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

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In This Issue

Insects, Mites, and Nematodes

Hessian Fly Infestation in Indiana Extremely Low in 2003– (*Sue Cambron*) -

- Planting after the fly-free date is a key management strategy for reducing Hessian fly problems
- Destruction of volunteer wheat helps reduce insect reservoir to avoid spring infestations
- Variety with resistance to Biotype L available for areas of mid-south
- New gene for resistance to Biotype L identified

The Hessian fly is present in wheat-growing areas throughout Indiana and often survives, although in lower numbers, in wheat stubble or grasses during the summer. Examination of three uniform nurseries located in the wheat growing regions of Indiana found no evidence of the fly in 2003. However, there is potential for rapid increase of fly populations as a result of weather conditions or cropping practices that favor survival of eggs and young larvae in the fall.

Much of the fall fly population can be avoided by planting after the fly-free date. This is key to avoiding subsequent infestation by the spring brood. Additionally, it has been shown that following the fly-free date will help reduce wheat disease problems and reduce winter kill from excessive growth. Crop rotation, where wheat following wheat is avoided, also is one of the key management strategies for reducing Hessian fly problems.

The Hessian fly passes the summer in the stubble of the current wheat crop. Plowing the stubble results in the destruction of the pest. Volunteer wheat germinates and begins growing just in time for the fall emergence of the Hessian fly. These plants are readily infested resulting in a rapid build-up of the population. Removal of volunteer wheat before the emergence of the fall brood greatly reduces the insect reservoir for a spring infestation.

INW9811, with the H13 gene for resistance to Biotype L was grown widely in mid-south regions of the eastern U.S. This cultivar, developed by the Purdue small grains breeding program in conjunction with USDA-ARS, was the first commercially available wheat with resistance to

Biotype L. It is adapted to the wheat growing regions of southern Indiana and Illinois, southward to northern Alabama, Georgia and the Carolinas.

A new gene for resistance was identified by the USDA-ARS and Purdue University small grains group. The gene was moved from a tetraploid durum (*Triticum turgidum* Desf.), CI3984, which was obtained from the USDA-ARS National Plant Germplasm Laboratory in Aberdeen, Idaho, into a common wheat germplasm identified as P921696. The reference is cited below.

Theoretical and Applied Genetics
International Journal of Plant Breeding Research
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Phenotypic assessment and mapped markers for H31, a new wheat gene conferring resistance to Hessian fly (Diptera: Cecidomyiidae)

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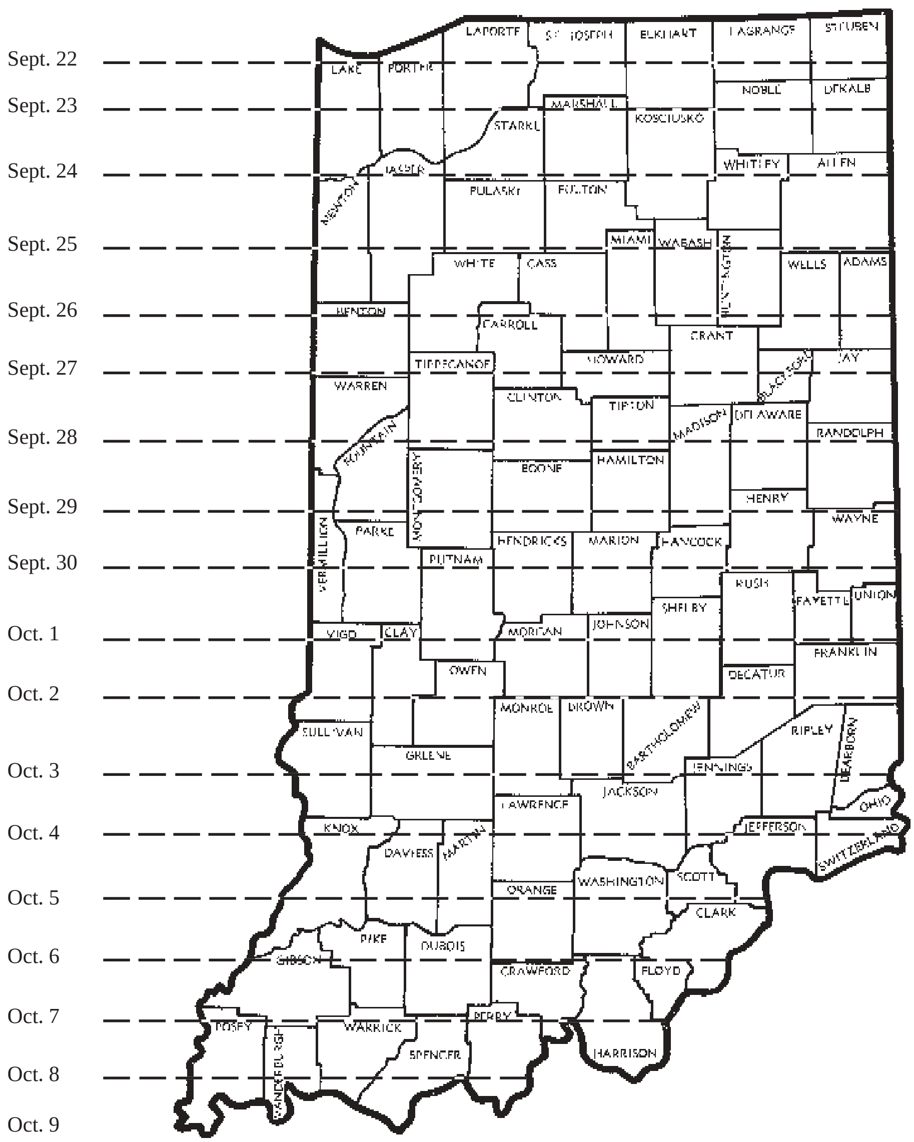

"FLY-FREE" DATES FOR SEEDING WHEAT

Black Light Trap Catch Report - (*John Obermeyer*)														
County/Cooperator	8/20/03 - 8/25/03							8/26/03 - 9/2/03						
	VC	BCW	ECB	SWCB	CEW	FAW	AW	VC	BCW	ECB	SWCB	CEW	FAW	AW
Dubois/SIPAC	0	41	4	0	6	1	1	0	29	2	0	130	3	4
Jennings/SEPAC	0	1	7	0	17	0	1	0	2	0	0	25	0	0
Knox/SWPAC	0	4	12	2	0	0	1	0	3	18	2	3	0	1
LaPorte/Pinney Ag Center	0	0	222	0	0	0	0	1	1	69	0	11	2	0
Lawrence/Feldun Ag Center	0	22	2	0	8	0	2	2	43	4	0	123	6	3
Randolph/Davis Ag Center	0	2	88	0	0	0	0	0	0	47	0	37	2	0
Tippecanoe/TPAC Ag Center	0	6	225	0	14	0	0							
Vermillion/Hutson	1	9	29	0	0	0	0	1	1	0	0	4	0	0
Whitley/NEPAC	0	0	169	0	0	0	5							
VC = Variegated Cutworm, BCW = Black Cutworm, ECB = European Corn Borer, SWCB = Southwestern Corn Borer, CEW = Corn Earworm, FAW = Fall Armyworm, AW = Armyworm														

Plant Diseases

Soybean Sudden Death Syndrome – (*Gregory Shaner and Andreas Westphal*) -

- SDS – a repeat of 2002

The disease situation in soybean appears similar to that in 2002. As in 2002, the progress of planting soybeans this spring was delayed and sudden death syndrome is once again developing later than we normally expect to see it. The late planting, coupled with cool weather during June and July, slowed plant development. Blooming, pod set, and seed development lagged behind the 5-year average. Whereas the late appearing SDS symptoms would normally not cause concern about yield and quality of the crop, the later than normal plant development this year may make the soybean crop vulnerable to significant yield loss. Yields of plants affected after pods are well developed may still be reduced due to the production of only small seed.

First SDS symptoms were spotted at the end of July. A little more SDS was seen in the early August, but over the past couple of weeks, more and more soybean fields in Indiana have shown symptoms. In affected plants, leaf tissue between the major veins turns yellow, then brown. Soon, the leaflets die and shrivel. In severe cases they drop off, leaving the petioles (leaf stalks) attached. Brown stem rot may cause similar foliar symptoms, but the leaflets tend to remain attached to the petioles and symptoms in the plant stem are different. When the lower stem and tap root is split, a plant with SDS will exhibit a dark cortex, but the pith will be white. In contrast, the pith of a plant with brown stem rot is dark, but the cortex is not much discolored. If a plant with SDS is dug up when soil is moist, there may be small, light-blue patches on the surface of the taproot. These are spore masses of the SDS fungus. As the plant dries, this color will fade, but when it is seen, in conjunction with the other symptoms mentioned above, a diagnosis of SDS is strongly indicated.

SDS-affected areas may be extensive in a field, or confined to a few patches. The disease is most likely to show up earlier and be more severe in areas with soil compaction. With the planting problems this spring, compaction is a greater problem than normal, and this has probably contributed to the development of SDS. Often the areas of SDS run parallel to the edge of the field on the turn row. Because of higher traffic in spring, these are areas are likely to be compacted.

Growers should make note of which fields show SDS and map the locations of affected areas. This can be useful information for future planting decisions in those fields. Where SDS is a problem, growers should avoid early planting of soybeans (That apparently did not always work this year!) and use a variety with some resistance to the disease. It's also a good idea to make note of varieties that show severe symptoms of SDS. Susceptible varieties should be avoided when planting a field that has any history of the disease. Planting date, soil condition, weather pattern, and field history have a strong influence on disease severity.

It is difficult to identify resistant varieties. If one field, planted with a particular variety, has SDS, but a nearby field, planted with another variety, has little or no SDS, one cannot necessarily conclude that the variety with little or no SDS is resistant. The best (and only) way to determine if a variety has resistance is to test it in replicated yield trials in several locations and years under severe and uniform SDS pressure. Scott Abney, with the USDA-ARS at Purdue, has been conducting such tests for several years and has identified several varieties that have a useful degree of resistance.

More information about sudden death syndrome of soybean can be found at <http://www.btny.purdue.edu/Extension/Pathology/CropDiseases/Soybean/Soybean.html#suddendeathsyndrome> or in Purdue extension publication BP-58 *Sudden Death Syndrome in Soybeans*.

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Soybean in Rotation with Watermelon – (*Andreas Westphal, Daniel S. Egel, and Gregory Shaner*)-

- Crop rotation is a good thing - but what about the plant-parasitic nematodes?

The beginning of fall is the time for some soil-borne diseases to show. In soybean, one of the late season diseases is sudden death syndrome (SDS) (see companion article by Shaner and Westphal). Whereas SDS is strongly weather-dependent, other soil-borne problems are always present and oftentimes damage crops. Plant-parasitic nematodes are a constant threat. Some nematodes have a restricted host range, e.g., the soybean cyst nematode primarily infects soybean, but does not infect other crops widely grown in Indiana. In contrast, root knot nematodes have much wider host ranges and can infect several of Indiana's agricultural and ornamental crops.

Drought conditions during August were a stress factor for many fields. In southern Indiana, plants were under drought stress on light soils because of the limited water holding capacity of these soils. In a drought, any debilitation of the root system can interfere with root functions and has potential to be detrimental to plant growth and reduce yield. Growers are well aware of the soybean cyst nematode that feeds on soybean roots and know that the selection of a variety resistant to the nematode population present in a particular field will mitigate yield loss. Root knot nematodes of the species *Meloidogyne*, have long been recognized as problem in soybean in southern states. Limited attention has been given to these nematodes in the North Central region, possibly because of the overwhelming importance of the soybean cyst nematode. Currently there is no indication that cyst nematode resistance has any correlation with root knot nematode resistance.

Recent damage surveys of soybean diseases did not associate extensive damage with root knot nematodes. However, in isolated regions of Indiana the situation might be different. Westphal and Egel observed root knot nematodes in a southern Indiana field. The field is in a cucurbit-field crops rotation and root knot nematode damage was detected on watermelon roots in 2002. In 2003, this field had the typical wavy appearance (Fig. 1) often seen with soil-borne problems. Nematode damaged plants are stunted and lack vigor compared to healthy plants. Above-ground symptoms can be confused with other soil-borne problems. Examination of the roots of symptomatic plants revealed several root knots. Roots of symptomless plants were devoid of nematode-induced galls, and had copious nodulation (Fig. 2). Nematode-induced galling can be distinguished from the beneficial *Rhizobium* nodules. Nodules, typically 1/8-1/4 of an inch in diameter, develop on the surface of the root. Root knot nematode galls are integrated into the root structure and can result in pronounced deformation. Soybean cyst nematodes were also present in this field. Thus plant damage was probably not solely associated with root knot nematodes, but the root knot nematode likely contributed to plant stress and damage.

While the damage to soybean from root knot nematodes might be tolerable, rotation of watermelon with soybean may be unfortunate. Root knot nematode populations can be maintained in the "non-watermelon" years and can potentially increase and so enlarge the problem in future cucurbit crops. A careful monitoring of fields for root knot nematodes will allow the growers to learn more about pressure of soil-borne diseases and will help in making good management decisions to avoid "surprises" of root knot nematodes in highly valuable melon crops in coming years.

Fig. 1. Soybean field. Note the "wavy" uneven plant canopy height.

Fig 2. Soybean roots. Healthy roots with copious *Rhizobium* nodules on the left, and root knot nematode induced galling on the right.

Agronomy

Variety Selection and Seeding Rate for Soft Red Winter Wheat - (*Charles Mansfield and Ellsworth Christmas, Agronomy Department*)

- Plant high quality seed of several varieties.
- Adjust seeding rate according to seed size.
- Optimum plant population is around 30 -35 plants/ square foot.
- Plant timely and observe Hessian fly-free date.

When choosing among the many public and private wheat varieties that are available, select those varieties that have the combination of traits that best fit your production system. In addition to yield, certain traits dealing with disease resistance, winter hardiness, and earliness may also be important. It is likely that not any one single variety will contain all the traits that you consider important. Therefore, plant several varieties to help spread the risk associated with the various diseases and environmental stresses of your area. Information on southern Indiana variety trials can be obtained from the Warrick County Web site <http://www.ces.purdue.edu/warrick/ag>. Click on the **Crop Production Plots** link to get variety trial results. There is also a link to variety trails in other states at the **State Plots** link on that page. In addition, information is available from the Performance of Public and Private Small Grains Bulletin available on the WEB at <http://www.agry.purdue.edu/ext/variety.htm>. Then click on **2003 PDF** under **Small Grains**.

Seed might also be saved from the previous season if it is high quality and not contaminated with seed borne diseases like smut. Seed should be professionally cleaned to remove light, shriveled, low quality kernels. A seed treatment can also be applied. Good quality seed should have at least 85 to 95% germination.

The seeding rate for soft red winter wheat should be adjusted for seed size. Seed size can vary from less than 12,000 seeds per pound to more than 16,000 seeds per pound. Accordingly seeding rates can also vary from as little as 90 lb./acre for very small seeded varieties to as much as 165 lb./acre for large seeded varieties (see table). Optimum plant population is around 1.3 to 1.5 million plants/acre. The higher rates should be used for late-planted wheat (i.e., more than 3 weeks after the Hessian fly free date).

Seed should be sown 3/4 to 1 1/2 inches deep. This becomes especially important in no-till situations with heavy residue. It is important to get the seed through the residue and into the soil to assure good seed to soil contact and subsequent uniform germination and emergence. Wheat will be more winter hardy and less susceptible to winter heaving if well established by proper seeding in a timely manner. Adequate nitrogen and phosphate fertilizer is also important for seedling establishment in the fall. Apply approximately 20 to 25 lb. N/acre and phosphate fertilizer according to soil test. Potash is important for later growth and development and should also be applied according to soil test.

Wheat should be sown in a timely manner, but not before the Hessian fly-free date. The optimum planting window for wheat is the two-week period following the Hessian fly-free date. The fly-free date ranges from September 22 across the northern tier of Indiana counties to October 9 in the southwestern corner of the state. In addition to dodging the Hessian fly, planting in this window reduces the risk of several diseases. For example, wheat that is planted early is more susceptible to take-all and may also be exposed to high aphid populations that can transmit Barley Yellow Dwarf virus. Early planted wheat could also succumb to winter kill if it gets too much fall growth prior to dormancy. Late planted wheat (more than 3 weeks after the fly-free date) is often predisposed to winter die back and increased susceptibility to heaving.

Seeding Rates for Winter Wheat Based on Seed Size*

		Desired Population		
Number of seeds/lb.	**Seed Size**	**1.1[a] 25[b]**	**1.3[a] 30[b]**	**1.5[a] 35[b]**
		lb. seed/acre		
10,000	large	120	145	165
12,000	large	100	120	140
14,000	medium	85	100	120
16,000	small	75	90	105

* Seeding rates adjusted to 90% field emergence.
[a] million plants/acre
[b] plants/square foot

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Corn Fields Shutting Down - (*Bob Nielsen*) -

Fields of corn around Indiana, especially early-planted ones, are in the process of shutting down for the season. While only 3% of the state's crop was estimated to be mature (i.e., kernel black layer) as of the week ending 31 Aug, 41% of the crop was estimated to be at dent stage or beyond (Indiana Ag Stats Service, 2 Sep 2003).

The onset of maturity is naturally accompanied by an eventual senescence of the entire solar harvesting "machinery," but some fields appear to be shutting down prematurely and deserve to be monitored for potential stalk health issues prior to harvest (Nielsen, 2003). The short-term forecast for cool evening temperatures in the mid-50's or lower throughout much of the state the remainder of this week will further accelerate premature senescence of these stressed fields.

Plant stresses contributing to the premature "shutdown" of some fields include:

- Root systems compromised by saturated soil conditions caused by early and mid-season "monsoon" events.

- Drier than normal conditions throughout much of August, accompanied by stressful low to mid-90°F temperatures in the latter part of the month.

- Development of leaf diseases, including gray leaf spot and northern corn leaf blight. The occurrence of the latter disease is interesting given that many corn hybrids have good levels of resistance to this disease (Lipps & Dorrance, 2003).

- Nitrogen deficiency resulting from soil nitrogen loss that occurred earlier in the season following the "monsoon" events.

- Stalk tunneling caused by minor infestations of European or Southwestern corn borer in some fields.

Identifying the cause(s) of premature "shutdown" this year may help you identify management decisions for future years. For example, if leaf disease(s) is the primary culprit this year, then be sure to include disease tolerance/resistance as one of your primary hybrid decision factors next year.

Related References:

Indiana Ag. Statistics Service. 2 Sep 2003. **Indiana Crop & Weather Report.** USDA-NASS. Available on the Web at <http://www.nass.usda.gov/in/cropweat/2003/we3503.txt>. [URL verified 9/3/03].

Lipps, Pat and Anne Dorrance. 2003. **Corn Leaf Diseases Increasing.** Crop Observation and Recommendation Network, #28: August 25 - September 1, 2003. Available on the Web at <http://corn.osu.edu/archive/2003/aug/03-28.html>. [URL verified 9/3/03].

Nielsen, RL (Bob). 2003. **Stalk Health Issues in Stressed Corn.** Purdue Univ. Corny News Network. Available on the Web at <http://www.kingcorn.org/news/articles.03/StalkHealth-0813.html>. [URL verified 9/3/03].

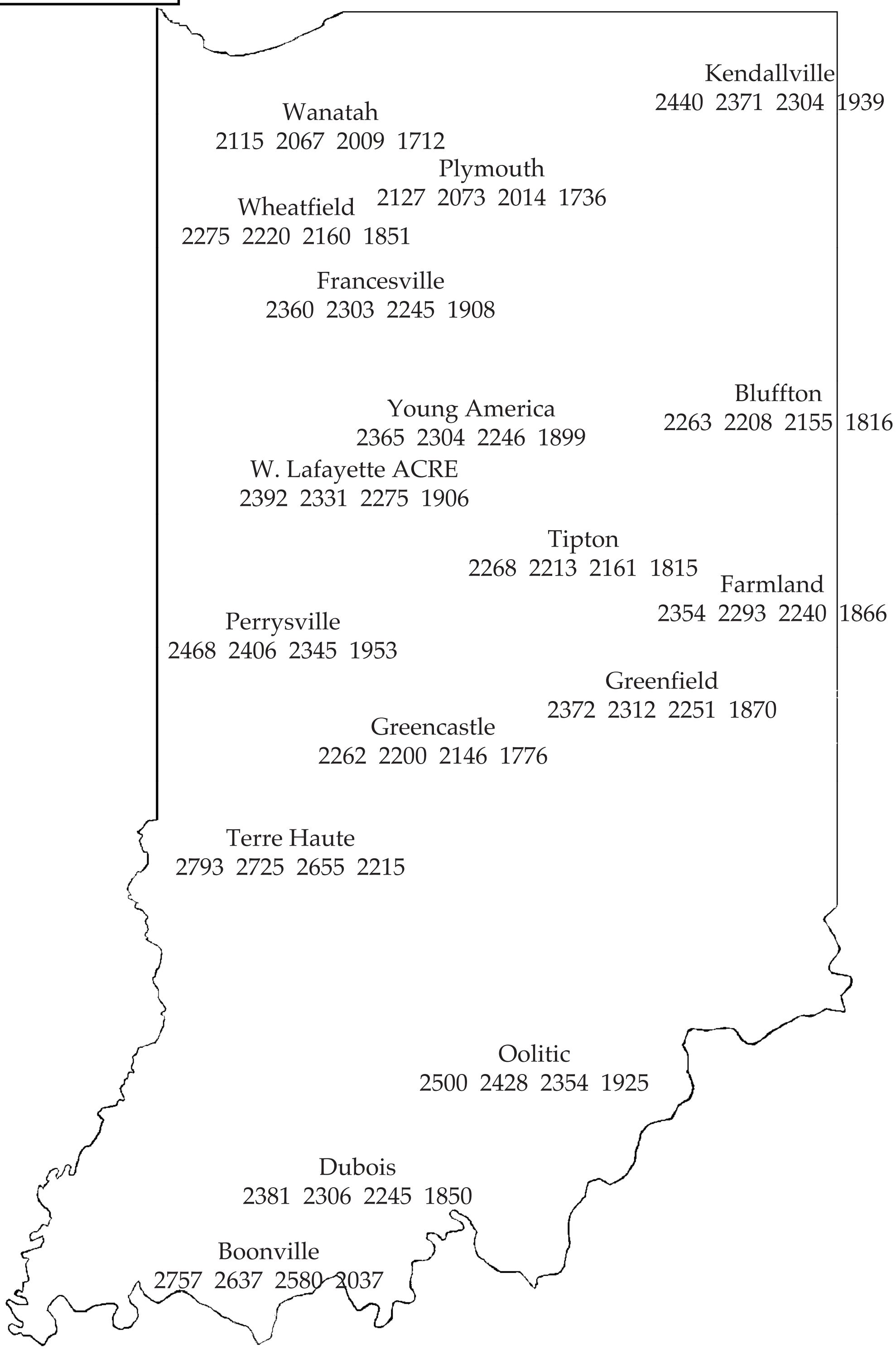
Don't forget, this and other timely information about corn can be viewed at the Chat''n Chew CafÈ on the Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the Web at'<http://www.kingcorn.org>.

Weather Update

Temperatures as of September 3, 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 9/3/03

Location	Max.	Min.
Wanatah	68	65
Columbia City	66	64
Winamac	66	64
Bluffton	68	67
W Laf Agro	66	65
Tipton	73	72
Farmland	66	66
Perrysville	67	67
Terre Haute	71	69
Oolitic	72	70

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.