Because of this acropetal sequence of silk elongation, silks from the basal (butt) portion of the ear typically emerge first from the husk, while the tip silks generally emerge last. Complete silk emergence from an ear generally occurs within four to eight days after the first silks emerge from the husk leaves.

As silks first emerge from the husk, they lengthen as much as 1.5 inches per day for the first day or two, but gradually slow over the next several days. Silk elongation occurs by expansion of existing cells, so elongation rate slows as more and more cells reach maximum size. Elongation of an individual silk stops shortly after pollen is captured, germinates and then penetrates the silk.

If not pollinated, silk elongation stops about 10 days after silk emergence due to senescence of the silk tissue. Unusually long silks can be a diagnostic symptom that the ear was not successfully pollinated (Nielsen, 2018).

Silks remain receptive to pollen grain germination up to 10 days after silk emergence, but to an ever-decreasing degree. The majority of successful ovule fertilization occurs during the first 4 to 5 days after silk emergence (see photos that follow).

Collapse of silk tissue during its natural senescence over time restricts continued growth of the pollen tube. Silk emergence usually occurs in close synchrony with pollen shed, so that duration of silk receptivity is normally not a concern. However, sometimes that synchrony is disrupted by stress. Delay or failure of silks to emerge due to severe drought stress can result in poor kernel set or barren cobs if there is no pollen remaining to be captured by the silks. Some hybrids bred for drought tolerance have very aggressive silk behaviors, meaning that silk elongation is more tolerant of drought conditions. Unfortunately, sometimes under “good” growing conditions, these hybrids silk 4-5 days before any pollen is available. In this situation, the first silks to emerge (generally from near the butt end of the ears) fail to be pollinated, resulting in poor kernel set at the butt end of the cob. See my article on long silks for some photos.



Pollination and Fertilization

For those of you who are anal about semantics, let’s review two definitions relevant to sex in the cornfield. Pollination is the act of transferring the pollen grains to the silks by wind or insects. Fertilization is the union of the male gametes from the pollen with the female gametes from the ovule. Technically, pollination is almost always successful (i.e., the pollen reaches the silks), but unsuccessful fertilization (i.e., pollen tube failure, silk failure, pollen death) will result in poor kernel set and yield losses.

Pollen grain germination occurs within minutes after a pollen grain lands on a receptive silk. A pollen tube, containing the male genetic material, develops and grows inside the silk, and fertilizes the ovule within 24 hours. Pollen grains can land and germinate anywhere along the length of an exposed receptive silk. Many pollen grains may germinate on a receptive silk, but typically only one will successfully fertilize the ovule.

Silk Responses to Severe Stress

Severe Drought Stress. The most common cause of incomplete silk emergence is severe drought stress. Silks have the greatest water content of any corn plant tissue and thus are most sensitive to moisture levels in the plant. Severe moisture deficits will slow silk elongation, causing a delay or failure of silks to emerge from the ear shoot. If the delay is long enough, pollen shed may be almost or completely finished before receptive silks are available; resulting in nearly blank or totally blank cobs.

In addition to causing silk emergence failure, severe drought stress, especially accompanied by high temperatures and low relative humidity, can also desiccate exposed silks and render them non-receptive to pollen germination. In the Eastern Corn Belt, this effect of drought stress on silk receptivity is likely more common than effects on pollen availability or viability.

The severity of drought stress required for significant silk emergence delay or desiccation can probably be characterized by severe leaf rolling that begins early in the morning and continues into the early evening hours. Such severe leaf rolling is often accompanied by an initial change in leaf color from “healthy” green to a grayish-tinged green, before the leaves eventually die.

Silk Clipping by Insects. Severe silk clipping by insects such as corn rootworm beetle or Japanese beetle can interfere with the success of pollination by decreasing or eliminating viable or receptive exposed silk tissue. Fortunately, unless the beetle activity is nonstop for days, continued elongation of silks from inside the husk will expose undamaged and receptive silk tissue at the rate of about one inch or more per day.

Silk “Balling”. Occasionally, silks fail to emerge successfully because they fail to elongate in their usual straight “path” from the ovules toward the end of the husk leaves. Instead, silk elongation becomes convoluted (twisted, coiled, scrambled) inside the husk leaves. This silk “balling” phenomenon is not well-understood and hybrids tend to vary in their vulnerability to this type of silk emergence failure. Two different pieces of circumstantial evidence are often associated with the problem. One is a physical restriction imposed on silk elongation caused by unusually”tight” or long husk leaves in certain hybrids. The other circumstance often correlated with silk “balling” is the occurrence of unusually cool nights during the time silk elongation is occurring, but prior to silk emergence. The physiological effect of such cool nights on silk elongation is not understood. It has been years since I last saw a field with a significant level of silk “balling” (Nielsen, 2000).

Related Reading

Abendroth, L.J., R.W Elmore, M.J. Boyer, and S.K. Marlay. 2011. Corn Growth and Development. Iowa State Univ. Extension Publication #PMR-1009. https://store.extension.iastate.edu/Product/Corn-Growth-and-Development [URL accessed July 2020].

Nielsen, RL (Bob). 2000. Scrambled Silks, Anyone?. Corny News Network, Purdue Extension. http://www.kingcorn.org/news/articles.00/SilkBalling-0718.html [URL accessed July 2020].

Nielsen, R.L. (Bob). 2016. A Fast & Accurate Pregnancy Test for Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/EarShake.html [URL accessed July 2020].

Nielsen, R.L. (Bob). 2020. Tassel Emergence & Pollen Shed. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/Tassels.html [URL accessed July 2020].

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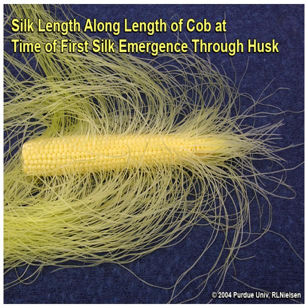
Image Gallery

Silk elongation on the lower half of a V12 ear shoot; 10 to 14 days before silk emergence..

Silk elongation on the lower 2/3 of a V14 ear, about 4 days after V12; 6 to 10 days before silk emergence.

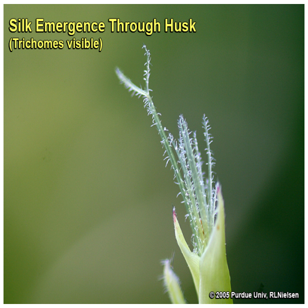


Variable silk length along length of cob at first silk emergence; illustrating the acropetal development of silks.

Silks recently clipped with a knife; note the discolored, non-receptive damaged ends of the silks.

About 1.5 inches of silk elongation since being manually clipped about 15hrs previous.

Western Corn Rootworm beetles (Diabrotica spp.) actively feeding on silks and pollen.



Trichomes visible on silks just emerging through husk leaves.

Pollen "captured" by silk trichomes on a popcorn hybrid with anthocyanin-pigmented silks.

Kernel set on ears where pollination was prevented for 3 days after first silk emergence, then allowed to proceed without interference.

Kernel set on ears where pollination was prevented for 4 days after first silk emergence, then allowed to proceed without interference.

Kernel set on ears where pollination was prevented for 5 days after first silk emergence, then allowed to proceed without interference.

Tassel Emergence & Pollen Shed

(Bob Nielsen)

Field corn in Indiana typically enters the critical flowering stages of pollen shed and silk emergence sometime between late June to late July. Success or failure during this period of the corn plant's life greatly influences the potential grain yield at harvest time.

As important as this process is to the determination of grain yield, it is surprising how little some folks know about the whole thing. Rather than leaving you to learn about such things "on the streets", I've developed this article and the accompanying one on silking (Nielsen, 2020) that describe the ins and outs of sex in the corn field.

Remember that corn has both male flowers and female flowers on the same plant (a flowering habit called monoecious for you trivia fans.) Interestingly, both flowers are initially bisexual (aka "perfect" flowers), but early in their development the female components (gynoecia) of the male flowers and the male components (stamens) of the female flowers abort, resulting in tassel (male) and ear (female) floral development.

Growth Stage VT (Tasseling)

Portions of the tassel may be visible before the plant technically reaches its final leaf stage (uppermost, final visible leaf collar) has occurred. By definition, growth stage VT occurs when the last **branch** of the tassel emerges from the whorl (Abendroth et al., 2011). This source furthermore states that growth stage VT is "*...initiated when the last branch of the tassel is completely visible and the silks have not yet emerged.*" Once upon a time, that exact developmental sequence may have been true, but today's hybrids tend to behave differently. It is not uncommon for silk emergence (growth stage R1) to begin not only prior to the last tassel branch appearing from the whorl, but sometimes prior to the exsertion of anthers and the beginning of pollen shed (Nielsen, 2018).

Maximum plant height occurs at or shortly after growth stage VT as the final stalk internodes complete their elongation. The corn plant is most vulnerable to hail damage at growth stage VT/R1 because all of its leaves are exposed. Complete (100 %) leaf loss at growth stage VT will usually result in complete (100 %) yield loss by harvest. Even if the ovules on the ears are successfully fertilized by the pollen, severe defoliation at growth stage VT/R1 often causes entire ear shoots to die because so few leaves remain to produce the necessary carbohydrates (by photosynthesis) to sustain ear and kernel development.

Tassel Morphology

Approximately 1,000 individual spikelets form on each tassel and each one bears two florets encased in two large glumes. Each floret contains three anthers. An anther and its attached filament comprise the stamen of the male flower. The anthers are those "thingamajigs" that hang from the tassel during pollination. Under a magnifying lens, individual anthers look somewhat like the double barrel of a shotgun. Do the math and you will realize that an individual tassel produces approximately 6,000 pollen-bearing anthers, although hybrids can vary greatly for this number.

As the florets mature, elongation of the filaments allows the anthers to emerge ("exsert" for you trivia fans) from the glumes. Pollen is dispersed through pores at the tips of the anthers that open as the anthers exsert from the glumes. Anther exsertion and pollen shed usually begin in the mid-portion of the central tassel spike and then progresses upward, downward and outward over time. Anthers typically emerge from the upper floret of a pair first, while those from lower floret typically emerge later the same day or on following days. After its pollen is shed, "spent" anthers eventually drop from the tassel and are sometimes mistaken for the pollen when observed on the leaves or ground.

The yellow or white "dust-like" pollen that falls from a tassel represents millions of individual, nearly microscopic, spherical, yellowish- or whitish translucent pollen grains. Estimates of the total number of pollen grains produced per tassel range from 2 to 25 million (yes, they are difficult to count). Each pollen grain contains the male genetic material necessary for fertilizing the ovary of one potential kernel.

The outer membrane of a pollen grain is very thin. Once dispersed into the atmosphere, pollen grains remain viable for only a few minutes before they desiccate. Yet, with only a 15 mph wind, pollen grains can travel as far as 1/2 mile within those couple of minutes.

Therein lies the concern of the potential for pollen "drift" from a transgenic corn field to an adjacent non-transgenic corn field and the risk of transgenic "contamination" of grain intended for non-transgenic markets. The good news is that research suggests that the overwhelming majority of a corn field's pollen load is shed in the field itself.

All of the pollen from a single anther may be released in as little as three minutes. All the anthers on an individual tassel may take as long as seven days to finish shedding pollen, although the greatest volume of pollen is typically shed during the second and third day of anther emergence. Because of natural field variability in plant development, a whole field may take as long as 14 days to complete pollen shed.

Peak pollen shed usually occurs in mid-morning. Some research indicates that pollen shed decreases after temperatures surpass 86F. A second "flush" of pollen often occurs in late afternoon or evening as temperatures cool. Pollen shed may occur throughout most of the day under relatively cool, cloudy conditions.

Weather conditions influence pollen shed. If the anthers are wet, the pores will not open and pollen will not be released. Thus, on an average Indiana summer morning following a heavy evening dew, pollen shed will not begin until the dew dries and the anther pores open. Similarly, pollen is not shed during rainy conditions. Cool, humid temperatures delay pollen shed, while hot, dry conditions hasten pollen shed.

Extreme heat stress (100F or greater) can kill corn pollen, but fortunately the plant avoids significant pollen loss by virtue of two developmental characteristics. First of all, anthers do not mature at the same time up and down the tassel, nor does complete pollen shed occur on a single day. Anther maturation and pollen shed occur over several days and up to two weeks. Therefore, a day or two of extreme heat usually does not affect the entire pollen supply. More importantly, the majority of daily pollen shed occurs in the morning hours when air temperature is much more moderate.

Related Reading

Abendroth, L.J., R.W Elmore, M.J. Boyer, and S.K. Marlay. 2011. Corn Growth and Development. Iowa State Univ. Extension Publication #PMR-1009. https://store.extension.iastate.edu/Product/Corn-Growth-and-Development [URL accessed July 2020].

Nielsen, RL (Bob). 2016. A Fast & Accurate Pregnancy Test for Corn. Corny News Network, Purdue Univ. [On-Line]. Available at http://www.kingcorn.org/news/timeless/EarShake.html [URL accessed July 2020].

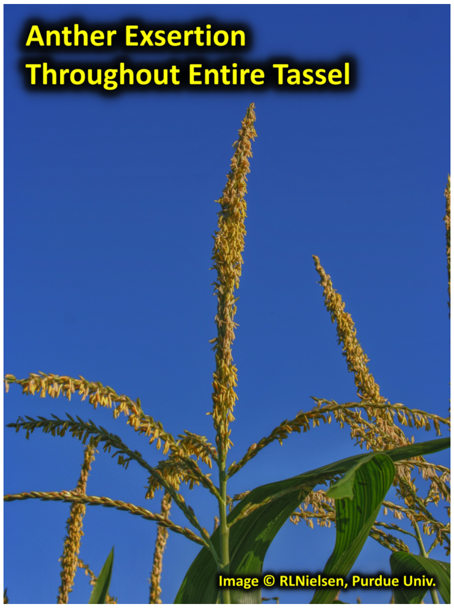
Nielsen, RL (Bob). 2018. Unusually long silks in corn. Corny News Network, Purdue Univ. [online] http://www.kingcorn.org/news/timeless/LongSilks.html [URL accessed July 2020].

Nielsen, RL (Bob). 2020. Silk Emergence. Corny News Network Purdue Univ. [On-Line]. Available at http://www.kingcorn.org/news/timeless/Silks.html [URL accessed July 2020].

Russell, W.A. and A.R. Hallauer. 1980. Corn. (a chapter in Hybridization of Crop Plants. American Soc. of Agronomy-Crop Science Soc. of America. Madison, WI.

Image Gallery

Exserted anthers on central tassel branch.



Exserted anthers throughout entire tassel.

Exserted anthers on a tassel.

Closeup of anthers.

Corn pollen size relative to a dime.

Hot and dry – stressful on plants and people

(Beth Hall)

The forecasts and climate outlooks are still calling for hot and dry (though humid) conditions for the rest of July. This will likely exacerbate any developing drought conditions leading to plant stress and the possible need for irrigation. While dry in terms of precipitation, this heat is also associated with high humidity and lower winds, so be cognizant of the higher heat index values that could put added stress on humans!

Over the next 7 days, northern Indiana could receive up to 1.5" of rainfall, but the southern half will likely receive less than 0.5". This rainfall is expected to be spotty throughout the state, with no widespread weather systems expected. From now until about June 18th, the climate outlooks are indicating confidence for above-normal temperatures and below-normal precipitation.

Accumulated modified growing degree-days are trying to catch up to past years (Figures 1 and 2) but the high temperatures may have slowed plant growth due to the excessive heat. The Midwestern Regional Climate Center provides daily accumulated modified corn stress degree-day maps (https://mrcc.illinois.edu/VIP/indexSDD.html). At this point, the heat stress is near normal across the state (Figure 3), but that may change over the next few weeks.

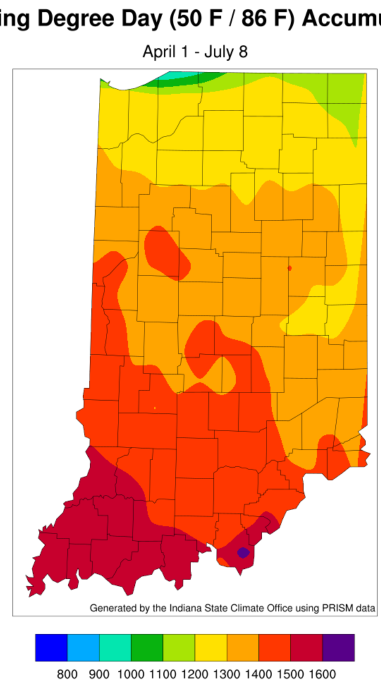


Figure 1. Accumulated modified growing degree days for April 1 through July 8, 2020.

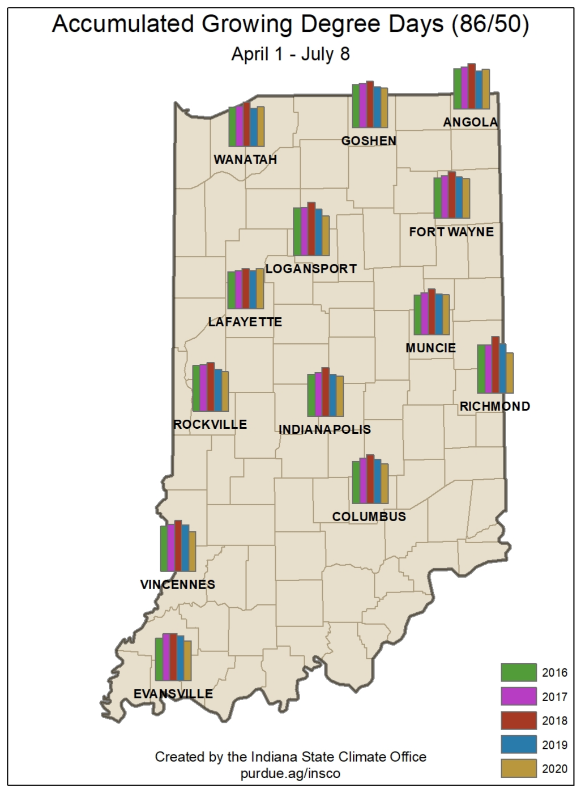


Figure 2. Comparison of the April 1 through July 8, 2020 accumulated modified growing degree days over the past several years.

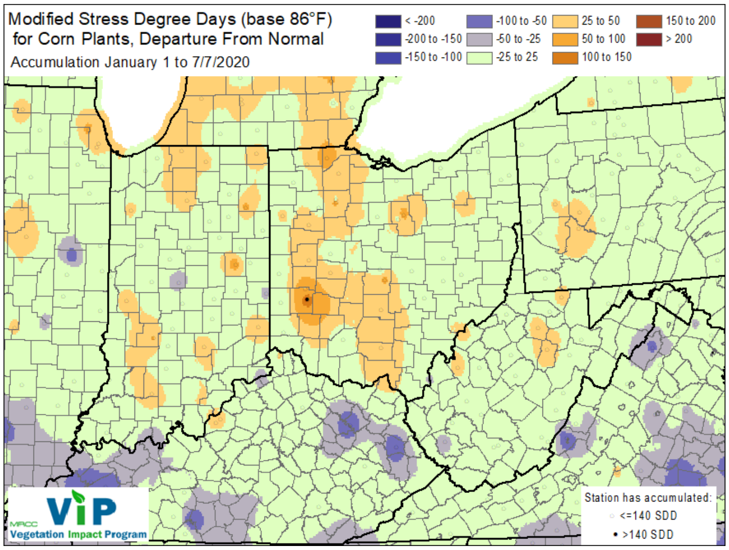


Figure 3. Modified corn stress degree days departure from normal for January 1 through July 7, 2020.

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