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In This Issue

Japanese Beetle Treatment Guidelines

Authors: John Obermeyer and Christian Krupke

News flash … Japanese beetle are emerging and can be seen throughout the state on corn and soybean plants. OK, not that news worthy. How about … some areas of state are seeing tremendous numbers of beetles while some areas report low populations. Again, old news, as this happens every year. Here is a headline sure to grab attention … Japanese beetle – their presence and damage is usually perceived worse than it is. Please refer to the following treatment thresholds.

Field Corn: Japanese beetle feed on corn leaves, tassels, and silks. Generally leaf and tassel feeding can be ignored. If beetles are present and feeding on corn silks, an insecticide should be applied only if on average the silks are being cut off to less than 1/2 inch before 50% pollination has taken place. This rarely happens on a field-wide basis. Don't be overly excited by this pest's tendency to clump on a few ears within an area and eat the silks down to the husks. With sufficient soil moisture, silks will grow from 1/2 to 1 inch per day during the one to two weeks of pollen shed. Silks only need to be peeking out of the husk to receive pollen. Besides, beetles are generally attracted to silks that have already completed the fertilization process even though they are still somewhat yellow. Check for pollen shed and silk feeding in several areas of the field, Japanese beetles tend to be present only in the outer rows of the field. Don't be influenced by what you think you may see from windshield surveys! Get out into fields to determine beetle activity. Be sure to walk in beyond the border rows before drawing any conclusions.

Soybean: Soybean plants have the amazing ability to withstand considerable leaf removal (defoliation) before yield is impacted. The impact of defoliation is greatest during flowering and pod fill because of the importance of leaf area to photosynthesis, and ultimately to yield. Therefore, approximately 15% defoliation from bloom to pod fill can be tolerated before yields are economically affected. This defoliation must occur for the whole plant, not just the upper canopy. The beetles often congregate in areas of a field where they are first attracted to weeds such as smartweed. Typically, if economic damage occurs, it is only in these areas. Therefore, spot treatments should be considered. Don't be overly alarmed by these bright, iridescent beetles that feed on the top canopy of the soybean plants. Consider that as they feed their defoliation allows for better sunlight penetration into the lower plant canopy!

Should controls be needed, refer to publications *Corn Insect Control Recommendations* or *Soybean Insect Control Recommendations* for labeled products.

Field damage from Japanese beetles may concentrate around attractive weeds or fence line plants.

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A Slow Start to the Western Bean Cutworm Flight

Author: John Obermeyer

Our faithful pheromone trappers are back in business, as they are now monitoring for the emergence of western bean cutworm moths from the soil. After the amount of damage reported from this pest last year in northern Indiana, I anticipated a big start to the season, so far that hasn't been the case, see western bean cutworm pheromone trap report. It is still early, as this pest's moth emergence happens over 6-8 weeks. Stay tuned for updated moth flight numbers and scouting alerts in future issues of the *Pest&Crop*.

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One Grower’s Gamble is a Reminder That Rootworm is Still a Threat

Author: John Obermeyer

This past week we learned of a producer in a northwestern Indiana county that gambled by not protecting his continuous-corn from rootworm. It was a “money saving” decision, as traited Bt-RW corn or soil insecticides were input costs he decided to forgo. As you can see from the accompanying pictures, it was a mistake.

It is true that western corn rootworm have been at very low levels the past several years. Numerous years of wet soils during egg hatch (climate change?) and efficacy of Bt-RW corn has diminished the pressure from this pest, but not eliminated it. Understandably there are many details to this “lesson learned” situation that have not been revealed by the embarrassed producer. But the first question I would have asked is if he had inspected last year’s corn for rootworm beetles during the time of pollination. This would have been the first logical step (IPM) in his input decision making for this season. In hindsight, without having been to these fields, we know there were significant numbers of beetles to have laid eggs. It may have been either corn pollen/silks or weed pollen that attracted them, but their biology tells us they were there.

We are aware of many astute Indiana producers that have been lowering rootworm control inputs, but only after understanding the risks. Especially with combining field, both corn and soybean, visits during the time that rootworm beetles are actively mating and laying eggs. They, and now this unnamed producer, know that continuous corn is generally HIGH-RISK.

Understanding of the pest’s biology, combined with knowledge by visiting fields, provides the information needed for informed and sound pest management decisions. Happy scouting!

Lodging of corn and rootworm feeding. (Photo Credit: Marty Park).

Root feeding damage by corn rootworm. (Photo Credit: Marty Park).

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2018 Western Bean Cutworm Pheromone Trap Report

County	Cooperator	WBC Trapped Wk 1 6/21/18-6/27/18	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7
Adams	Roe/Mercer Landmark	0						
Allen	Anderson/Syngenta							
Allen	Gynn/Southwind Farms	0						
Allen	Kneubuhler/G&K Concepts	0						
Bartholomew	Bush/Pioneer Hybrids							
Clay	Bower/Ceres Solutions/Clay City	0						
Clay	Bower/Ceres Solutions/Bowling Green	0						
Clay	Bower/Ceres Solutions/Brazil	0						
Clinton	Emanuel/Boone Co. CES	3						
Clinton	Foster/Rossville							
Daviess	Venard/Venard Agri-Consulting/Washington	0						
Daviess	Venard/Venard Agri-Consulting/Elnora	0						
DeKalb	Hoffman/ATA Solutions	0						
Dubois	Eck/Dubois Co. CES	0						
Elkhart	Kauffman/Crop Tech Inc.							
Fayette	Schelle/Falmouth Farm Supply Inc.	0						
Fountain	Mroczkiewicz/Syngenta	12						
Fulton	Jenkins/Ceres Solutions/Talma	3						
Fulton	Randstead/Ceres Solutions	0						
Greene	Venard/Venard Agri-Consulting	0						
Hamilton	Campbell/Beck’s Hybrids	0						
Hendricks	Nicholson/Nicholson Consulting							
Jasper	Overstreet/Jasper Co. CES	0						
Jasper	Ritter/Brodbeck Seeds	10						
Jay	Boyer/Davis PAC	1						
Jay	Shrack/Ran-Del Agri Services	0						
Jay	Temple/Jay Co. CES/Redkey							
Jay	Temple/Jay Co. CES/Pennville	0						
Jennings	Bauerle/SEPAC	0						
Knox	Bower/Ceres Solutions/Freelandville	0						
Knox	Bower/Ceres Solutions/Vincennes	0						
Kosciusko	Klotz/Etna Green	5						
Lake	Kleine	2						
Lake	Moyer/Dekalb Hybrids/Shelby	0						
Lake	Moyer/Dekalb Hybrids/Scheider	5						
LaPorte	Rocke/Agri-Mgmt. Solutions/Wanatah	1						
LaPorte	Smith/Co-Alliance, LLP/South Center	0						
LaPorte	Smith/Co-Alliance, LLP/Lacrosse	4						
LaPorte	Smith/Co-Alliance, LLP/Union Mills	8						
Marshall	Harrell/Harrell Ag Services/Plymouth	0						
Marshall	Harrell/Harrell Ag Services/Bremen	0						
Marshall	Klotz/Nappanee	6						
Marshall	Miller/Ceres Solutions/Plymouth	2						
Marshall	Smith/Co-Alliance, LLP/Argos	7						
Miami	Early/Pioneer Hybrids	4						
Montgomery	Delp/Nicholson Consulting	0						
Newton	Moyer/Dekalb Hybrids/Lake Village	1						
Porter	Tragesser/PPAC	2						
Posey	Schmitz/Posey Co. CES							
Pulaski	Capouch/M&R Ag Services	7						
Pulaski	Leman/Ceres Solutions							
Putnam	Nicholson/Nicholson Consulting	0						
Randolph	Boyer/DPAC	1						
Rush	Schelle/Falmouth Farm Supply Inc.	0						
Shelby	Fisher/Shelby County Co-op	0						
Shelby	Simpson/Simpson Farms	1						
St. Joseph	Barry/Helena	1						
St. Joseph	Battles/Mishawaka	0						
St. Joseph	Carbiener/Breman							
St. Joseph	Smith/Co-Alliance, LLP/Granger	3						
St. Joseph	Smith/Co-Alliance, LLP/New Carlisle	1						
Starke	Capouch/Medaryville	2						
Starke	Smith/Co-Alliance, LLP/Hamlet	9						
Sullivan	Bower/Ceres Solutions/Farmersburg	0						
Sullivan	Bower/Ceres Solutions/Sullivan	0						
Tippecanoe	Bower/Ceres Solutions/Lafayette	4						
Tippecanoe	Nagel/Ceres Solutions	0						
Tippecanoe	Obermeyer/Purdue Entomology	0						
Tippecanoe	Westerfeld/Monsanto Research Farm	6						
Tipton	Campbell/Beck’s Hybrids	0						
Vermillion	Bower/Ceres Solutions/Clinton	0						
Wabash	Enyeart/Ceres Solutions	0						
Whitley	Boyer, Richards/NEPAC/Schrader	3						
Whitley	Boyer, Richards/NEPAC/Kyler	0						

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

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Factors Affecting Herbicide Carryover in 2018

Authors: Joe Ikley and Bill Johnson

Many people have commented that we have the best stands of corn and soybean across the state that we have seen in many years. Our dry planting window certainly helped get crops uniformly established, but now we have been receiving many questions about herbicide carryover injury on crops this year. Any discussion about herbicide carryover will focus on three key components: environmental conditions since herbicide application; chemistry of the herbicides applied; and interactions between the herbicide and soil conditions.

Weather is usually the driving component whenever we see injury from a wide variety of herbicides applied the previous year. While we have not been as dry as areas in the western corn belt, a look at our total precipitation from August 1st 2017 until June 1st of this year shows a large area of the state had 4 to 6 fewer inches of precipitation than normal (figure 1). We also were colder than average across most of the state from November until the record-breaking heat in May of this year (figure 2). Dry conditions, combined with a cold winter provides the perfect set up for herbicides to persist into the following growing season. We also can't forget the fact that there were many late applications of herbicides last summer after we experienced a record year for replanted acres that also saw delayed canopy closure, and persistent waterhemp, giant ragweed, and marestail pressure throughout the summer. With the right set of weather and application circumstances, the next question to ask is what product was sprayed, and when.

There are certain chemicals that have a higher risk of persisting in the soil and causing injury in subsequent years. We have seen issues with atrazine (figure 3), fomesafen (Flexstar, others; figure 4), mesotrione (Callisto, others; figure 5), chlorimuron (Classic, others), and imazethapyr (Pursuit; figure 6). With the exception of mesotrione, all of these chemicals have long half-lives, which is the time it takes for ½ of the chemical to degrade, under most soil conditions (40 to 100 days depending on the chemical). In general, most herbicides are broken down by chemical or microbial processes. Whenever we have dry conditions, the half-life can last longer, since many microbial and chemical processes that degrade herbicides are driven by moisture, and these processes slow down or halt completely in dry and/or cold soil conditions.

Lastly, in addition to increased risk of carryover due to environmental conditions, there are certain soil properties that increase chance of injury with some herbicides. The sulfonylureas (chlorimuron, others) and atrazine are not readily broken down in soils with pH higher that 6.8, while imazethapyr is more likely to cause injury in subsequent years in soils with a pH lower than 6.5. Since soil conditions are never uniform across a field, this means that injury will sometimes show up in pockets of high or low pH. Fields with sandy knolls can also experience spotty injury when those sandy areas are relatively drier compared to the rest of the field. Add all these factors together, and some areas of the state had the perfect storm of conditions to experience carry-over issues in 2018.

Moving forward, how do we minimize the chance for herbicide carryover for the 2019 growing season? First of all, read the label, specifically the "crop rotation intervals". Every herbicide will have a statement on the label that specifies the interval that must elapse before rotational crops can be planted. In almost every case of fomesafen (Flexstar, Prefix, others) carryover, a July or later application was made in 2017. With atrazine, higher rates applied in June were problematic. For most of the herbicides that can cause carryover problems in Indiana, the recropping intervals are 9-10 months. So, late spring or summer applications combined with dry fall weather and a cold, extended winter will make one realize that these rotational intervals are on the label for a reason. If you know going into the following growing season that your weed management program and weather was a good set up for carryover problems, the simplest thing to do is to plant the same crop in that particular field that was planted last year.

The second strategy to consider is tillage. Tillage will help to stimulate microbial activity and also dilute herbicide residues by mixing the soil. If using tillage to minimize herbicide carryover, it needs to be aggressive and ideally some tillage is done in the fall and also in the spring.

The third issue to consider is soil pH. As stated above, extremes in soil pH can cause some herbicides to be more persistent. A target soil pH of about 6.5-7.0 will reduce carryover potential of most of the herbicides we use in Indiana corn and soybean. If you know of isolated areas in a field with pH extremes, we now have the technology to map these areas out and apply corrective measures to smaller areas of a field.

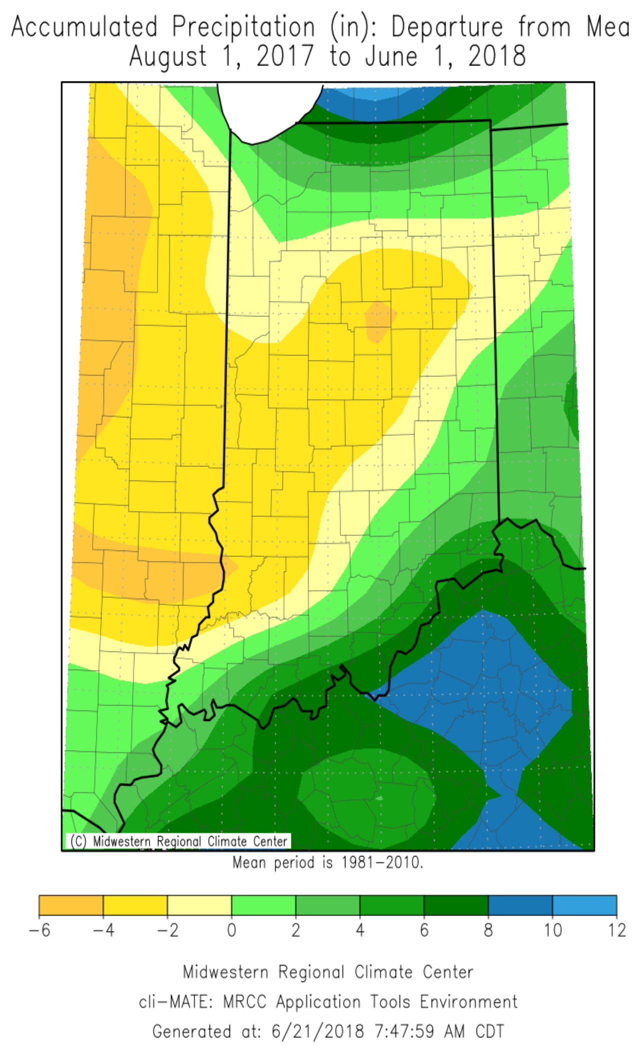

Figure 1. Precipitation deviation from mean for August 1 2017 until June 1 2018.

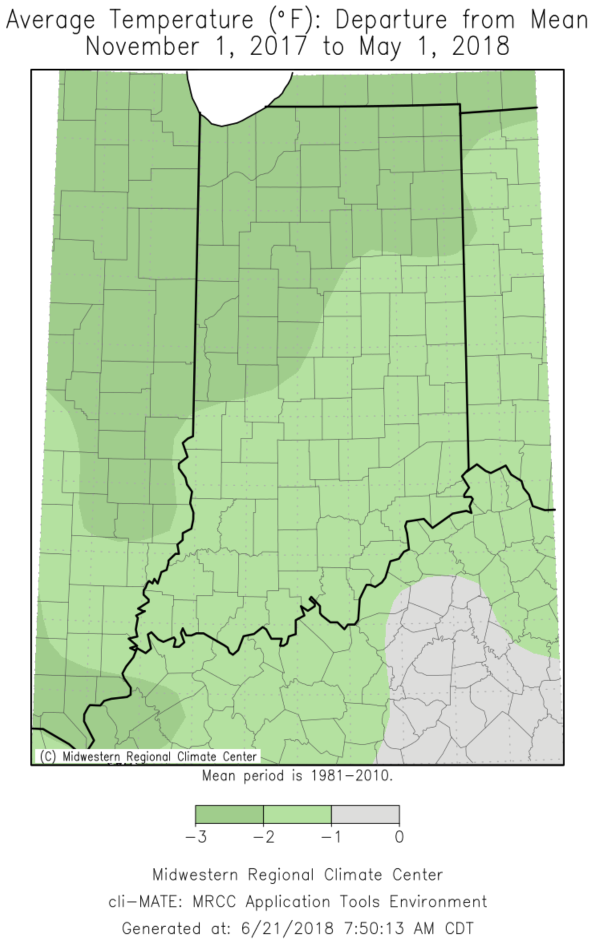

Figure 2. Temperature deviation from mean for November 1 2017 until May 1 2018.

Figure 3. Atrazine carryover onto soybean. Marginal necrosis and chlorosis appears on older leaves. Newer leaves eventually emerge with little to no symptoms.

Figure 4. Fomesafen carryover onto corn. Veinal necrosis and chlorosis appear on corn leaves. Severe carryover will result in buggy-whipping of corn plants.

Figure 5. Mesotrione carryover onto soybean. Bleaching/chlorosis will appear on whole leaves and leaf margins. Soybean leaves can sometimes appear strapped, which is confused for growth regulator injury.

Figure 6. Imazethapyr carryover onto corn. Corn plants will be stunted, with discoloration of leaves. Leaves can appear yellow, purple, or red. Midvein is often purple or red. Roots will show bottle-brush symptoms.

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Effects of Flooding or Ponding on Corn Prior to Tasseling

Author: Bob Nielsen

Intense rainfall events (technically referred to as “toad stranglers” or “goose drownders”) flood low-lying corn fields and create ponding (standing water) in poorly drained areas (depressions, compacted soil) within other fields. Other areas within fields, while technically not flooded or ponded, often remain saturated for lengthy periods of time. Recurrent heavy rainfall events, like Indiana has experienced recently throughout the last couple weeks in June, simply “add insult to injury” by re-wetting, re-ponding, and re-flooding the same areas of the fields.

What are the prospects for recently submerged corn fields or plants simply enduring days and days of saturated soils? The flippant answer is that suffering crops will survive until they die.

What I mean to say is that no one can tell you with certainty the day after the storm whether a ponded area of a corn field will survive or whether there will be long-term yield consequences until enough time has gone by such that you can assess the actual recovery of the damaged plants. We can, however, talk about the factors that increase or decrease the risks of severe damage or death to flooded soils.

- Plants that are completely submerged are at higher risk than those that are partially submerged.
  - Plants that are only partially submerged may continue to photosynthesize, albeit at limited rates.
- The longer an area remains ponded, the higher the risk of plant death.
  - Most agronomists believe that young corn can survive up to about 4 days of outright ponding if temperatures are relatively cool (mid-70’s F or cooler); fewer days if temperatures are warm (mid-70’s F or warmer).
  - Soil oxygen is depleted within about 48 hours of soil saturation. Without oxygen, the plants cannot perform critical life sustaining functions; e.g. nutrient and water uptake is impaired and root growth is inhibited (Wiebold, 2013).
- Even when surface water subsides quickly, the likelihood of dense surface crusts forming as the soil dries increases the risk of emergence failure for recently planted crops.
  - Be prepared with a rotary hoe to break up the crust and aid emergence.
- The greater the deposition of mud or old crop residues on plants as the water subsides, the greater the stress on the plants due to reduced photosynthesis.
  - Ironically, such situations would benefit from another rainfall event to wash the mud deposits from the leaves.
- Mud and crud that cakes the leaves and stalks encourage subsequent development of fungal and bacterial diseases in damaged plant tissue. In particular, bacterial ear rot can develop when flood waters rise up to or above the developing ears of corn plants (Nielsen, 2003).
- Corn younger than about V6 (six fully exposed leaf collars) is more susceptible to ponding damage than is corn older than V6.
  - This is partly because young plants are more easily submerged than older taller plants and partly because the corn plant’s growing point remains below ground until about V6. The health of the growing point can be assessed initially by splitting stalks and visually examining the lower portion of the stem (Nielsen, 2008a). Within 3 to 5 days after water drains from the ponded area, look for the appearance of fresh leaves from the whorls of the plants.
- Extended periods of saturated soils AFTER the surface water subsides will take their toll on the overall vigor of the crop.
  - Some root death will occur and new root growth will be stunted until the soil dries to acceptable moisture contents. As a result, plants may be subject to greater injury during a subsequently dry summer due to their restricted root systems.
  - Nutrients like nitrogen are rapidly remobilized from lower leaves to upper, newer leaves; resulting in a rapid development of orange or yellow lower leaves.
  - Because root function in saturated soils deteriorates, less photosynthate is utilized by the root system and more accumulates in the upper plant parts. The higher concentration of photosynthate in the stems and leaves often results in dramatic purpling of those above-ground plant parts (Nielsen, 2017).
  - Damage to the root system today will predispose the crop to the development of root and stalk rots later by virtue of the photosynthetic stress imposed by the limited root system during the important grain filling period following pollination. Monitor affected fields later in August and early September for the possible development of stalk rots and modify harvest-timing strategies accordingly.
- Concomitant (I found a new word in the dictionary!) with the direct stress of saturated soils on a corn crop, flooding and ponding can cause significant losses of soil nitrogen (N) from either denitrification of nitrate-N in heavier soils or leaching of nitrate-N in coarser soils.
  - Significant loss of soil N will cause nitrogen deficiencies and possible additional yield loss.
  - On the other hand, if the corn dies in the ponded areas it probably does not matter how much nitrogen you’ve lost.
- Lengthy periods of wet soil conditions favor the development of seedling blight diseases in young corn seedlings, especially those caused by Pythium fungi (Sweets, 2014).
  - Fungicidal seed treatments effectively protect the seed and seedling for only about 3 weeks after planting. After that, especially if seedling development has been delayed by cold or excessive soil moisture, the risk of infection increases quickly. Fields that looked acceptable one week can be devastated by seedling blight by the next week if conditions are favorable for the disease and seedling development has not yet reached about V3 to V4.
  - Poorly drained areas of fields are most at risk for the development of these diseases and so will also be risky for potential replant operations.
- The risk of diseases like common smut and crazy top also

increases when soils are saturated or plants are submerged and temperatures are cool (Pataky and Snetselaar, 2006; Jackson-Ziems, 2014, APS, 2015).

    - The fungus that causes crazy top depends on saturated soil conditions to infect corn seedlings.
    - The common smut fungal organism is ubiquitous in soils and can infect young corn plants through tissue damaged by floodwaters. There is limited hybrid resistance to either of these two diseases and predicting damage is difficult until later in the growing season.

- Wind damage to corn during severe storms results in either stalk breakage (aka "green snap") or root lodging (plants uprooted and laying nearly flat to the ground). The risk of permanent damage is greater during late vegetative development and less with younger plants.

    - The yield effect of "green snap" damage depends on the percentage of field affected and whether the stalk breakage occurs above or below the ear, but is usually serious regardless. Obviously, stalk breakage below the ear results in zero yield for that plant. Stalk breakage above the ear results in significant yield loss due to the loss of upper canopy photosynthesis capacity for that plant.
    - Root lodged corn will recover or straighten up to varying degrees depending on the growth stage of the crop. Generally, younger corn has a greater ability to straighten up with minimal "goose-necking" than older corn. Yield effects of root lodging depend on whether soil moisture remains adequate for root regeneration, the severity of root damage due to the uprooting nature of root lodging, and the degree of "goose-necking" that develops and its effect on the harvestability of the crop.

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Editor: Tammy Luck | Department of Entomology, Purdue University, 901 W. State St., West Lafayette, IN 47907

Tassel Emergence & Pollen Shed

Author: Bob Nielsen

- Corn produces individual male and female flowers on the same plant.
- The tassel represents the male flower of the corn plant.

Depending on the year, Indiana's corn crop 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 "in the streets", I've developed this article and the accompanying one on silking (Nielsen, 2016) that describe the ins and outs of sex in the corn field.

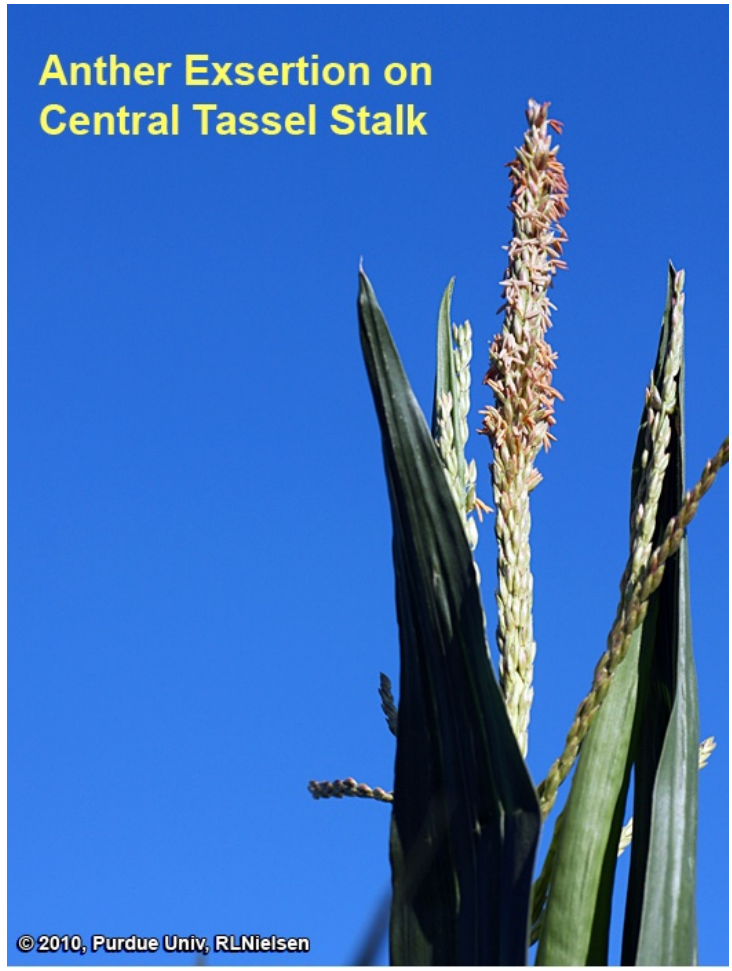
Remember that corn has both male flowers and female flowers on the same plant (a flowering habit called monoecious for you trivia fans.) Interestingly, both flowers are initially bisexual (aka "perfect"), but during the course of development the female components (gynoecia) of the male flowers and the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

Field of tasseling corn.

Growth Stage VT (Tasseling)

Portions of the tassel may be visible before the plant technically reaches the last leaf stage (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 authoritative source furthermore stated 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 to begin not only prior to the last tassel branch appearing from the whorl, but also prior to the exsertion of anthers and pollen shed (Nielsen, 2009).

Plant height reaches its maximum 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 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 pollination results in successful fertilization of the ovules, entire ear shoots will usually die because so few leaves remain to produce the necessary carbohydrates (by photosynthesis) to complete grain fill.



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, 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 these florets mature, elongation of the filaments helps exsert the anthers from the glumes. Pollen is dispersed through pores that open at the tips of the anthers. Pollen shed usually begins 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 the pair first, while those from lower floret typically emerge later the same day or on following days. 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. 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 recent 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, corn pollen does not mature or shed all at once. Pollen maturity and 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

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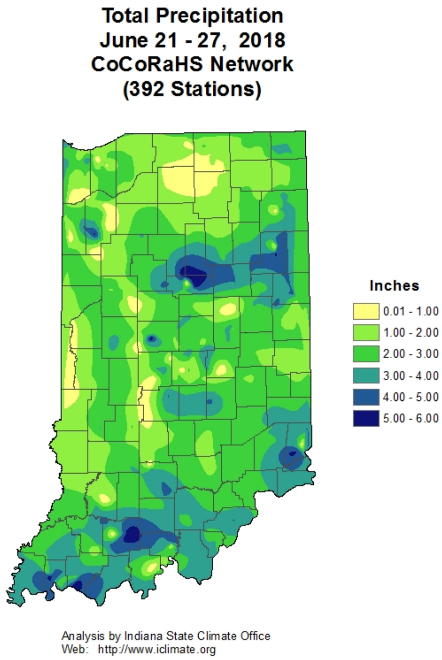

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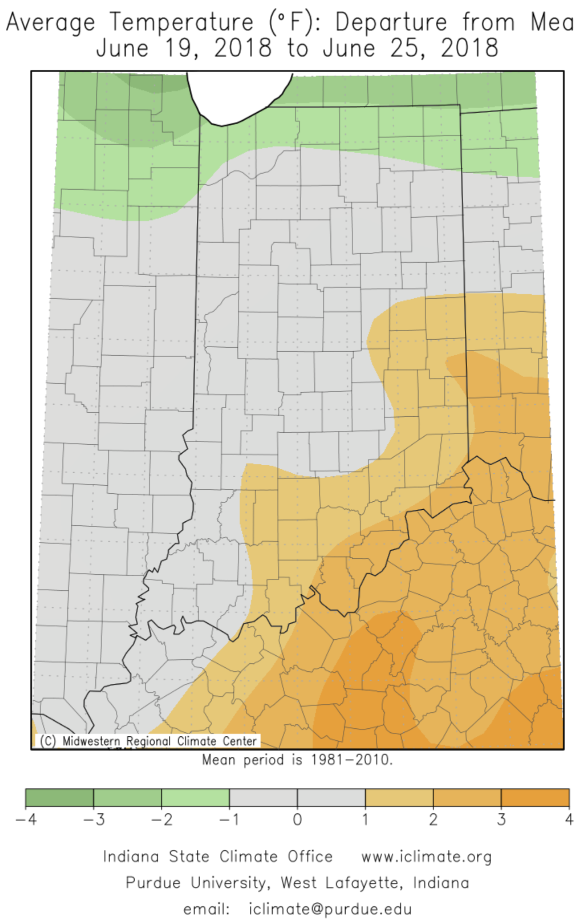

Average Temperature Departure from Mean June 18-25, 2018.