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Insects, Mites, And Nematodes

Alfalfa Weevil Development Continues Northward, Management Problematic – (Christian Krupke and Larry Bledsoe)

Warmer conditions have accelerated alfalfa weevil development in the northern Indiana Counties, see accompanying map, "Accumulated Heat Units (Base 48)." Scouting for weevil damage is encouraged at 200 or more heat units. As previously mentioned, alfalfa cutting and/or weevil management has been a challenge this soggy spring. Refer to last week's management guidelines and recommended insecticides.

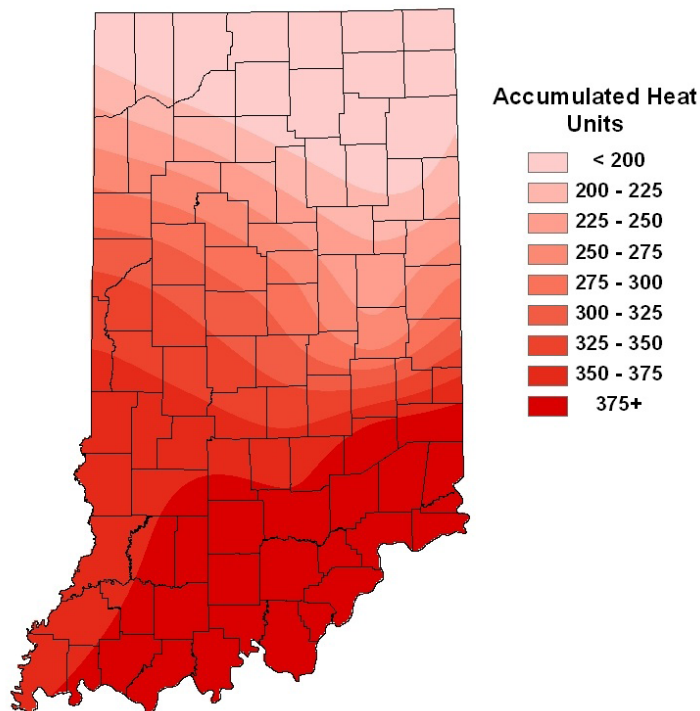
Silver lining within our dark clouds: David Trotter, Clark County CES, inspected some fields this week and found discolored (yellowish to brown) alfalfa weevil larvae. It is likely that these larvae are infested with the insect fungal pathogen, *Zoophthora phytonomi*. One of many fungi that attack and kill insects, this disease has occurred because of the abundance of moisture we have received. Once this disease is established in a field with high humidities, weevil larvae can quickly diminish. Unfortunately, weevil



Brownish weevil, in the middle, is diseased and dying.

populations are usually pretty high before this disease is effective at controlling them, so we cannot rely upon it for control.

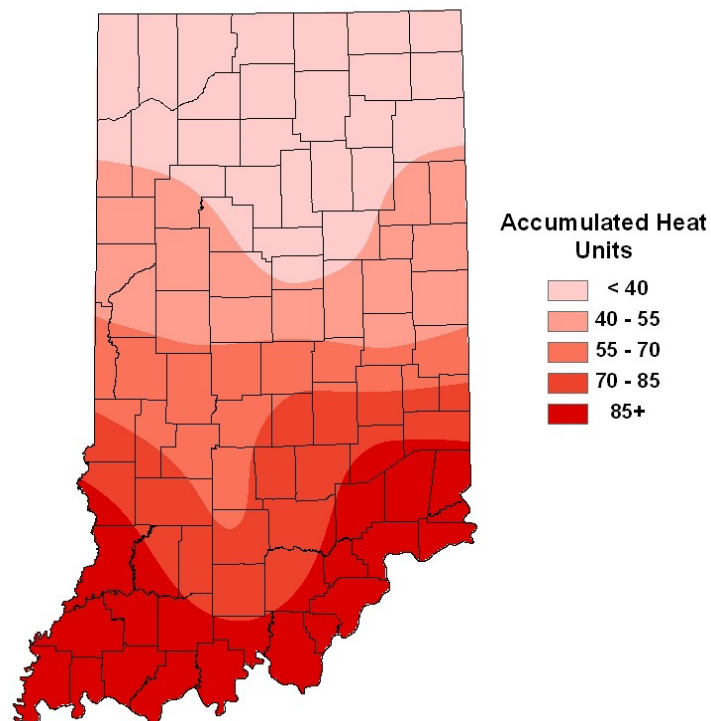
Accumulated Heat Units (Base 48) Since January 1



Data Provided by Indiana State Climate Office
Web: <http://www.isclimate.org>



Accumulated Heat Units (Base 50) Since April 29, 2009



Nematode Updates - (Jamal Faghihi, Christian Krupke, and Virginia Ferris)

No Black Cutworms Yet...Very Little Corn Either – (Christian Krupke and John Obermeyer)

Two intensive black cutworm moth captures, 9 or more caught over a 2-night period, last week signaled for us to begin tracking heat units (Base 50), see following map. Based on the black cutworm's growth development model, it takes approximately 300 heat units (base 50°F) from egg hatch to early 4th instar; this is when black cutworm larvae begin to cut plants. Some leaf injury may be present before then.

In referring to the map, it is too early for black cutworm scouting. Unfortunately, only about 5% of the corn is planted, but weedy fields for egg laying are abundant. Consider the timing of corn emergence, yet to be planted, and the progression of cutworm development in the next week or two. The good news is that, except for a few very active pheromone traps, overall moth captures have been lower than typical. Stay tuned.

Most of you have already decided what soybean cultivars you are going to plant. If you have had problems with SCN in the past, you probably have chosen one or more of the "cyst-bean" cultivars to plant. You might need to pay closer attention to the source of resistance for these cultivars. As we indicated previously, field populations of SCN in Indiana are changing in ways that render less effective the most common source of resistance to SCN (PI 88788). Other researchers in the region have reported similar trends. Our collaborative NCRSRP-funded research indicated that Peking and PI437654 sources of resistance are still very effective sources of resistance to SCN in Indiana and you might want to consider these when choosing soybean cultivars.

To have a better understanding of the SCN distribution in Indiana, we travelled throughout Indiana in 2008 and collected many samples (supported by a one-year grant from ISA). However, we need additional samples from counties that are colored in red. We would like to encourage growers who farm in these counties to send us at least one sample from their farm. The customary processing charge of \$10/sample will apply but any additional work that we do with these samples will not be charged to you. We will expose these samples to the most common source of resistance, PI88788. If these samples qualify for HG type testing we

One might ask why further soil testing is needed if SCN is already known to be present. The answer to this question is that soil tests are the only way you can find out whether your SCN population is changing and whether your resistant variety is still working. All growers need to understand that changes in SCN field populations are gradual and one should not wait for drastic yield losses before finding out that a change in the SCN population has occurred. Growers can look for white and yellow SCN females on the roots about two months after planting. Or they can send soil plus root samples in the middle of the growing season to our nematology laboratory to determine the effectiveness of resistant varieties growing in the field. If race determination has been performed for a field population in the past, you might want to repeat the test after about four years of growing soybeans to measure any possible changes. If no profile exists, one must be established so future comparisons are possible. In short, planting SCN resistant varieties is not the final solution to the soybean cyst nematode problem. The management of this pest is an ongoing and dynamic operation requiring constant vigilance.

The best way to manage SCN over the years is to monitor your populations by sampling each field at least every four years. You can sample the soil anytime of the year and get an accurate understanding of the cyst population. This is a very crucial step in SCN management and should not be neglected. We provide this service to soybean growers at the cost of \$10/sample, for which the submitter will receive a bill unless we are instructed otherwise. For more information on other services that we provide you may visit the Nematology website: <http://www.entm.purdue.edu/nematology/>

If you have any questions about SCN or any other kinds of plant parasitic nematodes, you can contact Jamal Faghihi at 765-494-5901 or send an email to <jamal@purdue.edu>.



County/Cooperator	4/21/09 - 4/27/09							4/28/09 - 5/4/09						
	VC	BCW	ECB	SWCB	CEW	FAW	AW	VC	BCW	ECB	SWCB	CEW	FAW	AW
Dubois/SIPAC Ag Center	0	0	0	0	0	0	7	0	0	0	0	0	0	4
Jennings/SEPAC Ag Center	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Knox/SWPAC Ag Center	3	1	0	0	0	0	52	1	1	0	0	0	0	9
LaPorte/Pinney Ag Center	0	0	0	0	0	0	3	0	0	0	0	0	0	8
Lawrence/Feldun Ag Center	0	1	0	0	0	0	67	0	1	0	0	0	0	6
Randolph/Davis Ag Center	1	0	0	0	0	0	5	0	0	0	0	0	0	2
Tippecanoe/TPAC Ag Center	3	2	0	0	0	0	58	2	1	0	0	0	0	4
Whitley/NEPAC Ag Center	1	2	0	0	0	0	41							

VC = Variegated Cutworm, BCW = Black Cutworm, ECB = European Corn Borer, SWCB = Southwestern Corn Borer, CEW = Corn Earworm, FAW = Fall Armyworm, AW = Armyworm

Black Cutworm Adult Pheromone Trap Report
Week 1 = 4/23/09 - 4/29/09 Week 2 = 4/30/09 - 5/6/09

County	Cooperator	BCW Trapped		County	Cooperator	BCW Trapped	
		Wk 1	Wk 2			Wk 1	Wk 2
Adams	Roe/Mercer Landmark	0	1	Knox	Clinkenbeard/Ceres Solutions - West-phalia	0	2
Allen	Anderson/Garst Seed	0	2	Knox	Cardinal/SWPAC	0	2
Allen	Gynn/Southwind Farms	1	3	Lake	Kleine/Kleine Farms	12	9
Benton	Babcock/Ceres Solutions	3	4	Marshall	Barry/North Central Co-op	12	0
Clay	Kennedy/Ceres Solutions - Clay City	2	2	Newton	Babcock/Ceres Solutions	2	3
Clay	Mace/Ceres Solutions - Brazil	0	0	Newton	Busboom/Crop Guard Services		
Clinton	Foster/Purdue Entomology	26*	43*	Newton	Ritter/Newton Co. CES		0
Daviess	Venard/Venard Agri-Consulting	8	4	Putnam	M. Nicholson/Nicholson Consulting	18*	15*
Decatur	Gauck/Beck's Hybrids	1	0	Randolph	Boyer/DPAC	0	0
Elkhart	Kauffman/Crop Tech Inc.	4	1	Rush	Liggett/Pioneer Hi-Bred		
Fayette	Schelle/Spring Valley Farms	3	2	Rush	Liggett/Pioneer Hi-Bred		
Fountain	Mroczkiewicz/Syngenta	4	9*	Starke	Jensen/Pioneer	8	0
Fulton	Jenkins/North Central Co-op - Rochester	3	2	Starke	Wickert/Wickert Agronomy Services	0	0
Fulton	Jenkins/North Central Co-op - Kewanna	4	1	Sullivan	Baxley/Ceres Solutions - East	7	9
Greene	Meyers/Pioneer Hi-Bred	2		Sullivan	Baxley/Ceres Solutions - West	3	4
Hamilton	Beamer/Beck's Hybrids	3	16*	Tippecanoe	Obermeyer/Purdue Entomology	0	0
Hendricks	A. Nicholson/Nicholson Consulting	2	0	Tippecanoe	Schroeder/Monsanto Research Farm	0	2
Jasper	Overstreet/Jasper Co. CES	0	0	Tipton	Johnson/Pioneer Hi-Bred	3	13*
Jay	Shrack/Ran Del Agri Services	3	6	Warren	Babcock/Ceres Solutions	1	0
Jennings	Wahlman/SEPAC	0	0	White	Reynolds/ConAgra Snack Foods	0	0
Knox	Clinkenbeard/Ceres Solutions - Fritchton	0	0	Whitley	Walker/NEPAC	7	0

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

Plant Diseases

Fusarium Head Blight Update – (Kiersten Wise)

Wheat in far southern Indiana reached flowering (10.5.1) this week, and wheat throughout southern Indiana is in late boot stage or beginning to head. Wheat in central to northern Indiana is still variable, ranging from early boot to just past jointing (Feekes 7). In southern Indiana this is an important time to consider the risk for Fusarium head blight development in wheat.

Last week, we discussed the Fusarium head blight prediction model and disease management in the *Pest&Crop* Newsletter <<http://extension.entm.purdue.edu/pestcrop/2009/issue5/index.html#wheat>>. To summarize what we discussed last week, Fusarium head blight development depends largely on weather conditions,

primarily rainfall, humidity, and temperature. High humidity (80%), dew formation, frequent rainfall, and temperatures in the high 60s to mid 80s°F favor disease development. Weather conditions have been favorable for Fusarium head blight development in far southern Indiana, and growers should be checking the model to determine the approximate level of risk for their location <<http://www.wheatscab.psu.edu/>>. Additionally, it is important to scout fields in southern Indiana to determine the exact growth stage of wheat for optimum timing of any potential fungicide applications.

A few points to remember if fungicide applications are considered:

Fungicides should be applied at Feekes 10.5.1 for optimum control of Fusarium head blight. There are

several fungicides available for Fusarium head blight control. These products are listed in the fungicide table that we discussed last week <http://www.ppdl.purdue.edu/ppdl/wise/NCA_184wheatfungicides.pdf>. Caramba, Prosaro, and Proline were given a rating of “good” based on a designation system from the Regional Wheat Disease

Committee. Products containing only tebuconazole (Folicur, others) were rated as fair, and propiconazole alone (Tilt, others) was rated as poor for management of Fusarium head blight. Remember, DO NOT apply fungicides that have a strobilurin mode of action (Headline, TwinLine, Quadris, Quilt, Stratego) for Fusarium head blight control.

Agronomy Tips

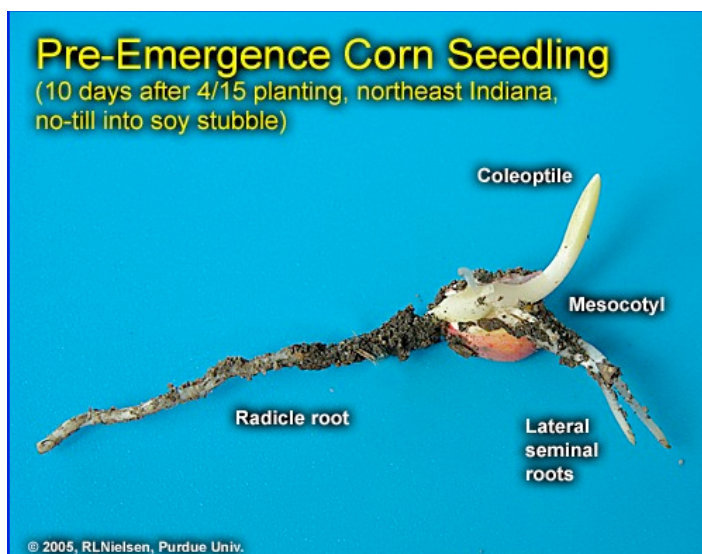
Germination Events in Corn - (Bob Nielsen)

Germination is the renewal of enzymatic activity that results in cell division and elongation and, ultimately, embryo emergence through the seed coat. Germination is triggered by absorption of water through the seed coat. Corn kernels must absorb (imbibe) about 30 % of their weight in water before germination begins. Less than optimum absorption of water (perhaps due to a rapidly drying seed zone) may slow or stop germination. Repeated wetting/drying cycles can decrease seed viability.

By comparison, soybeans must imbibe about 50 % of their weight in water. But since soybeans are approximately 2/3 the weight of corn kernels, the total amount of absorbed water required for germination is relatively similar.

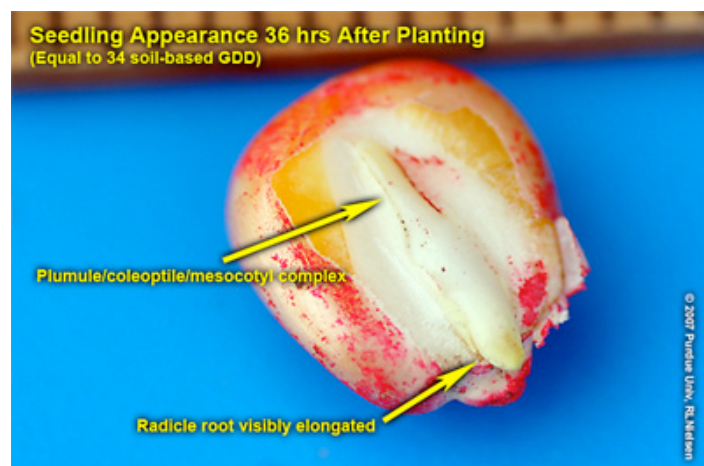
toward the dent end of the kernel by virtue of the elongation of the mesocotyl. The coleoptile is a rigid piece of plant tissue that completely encloses the four to five embryonic leaves (plumule) that formed during grain development of the seed production year. The plumule leaves slowly enlarge and eventually cause the coleoptile to split open as it nears the soil surface.

The **lateral seminal roots** emerge last, near the dent end of the kernel. Even though these and the radicle root are technically nodal roots, they do not comprise what is typically referred to as the permanent nodal root system. The first set of so-called “permanent” roots begins elongating at approximately the V1 leaf stage (1 leaf with visible leaf collar) and is clearly visible by V2.



The visual indicators of germination occur in a distinct sequence. The radicle root emerges first, near the tip end of the kernel, within two to three days in warm soils with adequate moisture. In cooler or drier soils, the radicle root may not emerge until one to two weeks after planting.

The **coleoptile** (commonly called the “spike”) emerges next from the embryo side of the kernel within one to many days of the appearance of the radicle, depending on soil temperature. The coleoptile initially negotiates its way



Seedling appearance 36 hrs (36 GDD) after planting.



Seedling appearance 72 hrs (67 GDD) after planting.

Click here to see more of the Visible Indicators of Germination in Corn <<http://www.agry.purdue.edu/ext/corn/news/timeless/GerminationGallery.html>>.

Troubleshooting Considerations

When temperatures are optimum, these three parts of the seedling may emerge from the kernel on nearly the same day. Excessively cool soils may delay the appearance of the coleoptile and lateral seminal roots for more than a week after the radicle root emerges. It is not uncommon in cold planting seasons to dig up kernels two weeks after planting and find only short radicle roots and no visible coleoptiles.

When excessively cold and/or wet soils delay germination and/or emergence, the kernel and young seedling are subjected to lengthier exposure to damaging factors such as soil-borne seed diseases, insect feeding and injury from pre-plant or pre-emergent herbicides and carryover herbicides from a previous crop.

Related References

Hick, Dale and Seth Naeve. Date unknown. The Corn Growers Field Guide For Evaluating Crop Damage And Replant Options. Univ. of Minnesota Ext. Service. [On-Line]. Available at <<http://www.soybeans.umn.edu/pdfs/CornGuide.pdf>>. (URL accessed 5/5/09).

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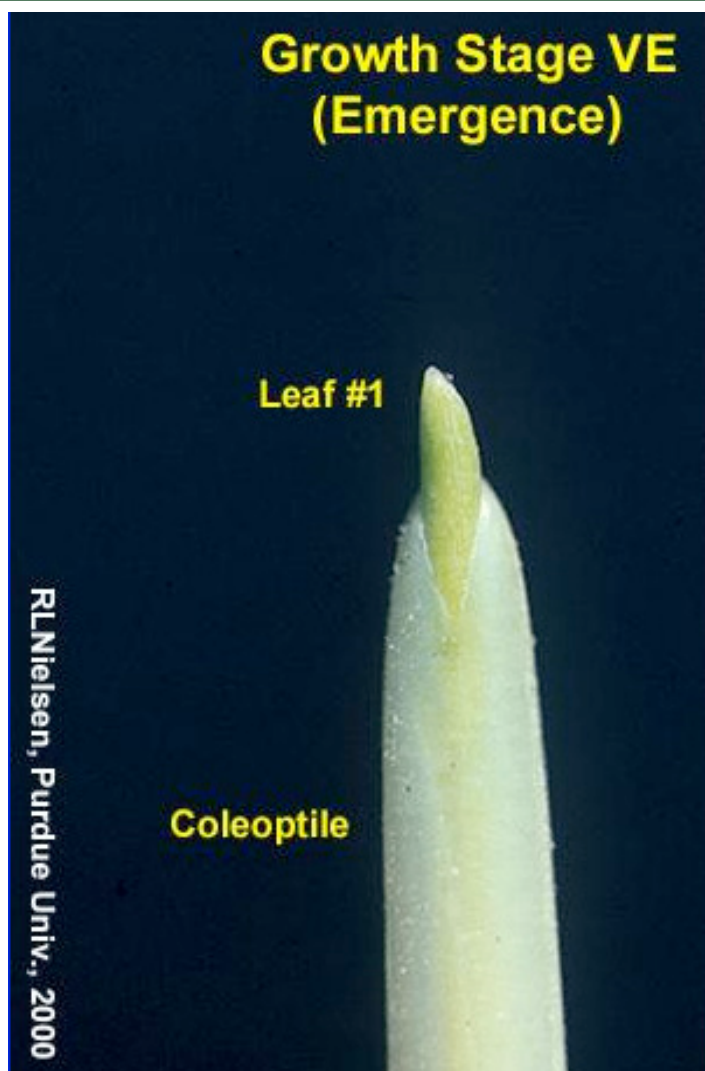
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The Emergence Process in Corn - (Bob Nielsen)

Successful germination alone does not guarantee successful emergence of a corn crop. The coleoptile must reach the soil surface before its internal leaves emerge from the protective tissue of the coleoptile. Growth stage VE refers to emergence of the coleoptile or first leaves through the soil surface (Ritchie et. al., 1993).

As with all of corn growth and development, germination and emergence are dependent on temperature, especially



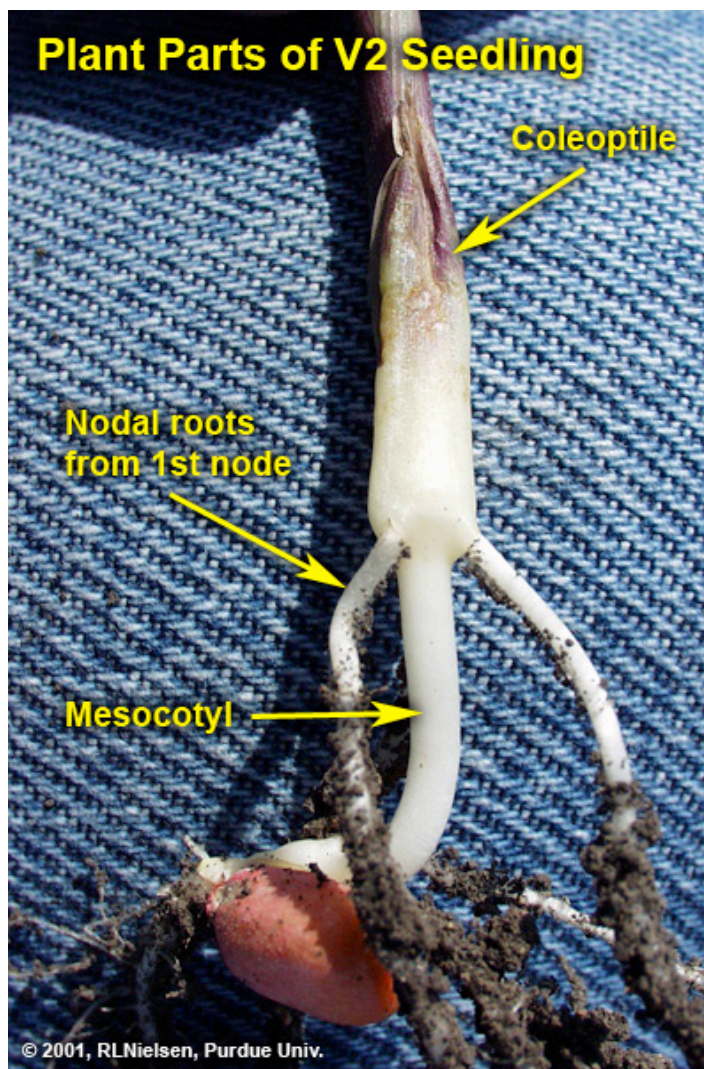
Emergence of inner leaves through split tip of coleoptile.

soil temperature. Corn typically requires from 100 to 120 GDD (growing degree days) to emerge. Under warm soil conditions, the calendar time from planting to emergence can be as little as 5 to 7 days. Under cold soil conditions, emergence can easily take up to four weeks.

Elongation of the **mesocotyl** elevates the coleoptile towards the soil surface. The mesocotyl is the tubular, white, stemlike tissue connecting the seed and the base of the coleoptile. Technically, the mesocotyl is the first internode of the stem.

Useful Tip: Physiologically, mesocotyls have the capability to lengthen from at least a 6-inch planting depth. Realistically, corn can be planted at least three inches deep if necessary to reach adequate moisture.

As the coleoptile nears the soil surface, exposure of the mesocotyl to the red light portion of the solar radiation spectrum halts mesocotyl elongation. Continued expansion of the leaves inside the coleoptile ruptures the coleoptile tip, allowing the first true leaf to emerge above the soil surface. Since the depth at which the mesocotyl senses red light is fairly constant, the resulting depth of the crown (base) of the



coleoptile is nearly the same (1/2 to 3/4 inch) at seeding depths of one-inch or greater.

Useful Tip: When corn is seeded very shallow (less than about 1/2 inch), the crown of the coleoptile will naturally be closer to the soil surface if not right at the surface. Subsequent development of the nodal root system can be restricted by exposure to high temperatures and dry surface soils.



Coleoptile tissue removed to reveal inner leaves of the plumule.

Click here to see more Coleoptile appearance during emergence <<http://www.agry.purdue.edu/ext/corn/news/timeless/ColeoptileGallery.html>>.

Troubleshooting Considerations

Several factors can cause the coleoptile to split prematurely, allowing the leaves to emerge underground. Usually, more than one of the following factors are present when this problem occurs, making it difficult to place the blame on any one factor.

Exposure to light at deeper soil depths than usual due to cloddy seedbeds, dry seedbeds, sandy soils, or open slots in no-till.

Injury from certain herbicides, particularly under stressful environmental conditions. Symptoms include corkscrewed coleoptile, swollen mesocotyl and true leaves emerged from side of coleoptile.

Surface crusting, cloddy seedbeds, rocky seedbeds, planter furrow compaction, or otherwise dense surface soil that physically restrict mesocotyl elongation and coleoptile penetration. The pressure of the expanding leaves within the coleoptile eventually ruptures the side of the coleoptile. Symptoms include corkscrewed coleoptile, swollen mesocotyl and true leaves emerged from side of coleoptile. Note the similarity to those symptoms from herbicide injury.

Cold temperature injury, either from exposure to long periods of soil temperatures around 50°F or from exposure to wide daily swings (25 to 30°F) in soil temperatures. Symptoms include absence of emerged coleoptile, corkscrewed mesocotyl or coleoptile and true leaves emerged from side of coleoptile. Note the similarity to those symptoms from herbicide injury.

Useful Tip: The mesocotyl should remain firm, white and healthy through at least the 6-leaf stage, if not longer. If it is mushy, discolored, or damaged prior to this stage, then it is likely part of the crop problem being investigated.

Related References

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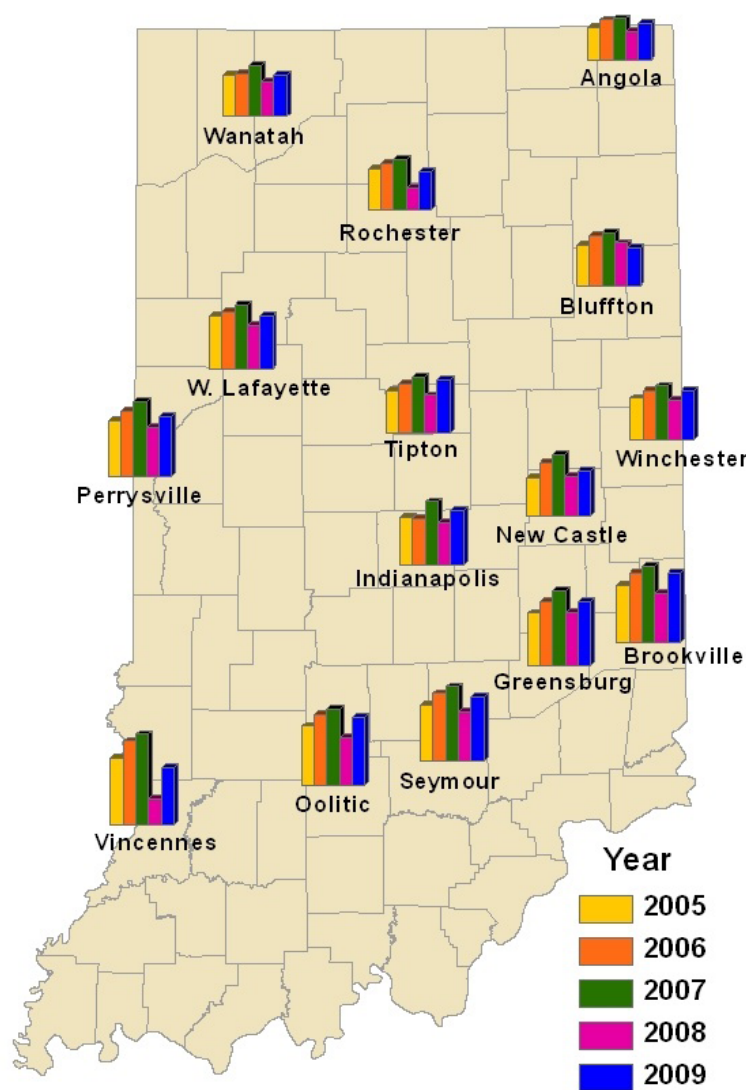
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Weather Update

Accumulated Growing Degree Days (86/50) Since January 1



Data Provided by Indiana State Climate Office
Web: <http://www.iclimat.org>

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