Pest & Crop

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

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In This Issue

Insects, Mites, and Nematodes

Corn Borer Season Begins - *(John Obermeyer and Larry Bledsoe)* -

- Corn taller than 18" extended leaf height needs to be scouted for corn borer egg masses and borer damage
- "Tall" corn fields may be attracting egg laying moths

It's hard to imagine, but it is corn borer scouting time! Although, if the low black light trap catches of moths are an indicator of the larval infestations, then most cornfields will have little damage. Corn throughout Indiana that was planted early and are "tall" compared to surrounding corn may be acting as a "trap crop" and should be scouted for larval damage, "shot-hole" feeding.

European corn borer in giant ragweed stem

Corn planted in early to mid May will have less risk of infestation. Typically, corn borers are not able to establish very well on corn less than 18" extended leaf height; this is mainly due to DIMBOA, a plant aglucone, which acts as a "built-in insecticide." Thus, emerging larvae may not survive once they begin to feed. If an

impregnated female is not able to find a suitable corn field to lay her eggs, she has hundreds of other hosts (i.e., soybeans, potatoes, grass weeds, broadleaf weeds, flowers, etc.) to choose among. Presently we are conducting a greenhouse experiment with Bill Johnson, Purdue Extension Weed Scientist. We have been infesting giant ragweed seedlings with newly hatched European corn borer and have found that many plants were infested and killed. Perhaps with this season's slow growing corn crop, corn borers will control the ragweeds that escaped the herbicides!

Go to <http://www.entm.purdue.edu/entomology/ext/fieldcropsipm/b/ECB.HTM> for detailed management guidelines. More on this pest later.

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Potato Leafhopper Sampling Should Begin Soon - *(John Obermeyer and Larry Bledsoe)* -

- Sample newly cut alfalfa fields for leafhoppers
- If yellowing has already occurred, it is too late to prevent damage this cutting
- Management guidelines are given

Although economic populations of potato leafhoppers have not been observed or reported, populations are increasing. Alfalfa producers should begin sampling their alfalfa for leafhoppers following first cutting.

Potato leafhoppers are small, wedge-shaped, yellowish-green insects that remove plant sap with their piercing-sucking mouth parts. Leafhopper feeding will often cause the characteristic wedge-shaped yellow area at the leaf tip, which is referred to as "hopper burn." Widespread feeding damage can cause a field to appear yellow throughout. Leafhopper damage reduces yield and forage quality through a loss of protein. If left uncontrolled for several cuttings, potato leafhoppers can also significantly reduce stands.

Potato leafhopper damage can be minimized by spraying alfalfa with an insecticide or by planting resistant varieties. It is critical to note, however, that insecticide treatment is preventative rather than curative. Thus, to effectively prevent economic losses, treatments must be applied before yellowing occurs. Usually the best results are obtained when treating small alfalfa, so be sure to watch the alfalfa for leafhoppers after cutting.

The need to treat for leafhoppers can be determined prior to the appearance of damage if fields are surveyed on a regular basis. To assess leafhopper populations and the potential for damage, take at least 5 sets of 20 sweeps with a 15" diameter sweep net in representative areas of a field. Carefully examine the contents of the sweep net, count the number of adults and nymphs, and calculate the number of leafhoppers per sweep. Use the guidelines given below to determine the need for treatment. For recommended insecticides see Extension Publication E-220, *Alfalfa Insect Control Recommendations* - 2003 (Revised 5/2003) which can be viewed at <http://www.entm.purdue.edu/entomology/ext/targets/e-series/e-list.htm>.

Management Thresholds for Potato Leafhoppers

Stem Height in Inches	Leafhoppers(Adults/ Average Number Nymphs) Per Sweep
under 3	0.2
4 - 6	0.5
7 - 12	1.0
greater than 12	1.5

Hopper burn on alfalfa

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Prepare Grain Bins for Wheat - (*Linda Mason*) -

- Stored grain insect infestations usually begin from poor sanitation
- Procedures are given to prevent infestations
- Now is the time to carry through these procedures

Harvest time for the 2003 wheat crop will soon be here. Preparing bins for storage now goes a long way toward preventing insect infestations during the summer. Several species of insects may infest grain in storage. The principal insects that cause damage are the adult and larval stages of beetles, and the larval stage of moths. Damage by these insects includes reducing grain weight and nutritional value; causing contamination

(alive or dead); odor, mold, and heat damage problems that reduce the quality of the grain.

Newly harvested wheat may become infested with insects when it comes in contact with previously infested grain in combines, truck beds, wagons, other grain-handling equipment, augers, bucket lifts, grain dumps, or grain already in the bin. Insects may also crawl or fly into grain bins from nearby accumulations of old contaminated grain, livestock feeds, bags, litter, or any other cereal products.

Insect infestations can be prevented with good management practices. Now that many grain bins are empty, the following guidelines should be used before the 2003 grain is placed in bins:

- Brush, sweep out and/or vacuum the combine, truck beds, transport wagons, grain dumps, augers, and elevator buckets to remove insect-infested grain and debris.
- In empty bins, thoroughly sweep or brush down walls, ceilings, ledges, rafters, braces, and handling equipment and remove debris from bins.
- Inside cleaned bins, spray wall surfaces, ledges, braces, rafters, and floors with an approved insecticide (Chlorpyrifos-methyl, cyfluthrin or diatomaceous earth) creating a perimeter barrier. Outside, complete this barrier by treating the bases and walls up to 15 feet high, plus the soil around the bins. Cyfluthrin gives good control of lesser grain borer and is recommended if this insect is your primary concern
- Remove all debris from fans, exhausts, and aeration ducts (also from beneath slotted floors, when possible).
- Remove all debris from the storage site and dispose of it properly according to area, state, and/or federal guidelines (this debris usually contains insect eggs, larvae, pupae, and/or adults, ready to infest the newly harvested grain).
- Remove all vegetation growing within ten feet of the bins (preferably the storage area). Then spray the cleaned area around bins with a residual herbicide to remove all undesirable weedy plants.
- Repair and seal all damaged areas to the grain storage structure. This is not only to prevent insect migration into the bin, but also to prevent water leakage, which leads to mold growth.
- Do not store newly harvested grain on old grain already in storage.
- Whenever fans are not operated, they should be covered and sealed. This reduces the opportunity for insects and vertebrates to enter the bin through the aeration system.
- Grain may be treated with an approved insecticide (Chlorpyrifos-methyl or diatomaceous earth).

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Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	5/20/03 - 5/27/03							5/28/03 - 6/2/03						
	VC	BCW	ECB	SWCB	CEW	FAW	AW	VC	BCW	ECB	SWCB	CEW	FAW	AW
Dubois/SIPAC	0	0	0	0	0	0	0	0	0	10	0	0	0	1
Jennings/SEPAC	0	0	10	0	0	0	0	0	0	24	0	0	0	1
Knox/SWPAC	1	0	2	0	0	0	1	1	1	11	0	0	0	0
LaPorte/Pinney Ag Center	0	0	2	0	0	0	3	0	0	2	0	0	0	1
Lawrence/Feldun Ag Center	0	0	7	0	0	0	0	0	0	1	0	0	0	0
Randolph/Davis Ag Center	0	0	2	0	0	0	1	0	0	3	0	0	0	0
Tippecanoe/Throckmorton Ag Center	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Whitley/NEPAC	0	0	0	0	0	0	16	0	0	4	0	0	0	1

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

Sightings From the Field

Stalk Borer - (*Ron Blackwell*) –

Paul Georgen called us concerning a couple corn fields in Marshall County with severe stalk borer damage. While the fields did appear relatively clean as far as weeds were concerned, there were patches of the field where the damage was severe enough that the producer was going to replant those areas. Both fields will likely be treated with an insecticide later in an attempt to kill the stalk borer larvae as they move from the plants they are currently in to attack new plants. As mentioned in last week's P&C issue, timing of such treatments is critical to increase the probability of success.

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Click Beetles – (*Ron Blackwell*) -

On two occasions this spring, someone has told me that click beeltes were so abundant that they were landing on them while they were doing fieldwork. Both times the calls came from Marshall County. Click beetles are the adult life stage of wireworms. In several areas of Indiana wireworms can be a serious early season corn pest. If you have had a similar experience with click beetles or have had a serious infestation of wireworms in corn this spring, please let us know. Call me (Ron Blackwell) at 765-494-4579 or send an e-mail to ron@entm.purdue.edu.

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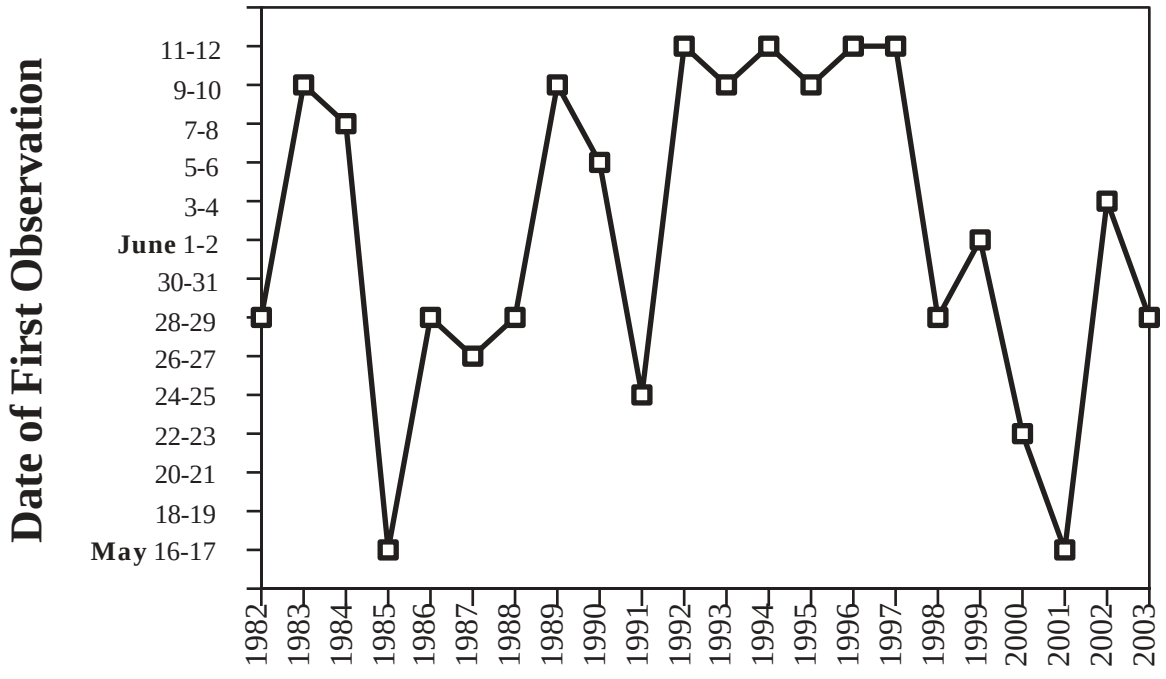
Rootworms – (*Ron Blackwell*) –

As mentioned in last week's P&C issue, first instar rootworm larvae were found in west central Indiana on May 29th. See the graph below to see how this season's observance compares to the last 21 years.

DATES CORN ROOTWORM LARVAE FIRST OBSERVED IN CORN ROOTS, TIPPECANOE COUNTY, INDIANA, 1982-2003



Can Postemergence Callisto Activity on Grass Weeds be Improved with Atrazine? – (*Earl Creech and Bill Johnson*) -

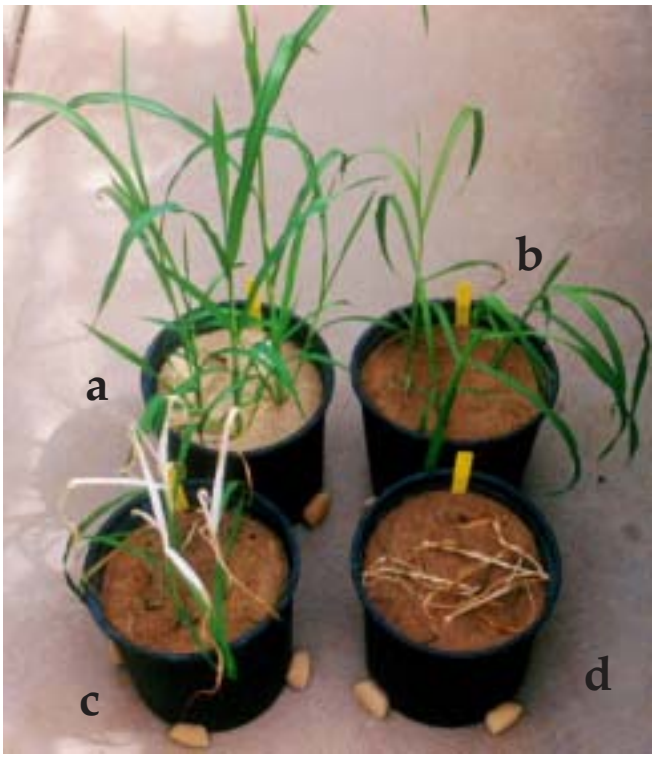
Callisto (mesotrione) is a relatively new herbicide with activity on a number of both grass and broadleaf species. Callisto is labeled to be preemergence (PRE) or postemergence (POST) applied in corn and inhibits HPPD, a blockage which leads to bleaching symptoms in susceptible plants. A number of researchers have observed that the efficacy of Callisto + atrazine is substantially more than Callisto alone, particularly on grass weed species and certain broadleaves such as giant ragweed. Greenhouse work has recently been completed at Utah State University to examine this potential interaction and was supported by observations in the field.

Photosynthesis and growth of four weed species (green foxtail, barnyardgrass, velvetleaf, and redroot pigweed) following foliar applications with either Callisto (3 oz / A), atrazine (1 pt / A), or a tank mix of Callisto (3 oz / A) + atrazine (1 pt / A) were compared in a greenhouse experiment (Figure). Photosynthesis and dry mass of barnyardgrass, redroot pigweed, and velvetleaf were significantly reduced by Callisto and atrazine alone and in combination. Long-term photosynthesis and dry mass of green foxtail plants were not suppressed by either herbicide applied alone, but plants treated with the Callisto / atrazine tank mix did not regain photosynthetic capacity and had significantly lower dry mass. Shoot dry mass of broadleaf weeds was reduced by all three herbicide treatments, except large redroot pigweed plants treated with mesotrione alone.

In the field, POST Callisto controlled redroot pigweed and velvetleaf but failed to adequately control green foxtail. Tank mixed applications of Callisto and atrazine resulted in a 3-fold increase in green foxtail control (64%) and more consistent control of redroot pigweed over Callisto alone.

In conclusion, tank mixing Callisto and atrazine POST:

- Increased herbicidal activity on barnyardgrass, and green foxtail.
- Resulted in more consistent control of redroot pigweed.
- We recommend tank mixing Callisto with atrazine if corn is less than 12" tall to maximize activity on weeds, particularly giant ragweed. If corn is greater than 12" tall, other tank mix partners should be considered. Some evidence exists that other photosynthesis inhibitors such as Buctril may also synergize with Callisto and have a wider application window than atrazine.



Barnyardgrass plants 14 days after herbicide treatment in the greenhouse; a) Nontreated, b) Atrazine (1 pt / A), c) Callisto (3 oz / A), and d) Callisto (3 oz / A) + atrazine (1 pt / A)*

* Plants grown in a greenhouse are only exposed to favorable growing conditions are generally more sensitive to herbicides than plants grown outdoors. This level of barnyardgrass activity with Callisto + atrazine was not observed in the field.

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Herbicide-Related Corn Injury Reports - (*Bill Johnson, Glenn Nice and Tom Bauman*) -

We have received a number of herbicide injury reports during the past 2 weeks. In most cases, the cause of the injury is related to stressful weather conditions which have reduced the plant's ability to metabolize or degrade the herbicide. In some cases, because corn was planted at such a rapid rate in late April and early May before rainy weather set in, growers and custom applicators were not able to spray soil-applied herbicides before the crop emerged. As a result, many soil-applied products were put on emerged corn. This resulted in the corn plant receiving a much higher dose of herbicide than if the products were applied to the soil, and diluted before being absorbed by the corn plant.

The following is a summary of the most common injury cases observed thus far.

Atrazine/chloroacetamide injury. A few cases of this type injury have been observed when the products were applied to emerged corn and adjuvants, 2,4-D, simazine (Princep, others) were added to the mixture to control emerged weeds. In other cases the atrazine/chloroacetamide premix was applied in a liquid fertilizer solution to emerged corn. Symptomology observed is short, stunted corn with necrotic tissue on the leaf edges and lower leaves may be burned off. In addition, larger plants will show buggywhipping and twisted whorls that were discussed by Bob Nielsen in another article. Although some stand loss has been observed in certain fields, in most cases the corn will grow out of this injury when warm, sunny days return. Key points for future consideration of this issue:

Atrazine/chloroacetamide injury to corn

1) Princep is not labeled for applications to emerged corn.
2) Most labels indicate that mixtures of 2,4-D with atrazine premixes should be applied 7-14 days before planting or 3-5 days after planting, but before corn emerges. These precautions are for two reasons: First, 2,4-D is very water soluble, but has a relatively short half live. Applications at corn planting can result in the product being washed down into the seed furrow if enough precipitation is received. This results in a high concentration of herbicide around the corn seed and injury. Second, 2,4-D formulations tend to be somewhat oily and can function as a crop oil concentrate and increase uptake of other herbicides.
3) The use of liquid fertilizer solutions as the carrier is discouraged on most of the labels of these products if corn has emerged. Liquid fertilizer solutions can also act as adjuvants to increase uptake of herbicides. Liquid fertilizer solutions will also cause injury symptoms on corn in addition to acting as an adjuvant.

Lumax/Callisto and Balance Pro injury. Callisto is one of the components in Lumax. We have observed a few cases of bleached corn caused by these products. Injury is typically located in low or wet areas on the field and on sandy soils. Symptomology observed is short, stunted plants with chlorotic tissue on older leaves with new leaves appearing normal in color. Injury is occa-

Lumax/Callisto and Balance Pro injury to corn

sionally more severe when these products were applied with higher rates of atrazine (1.5 lb ai / A or more). Injury from these herbicides is typically more noticeable than most other herbicide families. Recovery and yield potential is good if less than 30% of the plant tissue is affected (chlorotic).

Key points for future consideration of this issue:

1) The bleaching or chlorosis injury can also occur on emerged plants if hard rains drive the corn leaf tips into the soil. Both Balance Pro and Callisto have relatively high water solubilities and can be taken up by corn foliage after corn emergence.
2) Balance Pro injury potential is higher on sandy soils with high pH. The Balance Pro label has very specific instructions regarding appropriate use rates on various soil textures and organic matter contents. The use rate matrix reminds me of the table in the Bladex label from years past. Essentially, we should think of Balance Pro in a similar manner as Bladex and pay very close attention to the rate instructions. This issue of use rate can be particularly difficult to interpret on the sand / muck soils in northern Indiana.
3) The activity of both herbicides is increased when used with atrazine. Although the synergistic activity of these combinations is valuable in terms of weed control, it can also cause higher incidences of crop injury.

In both cases, corn plants will usually lose one or two of its lower leaves. If one will be using postemergence herbicides in these fields, it is advisable to be sure to correctly estimate the corn growth or "V" stage to avoid more injury problems. Information on staging corn growth is available in past issues of the newsletter and on the "Chat and Chew" website at <http://www.agry.purdue.edu/ext/corn/cafe/>.

Plant Diseases

Scab (Fusarium Head Blight) of Wheat – (*Gregory Shaner and Andreas Westphal*) -

- Wheat scab is showing up in southern Indiana

A couple of weeks ago an article in Pest & Crop discussed the likelihood of wheat scab in various regions of Indiana. These probabilities were calculated from a weather-based disease forecast. For southern Indiana, the model predicted about a 50:50 chance for a severe epidemic. It looks like the coin landed on the wrong side. While planting soybeans at SEPAC (Jennings County) yesterday (finally!), Shaner saw scab in several wheat fields and plots. Westphal observed scab in wheat at SWPAC, near Vincennes, an area where the disease forecast also predicted about a 50% chance of severe scab. In one bulk field at SEPAC, 12% of the heads had scab. Severity (the amount of scab per head) was low, averaging 1.1 spikelets. At this time, casual inspection of a field may lead to considerable underestimation of the number of diseased heads because it's easy to overlook a head with only a single blighted spikelet. However, once the fungus has infected a spikelet, it moves into the rachis and then spreads up and down the head from the point of infection. Over the next week or so, depending on temperature, more spikelets on infected heads will become blighted, and so infected heads will become more conspicuous. The wheat at SEPAC is just at the early milk stage of growth (Feekes 11.1), so the potential for damage to the grain is considerable.

Scab has been with Indiana growers for a number of years now. Fields following a crop of corn, in particular

Wheat heads infected wth scab

no-tillage fields, are especially at risk. The fungus that causes scab also causes a stalk rot on corn. The fungus produces spores on the corn debris on top of the soil while the wheat crop develops. During flowering of wheat, the most vulnerable period for scab, spores of the fungus are copious in the field and can infect the wheat crop when conditions for infection are favorable.

Recognition of scab may be complicated by the presence of glume blotch (see companion article). This disease causes the tips of glumes and lemmas to turn dark brown. Scab causes a premature bleaching of the head tissue. The entire spikelet, not just the outer glumes, turns white. When weather is humid, a pink growth (spores of the scab fungus) is evident on scabby heads, particularly at the base of the spikelet. With careful examination of heads, it is possible to distinguish these two diseases.

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Leaf and Glume Blotch of Wheat – (*Gregory Shaner and Andreas Westphal*) -

- Leaf blotch is on the move and glume blotch is starting to appear

The wet weather that has favored wheat scab has also promoted development of leaf and glume blotch. Leaf blotch is caused by at least two different fungi: *Septoria tritici* and *Stagonospora nodorum*. *Stagonospora* has been the more troublesome of the two for several years in Indiana, and appears to be the main cause of leaf blotch again this year. Infections first appeared early in the spring on lower leaves, but are now showing up on the flag leaf (F) and the leaf below (F-1) and can also infect the wheat head. These plant parts are critical for grain fill, so their premature destruction by leaf and glume blotch results in poorly filled grain, meaning low yield and test weight.

In southern Indiana, there are numerous infections on the flag and F-1 leaves. The disease has not progressed quite this far yet on wheat in the central part of the state. The lesions on these upper leaves are still mostly small, brown spots, but they will enlarge to become elliptical spots up to 1/2-inch long. Mature lesions are tan with a dark center. Leaf tissue surrounding the lesion may be yellow. As more infections develop on these upper leaves, individual lesions coalesce to produce large dead areas of irregular shape.

The current and predicted cool weather will slow down disease development, but it is also slowing down the development of grain. Where disease has already reached F-1 and F, there is potential for damage.

When *Stagonospora nodorum* infects heads, the disease is called glume blotch. Initial symptoms usually appear on tips of glumes and lemmas. These organs become chocolate-brown. Close examination of these brown areas will reveal small bumps. These are the tips of embedded pycnidia, the fruiting bodies of the fungus. Under wet conditions, spores produced in these pycnidia are released and can cause additional infections on heads and leaves.

Growers who applied a fungicide to their fields should check sprayed and unsprayed areas to evaluate the efficacy of treatment in suppressing the disease.

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Stripe Rust of Wheat – (*Gregory Shaner and Andreas Westphal*) –

- A focus of stripe rust is present in southeastern Indiana

While taking a quick look at a wheat variety trial at SEPAC (Jennings County) on 2 June, Shaner found a focus of stripe rust. There are three rusts that attack wheat: stem rust, leaf rust, and stripe rust. Stripe rust is more commonly found in regions that have mild winters and long, cool springs. In the U.S., it's mainly a problem in the Pacific Northwest and parts of California. In recent years, it has been showing up frequently in the southeastern U.S., and occasionally in Indiana. Stripe rust has been prevalent this spring in parts of Kansas, Oklahoma, Georgia, and Arkansas.

Infections on the wheat at SEPAC were mainly on the upper two leaves (flag and leaf below), suggesting that the first spores of the stripe rust fungus did not arrive until after these leaves had emerged. Southerly winds probably carried spores up from Arkansas and other points south.

Stripe Rust

Stripe rust differs distinctly from leaf and stem rusts in two ways. The pustules of stripe rust are yellow (the disease is known as yellow rust in many parts of the world), whereas pustules of leaf rust are orange and those of stem rust are brick red. Pustules of stripe rust also develop in long stripes along the leaf veins. Following infection of a leaf by a spore of stripe rust, the fungus produces runner hyphae. These internal strands of the fungus extend for several inches in the leaf and give rise to pustules along their length. The major veins in the wheat leaf restrict the lateral growth of these hyphae, which is why the pustules form narrow stripes. However, if several infections occur on a single leaf, its entire surface may be covered with pustules.

Another characteristic of stripe rust is its tendency to develop in foci within a field. This means that there may be a small area (a circle or elliptical area in a field) where plants are severely rusted, with little rust found in other areas in the same field. Unlike other rusts, spores of stripe rust seem to land close to where they were produced, giving rise to isolated "hot spots" (foci) of the disease. When a spore happens to land on a leaf and infect, it will produce new pustules after a few days. These pustules are masses of spores, each capable of causing a new infection.

Since the disease is so uncommon in Indiana, wheat breeders in this part of the country are not able to select for resistance to stripe rust, and it is likely that many wheat varieties grown in Indiana are susceptible to stripe rust. Stripe rust has never been a major problem in Indiana. We normally progress from weather that is too cold for the fungus to weather that is too hot in such a short time the disease does not have a chance to become severe. The cool, moist weather of recent days has been ideal for stripe rust, and weather predictions indicate more of the same, so we may see more stripe rust than usual.

Agronomy Tips

Cold Weather Impacts on the Soybean Plants – (*Ellsworth P. Christmas*) -

- Why are my soybeans growing so slowly?
- Why do my soybeans have a light green to nearly yellow color?
- Will my soybeans recover?

A number of individuals have expressed concerns regarding the very slow emergence and growth of soybeans. The name of the game is low temperatures, both of the air and the soil. For the past 14 days, nighttime air temperatures at Wanatah were at or above 50°F for eleven nights. The Agronomy Research Center had ten nights of air temperatures at or above 50°F. Southern Indiana was not much better with low air temperatures at Dubois at or above 50°F six of the past 14 nights. Soil temperatures fared a little better with nighttime lows at or below 60°F about half of the time the past two weeks, but in all cases above 50°F. Mean bare soil temperatures have ranged in the low 60's to high 50's over much of the state the past two weeks.

Soybean seed will begin the process of germination at soil temperatures of 50°F or above, but the process is very slow. The most rapid emergence occurs at soil temperatures of 70 to 80°F. It is quite typical that at current soil temperatures, three or more weeks may be required for emergence. The major risk of slow emergence at low temperatures is the increased probability of injury to the seedling from fungi and/or insects.

Low nighttime air temperatures can cause injury to the soybean plant or can result in very slow vegetative growth. Many times a soybean plant can tolerate temperatures as low as 28°F without injury, but under certain conditions temperatures well above freezing can result in plant injury or death. Cold conditions can result in water stress in the plant and can be one of the causes of low temperature injury to the soybean plant depending on the length of time exposed to the low temperatures and the relative humidity. Research data shows that chilling the soybean plant for one week at temperatures close to the temperatures of the past two weeks can result in reduced leaf elongation, rate of leaf emergence, and CO_2 uptake. Usually, all of these will return to normal when temperatures return to levels at or above 75°F.

Low soil temperatures also result in a reduction of nodule formation and activity. Soybean plants that had just emerged prior to the cold soil temperatures may exhibit nitrogen deficiencies once air temperatures return to normal and the plants grow rapidly. This is the result of a demand by the plant for nitrogen greater than that available from the cotyledons and the soil. Once soil temperatures warm to a level suitable for nodule activity, the leaves will become a darker green color and the plant will resume normal growth.

All of these stresses may result in a plant with lower internodes shorter than normal, hence short plant for their age. Most of the stresses discussed above should not have any long-term effects on the soybean crop with the exception of the fungal disease potential.

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Weather-Related Twisted Whorls in Corn - (*Bob Nielsen*) -

Most everyone agrees that Indiana weather conditions during the past 30 days or so can only be described as "crappy" for the growth and development of the state's corn crop. Daily high temperatures have been primarily in the 60's and low 70's. Daily low temperatures have been in the 50's and even 40's. About the only good news overheard down at the Chat 'n Chew Café is that surface soil moisture levels have been replenished in most areas of the state, although in many areas rainfall has been excessive.

We know that warm, sunny weather will eventually return to the Hoosier state. We also know that corn, being a temperature-dependent crop, will respond to that onset of warm, sunny weather by shifting to a faster rate of development. Therein lies the cause for issuing this fearmonger alert.

When periods of slow corn development (typically, cool cloudy weather) are followed by a sharp transition to periods of rapid corn development (typically, warm sunny weather plus ample moisture), scattered plants throughout fields may begin exhibiting unusual symptoms of twisted whorls. The whorls of the affected plants appear tightly twisted, bend over at right angles, and remain unfurled for quite some time.

One's natural instincts would blame the twisted growth on herbicide injury. Where cell growth inhibitor herbicides are applied pre-plant or pre-emergence, shoot uptake of the herbicide by the emerging seedling can indeed result in twisted growth of the young plants. Late application of growth regulators can also cause twisted whorls in older plants when leaves and whorl intercept a substantial amount of the herbicide.

It is important to recognize, though, that twisted whorls of corn may appear in fields where none of this herbicide chemistry has been applied. Some hybrids react to a rapid change from poor to good growing conditions by basically going "bonkers" as their rate of development speeds up.

For some reason, the upper whorl of some plants sometimes won't unfurl properly as if the rolled leaf tissue has lost its elasticity. Younger leaves deeper in the whorl continue to develop rapidly, but are unable to emerge from the tightly wrapped upper leaves. The subsequently tightly twisted whorl then bends and kinks from the pressure exerted from the younger leaves' continued growth.

The growth stage where I've observed this phenomenon in past years was around four to six visible leaf collars (somewhat less than knee-high). That growth stage accurately reflects that of early-planted corn right now and, in fact, I've received a few reports of the occurrence of the phenomenon from various areas of the state.

At the peak of the problem, the appearance of these plants is indeed unsettling and one would think that the whorls would never unfurl properly. Given another week, though, twisted whorls of most of the plants will unfurl and the plants subsequently develop normally.

If you didn't notice the twisted growth to begin with, you may notice the appearance of "yellow tops" across the field after the whorls unfurl. The younger leaves that had been trapped inside the twisted upper

leaves emerge fairly yellow due to the fact that they had been shaded for quite some time. In addition to being fairly yellow, the leaves will exhibit a crinkly surface caused by their restricted expansion inside the twisted whorl. Another day or two will green these up and the problem will no longer be visible.

The Good News: Yield effects from periods of twisted growth caused by weather-related causes are minimal, if any.

For more images of this oddity, see the accompanying image gallery.

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More Thoughts on Southern Indiana Delayed Corn Planting - (*Bob Nielsen*) -

Increasingly aggravating rainfall throughout southern Indiana continues to interfere with the completion of corn and soybean planting. As of June 1, the Indiana Ag. Statistics Service reported that only 51% of the intended corn acres and 22% of the intended soybean acres had been planted in the southern crop reporting districts of Indiana.

Corn growers are particularly frustrated with the delayed planting situation. Last week I indicated that one small bit of good news is that southern Indiana corn growers can avoid drastic changes to hybrid maturities for quite some time due to that area's longer growing season and corn's ability to adjust its heat unit requirements with delayed planting (Nielsen, 2003).

Listed here again are the safe hybrid maturities for two planting periods:

* **Safe hybrid maturities for planting in southern Indiana through June 10**

Southwest: Fuller season maturity than most plant anyway
Southcentral: Hybrid maturities from 115 to 118 CRM (Pioneer® brand rating)
Southeast: Hybrid maturities from 116 to 119 CRM

* **Safe hybrid maturities for planting in southern Indiana through June 20**

Southwest: Hybrid maturities from 117 to 120 CRM
Southcentral: Hybrid maturities from 109 to 112 CRM
Southeast: Hybrid maturities from 110 to 113 CRM

While a switch to significantly earlier hybrid maturities is not physiologically warranted for a couple more weeks, growers may nonetheless want to consider switching to earlier maturities to reduce their potential grain drying costs in the fall. Long-term plot data from Pioneer Hi-Bred International (Iragavarapu, 2003) indicates that the yield potential for late, medium, and early maturity hybrids becomes very similar as planting is delayed beyond June 10 in the central U.S. Corn Belt. Grain moisture differences at harvest, on the other hand, remain similar among the hybrid maturities, if not more dramatic, as planting is delayed.

Final Note of Caution: Growers who elect to switch to earlier maturity hybrids for mid- to late June plantings in southern Indiana must also remember to select hybrids with acceptable disease tolerance because of the greater risk of leaf diseases with late-planted corn (Vincelli, 2003). This is especially true if you are considering maturities unusually early, and therefore agronomically unadapted, for your location.

Related References:

- Indiana Ag. Statistics Service. 2003 (June 2). **Indiana Crop & Weather Report.** U.S. Dept of Ag. Available online at <http://www.nass.usda.gov/in/cropweat/2003/we2203.pdf<. [URL verified 6/3/03].
- Iragavarapu, Raj. 2003. **Basing Hybrid Maturity Switches on Long-term Data.** Pioneer Hi-Bred International, Inc. Available online at <http://www.pioneer.com/growingpoint/agronomy/crop_insight/1012.jsp>. [URL verified 6/3/03]. **Note that online access to this document requires free registration via Pioneer's GrowingPoint™ Web site.**
- Nielsen, Bob. 2003. **Delayed Corn Planting Issues for Southern Indiana**. Purdue Univ. Corny News Network. Available online at <http://www.kingcorn.org/news/articles.03/DelayPlantSouth-0528.html>. [URL verified 6/3/03].
- Vincelli, Paul. 2003. **Risk of Leaf Disease in Late-Planted Corn.** Kentucky Pest News. Univ. of Kentucky. Available online at <http://www.uky.edu/Agriculture/kpn/kpn_03/pi030519.htm>. [URL verified 6/3/03].

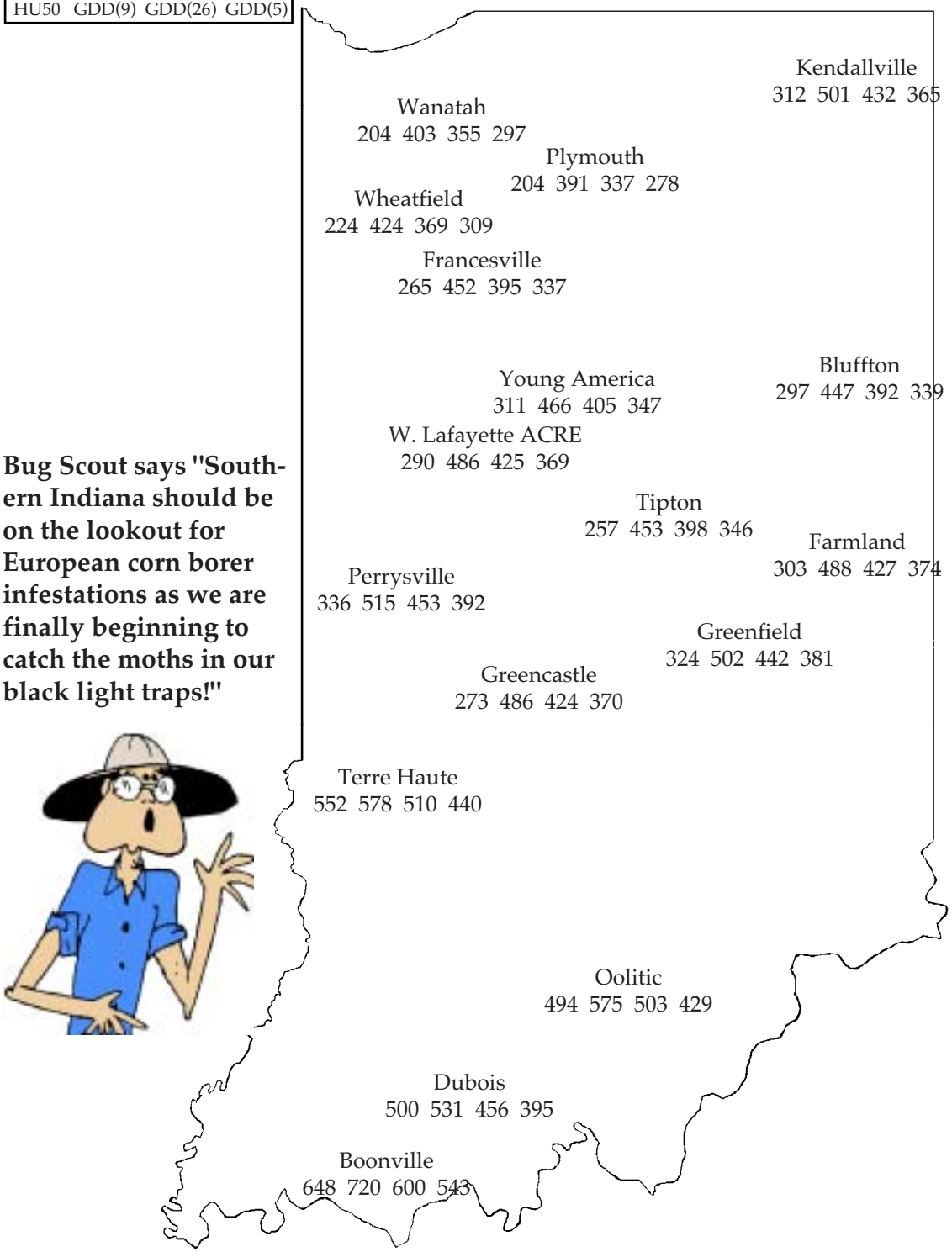
Don't forget, this and other timely information about corn can be viewed at the Chat 'n Chew Café on the Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the Web at <http://www.kingcorn.org.>.

Weather Update

Temperatures as of June 4, 2003

HU50 = heat units at a 50°F basefrom date of intensive moth capture, for black cutworm development (larval cutting begins about 300)
GDD(9) = Growing Degree Days from April 16 (9% of Indiana's corn planted), for corn growth and development
GDD(26) = Growing Degree Days from April 25 (26% of Indiana's corn planted), for corn growth and development
GDD(50) = Growing Degree Days from April 30 (50% of Indiana's corn planted), for corn growth and development

MAP KEY				
Location				
HU50	GDD(9)	GDD(26)	GDD(5)	



Bug Scout says "Southern Indiana should be on the lookout for European corn borer infestations as we are finally beginning to catch the moths in our black light traps!"

4" Bare Soil Temperatures 6/4/03

Location	Max.	Min.
Wanatah	58	55
Columbia City	57	55
Winamac	58	55
Bluffton	60	59
W Laf Agro	58	57
Tipton	61	60
Farmland	54	54
Perrysville	57	57
Crawfordsville	60	59
Terre Haute	61	59
Oolitic	65	55
Dubois	62	57

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