Pest & Crop

May 24, 2002 - No. 10

In This Issue

Insects, Mites, and Nematodes

Soil Insecticides for Late Corn Planting - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

Corn planted between now and early June and where rootworms are likely to be a problem should still receive an insecticide application to protect roots. If applying a granular soil insecticide, using 3/4 the labeled rate of some products (Counter CR and Lorsban 15G best candidates) should provide adequate rootworm protection. This will help reduce pesticide handling time and costs per acre. If using reduced rates, it is important that:

- Insecticide applicators on planters be precisely calibrated and set up to deliver the insecticide at the targeted rate and proper location.
- The rate not be reduced by more than 25% below the labeled rate.

Producers who experiment with reduced rates do so with the understanding that they are solely responsible for the performance of the product. Other soil insect pests may not be controlled with reduced insecticide rates. Data for liquid soil insecticides (i.e., Capture, Furadan, and Regent) used at reduced rates are not available. The consistency of performance of these liquid products has been erratic at full rates so lowering the rate is not recommended.

Corn planted after June 10 is less likely to need a soil insecticide for rootworm protection. Egg hatch should be nearly complete at this time and larvae will have starved to death moving about the soil trying to find corn roots.

• • P&C • •

Continue to Watch for Bean Leaf Beetle as Soybean Emerge - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- Overwintering beetles are a threat to emerging soybean
- Beetles may not be a problem later in the season

Bean leaf beetle have been observed in early-planted bean fields in several areas of the state. Although a limited number of fields were planted early, those that were probably have beetles present. Since we have very few "early" soybean fields this year, this should mean fewer early season bean leaf beetle problems. This could also mean that late season problems may be reduced.

Over the past 15 or so years, we have noted that late-planted soybean had less bean leaf beetle pod feeding damage than early planted beans. We will continue to watch this situation and if it changes from what we have described above, an alert will follow.

• • P&C • •

Stink Bugs in Corn - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

- Stink bugs are seldom seen, but damage can be dramatic when bugs are present
- Late planting into wet soils where seed furrow doesn't close favors stink bug problems
- Rescue treatments must be used before damage appears

Extremely late corn planting into soils that are too wet leaves the door open for stink bug damage. Southern Indiana counties are at greatest risk from this little seen pest. The situation that seems to favor the development of stink bug problems the most is where corn is no-tilled following small grains used as a winter cover crop or where planted into very weedy fields. When the cover crop or weeds are killed by herbicides, the stink bugs shift their feeding to the emerging corn.

Stink bugs feed on corn by inserting their straw-like beak into the stalk while injecting an enzyme, which helps digest plant tissue. They prefer to feed in the area of the growing point. When seed slots are not properly closed during planting, stink bugs may feed on this vital tissue. It is important to remember that spiking corn plants are most vulnerable to attack and damage. By the time feeding symptoms appear, the damage has been done and the stink bugs are long gone. Symptoms vary from linear holes in the leaves, twisted or deformed stalks, plant suckering, and occasionally plant death. This damage can often be confused with many other causes, e.g., herbicide injury, rotary hoe, billbugs, etc.

Sampling for stink bugs is difficult and time-consuming. High-risk fields with prior history of stink bug damage and/or where stink bugs are noted during corn emergence, especially if seed-slots are not properly closed, may require a rescue treatment of a foliar insecticide. Mustang (2.9 – 4.3 fl. oz/A), Penncap-M (1-3 pt./A) or Warrior (2.5-3.8 fl. oz/A) are labeled for stink bug control in corn. Read and follow label directions and restrictions!

• • P&C • •

Insect Notes – (*John Obermeyer*) –

Ron Blackwell, IPM Survey Specialist, and Todd Hutson, Vermillion County Extension Educator, surveyed emerged fields on May 21 for critters. The only damage noted was from frost and deer stepping on corn. Other than alfalfa weevil, no reports of economic insect damage in Indiana have been received this week. So far…so good!

• • P&C • •

Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	5/7/02 - 5/13/02							5/14/02 - 5/20/02						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	3	6	0	0	0	0	62	0	0	0	0	0	0	3
Dubois/SIPAC	1	0	3	0	0	0	4	0	0	0	0	1	0	1
Fountain/Mroczkiewicz	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jennings/SEPAC	0	0	2	0	0	0	4	0	0	4	0	1	0	6
Knox/SWPAC								0	1	3	1	0	0	4
LaPorte/Pinney Ag Center	0	0	0	0	0	0	9	0	0	0	0	0	0	8
Lawrence/Feldun Ag Center	1	0	3	0	1	0	24	0	0	0	0	0	0	1
Randolph/Davis Ag Center	0	1	0	0	0	0	64							
Tippecanoe/TPAC	0	0	0	0	0	0	30	0	0	0	0	0	0	4
Vermillion/Hutson	0	0	0	0	0	0	4	0	1	0	0	0	0	0
Whitley/NEPAC	0	7	0	0	0	0	183							

BCW = Black Cutworm ECB = European Corn Borer GC = Green Cloverworm CEW = Corn Earworm
AW = Armyworm FAW = Fall Armyworm VC = Variegated Cutworm

Black Cutworm Adult Pheromone Trap Report
Week 1 = 5/9/02 - 5/15/02 Week 2 = 5/16/02 - 5/22/02
(Ron Blackwell)

County	Cooperator	BCW Trapped		County	Cooperator	BCW Trapped	
		Wk 1	Wk 2			Wk 1	Wk 2
Adams	Roe/Price Ag Services	9	12*	Knox	Smith/Growers Co-op (Whtlnd 2)	0	10*
Bartholomew	Weinantz Farm/Pioneer	0	8	Lake	Kliene (1)	4	5
Clay	Smith/Growers Co-op (Bzl)	12*	1	Lake	Kliene (2)	3	9
Clay	Smith/Growers Co-op (CC)	0	10	Marshall	Barry/Marshall Co. Co-op	10*	4
Clinton	Blackwell/Purdue	19*	21*	Parke	Rule/Midland Co-op	15*	5
Decatur	Miers Farm/Pioneer	11*	30*	Porter	Mueller/Agriliance	0	0
Fayette	Schelle/Falmouth Farm Supply	9*	10	Randolph	Jackson/Davis-Purdue Ag Center (S)	3	0
Fountain	Mroczkiewicz/Syngenta	0	1	Randolph	Jackson/Davis-Purdue Ag Center (N)	0	0
Fountain	Hutson/Purdue	0	0	Rush	Peggs/Pioneer	7	25*
Hendricks	Whicker/Midland Co-op	0	3	Sullivan	Smith/Growers Co-op (W)	5	0
Henry	Schelle/Falmouth Farm Supply	10*	16	Sullivan	Smith/Growers Co-op (E)	24*	8
Jasper	Manning/Jasper Co. Extension (S)	0	0	Sullivan	Smith/Growers Co-op (N. Lebanon)	0	20*
Jasper	Manning/Jasper Co. Extension (W)	4	2	Tippecanoe	Obermeyer/Purdue	15	4
Knox	Smith/Growers Co-op (Oaktown)	4	6	Vermillion	Hutson/Vermillion Co. Ext. (N)	0	1
Knox	Smith/Growers Co-op (Edwardsport)	20*	1	Vermillion	Hutson/Vermillion Co. Ext. (S)	0	0
Knox	Smith/Growers Co-op (Whtlnd 1)	3	1	Vigo	Smith/Growers Co-op	16*	1

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

Plant Diseases

Yellow Dwarf in Wheat and Oats - (*Gregory Shaner*)

- Aphids were busy last fall spreading the two viruses that cause yellow dwarf in wheat

In an earlier issue of *Pest&Crop*, I speculated that yellow dwarf might be widespread in wheat this year because of the mild weather that persisted late into last autumn. Aphids transmit *Barley yellow dwarf virus* and *Cereal yellow dwarf virus* to small grains. They can do this in the autumn or the spring. Autumn infection generally causes more damage to winter wheat than spring infection. The warm weather last autumn meant a long period during of activity for aphids. It appears that yellow dwarf is indeed more severe than normal in many wheat fields. Affected plants are shorter than nearby healthy plants. They have short, erect flag leaves, fewer tillers, and smaller heads than healthy plants. Tips of leaves are yellow or red. Varieties differ markedly in the incidence and severity of yellow dwarf. In a wheat variety trial near Vincennes, IN, the percentage of symptomatic plants ranged from 3 to 80% among varieties that I rated about 10 days ago. Yield losses from yellow dwarf are reported to fall in the range of 5 to 25%. I suspect that the varieties with a high incidence of yellow dwarf will yield poorly this summer.

• • P&C • •

Late-planted Corn and Prospects for Gray Leaf Spot - (*Gregory Shaner*) –

- With so little of Indiana's corn in the ground, it seems early to talk about leaf blights, but the late planting may be setting the stage for a problem this summer

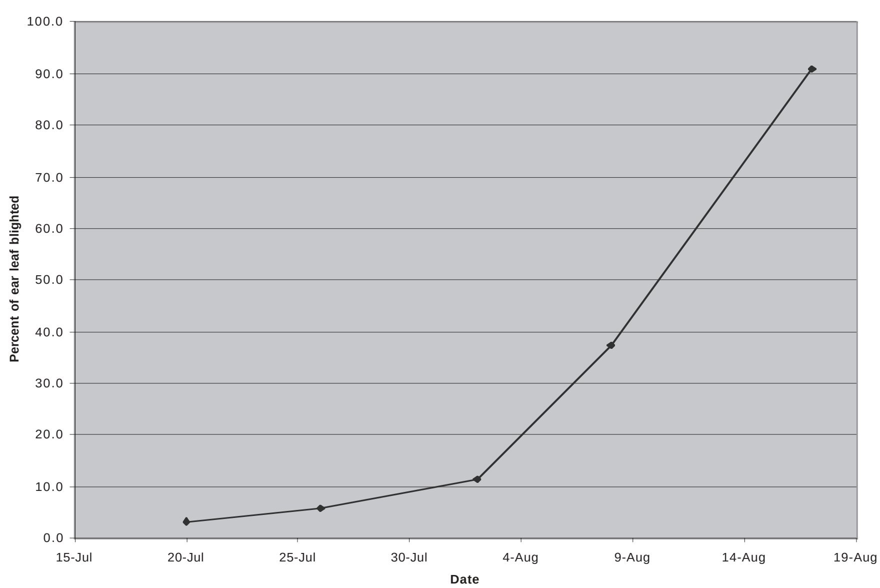
Several corn leaf blight fungi are common in Indiana. They overwinter on residue of plants that were infected during the growing season. The following summer, rain and wind disperse fungal spores produced on this residue. Spores that land on new corn can infect and initiate disease. Most hybrids have adequate resistance to many of these fungi. Resistance to gray leaf spot is the most questionable. Gray leaf spot emerged during the 1980s as a major disease of corn throughout the eastern US and Corn Belt. Many hybrids grown through the mid 1990s were very susceptible to gray leaf spot. Since about 1996, gray leaf spot has not been a serious problem in most areas, not necessarily because of improved genetic resistance in corn, but because weather conditions were not as favorable as in earlier years. Last year, there was a resurgence of gray leaf spot. The disease came on late enough that there was probably only limited effect on yield. The late-season buildup of the disease did replenish the fungus population, however. This means that we are entering the 2002 season with more inoculum than in the past few years. This in itself is cause for concern. The delayed planting of Indiana's corn crop adds another concern.

Gray leaf spot is typical of many leaf diseases of crops. Disease begins with a few infections on older leaves. These commonly occur before all the leaves of the plant have emerged. By late June, lesions (the rectangular dead areas) may be evident on lower leaves. The fungus produces spores in these lesions, which are dispersed throughout the canopy. These spores can infect younger leaves. This process may repeat many times during the growing season, so with the passage of time, more and more of the leaf area becomes blighted (see figure).

The concern about late planting is that corn development is delayed. Thus, corn will be at an earlier than normal stage of development (pollination and early grain filling) later in the season, when conditions are more likely to be favorable for rapid development of gray leaf spot. Damage to the corn from defoliating diseases is a function of how much leaf tissue is destroyed and how early in grain development this destruction occurs. It is roughly analogous to how hail damage is assessed. (The analogy is not perfect because leaf disease develops over a long period of time whereas hail damage is instantaneous).

Whether this worrisome scenario comes to pass depends on two other major factors. One is the weather during July and August. If July and August are hot and humid, with long periods of high relative humidity each day, we can expect to see a lot of gray leaf spot. If July and August are dry, with low relative humidity (few hours with RH>90%), then gray leaf spot will not develop to any serious extent.

The other factor is the resistance or susceptibility of corn hybrids. The data in the figure below are for an inbred, and few if any hybrids would be this susceptible. However, some hybrids of recent vintage were almost this susceptible. Since the mid 1990s, when gray leaf spot was widespread and severe in the Corn Belt, seed companies have been working to improve the resistance in hybrids. Presumably, the really susceptible hybrids are no longer offered for sale. Many newer hybrids are characterized as having some degree of resistance to gray leaf spot. Even if weather is conducive to gray leaf spot, resistant hybrids should not sustain as much damage as susceptible hybrids. Resistance to gray leaf spot, as to many leaf pathogens of corn, is partial and quantitative. With a crop that is delayed in development, resistance may be sorely tested if we have weather favorable for gray leaf spot during July and August.



Progress of gray leaf spot on the ear leaves of a susceptible corn inbred, 2001. Lesions were already present on leaves 4-8 of this corn by late June, and were first evident on the ear leaves on 10 July. At first, the percentage of ear leaf blighted increased slowly, but starting in late July, the disease entered an exponential phase of development.

Early Season Frost & Low Temperature Damage to Corn and Soybean - (*Bob Nielsen & Ellsworth Christmas*)

- Lethal cold temperatures are more damaging than "simple" frost
- Leaf injury or death does not guarantee plant death or yield loss
- Patience is a virtue when waiting for crops to indicate their recovery

Almost every year, late spring frosts damage corn or soybean somewhere in the state. Almost every year farmers and consultants wonder whether the damage will be severe enough to warrant replanting parts of fields injured by frost. So, almost every year we publish the following information about early season frost injury to corn and soybean.

When contemplating the effects of frost injury to corn and soybean, it is important to recognize that the extent of crop injury depends quite a bit on whether the field experienced lethal cold temperatures or "simple" frost. Lethal cold temperatures for corn and soybean are those at or below 28˚F. Our definition of "simple" frost is that which occurs at temperatures warmer than 28˚F.

At young developmental stages, soybean is more susceptible than corn to aboveground damage by frost or lethal cold temperatures because its growing points are exposed above ground as soon as the crop emerges. Soybean axillary buds develop at each leaf axil of a soybean plant, including the cotyledons. Recovery from frost damage is possible if any of these buds remain alive. Frost or freeze damage extending below the cotyledons translates to complete death of the seedling.

The growing point region of a corn plant remains below ground until about the 5-leaf collar stage and, thus, is reasonably protected from the effects of aboveground frost. Consequently, the effects of "simple" frost damage to corn are usually minor and limited to death of aboveground plant parts. Corn can easily recover from this type of damage early in its development and suffer no yield loss whatsoever.

When air temperatures actually drop to lethal levels (28˚F or less) for more than a few hours, the growing point region of a young corn plant can be injured or killed even if it is still below the soil surface. Consequently, one of the key factors that determine whether corn will recover from frost damage is whether lethal cold temperatures accompany the frost. This distinction between damage by frost and lethal temperatures is the reason why your experience with frost damage in the past may differ from your neighbor's or our experiences.

The key requirement for assessing frost damage to either corn or soybean is to be patient and allow the plants to show you whether they are capable of recovering. While corn and soybean leaves may blacken and wither within a day after frost occurs, the true extent of plant damage may not yet be discernible.

The bottom line on diagnosing the severity of frost or low temperature injury to corn or soybean 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. Recognize that cool days following a frost event may slow the plants' recovery and delay your ability to assess their health.

These three to five days will be better spent continuing to plant the remainder of your crop acres, assuming that most growers are not yet finished with corn and soybean planting. After that period of time, recovery of the surviving plants should be evident while those plants that are truly dead will not exhibit signs of recovery.

After three to five days, surviving corn plants should be showing new leaf tissue expanding from the whorls, while dead corn plants will still look dead. Surviving soybean plants will show new leaves emerging from one or more of the uppermost undamaged nodes, while dead plants will still look dead.

Yield loss to early season frost damage in corn and soybean is related primarily to the degree of stand loss, not to the degree of leaf damage. The dead tissue of the damaged part of the whorl may restrict this leaf extension for a while, but in most cases will not restrict it completely. Mowing of frost-damaged corn to encourage its recovery is rarely justified.

If recovery is evident after three to five days, then replanting is not justified. If a significant proportion of the population is obviously dead after this same period of time, then replanting may be justified.

Other Online References:

Carter, Paul and Daniel Wiersma. 2000. Early Season Frost Damage to Corn [Online]. Crop Insights, Vol. 10 No. 14. Pioneer Hi-Bred Int'l, Inc. <http://www.pioneer.com/usa/crop_management/corn/early_frost_damage.htm> [URL verified 5/19/02].

Elmore, Roger and Ben Doupnik, Jr.. 1995. Corn Recovery from Early-Season Frost [Online]. Univ. of Nebraska. <http://screc.unl.edu/Hotline/Frost/frost.htm> [URL verified 5/19/02].

Hicks, Dale and Seth Naeve. 2000. Corn and Soybean Regrowth After Frost Injury [Online]. Univ. of Minnesota. <http://www.extension.umn.edu/administrative/disasterresponse/components/hicks.html> [URL verified 5/19/02].

Nafziger, Emerson. 2001. Cold Weather and Crops. Univ. of Illinois. [Online] <http://www.ag.uiuc.edu/cespubs/pest/articles/200104k.html> [URL verified 5/19/02].

• • P&C • •

Requirements for Uniform Germination and Emergence of Corn - (*Bob Nielsen*) -

- Successful germination & emergence requires adequate moisture, temperature and seed-to-soil contact

Rapid, uniform germination and emergence of corn helps set the stage for maximum grain yield at the end of the season. Without such a successful start to the season, the crop is behind the proverbial 'eight-ball' right from the beginning. The good news is that there are only three simple requirements for uniform germination and emergence of corn. The bad news is that one or more of the requirements are often missing from one field to another.

Adequate and uniform soil moisture at the seed zone. Adequate soil moisture is most simply defined as not too dry and not too wet. Uneven soil moisture in the seed zone can be caused by soil characteristics, tillage patterns, unusual weather conditions and uneven seeding depth control. Uneven soil moisture in the seed zone is the primary cause of uneven emergence, the results of which can be yield losses ranging from 10 to 20 percent.

Adequate and uniform soil temperature at the seed zone. Adequate soil temperature is most simply defined as being greater than 50°F at the 2-inch depth. Corn will not germinate or emerge quickly or uniformly when soil temperatures are less than 50°F. When soils warm to the mid-50°F or greater, emergence will occur in seven days or less if soil moisture is adequate.

Uneven soil temperature can be caused by soil characteristics, uneven residue cover in reduced tillage systems and uneven seeding depth control. Temperature variability is most critical when average soil temperatures are barely within the desired minimum 48 to 50°F range for corn germination.

Useful Tip: Dark-colored soils will typically warm more quickly than light-colored soils. If soils dry differently across the field, the drier areas will typically warm faster than the wet areas. Uneven residue cover in reduced tillage systems causes significantly lower soil temperatures under the heavier cover than under barer spots in the field. Uneven seeding depth exposes deeper planted seeds to slightly cooler seed zones than seeds placed shallower.

Adequate and uniform seed-to-soil contact. In order for the kernel to absorb moisture quickly and uniformly, soil must be firmed around the kernel completely. Seed-to-trash contact results from 'hair-pinning' of surface trash into the seed furrow during no-till planting when soil and/or trash are too wet for adequate coulter cutting action. Seed-to-clod contact results from planting into cloddy fields created by working soil too wet. Seed-to-rock contact is, needless to say, not good for proper germination either. Seed-to-air contact results from open planter furrows when no-till planting into excessively wet soils. Germination of kernels lying in open planter furrows is dependent on rainfall keeping the open furrow environment moist.

Seed Size Considerations. Small sized seed require less total water to germinate than larger sized seed, thus possibly offering an advantage in drier soil conditions. On the other hand, larger sized seed (especially more dense seed) may have an advantage in poor growing conditions where a slowly developing seedling may depend on seed reserves longer than normal.

University of Wisconsin data documented the stand establishment difficulty that small rounds could have under early plantings or no-till conditions. Vigor of large rounds, particularly from butt of ear, can also be low due to rewetting occurrences of the ear and handling damage during seed processing.

• • P&C • •

The Germination Process in Corn - (*Bob Nielsen*) -

- Understanding the process helps you troubleshoot problems with germination

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.

The visual indicators of germination occur in a distinct sequence. First of all, 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** 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 (commonly called the 'spike') is a rigid piece of plant tissue and has a pointed tip with no visible openings. The coleoptile encloses four to five leaves (plumule) that were formed during grain maturation the previous year. These leaves begin to enlarge during the germination and emergence processes.

The **lateral seminal roots** emerge last, near the dent end of the kernel.

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 seed 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 preplant or pre-emergent herbicides and carryover herbicides from a previous crop

• • P&C • •

The Emergence Process in Corn – (*Bob Nielsen*) -

- Understanding the process helps you troubleshoot problems with emergence

Growth stage VE refers to emergence of the coleoptile or first leaves through the soil surface. Successful germination does not guarantee successful emergence of the crop. The coleoptile must reach the soil surface before its internal leaves emerge from the protective tissue of the coleoptile.

As with all of corn growth and development, germination and emergence are dependent on temperature, especially soil temperature. Corn typically requires from 100 to 150 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, it can easily take up to four weeks to emerge.

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.

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, planter furrow compaction, or otherwise dense surface soil that physically restricts 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.

Don't forget, this and other timely information about corn can be viewed at the Chat 'n Chew Café on the World Wide Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the World Wide Web at <http://www.kingcorn.org/ >.

• • P&C • •

The Impact of Cold Temperatures on the Wheat Plant – (*Ellsworth P. Christmas and Charles W. Mansfield*)

• Low temperatures and potential damage to wheat

Wet soils over the past month has kept most Indiana farmers out of the field and we have planted only 13 % of the corn and 4% of the soybeans in Indiana. To add insult to injury, the wheat crop in Indiana may have been injured by cold temperatures on one of the last three mornings. On the morning of May 19, 12 stations across northern and central Indiana reported low temperatures between 28 and 30°F. Three stations reported temperature of 29 or 30°F on May 20 and five on May 21, 2002. More than a dozen stations recorded temperatures of 32°F Wednesday morning May 22, 2002.

The stage of growth of the wheat varied from early dough stage in southwestern Indiana to early boot stage in northern Indiana. Once wheat has reached the boot stage, temperatures at or below 28°F for a period of two or more hours can result in freeze damage to the wheat plant. Symptoms of this injury may include floret sterility, head entrapment, stem damage or leaf discoloration. From emergence of the head until early milk stage, temperatures at or below 30°F for a period of two or more hours can result in freeze damage to the wheat plant. This damage can be characterized by floret sterility, white awns or heads, stem damage or leaf discoloration. The extent of the injury is dependent on the actual low temperature and length of time the plant was subjected to the low temperature.

The temperatures reported above may not represent the actual temperatures in the field at the level of the developing wheat heads. On the morning of May 21, the official low temperature at the Agronomy Research Center was 30°F. However, a small weather station placed in a wheat field recorded a low temperature of 31.7°F, at the official reporting height, and an average of 27.7°F for one hour at the height of the wheat heads. This temperature at the height of the heads was low enough to cause significant damage to the developing wheat head. We will continue to monitor this field of wheat and report back next week of any observed damage.

It is not possible to confirm freeze damage to wheat until the plant has had at least 5 days to continue to grow and develop. The table below gives a summary of the temperature required to cause freeze injury to the wheat plant at various stage of growth and the symptom most likely to be present.

Table 1. Temperatures that cause freeze injury to wheat at spring growth stages and symptoms and yield effect of spring freeze injury.

Growth Stage	Approximate Injurious Temp. (2 hrs)	Primary Symptoms	Yield Effect
Tillering	12° F (-11C)	Leaf chlorosis; burning of leaf tips; silage odor; blue cast to field	Slight to moderate
Jointing	24° F (-4C)	Death of growing point; leaf yellowing or burning; lesions, splitting, or bending of lower stems; odor	Moderate to severe
Boot	28° F (-2C)	Floret sterility; head trapped in boot; damage to lower stem; leaf discoloration; odor	Moderate to severe
Heading	30° F (-1C)	Floret sterility; white awns or white heads; damage to lower stem; leaf discoloration	Severe
Flowering	30° F (-1C)	Floret sterility; white awns or white heads; damage to lower stem; leaf discoloration	Severe
Milk	28° F (-2C)	White awns or white heads; damage to lower stems; leaf discoloration; shrunken, roughened, or discolored kernels	Moderate to severe
Dough	28° F (-2C)	Shriveled, discolored kernels; poor germination	Slight to moderate

• • P&C • •

Supplemental Forage Crops to Fill a Void - (*Keith Johnson*) -

• Livestock producers may want to consider supplemental forage crops if: alfalfa was damaged by winter,perennial forage seedings were not completed, corn silage inventory is low and corn planting with intended use as silage is delayed, and prevented planting acres become a reality.

Mother Nature has provided some challenges to livestock producers in Indiana this year. Winter damage to alfalfa was more common in 2002 than most years. Persistent spring rain has delayed perennial forage seedings to the point that many producers have opted to keep the seed in the bag until August. Livestock producers that utilize corn silage and find themselves with a less than desirable inventory of the 2001 corn crop in the silo are concerned about delayed corn planting as that translates into a late corn silage harvest, too. If spring rain remains persistent there will be much prevented planting acreage that is a candidate for a cover crop.

My top candidates for late May or June seeding as emergency use forages, with which I have had some experience, include the warm-season annual grasses sudangrass, sorghum x sudangrass hybrid, pearlmillet, or foxtail millet. Harvesting these crops as silage or by grazing is preferred as curing time is long and rain damage risk is high when harvested as hay. Brown midrib sorghum x sudangrass hybrids should be expected to have greater digestible dry matter than normal hybrids. A forage turnip, a forb (neither a grass nor a legume), that puts more growth into the leaf rather than the root would be a candidate where grazing is the method of harvest.

For detailed information, refer to Purdue Extension publication AY-263, "Producing Emergency or Supplemental Forage for Livestock." It is available online at: <http://www.agcom.purdue.edu/AgCom/Pubs/AY/AY-263.html>.

• • P&C • •

Bale Silage Makes Sense in Years Like This - (*Keith Johnson*) -

- Use of bale wrappers and in-line tubers can be an excellent tool to help with timeliness of hay harvest, especially in a wet and cool spring
- Forage-livestock producers should evaluate whether bale silage is a good option
- Large round balers appropriate for silage and an in-line tuber will be at Purdue Forage Day

It is more common today than a few years ago to see individual large round hay bales or long rows of hay bales wrapped in white plastic. A few Indiana forage producers have enlisted an option of making their forage into bale silage instead of dry hay. Instead of letting the cut forage crop dry to a safe-to-bale moisture level of the high teens (less than 20 percent moisture), as dry hay, they are packaging the plastic wrapped bales at around 50 percent moisture. The 50 percent moisture concentration coupled with a good quality crop and the creation of an anaerobic environment with the plastic wrap, results in fermentation and preservation of the forage crop.

These producers invested in this strategy of forage harvest to help them better manage, or frankly go to battle, with Mother Nature. Wilting the crop to 50 percent moisture instead of less than 20 percent moisture results in less exposure of the cut forage to a rainfall threat. This reduction of a rainfall occurrence on cut forage is especially true with the first forage harvest in May. Many producers opt to not cut their forage crop if rainy weather within a three-day time frame is predicted; as a result, forage quality will decline with the passage of time as the crop matures in the field.

Use of the technology does not come without a cost. Obviously, there is cost associated with the purchase of the wrapper or tuber, and plastic. This type of forage is best-used on-farm, as transport of high moisture bale silage will cost more per ton of dry matter than "dry" hay. One also has to deal with disposal of used plastic. I am convinced that a wrapper or in-line tuber can be co-owned among amiable individuals; obviously, this makes the technology more affordable to small- and mid-sized forage acreage producers. The Feldun-Purdue Ag Center and the Southern Indiana Purdue Ag Center have effectively shared an in-line tuber and have prevented much hay from rainfall deterioration. The distance between these two Centers is 60 miles. Use of a wrapper or in-line tuber would usually be shared between or among producers at a distance much less than this.

Forage producers are encouraged to come to the Purdue Forage Day on, Thursday, June 13 to have discussion with industry representatives about round balers designed to package silage bales and an in-line tuber. Equipment will be demonstrated in the afternoon at the Purdue Forage Day. This year's activity is at the Milco Dairy Farm in southern Henry Co. Specific information about the field day can be found by visiting <http://www.agry.purdue.edu/ext/forages/forageday/> or by contacting your local Purdue Cooperative Extension Service Educator.

Cutworms, Heat Units, and Scouting - (*Ron Blackwell*) -

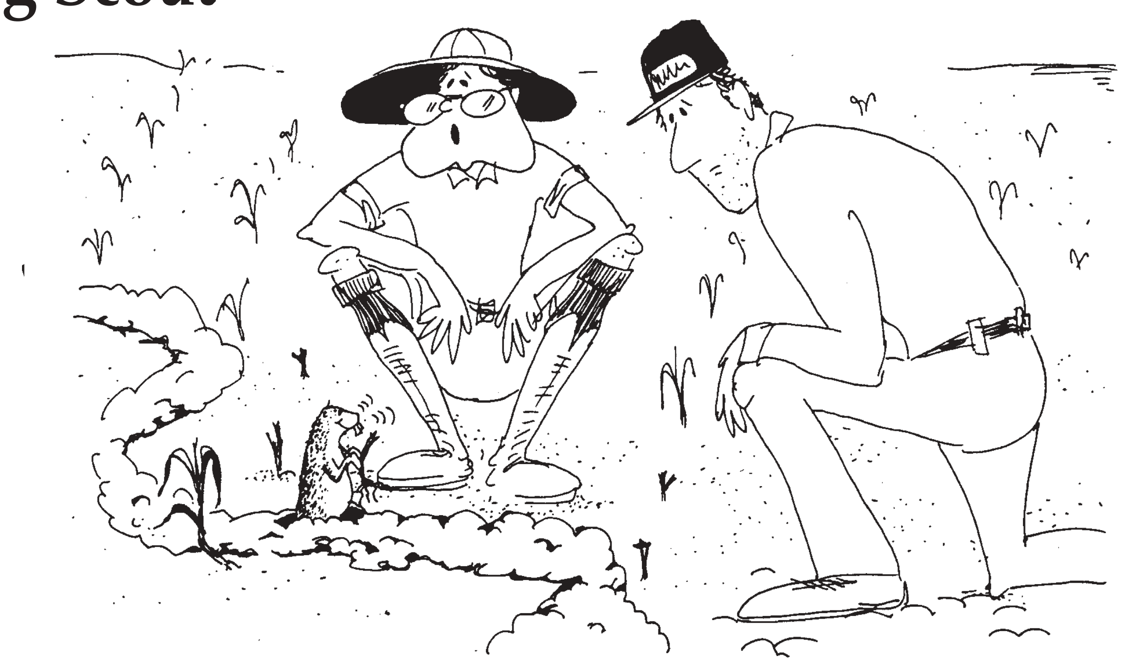
As most of our readers know, we determine when to start scouting for black cutworm feeding by using heat unit (HU) accumulations. When 300 HU (base 50°F) have accumulated from the date of an intensive flight, scouting needs to begin for leaf feeding and possible cutting. Not only has the recent cold, wet weather spell slowed/stopped corn planting, but it has also slowed development of black cutworm larvae. While we have found little damage in the few emerging corn fields so far, don't count the black cutworm out yet.

We based some of our earlier scouting trips on intensive flights that occurred around April 9th and April 15th. However, there have been several intensive flights since then, and lots of corn yet to be planted. Several cooperators had intensive captures around April 20th, April 25th, April 28th, May 6th, and May 13th. In most areas of Indiana, we have not yet reached 300 HU's from those flights. Corn planted this past week and in the near future could quite possibly be at risk from these later flights. Don't get too relaxed and let your guard down when that crop is finally planted. When the weeds die and the corn starts coming up, it will be time to start cutworm scouting.

Avoid ignoring what appears to be a trivial amount of damage. As an example, in one Parke County field scouted a week ago, there was roughly 5% leaf feeding damage and some cutting present. While the leaf feeding did not appear like much, if black cutworm are still present (and they were), more cutting will occur. What was 5% leaf feeding with some plants cut could soon become a significant stand reduction.

The following is summarized from a table in IPM-1 (*Field Crops Pest Management Manual*): In 2 leaf corn, with an average black cutworm instar of 4.5 being found, it only takes about 3% of feeding damage (leaf feeding or stalk cutting) to reach the control threshold. Once again, don't neglect to scout and be caught off guard. Scouting is the only way you can be sure whether or not your corn is under attack.

Bug Scout



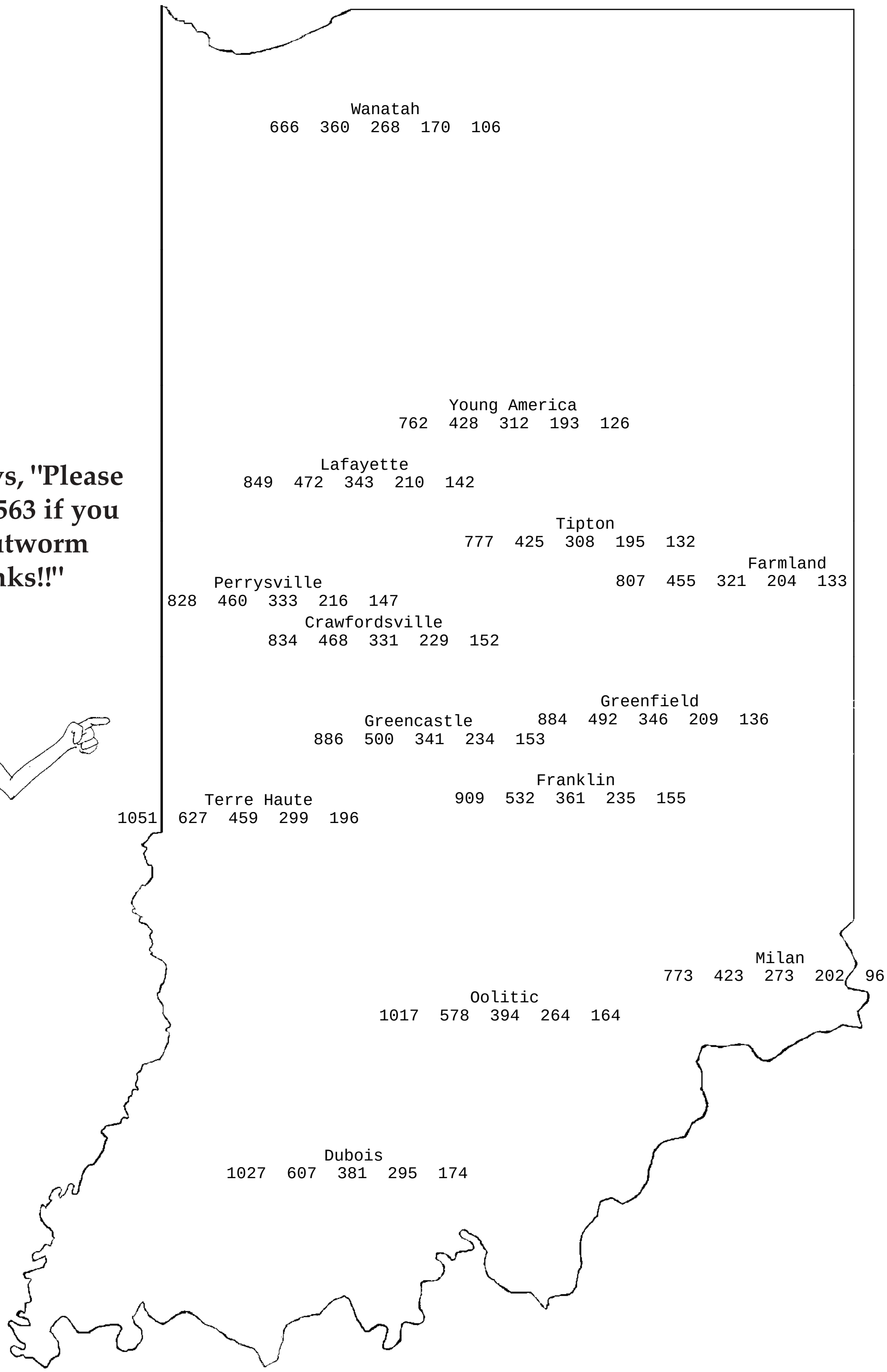
I didn't think it was cutworm damage!

Weather Update

MAP KEY
Location
HU41 HU48 HU50 GDD(2) GDD(10)

Temperature Accumulations from Jan. 1 to May 22, 2002

HU41 = heat units at a 41°F base from Jan. 1, stalk borer egg hatch begins by 600
HU48 = heat units at a 48°F base from Jan. 1, for alfalfa weevil development (begin scouting at 200)
HU50 = heat units at a 50°F base from date of intensive moth capture, for black cutworm development (larval cutting begins about 300)
GDD(2) = Growing Degree Days from April 21 (2% of Indiana's corn planted), for corn growth and development
GDD(10) = Growing Degree Days from May 5 (10% of Indiana's corn planted), for corn growth and development



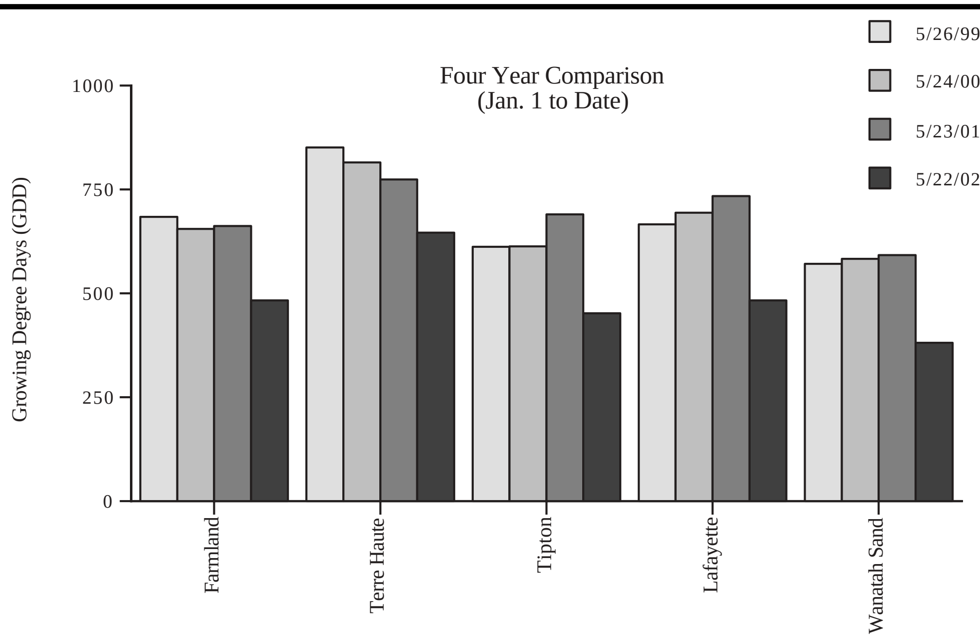
Bug Scout says, "Please call 765-494-4563 if you are finding cutworm damage! Thanks!!"

4" Bare Soil Temperatures 5/22/02

Location	Max.	Min.
Whitford Mills	53	50
Wanatah	65	49
Columbia City	62	43
Winamac	65	46
W Laf Agro	65	45
Tipton	57	53
Farmland	59	43
Perrysville	56	53
Crawfordsville	56	48
Liberty	51	47
Terre Haute	73	47
Oolitic	60	53
Dubois	68	47

Pest&Crop
Extension Entomology Office
Department of Entomology
Purdue University
1158 Smith Hall
West Lafayette, IN 47907-1158

http://www.entm.purdue.edu/Entomology/ext/targets/newslett.htm



The ***Pest Management and Crop Production Newsletter*** is produced by the Departments of Agronomy, Botany and Plant Pathology, and Entomology at Purdue University. The Newsletter is published monthly February, March, October, and November. Weekly publication begins the first week of April and continues through mid-September. If there are questions or problems, contact the Extension Entomology Office at (765) 494-8761.