Pest & Crop

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

September 19, 2003 - No. 26

In This Issue

Insects, Mites, and Nematodes

Beauties and the Beasts – (*John Obermeyer and Larry Bledsoe*) –

- Caterpillars that may have fed on crops are now gracing the roadsides with pretty butterflies
- Three species described below

While driving through the countryside, many have been greeted with the pleasing site of butterflies on and along side of roads, near puddles of water, or on flowering plants. Ironically, these beauties originated from larvae that may have fed on soybean or alfalfa. However, it is rare for any of these species to cause significant yield losses from defoliation. Below is a listing, with pictures, of some of the common butterflies and their caterpillars this time of year.

The painted lady butterfly, *Vanessa cardui*, is mostly orange mottled with black and white markings. This is a migratory species flying from and to Mexico and the Southwestern United States in the spring and fall. Adults arrive in Indiana in the spring and lay their eggs on several species of weeds. Although they feed on many weed species, their preferred host is Canada thistle. Several generations occur in Indiana before they begin their migration southwestward in the fall. The larvae, known as thistle caterpillars, are generally dark in color, with conspicuous yellowish markings on their bodies. The larvae are covered with many branching spines. Larvae reach a length of about 1-1/4 inches. The larvae feed within webbed enclosures on the upper leaves and may defoliate entire patches of weeds and feed in a similar manner on soybean.

Painted lady butterfly

Thistle caterpillar within its webbing

The yellow, alfalfa butterfly, *Colias eurytheme*, is a member of the "sulfurs." These butterflies congregate in large numbers near sources of moisture. They are most active during mid-day, their peak mating time. The larvae of these butterflies are the alfalfa caterpillar. This caterpillar is up to 1-1/2 inches long, has a velvety-smooth lime-green body with a white stripe on each of its sides. This caterpillar is common in alfalfa, clover, and vetch, but it can be occasionally found defoliating soybean leaves. Though the numbers of butterflies may be numerous, this does not indicate an outbreak of caterpillars is soon to follow. These caterpillars are very susceptible to insect diseases that can rapidly bring their numbers down to very low levels.

Alfalfa butterfly

Alfalfa caterpillar on soybean

The ugly looking caterpillar award goes to the silver-spotted skipper, *Epargyreus clarus.* These larvae are up to 2 inches in length, have brownish-red heads with two orange spots and a yellowish-green body. Larvae can often be found in leaves that have been rolled together and held by the caterpillars' silken threads. Feeding damage is generally localized to a few surrounding plants. Adult skippers, which are commonly seen feeding on flowers late in the summer, have an obvious silver-white splotch on each wing.

Silver-spotted skipper

Larva of the silver-spotted skipper

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Asian Lady Beetle, Beneficial Changes to Nuisance – (*John Obermeyer and Larry Bledsoe*) -

The multicolored Asian lady beetle certainly has made a turnaround in numbers after very low populations a year ago. The reason for the rapid increase is that the soybean aphid became so plentiful this past season. Few could argue their beneficial nature once they saw these beetles, and their larvae, devouring aphids in soybean fields. However, the "dark" side of these beetles will soon be felt as they invade homes and businesses for the next several weeks seeking shelter for the winter. If you and others become angry at this annoyance, you may want to divert that energy by reporting your findings. Susan Ratcliffe, North Central Region Pest Management Center, explains the reporting process below.

"As the multicolored Asian lady beetles begin creating problems for homeowners, fruit and vegetable growers, and other related industries, I would like to remind you of a web site designed to receive reports regarding multicolored Asian lady beetle infestations. The web site is located at <http://www.pmcenters.org/northcentral/MALB/>. There are three types of reports that can be submitted. Individuals submitting reports should click on "Reporting Beetles" in the upper left corner of the header. This will take them to a page where they can select residential, commodity or research reports. A form will come up that they can complete. The data will be used by researchers to track population variations within the region and to develop management recommendations..."

Multicolored Asian lady beetle

Beetles overwintering within a home's framework

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European Corn Borer Update – (*John Obermeyer and Larry Bledsoe*) – We have completed surveying cornfields in southern Indiana for corn borer damage and larvae attempting to overwinter. The completed survey will be presented in the October issue of the *Pest&Crop*. Even though moth flights throughout the season were low and little damage was reported, we have seen a few fields that have considerable larval tunneling. Corn borer tunneling often leads to stalk diseases and lodging. As well, some fields are exhibiting weakened stalks from diseases alone. From our early observations, there will be some surprises for producers as they pull into fields with the combine. We would suggest producers evaluate fields now for stalk strength to determine if some fields need early harvest.

Severe stalk rot lodging

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Black Light Trap Catch Report - (*John Obermeyer*)														
County/Cooperator	9/3/03 - 9/8/03							9/9/03 - 9/16/03						
	VC	BCW	ECB	SWCB	CEW	FAW	AW	VC	BCW	ECB	SWCB	CEW	FAW	AW
Dubois/SIPAC	0	20	0	0	25	2	0	0	7	0	0	7	0	5
Jennings/SEPAC	0	3	0	0	70	0	1	0	1	1	0	4	0	0
Knox/SWPAC	1	2	41	3	19	0	3	2	6	43	2	15	2	10
LaPorte/Pinney Ag Center	0	1	28	0	22	0	0							
Lawrence/Feldun Ag Center	0	36	0	0	13	0	4	0	12	0	0	3	1	5
Randolph/Davis Ag Center	0	1	0	0	100	0	5	0	4	6	0	8	0	5
Tippecanoe/TPAC Ag Center														
Vermillion/Hutson	0	0	0	0	12	0	0	2	3	0	0	16	0	0
Whitley/NEPAC	0	0	6	0	30	5	2	0	15	4	0	9	2	4

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

Weeds

Fall Applied Herbicides – (*Bill Johnson, Glenn Nice, and Tom Bauman*) -

Now is the time to start thinking about fall applied herbicides to control winter annual weeds in corn and soybean production. Use of fall applied herbicides should be considered if winter vegetation prohibits soil drying and timely planting in the spring. Also some evidence exists that specific weeds can serve as an alternative host for black cutworm and soybean cyst nematode. The specific goal of a fall applied program is usually to serve as a replacement for a burndown or tillage used in the spring to manage winter annuals. If the program used doesn't serve as a burndown replacement, the use of a fall applied program won't necessarily be advantageous unless you are using it to reduce infestations of insect pests or SCN.

The most common winter annual weeds found in Indiana are henbit, purple deadnettle, chickweed, and in some areas of the state marestail (horseweed). In Table 1, we have listed the commercially available programs that have provided 80% or more control of these weeds in University research trials and whether or not they will suppress or control dandelion. Most of the commercially available programs offer flexibility in growing either corn or soybean in the following cropping season. This is because their rotational intervals on the label are shorter than the time frame between a fall application and traditional planting dates in April and May of the following year. Specific programs mentioned below that do not offer crop rotation flexibility include Backdraft and Canopy XL (must grow soybean in 2004), and Princep or simazine (must grow only corn in 2004).

Going into the 2003 season, a number of areas in Indiana were experiencing severe problems with dandelion. Dandelions are controlled much more effectively with fall applied programs than with spring applied herbicides. All programs listed will provide control or suppression of dandelion. The key in most of the programs is the use of 2,4-D or glyphosate. Control of dandelion with 2,4-D is rate responsive. If dandelion infestations warrant fall treatment, use 2,4-D alone or with the other products at 1 qt/A unless you are using Canopy XL. If using Canopy XL, then the 2,4-D rate can be reduced to 1 pt/A Glyphoste is much more effective on dandelion in the fall than in the spring. Use 22 oz/A

of Roundup Weathermax, or 32 oz/A of the other 3 lb acid equivalent/gallon formulations.

Marestail is also controlled effectively by many fall applied programs. Managing this weed with fall applied programs should be strongly considered in areas with known infestations of glyphosate-resistant populations. All of the programs listed below will provide control or suppression of glyphosate-resistant marestail except Backdraft and glyphosate alone. The addition of 2.4-D to these products will greatly increase control of glyphosate resistant populations. (see related article for more information on glyphosate resistant marestail).

Fall applied herbicide treatments can be applied from mid October until early December. Products that do not have appreciable residual activity in soil (glyphosate, 2,4-D, or Gramoxone alone) should be applied late enough to so that weed reemergence after application is minimal. However, foliar activity with these products is better when applications are made during a period of several days of daytime air temperatures of 50 degrees or greater. For dandelion control, applications should be about the time of the 1st killing frost (typically late October to early November). Products with residual activity in the soil have more flexibility in application timing and can be applied as soon as the crop is removed from the field.

Table 1. Fall applied herbicide programs which should provide 80% or more control of henbit, purple deadnettle, and chickweed into April or 2004.

Herbicide Program	Labeled for fall application before corn	Labeled for fall application before soybean	Control or suppression of dandelion	Control or suppression of marestail
Backdraft	No	Yes	Yes	Yes, if not glyphosate resistant
Backdraft+2,4-D	No	Yes	Yes	Yes
Basis+2,4-D	Yes	Yes	Yes	Yes
Canopy XL+2,4-D	No	Yes	Yes	Yes
Canopy XL+Express+2,4-D	No	Yes	Yes	Yes
Dicamba (Banvel/Clarity/Sterling)	Yes	Yes	Yes	Yes
Dicamba+2,4-D	Yes	Yes	Yes	Yes
Express+2,4-D	Yes	Yes	Yes	Yes
Glyphosate	Yes	Yes	Yes	Yes, if no glyphosate resistant
Glyphosate+2,4-D	Yes	Yes	Yes	Yes
Gramoxone+Sencor+2,4-D	Yes	Yes	Yes	Yes
Harmony Extra+2,4-D	Yes	Yes	Yes	Yes
Princep+2,4-D	Yes	No	Yes	Yes
Valor+2,4-D	Yes	Yes	Yes	Yes
Valor + Express+2,4-D	Yes	Yes	Yes	Yes

Premature Death in Soybeans – (*Gregory Shaner, Andreas Westphal, and Scott Abney*) –

- Early dying of soybeans is the result of several problems

About a month ago soybeans in many fields began dying prematurely. In some fields, most plants died early, leaving just a few areas of normal plants. In other fields, there were only a few patches of dead plants. Sudden death syndrome has been a major problem in various regions of Indiana in recent years, and at first it appeared that SDS was once again the problem this year. Some fields did show the typical symptoms of SDS, indicating that this disease was the cause of premature plant death. However in other fields, close inspection of dying plants did not reveal the classical symptoms of SDS. Dead leaves remained attached to the stems and the characteristic brown streaks in the lower stem cortex were not evident.

Many of these fields showed evidence of charcoal rot. Charcoal rot is also known as dry-weather wilt or summer wilt, which gives a clue as to why it appeared this year. The disease appears during hot, dry weather, especially on plants that are already under stress. In irrigated fields, it can appear when water is cut off after flowering. The lack of rain during August in much of Indiana would have a similar effect. Like SDS, charcoal rot is caused by a soilborne fungus - *Macrophomina phaseolina*. The disease gets its name from survival structures, microsclerotia, produced by the fungus in the lower part of the soybean stem. These are small, black aggregations of the fungus that look like charcoal dust in the stem tissue. Microsclerotia can survive in host residue or freely in soil for 2 years or more. The fungus has a broad host range and is probably widespread in Indiana soils. Compromised root systems may have been predisposed soybean to charcoal rot. The stress on root systems imposed by wet, cool conditions early in the season, followed by dry weather during August set the stage for charcoal rot. In addition, *Fusarium* root rot, caused by *Fusarium solani* and other species of *Fusarium*, was associated with many plants that did not show characteristic symptoms of SDS. Such plants could not obtain sufficient water and nutrients from the soil to sustain growth until full normal maturity. Although this dying-off of soybean occurred late enough in the season to not reduce the number of pods, it might have reduced pod fill. Several reports of small seed in harvested beans support this hypothesis.

Agronomy Tips

End-of-Season Corn Stalk Nitrate Test - *(Bob Nielsen)* –

The End-of-Season Cornstalk Test, developed at Iowa State University (Blackmer & Mallarino, 1996), allows growers to conduct a "post-mortem" evaluation of the adequacy of their nitrogen program for the current growing season. The test is described as "post-mortem" because stalk samples are taken after the grain is physiologically mature. Given that this is a very late season test, the interpretation of the results offers no assistance in fine-tuning nitrogen (N) management for the current year, but rather provides insight into N management options for coming years.

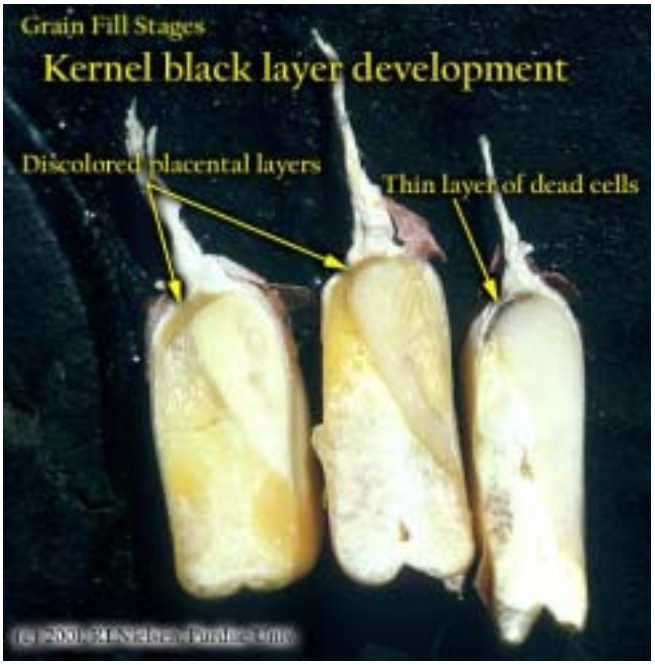
The basis for the test lies in the fact that corn plants deficient for nitrogen will usually remobilize stored N from the lower portions of the stalk and leaves to the developing grain; resulting in lower stalk nitrogen concentrations at the end of the season. Plants that take up excessive amounts of soil nitrogen (more than is needed for maximum yields) will store excessive amounts in the lower stalk sections by the end of the growing season; resulting in higher stalk nitrogen concentrations.

The stalk nitrate test is probably best suited for identifying fields / situations where soil nitrogen uptake was excessive (no yield benefit) and, thus, costly to the grower and possibly the environment. Typical situations where N uptake may be excessive include manured fields or fields following alfalfa that received additional (and possibly unnecessary) nitrogen fertilizer applications for the subsequent corn crop. Some growers may be particularly interested in evaluating the adequacy of their N management program this year given the occurrence of multiple "monsoon" events that likely caused significant soil nitrate-N loss and nitrogen deficiency in the corn crop.

Sampling Procedures in the Field

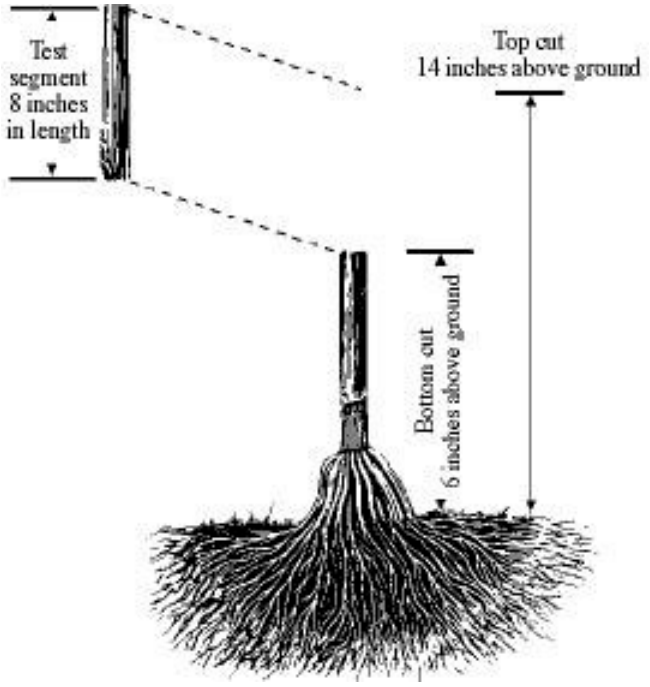
The procedure for collecting stalk samples is fairly straightforward and reasonably speedy to perform in the field (Blackmer & Mallarino, 1996). Typically, samples should be collected one to three weeks after 80% of the kernels reach the kernel black layer stage (physiological maturity). Some fields throughout the state are mature now, but many more will reach that point of development over the next several weeks. If you are unfamiliar with staging kernel development in corn, take a look at my article on the subject (Nielsen, 2002).

Aim to sample areas within fields using spatial patterns similar to how you would collect soil samples. Within each area of the field, collect individual stalk



segments from fifteen representative plants as outlined below. Each group of 15 stalk segments will be combined into a single sample for that area of the field.

- Cut an 8-inch stalk segment from each plant, BEGINNING at the 6-inch mark above the ground. Remove any leaves and leaf sheaths from the segment.
- Do not sample diseased stalks, unusually stunted plants, stalks damaged by hail or insects (e.g., European corn borer), or stalks with no ear or extremely small ears.
- Keep the stalk segments as cool and clean as possible while you finish collecting the other samples.
- Place each group of 15 stalk segments into a paper (NOT plastic) bag for shipment to the testing laboratory.
- Paper bags minimize mold growth during shipment and facilitate additional drying.
- Samples should be refrigerated (NOT frozen) if stored for more than a day before mailing to the lab.
- Mail the stalk samples to a laboratory for nitrate analyses. Most soil testing labs will also conduct stalk nitrate tests, but be sure to check with your usual laboratory before collecting and mailing samples (Brouder, 2003).



Interpretation of Results

The results of the analytical tests for stalk nitrate content are usually reported in terms of parts per million (ppm) nitrate-N and their interpretation is fairly simple. Recognize, though, that the results merely indicate whether nitrogen uptake itself was inadequate, adequate, or excessive relative to the nutrient needs of the crop in the current growing season. The following categories for stalk nitrate values are based on field calibration research trials conducted across Indiana in 1996 and 1997 (personal communication with S. Brouder, Purdue Univ.) and differ slightly from those published by Blackmer & Mallarino (1996).

1. Low = Less than 450 ppm nitrate-N = High probability that nitrogen is deficient

2. Optimal = 450 - 2000 ppm nitrate-N = Yields are not limited by nitrogen

3. Excessive = Greater than 2000 ppm nitrate-N = Uptake exceeds requirements

The true value of this test comes from repeated observations over years for a given field. If a field regularly tests in the optimal range (450 – 2000 ppm), the grower's nitrogen program is evidently performing well. If a field is regularly identified as being low or inadequate (less than 450 ppm), then additional N fertilizer amounts may be justified in future years. Fields that regularly exhibit stalk nitrate values in the excessive category (greater than 2000 ppm) are likely candidates for lower investments in N fertilizer in future corn years. The use of the pre-sidedress soil nitrate test (Brouder & Mengel, 2003) may also be warranted for fields that regularly test in the excessive category for stalk nitrates in the fall.

Related References:

Blackmer, A.M. and A.P. Mallarino. 1996. **Cornstalk Testing to Evaluate Nitrogen Management (PM-1584).** Iowa State Univ. Extension. Available on the Web at: <http://www.extension.iastate.edu/Publications/PM1584.pdf>. [URL verified 9/9/03].

Brouder, S. 2003. **Directory of Certified Soil Testing Laboratories.** Purdue Univ. Extension. Available on the Web at: <http://www.agry.purdue.edu/ext/soiltest.html>. [URL verified 9/9/03].

Brouder, S. and D. Mengel. 2003. **The Pre-sidedress Soil Nitrate Test for Improving N Management in Corn (AY-314-W).** Purdue Univ. Extension. Available on the Web at: <http://www.agry.Purdue.edu/ext/pubs/AY-314-W.pdf>. [URL verified 9/9/03].

Nielsen, RL (Bob). 2002. **Grain Fill Stages in Corn.** Purdue Univ. Corny News Network. Available on the Web at: <http://www.kingcorn.org/news/articles.02/Grain_Fill-0723.html>. [URL verified 9/9/03].

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Tip Fill Problems in Corn– (*Bob Nielsen*) **-**

One of the more common complaints overheard in recent days downtown at the Uptown Bar & Grill has to do with ears of corn that have not filled all the way out to the tip. Folks walking their fields scouting for stalk rot have also discovered ears with one to two inch barren tips. What are some of the causes of tip fill problems in corn and what are the yield consequences?

Causes

Barren tips of cobs result from some combination of an absence of kernel development and shriveled, aborted kernels. Each has a different set of possible causes.

An absence of kernel development indicates that pollination itself was not successful. The list of possible causes includes severe silk clipping by insects (corn rootworm or Japanese beetles) during the final stages of pollination, delayed silk emergence or deterioration of exposed silks due to excessive heat or drought conditions, silk emergence failure due to silkballing near the tip of ear, and lack of viable pollen due to excessive heat or drought conditions. Diagnosing the exact cause later in the grain fill period can be challenging.

The occurrence of kernel abortion signals the incidence of severe photosynthetic stress during the first few weeks of grain fill following the end of pollination. Tip kernels are especially vulnerable to

abortion because they are the result of the final days of pollination and therefore are technically the youngest kernels on the ear and most sensitive to subsequent severe photosynthetic stress.

Factors that can severely limit photosynthesis include consecutive cloudy days, excessive heat and drought conditions (especially when accompanied by severely compromised root systems), and loss of significant leaf area due to hail damage, severe nutrient deficiencies (think nitrogen this year), severe leaf diseases (e.g., gray leaf spot or northern corn leaf blight), and insect feeding injury (e.g., grasshoppers). There is anecdotal and some research evidence that unusually warm nights (mid-70's or warmer) during early grain fill periods may also contribute to abortion of tip kernels.

Ear size potential can influence the occurrence of barren tips. Remember that potential ear size (number of ovules) is determined early in the development of the plant, from approximately V6 (six visible leaf collars) to V15. Favorable growing conditions during this period encourages large ear size potential, especially in terms of ovule number per row (ear length).

Lengthy potential ears heading into pollination obviously maximize the potential kernel set and grain yield. Sometimes, though, unusually lengthy ear size results in barren tips if the final tip silks emerge after the field's pollen shed is already complete and thus never receive pollen. If pollen is available to pollinate the late emerging tip silks of lengthy ears, the resulting kernels are often dramatically "younger" than the remainder of the kernels on the cob and, therefore, particularly sensitive to severe photosynthetic stress.

Yield Consequence

Obviously, absent kernels translate to lost yield potential. Mathematically, for every absent kernel per row on an 18-row corn hybrid (assuming a final ear count of 28,000 ears per acre), the lost yield potential equals about 6 bushels per acre. Yes, yield loss can mount quickly as a consequence of barren tips.

But, it is also important to make sure you put the problem into perspective. Before you complain about barren tips to your seed rep, first evaluate the remainder of the cob. Typical kernel count for harvested ears of many hybrids is approximately 600. Hybrids whose ears are typically 16 rows in girth tend to set about 36 - 40 kernels on each row, while those that typically develop 20 rows of kernels tend to set closer to 30 kernels per row.

The point here is that if potential ear size (number of ovules) was quite large heading into pollination (favorable pre-pollination conditions) but failed to pollinate the tip silks, the resulting ears may still exhibit 30 – 40 kernels per row even though there is one to two inches of barren tip. In other words, harvested ear size will still average about 600 kernels and ultimate grain yield will be average to above average.

On the other hand, if kernel counts show only 20 to 25 kernels per row with lengthy barren cob tips, then that indeed indicates that the crop suffered significant stress conditions probably more than once during the season. Kernel counts per ear will be much less than 600 and ultimate grain yield in this latter example will likely be less than average for that field and/or hybrid.

Related References:

Nielsen, R.L. (Bob). 2002. **Yield Loss During Grain Fill.** Purdue Univ. Corny News Network. Available online at: <http://www.kingcorn.org/news/articles.02/Grainfill_Stress-0802.html>. [URL verified 9/17/03].

Nielsen, R.L. (Bob). 2002. **When and How Can I Estimate Corn Yields.** Purdue Univ. Corny News Network. Available online at: <http://www.kingcorn.org/news/articles.02/Yld_Est-0723.html>. [URL verified 9/17/03].

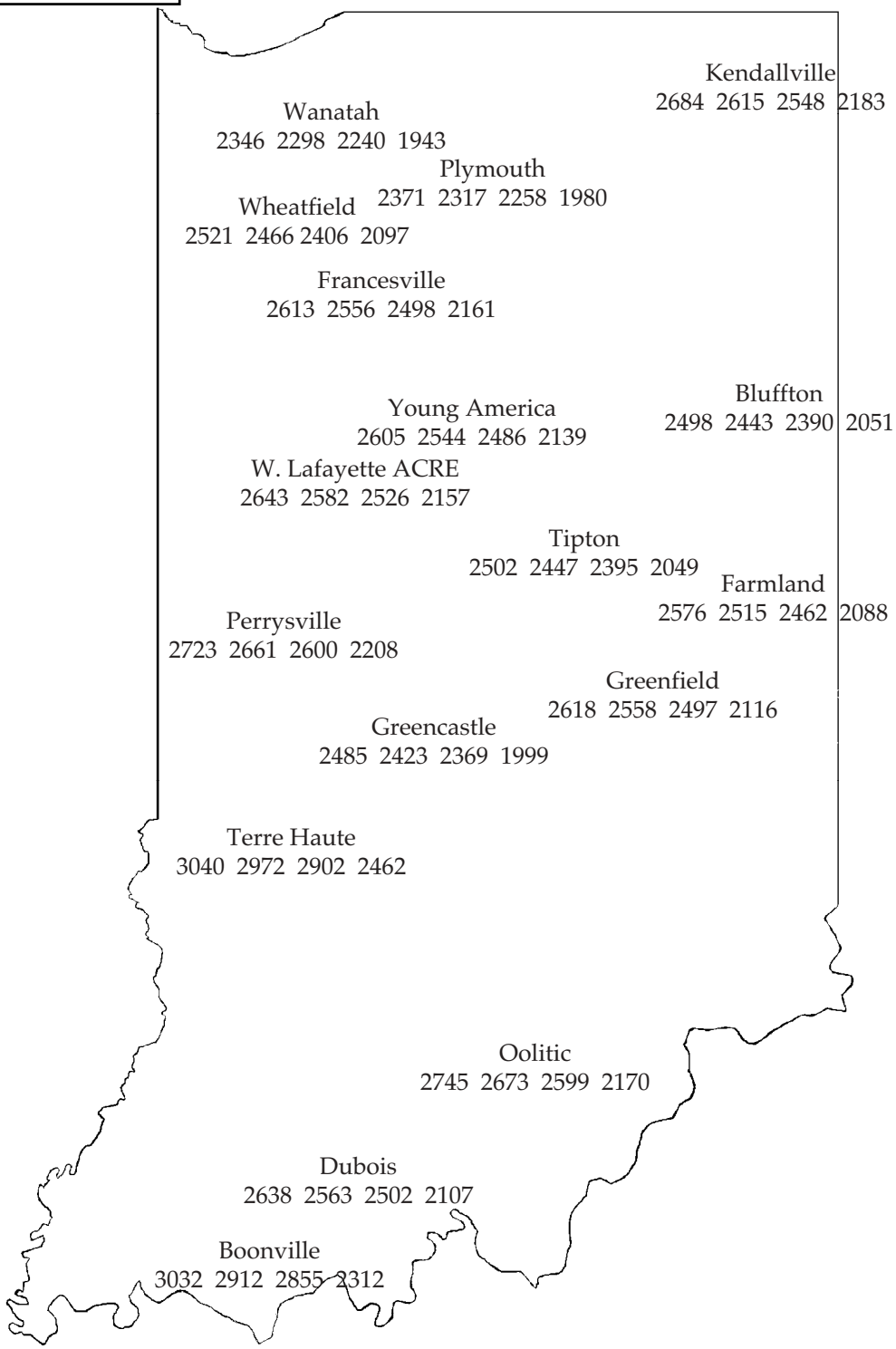
Don't forget, this and other timely information about corn can be viewed at the Chat 'n Chew CafÈ on the Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the Web at <http://www.kingcorn.org>.

Weather Update

Temperatures as of September 17, 2003

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
GDD(85) = Growing Degree Days from June 4 (85% of Indiana's corn planted), for corn growth and development

MAP KEY
Location
GDD(9) GDD(26) GDD(50) GDD(85)



4" Bare Soil Temperatures 9/17/03

Location	Max.	Min.
Wanatah	80	62
Columbia City	77	58
Winamac	70	64
Bluffton	65	64
W Laf Agro	81	63
Tipton	77	68
Farmland	70	63
Perrysville	73	66
Terre Haute	78	64
Oolitic	80	62

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.