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Pest&Crop newsletter

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In This Issue

Another Bt Resistance Occurrence – European Corn Borer

(Christian Krupke)

Dr. Jocelyn Smith and Art Schaafsma at the Ridgetown campus of the University of Guelph recently reported a new and unexpected development in the resistance to Bt saga – this time it happened all the way out in the Maritime Corn Belt (MCB), in Nova Scotia, a province in Eastern Canada. Yes, they grow corn there! At under 30,000 acres annually, their production is not much of the grand total. But this story is worth following because it features an old, familiar target of the first-ever Bt corn commercialization, the European corn borer. Tracey Baute's, University of Guelph Field Crops Entomologist, original newsletter article can be found HERE.

The insect toxin in question is Cry1F, which regular readers will remember is the same toxin that was once labeled for effective control of western bean cutworm, only to succumb to resistance in the US and Canada in the last several years.

What this means is that Cry1F expressing hybrids, should be monitored carefully for ECB damage in Indiana as well – if it can happen in Nova Scotia there is no reason that Hoosier corn borers cannot also adapt to this toxin. Complacency is the enemy in many aspects of agriculture, and Bt crops are no exception – periodic scouting is the only way we find these resistance stories in a timely manner, so that we can get the word out and try to contain resistant populations.

The good news is that some of the other Cry toxins targeting this pest are still efficacious, by all accounts. This includes Cry1Ab, Cry1A.105 and Cry2Ab2. If you are not familiar with these, and what hybrids contain which traits, you are not alone. As always, consult the Bt trait table (LINK HERE) when in doubt. We have been stacking multiple traits in each hybrid for years, and that trend should and will continue – because we are generally not equipped with high-dose traits for insect control, and this leads to resistance after continuous exposure.

That raises questions about the location of this resistance event – a geographically isolated part of Eastern Canada – and what we can learn about how resistance develops with respect to selection pressure, moth movement and gene flow. The hope is that this is an isolated event and can be contained with management approaches that limit subsequent exposure of ECB to Cry1F in those areas, while emphasizing higher dose Cry toxin deployment.

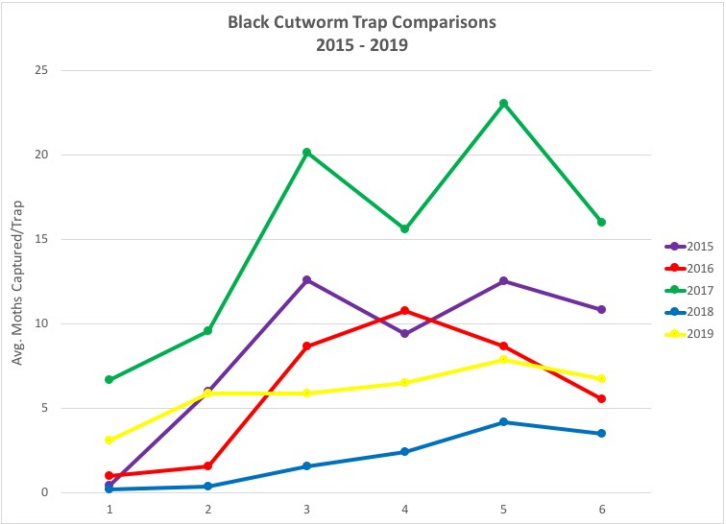
Stay tuned, there is likely more to come on this story in future issues!

Black Cutworm Moth Trapping is Over, Now It's "Worm" Time

(John Obermeyer)

Every spring, dozens of cooperators throughout the state put forth considerable effort in trapping for the arrival and intensity of black cutworm moths. I'm personally indebted to these faithful bug counters, hoping you also appreciate their efforts as reported in the "Black Cutworm Adult Pheromone Trap Report." If you recognize a name or two on this list of reporters, by county, please thank them!

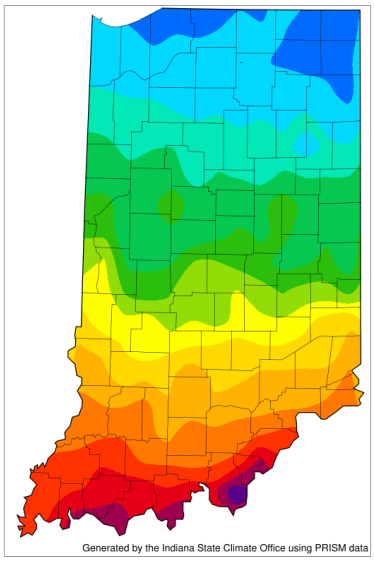
This year's average trap catches, compared to the previous four, looks mediocre. However, within these averages are many intensive moth captures over the six weeks of monitoring, many reporting the most they had ever captured. Presumably, this tells us that the moths were well distributed throughout the state during their arrival. This is one piece of important information, as we now track larval development, and follow-up with scouting in high-risk fields…which are plentiful this season!



Black cutworm larva feeding on pigweed, no corn available!

Growing Degree Day (Base 50) Accumulation

4/12/2019 - 5/15/2019



No Black Cutworm Activity Reported Yet…Very Little Corn Either

(John Obermeyer)

Multiple intensive black cutworm moth captures, 9 or more caught over a 2-night period, around April 12, signaled for us to begin tracking heat units (Base 50), see “Black Cutworm Pheromone Trap Report.” Based on the black cutworm’s growth development model, it takes approximately 300 heat units (base 50ºF) from egg hatch to early 4th instar; this is when black cutworm larvae begin to cut plants. Some minor leaf injury may be present before then.

In referring to the accompanying temperature accumulation map, the southern third of Indiana is currently at, or above, 300 degree days. With forecasted warmer temperatures, soon all of southern Indiana should be scouting for black cutworm feeding/cutting in high risk corn. Unfortunately, less than 10% of the corn is planted, and weedy fields for egg laying are abundant for continual moth arrivals. Consider the timing of corn emergence, yet to be planted, and the progression of cutworm development in the next week or two.

Happy scouting!

Black cutworm instars (i.e. size) 2 through 6, 4th instar is left of the penny.

2019 Black Cutworm Pheromone Trap Report

(John Obermeyer)

		BCW Trapped						
		Wk 1 3/28/19-4/3/19	Wk 2 4/4/19-4/10/19	Wk 3 4/11/19-4/17/19	Wk 4 4/18/19-4/24/19	Wk 5 4/25/19-5/1/19	Wk 6 5/2/19-5/8/19	Wk 7 5/8/19-5/15/19
County	**Cooperator**							
Adams	Roe/Mercer Landmark	0	7	20*	41*	27*	27*	32*
Allen	Anderson/Syngenta							
Allen	Gynn/Southwind Farms	0	0	14*	0	5	13	11*
Allen	Kneubuhler/G&K Concepts		1	65*	41*	9	14	47*
Bartholomew	Bush/Pioneer Hybrids		0	2	2	2	1	6
Boone	Emanuel/Boone County CES/Lebanon	0	2	13	5	9	4	4
Clay	Bower/Ceres Solutions/Brazil		6	11	11	1	0	0
Clay	Bower/Ceres Solutions/Clay City		1	2	5	4	1	
Clinton	Emanuel/Boone Co. CES	1	6	20*	9	21*	26*	15
Clinton	Foster/Rossville		3	9	8	10	63*	33*
DeKalb	Hoffman/ATA Solutions			0	1			
Dubois	Eck/Dubois Co. CES	4	14	23	19*	10	8	12
Fayette	Schelle/Falmouth Farm Supply Inc.	1	11	24*	3	2	1	1
Fountain	Mroczkiewicz/Syngenta	0	16*	24*	22*	36*	15	20*
Fulton	Jenkins/Ceres Solutions/Talma		0	3	5	7	2	15
Fulton	Ranstead/Ceres Solutions	0	0	0	0	3	4	5
Hamilton	Campbell/Beck’s Hybrids	0	4	20*	8	36*	24	4

		BCW Trapped						
		Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7
County	Cooperator	3/28/19-4/3/19	4/4/19-4/10/19	4/11/19-4/17/19	4/18/19-4/24/19	4/25/19-5/1/19	5/2/19-5/8/19	5/8/19-5/15/19
Hendricks	Nicholson/Nicholson Consulting	0	1	8	8	5	12*	3
Hendricks	Tucker/Bayer				0	12	4	3
Howard	Shanks/Clinton Co. CES		0	0	0	0	1	2
Jasper	Overstreet/Jasper Co. CES	0	0	7	2	2	8	16
Jasper	Ritter/Brodbeck Seeds		0	12	11	21	19	
Jay	Boyer/Davis PAC	2	24	52*	35	29*	38*	22*
Jay	Shrack/Ran-Del Agri Services	0	6	55*	32*	13	23	8
Jay	Temple/Jay Co. CES/Redkey	0	0	4	0	3	3	2
Jay	Temple/Jay Co. CES/Pennville	0	1	48*	1	6	10	5
Jennings	Bauerle/SEPAC	1	5	8	5	11	10	7
Knox	Bower/Ceres Solutions/Freelandville		0		0	0	0	0
Knox	Bower/Ceres Solutions/Vincennes							
Lake	Kleine			7	7	15	9	4
Lake	Moyer/Dekalb Hybrids/Shelby	0	3	14	4	8	7	15
Lake	Moyer/Dekalb Hybrids/Scheider	0	2	6	0	7	9	22*
LaPorte	Rocke/Agri-Mgmt. Solutions	0	0	13	0	0	7	1
Marshall	Barry				0	0	0	2
Marshall	Harrell/Harrell Ag Services		2	0	0	0	3	1
Miami	Early/Pioneer Hybrids	0	0	2	3	5	2	8
Montgomery	Delp/Nicholson Consulting		23*	23*	7	17	36*	1
Newton	Moyer/Dekalb Hybrids/Lake Village	0	0	2	2	1	2	7
Porter	Tragesser/PPAC	0	0	7	4	8	9	7
Posey	Schmitz/Posey Co. CES	0	1		3	4	0	
Pulaski	Capouch/M&R Ag Services		0		28	18*		22
Pulaski	Leman/Ceres Solutions			32*	24	18	38*	24*
Putnam	Nicholson/Nicholson Consulting		11*	8	2	12	7	9
Randolph	Boyer/DPAC	0	2	6	14	21	12	6
Rush	Schelle/Falmouth Farm Supply Inc.	0	0	1	0	1	1	1
Shelby	Fisher/Shelby County Co-op		3	2	7	2	0	0
Shelby	Simpson/Simpson Farms	1	21*	49*	39*	30*	35*	19*
Stark	Capouch/M&R Ag Services		0					
St. Joseph	Carbiener		0	3	4	7	13	
St. Joseph	Deutscher/Helena Agri-Enterprises	0	0	5	3	8	25	12
Sullivan	Bower/Ceres Solutions/New Lebanon		12	6	8	7	8	5
Sullivan	Bower/Ceres Solutions/Sullivan		0	16*	26*	20*	22*	5
Sullivan	Bower/Ceres Solutions/Farmersburg		2	6	14*	14*	11	9
Tippecanoe	Bower/Ceres Solutions	0	9	0	9	7	9	
Tippecanoe	Nagel/Ceres Solutions	0	5	20*	34*	26*	35*	35*
Tippecanoe	Obermeyer/Purdue Entomology	0	0	0	4	3	6	3
Tippecanoe	Westerfeld/Monsanto Research Farm	0	7	18	18	7	9	17
Tipton	Campbell/Beck's Hybrids	0	25*	54*	0	0	38*	16*
Vermillion	Bower/Ceres Solutions/Clinton		0	0	0	0	0	0
Wabash	Enyeart/Ceres Solutions		0	8	13	12	19	25
White	Foley/ConAgra	0	0	2	5	0	1	0
Whitley	Richards/NEPAC/Schrader		10	73*	36*	20*	27	22*
Whitley	Richards/NEPAC/Kyler		4	41*	19*	6	8	10

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

Armyworm Pheromone Trap Report – 2019

(John Obermeyer)

County/Cooperator	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10
Dubois/SIPAC Ag Center	5	24	91	74	8	3				
Jennings/SEPAC Ag Center	0	2	9	11	6	1				
Knox/SWPAC Ag Center	105	34	78	200	185	43				
LaPorte/Pinney Ag Center	0	127	312	52	51	39				
Lawrence/Feldun Ag Center	148	60	124	327	376	29				
Randolph/Davis Ag Center	0	193	183	420	446	236				
Tippecanoe/Meigs	8	5	127	120	361	82				
Whitley/NEPAC Ag Center	4	191	384	392	1222	739				

Wk 1 = 4/4/19-4/10/19; Wk 2 = 4/11/19-4/17/19; Wk 3 = 4/18/19-4/24/19; Wk 4 = 4/25/19-5/1/19; Wk 5 = 5/2/19-5/8/19; Wk 6 = 5/9/19-5/15/19; Wk 7 = 5/16/19-5/22/19; Wk 8 = 5/23/19 – 5/29/19; Wk 9 = 5/30/19-6/5/19; Wk 10 = 6/6/19-6/12/19

CPA – Planting Commodity Crops into Green Cover Crops

(Bill Johnson)

Our rainy wet weather conditions have certainly caused a lot of delays in field operations this spring. One of these challenges we face in a spring like this one is the process of getting crops terminated and summer annual crops like corn and soybean planted in fields where cover crops have grown somewhat large. In anticipation of a late wet spring, Purdue crop production and pest management specialists met with NRCS personnel about a month ago to discuss production strategies for fields with cover crops. The result of this discussion and our management recommendations are summarized in IB 180-19-02 Planting Green that NRCS is distributing to their clientele. There are also a few articles on Bob Nielsen's Chat and Chew webpage regarding cover crop management in a late wet spring as well.

What We Know And Don't Know About Ammonium Thiosulfate

(Jim Camberato)

Ammonium thiosulfate (ATS) is commonly added to liquid nitrogen (N) solutions to provide sulfur (S) to crop plants. Sulfur response trials have shown ATS to be an effective S fertilizer, however, thiosulfate and its first breakdown product, tetrathionate, are not utilized by plants. ATS can inhibit germination, hence it is not recommended for in-furrow placement. ATS can also damage plant roots.

Eventually tetrathionate is converted to sulfate, which is the form of S taken up by plants. Complete conversion of thiosulfate to sulfate may take 1-4+ weeks at temperatures typically encountered at planting and sidedressing time. Considerable variation in conversion rate exists among soils, but the soil factors affecting conversion have not been well identified. Even though sulfate availability is delayed with ATS, is should not be considered a "slow-release" fertilizer because sulfate, thiosulfate, and tetrathionate are all mobile in soil. Thus, leaching losses are expected to be a concern with applications of ATS well before planting.

In addition to providing S, ATS can also reduce ammonia volatilization by delaying urea hydrolysis. ATS also slows nitrification, the conversion of ammonium to nitrate, which can reduce loss of nitrate to the air and water. However, the inhibitory properties of ATS are not considered as good as products specifically sold to target urea hydrolysis and nitrification, such as NBPT or nitrapyrin.

Assessing Frost/Cold Temperature Injury to Young Corn

(Bob Nielson)

The risk of damaging spring frost events is one of the downsides to planting corn earlier than normal, but is one growers often accept when early spring field conditions are otherwise suitable for planting. However, the threat of low temperatures in late May or early June also raises the specter of frost or low temperature damage to young corn plants, regardless of planting date. Early morning temperatures in the 30s°(F) coupled with clear calm conditions overnight certainly are favorable for frost formation on exposed surfaces, including leaves of

young corn plants. In other words, temperatures do not need to drop to 32°F or cooler in order for frost to form.

Frost Crystals on a Corn Leaf at Sunup

When significant frost develops on young corn plants, it is tempting to jump to the logical conclusion that significant plant mortality will soon follow. However, frost by itself is not a guaranteed "kiss of death" for young corn plants. What is more important is whether the temperature that accompanied the frost event was lethal or not. Most agronomists agree that "lethally cold" temperatures for young corn are those that dip to 28°F or lower for 1 to 2 hours.

The effect of frost on young corn when it is accompanied by temperatures no lower than about 30°F is primarily damage and death of the exposed above ground leaf tissue. As long as the growing point of the young plant (aka the apical meristem) is still protected below the soil surface, the injured plant usually recovers from the effects of the superficial leaf damage.

Within 3 to 5 days of the frost event (more quickly with warm temperatures, more slowly if cool), elongation of the undamaged leaf tissue in the whorl will become evident. As long as the recovery is vigorous, subsequent stand establishment should be not be affected.

Plant appearance following damage by lethal cold temperatures (28°F or lower for a couple hours) may initially be similar to that due to "simple" frost damage. The difference is that there will be no subsequent elongation or "recovery" of leaf tissue from the whorl like you would see in the days following "simple" frost damage to leaves. Inspection of the growing point area (by slicing down middle of stem, through the crown of the young plant) will eventually reveal discolored, soft or mushy tissue as a consequence of the lethal temperatures.

The bottom line for diagnosing the severity of frost or low temperature injury to corn is that you generally need to wait three to five days after the weather event before you can accurately assess the extent of damage or recovery. Injury to the crop can look very serious the day after the event or even two days after the event, but recovery is likely if there is no injury to the growing points of the affected plants.

7 hrs post-frost

12 hrs post-frost

60 hrs post-frost, visible elongation of undamaged leaf tissue from whorl of plant

Related Reading

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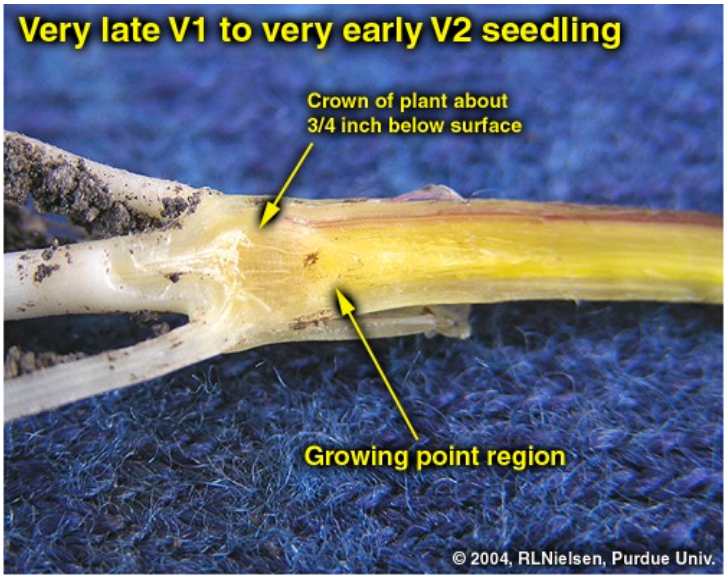

Corny Growing Points of Interest

(Bob Nielson)

Recovery from early season damage to corn is strongly dependent on the health of the main (apical) growing point region following the damage.

There is something about 30 mph winds and sand/grit/soil blasting across corn fields at seedling height that makes one curious about the ability of corn to recover from early season damage. The same can be said following a thunderstorm accompanied by strong winds and damaging hail (Nielsen, 2015). Whenever corn is damaged early in the growing season, growers are sometimes faced with the decision of whether or not to replant the field.

One of the most important, and most difficult, steps in making a replant decision is estimating the surviving plant population in the field. Corn is remarkably resilient to aboveground damage early in the season, yet growers often underestimate the ability of corn to recover from such damage. Consequently, much of the replanting that occurs each year is a waste of money and effort. Use the worksheet in my replant publication (AY-264-W) to estimate yield and dollar returns to corn replanting.

The health and condition of the corn plant's growing point (apical meristem) plays a major role in determining whether a damaged corn plant will recover or not. A plant damaged aboveground but with a healthy, undamaged growing point will usually survive. However, damage to the growing point area will either kill the plant or severely stunt its recovery.

Click to continue reading the rest of the article.

Einstein's Theory of Relativity as it Applies to Soil Moisture

(Bob Nielson)

Suitability of the soil moisture and whether a field is "fit" for field work and planting is partially "in the eyes of the beholder", but is also subject to the "laws of relativity" and calendar date. Use your best judgement. The bad news is that Monday's USDA-NASS crop progress report estimated that only 6% of Indiana's corn had been planted as of May 12, which puts our farmers in the unenviable position of suffering through the slowest planting progress EVER for this point in May. Nationally, only 30% of the corn crop was estimated to be planted as of May 12, compared with the most recent 5-year average progress of 66%. With more rain moving through the state late this week, let me offer a contrarian (if not "tongue in cheek") view about soil moisture and planting.

The superintendent of our Purdue Agronomy Farm and I commiserate every planting season when it comes to deciding when the soil is "fit" to work or plant. We scuff the surface of the fields in **mid-April**, dig a few spadefuls of soil, squeeze the soil into a ball like the soil scientists tell us to do, and then agree that the soil is too wet to work or plant.

Around the **first of May**, we scuff the surface of the fields, dig a few spadefuls of soil, squeeze the soil into a ball like the soil scientists tell us to do, and then agree that the soil is too wet to work or plant.

Again in **mid-May**, we scuff the surface of the fields, dig a few spadefuls of soil, squeeze the soil into a ball like the soil scientists tell us to do, and then agree that the soil is maybe just about right to work or plant, but we'll give it a few more days.

By **late May**, we scuff the surface of the fields, dig a few spadefuls of soil, squeeze the soil into a ball like the soil scientists tell us to do, and then agree that the soil is just as wet as it was back in mid-April, but maybe we ought to be working ground and planting anyway.

Einstein was right.....it's all about relativity.

The point of my sharing this annual ritual with you is that we are rapidly approaching the point in the planting season where we need to "fish or cut bait". Yes, there are risks of working ground too wet or planting "on the wet side" (see articles below), but there are also risks of waiting so long for the soil to become "fit" to begin planting that the majority of your corn ground gets planted way too late.

Heaven forbid that I should recommend anyone to work ground or plant corn in soils that are wet enough to cause severe compaction that will haunt you later this summer. But, you know, when you decide back in mid-April to wait, you've got quite a bit of good planting season left to go. When you decide in mid-May to wait AND you have a lot of acres to cover, what you save by avoiding some soil compaction now may be less than what you risk by planting the bulk of your corn acres very, very late.

If you concur with these thoughts and decide to "mud in" your corn and suffer serious yield losses; then you did not hear it from me. If you "pull the trigger" now and successfully avoid planting the bulk of your corn in mid-June and win the yield jackpot; then I'll accept all the credit.

There are no black & white answers to this situation, there are no silver bullets, and there are no certainties in farming. Use your best judgement in deciding when to head back to the fields over the coming days and/or weeks. You know your fields and soils better than anyone else.

Related References

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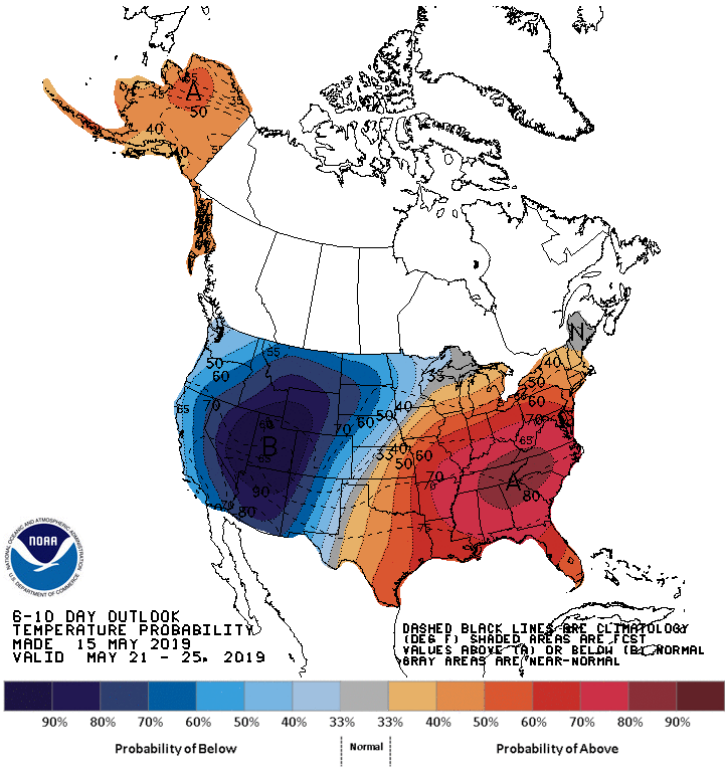

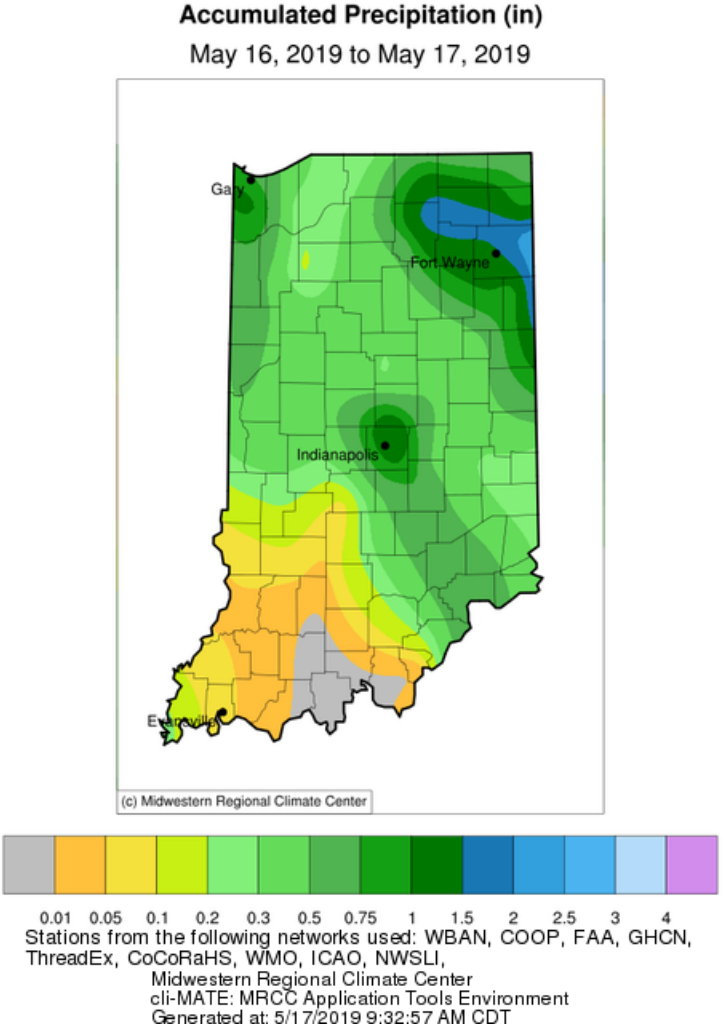

Indiana Climate and Weather Report – 5/16/2019

(Hans Schmitz)

Near term, Sunday looks like the next most likely precipitation event around the state. The active pattern seems to continue, with chances of rain continuing about every 3-4 days. Meanwhile, temperatures begin to trend more summer-like, with 80 degree days coming statewide, and likelihood for above average temperatures in the 6-10 day outlook high (see map, cpc.ncep.noaa.gov).

Important to note: high temperatures and excessive moisture favor many different kinds of disease and insect development. Scout any crops that have been planted for disease development or infestation and act accordingly. Contact your local Purdue Extension office for help in identifying problems or economic thresholds for treatment.

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