PURDUE UNIVERSITY | Extension ENTOMOLOGY

Pest&Crop newsletter

Issue: 2019.7
May 2, 2019

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

2019 Black Cutworm Pheromone Trap Report

(John Obermeyer)

		BCW Trapped						
County	Cooperator	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
Adams	Roe/Mercer Landmark	0	7	20*	41*	27*		
Allen	Anderson/Syngenta							
Allen	Gynn/Southwind Farms	0	0	14*	0	5		
Allen	Kneubuhler/G&K Concepts		1	65*	41*	9		
Bartholomew	Bush/Pioneer Hybrids		0	2	2	2		
Boone	Emanuel/Boone County CES/Lebanon	0	2	13	5	9		
Clay	Bower/Ceres Solutions/Brazil		6	11	11	1		
Clay	Bower/Ceres Solutions/Clay City		1	2	5	4		
Clinton	Emanuel/Boone Co. CES	1	6	20*	9	21*		
Clinton	Foster/Rossville		3	9	8	10		
DeKalb	Hoffman/ATA Solutions			0	1			
Dubois	Eck/Dubois Co. CES	4	14	23	19*	10		
Fayette	Schelle/Falmouth Farm Supply Inc.	1	11	24*	3	2		
Fountain	Mroczkiewicz/Syngenta	0	16*	24*	22*	36*		
Fulton	Jenkins/Ceres Solutions/Talma		0	3	5	7		
Fulton	Ranstead/Ceres Solutions	0	0	0	0	3		
Hamilton	Campbell/Beck's Hybrids	0	4	20*	8	36*		
Hendricks	Nicholson/Nicholson Consulting	0	1	8	8	5		
Hendricks	Tucker/Bayer				0	12		
Howard	Shanks/Clinton Co. CES		0	0	0			
Jasper	Overstreet/Jasper Co. CES	0	0	7	2	2		
Jasper	Ritter/Brodbeck Seeds		0	12	11			
Jay	Boyer/Davis PAC	2	24	52*	35	29*		
Jay	Shrack/Ran-Del Agri Services	0	6	55*	32*	13		
Jay	Temple/Jay Co. CES/Redkey	0	0	4	0	3		
Jay	Temple/Jay Co. CES/Pennville	0	1	48*	1	6		
Jennings	Bauerle/SEPAC	1	5	8	5	11		
Knox	Bower/Ceres Solutions/Freelandville		0		0	0		
Knox	Bower/Ceres Solutions/Vincennes							
Lake	Kleine			7	7	15		
Lake	Moyer/Dekalb Hybrids/Shelby	0	3	14	4	8		
Lake	Moyer/Dekalb Hybrids/Scheider	0	2	6	0	7		
LaPorte	Rocke/Agri-Mgmt. Solutions	0	0	13	0	0		
Marshall	Barry				0	0		
Marshall	Harrell/Harrell Ag Services		2					
Miami	Early/Pioneer Hybrids	0	0	2	3	5		
Montgomery	Delp/Nicholson Consulting		23*	23*	7	17		
Newton	Moyer/Dekalb Hybrids/Lake Village	0	0	2	2	1		
Porter	Tragesser/PPAC	0	0	7	4	8		
Posey	Schmitz/Posey Co. CES	0	1		3	4		
Pulaski	Capouch/M&R Ag Services		0		28	18*		
Pulaski	Leman/Ceres Solutions			32*	24	18		
Putnam	Nicholson/Nicholson Consulting		11*	8	2	12		
Randolph	Boyer/DPAC	0	2	6	14	21		
Rush	Schelle/Falmouth Farm Supply Inc.	0	0	1	0	1		
Shelby	Fisher/Shelby County Co-op		3	2	7	2		
Shelby	Simpson/Simpson Farms	1	21*	49*	39*	30*		
Stark	Capouch/M&R Ag Services		0					
St. Joseph	Carbiener		0	3	4			
St. Joseph	Deutscher/Helena Agri-Enterprises	0	0	5	3			
Sullivan	Bower/Ceres Solutions/New Lebanon		12	6	8	7		
Sullivan	Bower/Ceres Solutions/Sullivan		0	16*	26*	20*		
Sullivan	Bower/Ceres Solutions/Farmersburg		2	6	14*	14*		
Tippecanoe	Bower/Ceres Solutions	0	9	0	9	7		
Tippecanoe	Nagel/Ceres Solutions	0	5	20*	34*	26*		
Tippecanoe	Obermeyer/Purdue Entomology	0	0	0	4	3		
Tippecanoe	Westerfeld/Monsanto Research Farm	0	7	18	18	7		
Tipton	Campbell/Beck's Hybrids	0	25*	54*	0	0		
Vermillion	Bower/Ceres Solutions/Clinton		0	0	0	0		
Wabash	Enyeart/Ceres Solutions		0	8	13	12		
White	Foley/ConAgra	0	0	2	5	0		
Whitley	Richards/NEPAC/Schrader		10	73*	36*	20*		
Whitley	Richards/NEPAC/Kyler		4	41*	19*	6		

* = 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						
Jennings/SEPAC Ag Center	0	2	9	11						
Knox/SWPAC Ag Center	105	34	78	200						
LaPorte/Pinney Ag Center	0	127	312	52						
Lawrence/Feldun Ag Center	148	60	124	327						
Randolph/Davis Ag Center	0	193	183	420						
Tippecanoe/Meigs	8	5	127	120						
Whitley/NEPAC Ag Center	4	191	384	392						

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

Foliar Diseases of Wheat and Fusarium Head Blight (Scab) Management

(Darcy Telenko)

Even though rainy conditions continue to slow planting across the state, we need to keep an eye on winter wheat. These wet conditions will favor many fungal diseases. Already our southern neighbors have started reporting multiples diseases in wheat. These include – strip and leaf rust, Septoria leaf spot, tan spot, and Fusarium head blight (see figure 1). A number of resources are available to help distinguish wheat leaf diseases, they include the Purdue Wheat Field Guide (https://ag.purdue.edu/agry/dtc/Pages/WheatFG.aspx) and "*Identifying Rust Diseases of Wheat and Barley.*" https://www.ars.usda.gov/ARSUserFiles/50620500/Cerealrusts/Rust_Diseases_National.pdf

Samples can always be submitted to the Purdue Plant Pest Diagnostic Lab for disease identification and confirmation.

Wheat in Indiana was between 6-9 feekes at the end of last week and some of our southern fields are at boot stage (Feekes 10) as of today with early varieties at 10.1. Therefore, I expect flowering to start over the next couple of weeks. During flowering (anthesis) **warm, wet weather** with high relative humidity will favor the development of Fusarium head blight (scab). Fusarium head blight (FHB) is caused by the fungus *Fusarium graminearium*. It infects wheat during flowering, beginning at Feekes 10.5.1. Symptoms of FHB will appear as bleaches spiklets on the head later in the season. Infection can lead to small or shriveled grain kernels referred to as "tombstones." In addition to shriveled grain this fungus produces mycotoxins such as deoxynivalenol (DON), which can accumulated in the infected grain.

Figure 1. A-Wheat strip rust, B-Septoria leaf spot, and C-Fusarium head blight. (*Photo credits: PPDL*)

A number of resources are available to help you make disease management decisions in wheat.

1) **The Fusarium Risk Assessment Tool** is available at the following website. http://www.wheatscab.psu.edu/. This tool estimates the risk of a Fusarium head blight epidemic (> than 10% field severity) using weather conditions (temperature, rainfall, and relative humidity) measured 15 days prior to flowering. See below for the current risk map – much of Indiana is colored yellow (medium risk for scab development) and red (high risk for scab development) due to recent wet weather.

Keep in mind that actual disease risk depends heavily on the growth stage of wheat in your area. We are still on the early side; the estimate is most relevant just prior to flowering (Feekes 10.5.1) or the early stages of grain development. Fusarium head blight risk is highest when there are three or more days with extended periods of high relative humidity and moderate temperatures (65 to 80°F) during the early stages of kernel development.

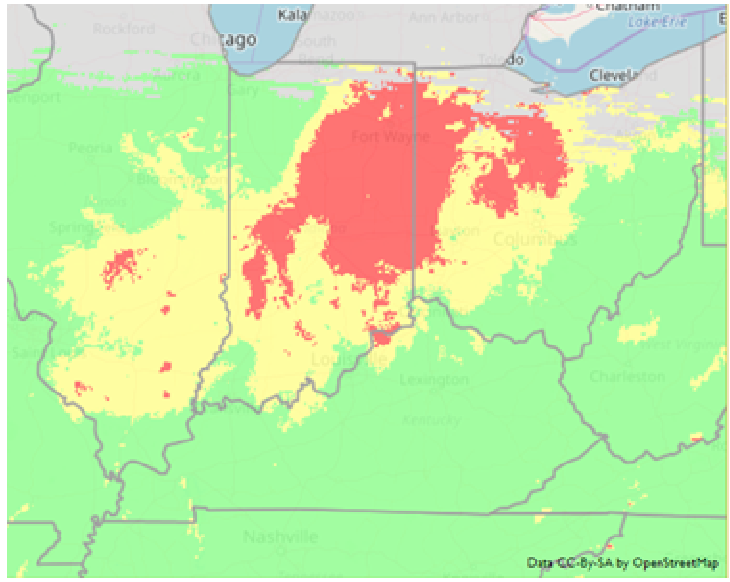


Figure 2. Fusarium Risk Assessment Tool Indiana map generated on 2 May 2019. Red = high risk, Yellow = medium risk, and Green = low risk for Fusarium head blight on wheat just prior to flowering or the early stages of grain development. (*Image credit: http://www.wheatscab.psu.edu/*)

I wanted to remind you that this tool is available. Farmers and crop advisors can sign up for alerts from the U.S. Wheat and Barley Scab Initiative, these can be sent to a cell phone as a text or email. To sign up visit https://scabusa.org/fhb_alerts.

2) **Fungicide Application:** A fungicide application might be considered if a Fusarium head blight (FHB) susceptible variety is planted, or if you are worried about scab on your farm. These applications should be made at Feekes 10.5.1, or early flowering to suppress FHB. Fungicides recommended for FHB and DON include Prosaro, Caramba, Proline, and Miravis Ace. The use of products containing strobilurin fungicides may result in higher levels of DON accumulation in grain when damaged by FHB. These are not labelled for FHB management.

Fungicide Efficacy Tables are updated yearly and available from the Purdue Extension Education Store or Crop Protection Network publications (https://cropprotectionnetwork.org/resources/publications). *Fungicide Efficacy for Control of Wheat Diseases* CPN -3002 and *Optimizing Fungicide Use for Fusarium Head Blight (Scab) and Associated Mycotoxins* CPN-3001 are two available resources.

These tables can help you identify products to use based on your targeted disease. As a reminder follow the label on harvest restriction as some products may have 30 to 45 days required between last fungicide application and harvest.

Luckily, most of our wheat is still a few weeks from flower, but this should be a warning to keep an eye on your fields. Those most at risk would be fields that were planted to a Fusarium head blight susceptible variety or those with limited rotation that follow a previous crop of wheat or corn.

Cressleaf Groundsel (Packera glabella)

(Marcelo Zimmer) & *(Bill Johnson)*

Every spring we receive several calls and e-mails about a certain 3-foot tall weed with yellow flowers. This year, cressleaf groundsel is slower to develop, presumably because of the extended cold and wet weather which has not allowed much field work (spring tillage or burndowns for no-till) to proceed. This article is intended to provide information on the biology and life cycle of cressleaf groundsel, as well as how to control it in fields and pastures.

Biology and Identification

Cressleaf Groundsel is a winter annual weed that has been becoming more prevalent in Indiana pastures and agronomic crop ground over the past decade. The small seeds produced by this weed allow it to thrive in reduced and no-till systems as well as poorly established pastures. Cool and wet springs of the past few years have also favored cressleaf groundsel, as it is a weed that prefers moist soils and typically struggles in hot and dry weather.

Much like most winter annual weeds, cressleaf groundsel emerges as a rosette in the fall then bolts, flowers, and produces seed in the spring. Basal rosette leaves are deep pinnate serrations with roundly lobed leaf margins. Leaves are typically 2 to 10 inches in length (Britton and Brown 1970). Bolting stems are hollow and can reach up to three feet in height with inflorescences that contain six to twelve yellow ray flowers that are often compared to the flowers of common dandelion. When looking for cressleaf groundsel in older weed id or taxonomic guides be aware that it has traditionally been placed in the *Senecio* genus and only recently was placed into the *Packera* genus.

Toxic Properties

The competitiveness of cressleaf groundsel with agronomic crops has not been researched, though its presence as a winter annual in no-till fields will have the same implications of slowing soil warming and drying as other winter annual weeds. The presence of this weed in pastures and hay fields should be of more concern as it does contain toxic properties when ingested by livestock. Leaves, flowers, and seeds of cressleaf groundsel contain alkaloids that will cause liver damage in livestock that is termed seneciosis and typically occurs on a chronic level (Kingsbury 1964). Symptoms of seneciosis are loss of appetite, sluggish depressed behavioral patterns, and in extreme cases aimless walking without regard to fences or structures. Although cressleaf groundsel is not as toxic as many of its relatives in the *Packera* genus, livestock producers encountering this weed in pastures or hay should take steps to avoid prolonged ingestion by animals.

Control

Herbicide applications for control of cressleaf groundsel are most effective when applied to plants in the rosette stage. Plants that are larger, or bolting are very difficult to control with herbicides. Infestations in pastures can be controlled with 2,4-D or a combination of 2,4-D and dicamba applied to rosettes in the fall or early spring prior to bolting (Nice 2008). Producers should be aware that applications of these herbicides will also kill favorable broadleaves (legumes) that are present in pastures.

Control recommendations for cressleaf groundsel in no-till agronomic crop fields has typically been to apply 2,4-D @ 1 qt/A to actively growing rosettes in the fall. Research at University of Illinois (Lake and Hager 2009) has shown that fall or spring applications to 2-8 inch diameter rosettes with the following herbicides and rates can achieve 94% or greater control of cressleaf groundsel. We have observed that control of cressleaf groundsel with spring burndowns can be challenging if the plants are large and spray applications are made in cool weather. In situations like this, we often observe severe injury and necrosis of leaves, but new growth will appear from live buds on the plant. In some instances, resprays are needed to finish off the cresseleaf groundsel.

References:

Britton, N. and A. Brown. 1970. An Illustrated Flora of the Northern United States and Canada. Volume 3. Dover Pulbications, Inc., New York. Pp 540-544.

Kingsbury K.M. 1964. Poisonous Plants of the United States and Canada. Pentice-Hall, Inc., Englewood Cliffs, N.J. pp 425-435

Lake, J.T. and A.G. Hager. 2009. Herbicide Selection and Application Timing for Control of Cressleaf Groundsel (Packera glabella). Weed Technol. 23:221-224

Nice, G. 2008. Guide to Toxic Plants and Forages. Purdue Extension Pulbication WS-37

Cressleaf groundsel. (*Photo credit: Joe Ikley*)

Detail of cressleaf groundsel flowers. (*Photo Credit: Joe Ikley*)

Optimum Plant Populations for Delayed Planting of Corn

(Bob Nielson)

The prospect of delayed planting of corn leads corn growers to consider whether changes in seeding rate should be made in response to late planting. The short answer is that optimum plant populations probably remain the same regardless of planting date. Based on 95+ field scale trials conducted around Indiana since 2008 (Nielsen et al., 2019), the average economically optimum HARVEST plant population is surprisingly low for most soils around the state (less than 30,000 plants per acre) and also surprisingly applicable to a wide range of grain yield levels (between about 150 and 250 bu/ac).

Planting dates among those 95+ trials varied by chance from as early as April 15 to as late as June 8. There is no obvious relationship between economic optimum plant population and planting date among those field scale trials (Fig. 1). What that means is that optimum populations for early-planted trials were essentially the same as those for later planted trials.

That conclusion supports what other researchers have also reported over the years in Ohio (Lindsey et al., 2015), Illinois (Nafziger, 1994), and Minnesota (Van Roekel & Coulter, 2011). In both the Ohio and Minnesota research, there was the occasional interaction between planting date and plant population, but overall those studies concluded there was little reason to increase seeding rates with delayed planting.

One caveat to remember is that soils are typically warmer with delayed planting than for "early" planting. Germination, emergence, and stand establishment will occur more rapidly (calendar time basis) with delayed planting and the percentage of planted seeds that become harvestable plants typically is higher (i.e., higher percent stand success). In other words, you may be able to achieve the same desired final population with a slightly lower seeding rate in delayed plantings and save a little on seed costs.

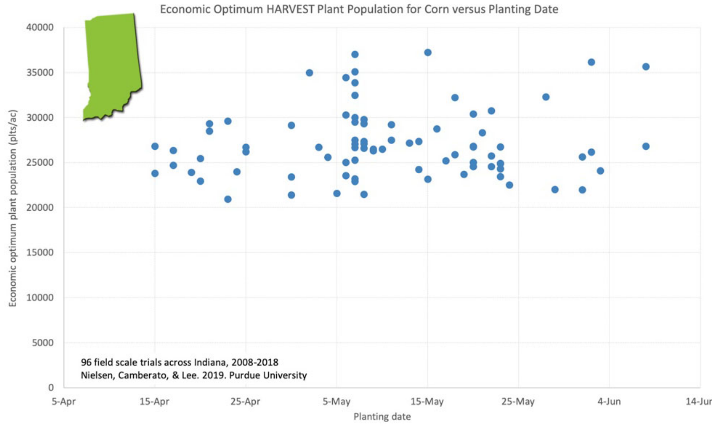


Figure 1. Economic optimum HARVEST plant population for corn versus planting date. Derived from 95+ field scale trials conducted across Indiana, 2008 to date.

Related reading

Lindsey, A. J., P. R. Thomison, R. Mullen, and A. B. Geyer. 2015. Corn Response to Planting Date as Affected by Plant Population and Hybrid in Continuous Corn Cropping Systems. Crop, Forage & Turfgrass Management 1:2014-0073. doi:10.2134/cftm2014.0073

Nafziger, E. D. 1994. Corn Planting Date and Plant Population. J. Prod. Agric. 7:59-62. doi:10.2134/jpa1994.0059

Nielsen, R.L. (Bob), Jim Camberato, and Jason Lee. 2019. Yield Response of Corn to Plant Population in Indiana. Agronomy Dept, Purdue Univ. http://www.kingcorn.org/news/timeless/CornPopulations.pdf [URL accessed May 2019]

Van Roekel, R. J., and J. A. Coulter. 2011. Agronomic Responses of Corn to Planting Date and Plant Density. Agron. J. 103:1414-1422. doi:10.2134/agronj2011.0071

Acknowledgements

The field scale research summarized in this update was partially supported by funds from the Indiana Corn Marketing Council, the Purdue Mary S. Rice Farm Fund, and the Indiana Certified Crop Adviser Program. Donation of seed corn by Becks Hybrids, DuPont-Pioneer and Stine Seed Company for field trials at Purdue Ag. Research Centers is gratefully acknowledged. Finally, the collaboration of the participating farmers, crop consultants, retail agronomists, county Extension Educators, and Purdue Ag. Research Center personnel is gratefully acknowledged.

Emergence Failure of Corn

(Bob Nielson)

Successful stand establishment of a corn crop relies on many factors, including the successful emergence of the seedlings in the first place. Seedling emergence occurs as a result of elongation of the mesocotyl that elevates the coleoptile or “spike” toward the soil surface. If successful, the appearance of the coleoptile at or near the soil surface is synchronized with the emergence of the first true leaf from inside the coleoptile.

Successful emergence of leaves from the coleoptile.

The mesocotyl is the white tubular stem-like plant part located between the kernel and the base of the coleoptile. Technically, the mesocotyl is the first true stem internode of the young corn seedling. As the coleoptile nears the soil surface, exposure to the red wavelengths of solar radiation causes a change in the supply of one or more growth hormones from the coleoptile to the mesocotyl tissue and mesocotyl elongation comes to a halt (Vanderhoef & Briggs, 1978).

If mesocotyl elongation and/or coleoptile emergence are compromised, the emergence of the leaves from the coleoptile may occur underground and the leaves remain trapped by the soil. Such “leafing out underground” is obviously viewed with great consternation by growers who were hopeful for perfect emergence of their crop. Emergence failure directly reduces the productive plant population; one of the major yield components of corn, and so grain yield potential may be unacceptably decreased if the productive plant population is substantially lower than the optimum population. Uneven seedling emergence and/or development effectively also decreases the productive plant population. See Nielsen et al. (2019) for guidelines on optimum plant populations for corn in Indiana.

Failure to emerge successfully can be caused by failure of the germination process itself, failure of the mesocotyl to successfully elongate and/or by soil restrictions that hinder successful penetration of the soil by the coleoptile. In extreme cases, elongation of the mesocotyl fails miserably, resulting literally in corkscrewed fiascos. Often, more than one of the following causal factors exist in a problem field and usually interact with each other to amplify the problem.

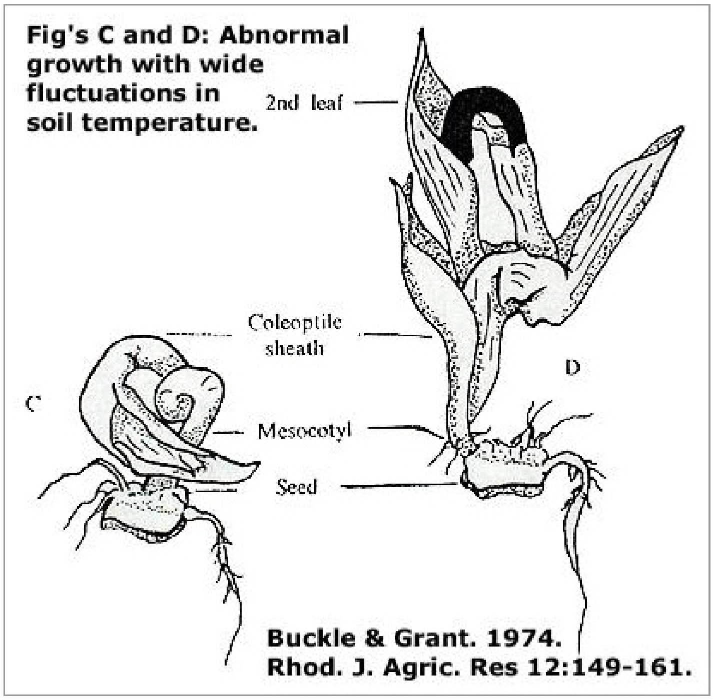
Herbicide Injury: Certain herbicides, notably cell growth inhibitors like acetochlor, can affect seedling shoot development especially if weather or soil conditions are not conducive for rapid seedling growth. See Hartzler and Anderson (2018) for more information. However when herbicide injury is suspected to be a contributing factor, cool soils and dense soil crusting are often also contributing factors, so is difficult to pin the blame completely on the herbicide injury.

Insect Injury: Certain soil-borne insects like seedcorn maggots (*Delia platura*) and wireworms (*Agriotes*, *Limonius*, etc. spp.) occasionally feed on corn kernels in the seed furrow, destroying or injuring the embryo in the process. Kernel symptoms from this type of injury are fairly obvious. See linked sites below in the Reading List for more information.

Disease Injury: Fungicidal seed treatments effectively prevent most seed rots and seedling blights for 2 to 3 weeks after planting. However, once the seed treatments deteriorate with time, fungal diseases like Pythium and Fusarium may infect the seed or young seedling, causing stunted development or outright death (Sweets, 2015). Kernel or seedling symptoms from these types of diseases are fairly easy to identify.

Kernel Position in Furrow: The coleoptile, the protective covering for the plumule leaves, emerges from the embryo side of the kernel and elongates in the direction of the dent end of the kernel by virtue of the elongation of the mesocotyl. The position of the kernel in the furrow with respect to the embryo face therefore directly influences the initial location where the coleoptile emerges. If the kernel lands with the embryo face down in the furrow, the coleoptile emerges on the bottom side of the kernel, elongates horizontally until the mesocotyl “clears” the end of the kernel, then finally begins its upward ascent. Such an “upside-down” beginning might contribute to a seedling’s susceptibility to other corkscrewing causal factors.

Restricted Emergence: Corkscrewed mesocotyl/coleoptile development can occur when the coleoptile encounters resistance as the mesocotyl elongates. Severe soil crusting or otherwise dense soil surface and cloddy soil surfaces can cause such resistance. A combination of severe sidewall compaction plus press wheel compaction over the furrow can also restrict coleoptile emergence and force the mesocotyl to elongate in unusual directions.



Figures C and D: Abnormal growth with wide fluctuations in soil temperature.

Cold Soils: Cold soils and/or wide fluctuations in soil temperatures throughout the day during the emergence process are also thought to be major contributing factors for the development of "corkscrewed" mesocotyl development (Buckle & Grant, 1974). The nature of the cold temperature injury appears to be damage to the outer surface layers of the mesocotyl. The elasticity of the damaged tissue is less than healthy tissue. The "corkscrew" elongation of the mesocotyl occurs when the tissue damage occurs unevenly around the circumference of the mesocotyl. The exact minimum soil temperatures that can cause such corkscrewed development are not clearly documented, but clearly it is not uncommon in Indiana for daily soil temperatures to dip as low as 40F (4.5C) during April and early May. Furthermore, bright sunny days can elevate bare soil temperatures quite high but still drop quite low the following night and thus result in a wide diurnal fluctuation in soil temperatures. Dry soils would be more prone than wetter soils to wide swings in daily soil temperatures.

Imbibitional Chilling Injury: Cold temperature injury that results in corkscrewed mesocotyls is not exactly the same as that which is referred to as "imbibitional chilling" injury. The latter refers to cold injury to the seed that occurs during the first 24 to 36 hours after planting as the dry seed imbibes (aka absorbs) water. The seed naturally swells in response to the imbibition of water. Cold seed cell tissue is less elastic and subject to rupturing as the seed swells. The threshold seed tissue temperature below which imbibitional chilling injury may occur is not clearly defined in the research literature, but appears to be temperatures cooler than 50F (10C). The most common symptom of imbibitional chilling damage is often simply swollen seed with little to no evidence of sustained germination progress. In contrast, seedlings with corkscrewed mesocotyls probably germinated successfully and **subsequently** experienced cold temperature injury to the mesocotyl tissue that interfered with normal mesocotyl elongation.

Related reading

Buckle, Janet and Penelope Grant. 1974. Effects of Soil Temperature on Plumule Growth and Seedling Emergence of Maize (Zea mays L.). Rhod. J. Agric. Res. 12: 149-161.

Hartzler, Bob and Meaghan Anderson. 2018. May Maize Maladies. Integrated Crop Management, Iowa State Univ. https://crops.extension.iastate.edu/blog/bob-hartzler-meaghan-anderson/may-maize-maladies [URL accessed Apr 2019]

Licht, Mark and Clarke McGrath. 2014. Imbibitional Chilling and Frost Damage to Corn and Soybean Seedlings. Integrated Crop Management News, Iowa State Univ. https://crops.extension.iastate.edu/cropnews/2014/05/imbibitional-chilling-and-frost-damage-corn-and-soybean-seedlings [URL accessed Apr 2019].

Nielsen, RL (Bob). 2014. The Emergence Process in Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/Emergence.html [URL accessed Apr 2019].

Nielsen, RL (Bob), Jim Camberato, and Jason Lee. 2019. Yield Response of Corn to Plant Population in Indiana. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/CornPopulations.pdf [URL accessed Apr 2019]

Purdue IPM. Seedcorn Maggot. Purdue Univ. Field Crops IPM. https://extension.entm.purdue.edu/fieldcropsipm/insects/corn-seedcorn-maggot.php [URL accessed Apr 2019]

Purdue IPM. Wireworms. Purdue Univ. Field Crops IPM. https://extension.entm.purdue.edu/fieldcropsipm/insects/corn-wireworms.php [URL accessed Apr 2019]

Sweets, Laura. 2015. Seed Decay and Seedling Blights of Corn. Integrated Pest Management, Univ. of Missouri. https://ipm.missouri.edu/ipcm/2015/5/Seed-Decay-and-Seedling-Blights-of-Corn [URL accessed Apr 2019]

Vanderhoef, Larry N., and Winslow R. Briggs. 1978. Red Light-inhibited Mesocotyl Elongation in Maize Seedlings. I. The Auxin Hypothesis. Plant Physiology 61: 534-537.

Natural curved elongation of the mesocotyl due to seed placed embryo face down in the furrow.

Deformed cesocotyl elongation caused primarily by seed furrow compaction.

Partial leafing out underground; caused primarily by dense surface soil crust.

Leafing out underground; caused primarily by dense surface soil crust.

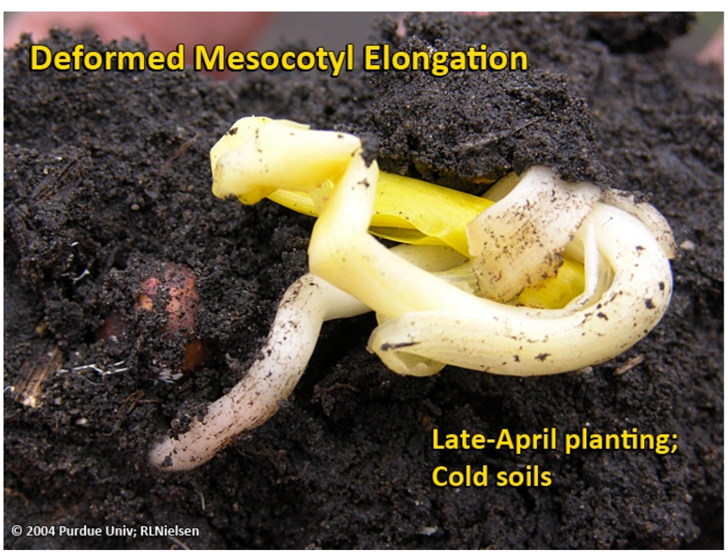
Deformed mesocotyl elongation caused primarily by cold soil temperatures.

Leafing out underground; caused primarily by dense surface soil crust.

Deformed mesocotyl elongation caused primarily by cold soil temperatures.

Deformed mesocotyl elongation caused primarily by cold soil temperatures.

Deformed mesocotyl elongation caused primarily by cold soil temperatures.

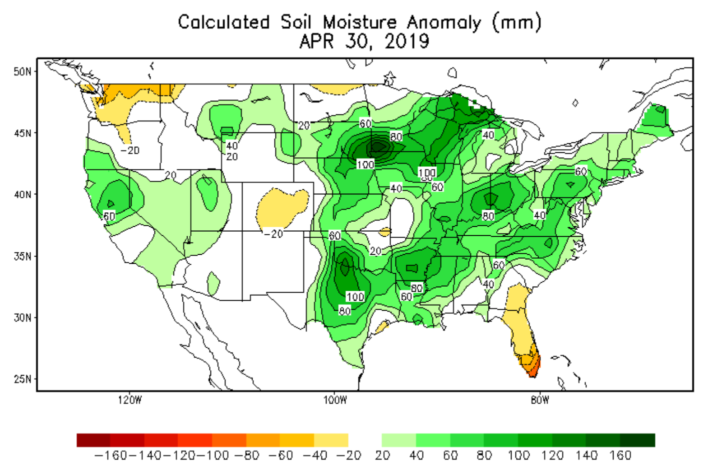


Deformed mesocotyl elongation caused primarily by cold soil temperatures.

Indiana Climate and Weather Report – 5/1/2019

(Beth Hall)

Rain, rain, go away! I hesitate to scream that too loud, though, for fear of a drought. That seems to be the weather and climate, these days – one extreme or another. For temperature, April finished close to normal. However, it was characterized by temperatures that seemed either too cool or too warm. Precipitation, on the other hand, was on the wetter side for the month with southern and eastern parts of the state receiving over 175% of normal April amounts. Will this continue? For the next several weeks, there is strong confidence that precipitation will remain above normal. Temperatures will likely start off cool and then become warmer near the end of next week. The climate outlooks for May are showing increasing probabilities of warmer temperatures with above-normal precipitation. According to the National Oceanic and Atmospheric Administration's Climate Prediction Center's Soil Moisture product, as of 30 April 2019, most of Indiana is showing around 600mm of soil moisture – or 60-80mm above average (Figure 1)! No need to start irrigating those fields quite yet (Figure 2).




Taken in Knox County on the "banks" of the White River. (*Photo credit: Hans Schmitz*)

Pest&Crop newsletter © Purdue University - extension.entm.purdue.edu/newsletters/pestandcrop
Editor: Tammy Luck | Department of Entomology, Purdue University, 901 W. State St., West Lafayette, IN 47907