Pest&Crop

July 28, 2000 - No. 19

In This Issue

Insects, Mites, and Nematodes

Fall Armyworm in Late Planted Corn Whorls - *(John Obermeyer, Rich Edwards, and Larry Bledsoe)* -

- Fall armyworm damage observed in southern Indiana
- When necessary, spot treat with a high clearance rig using ample water
- Control decisions and products discussed below

Late planted or replanted corn fields are attractive to fall armyworm moths which arrived earlier this summer from southern states. Producers with late planted corn should be inspecting their corn for leaf and whorl damage. This is especially true for replanted wet areas or river bottom ground. Fall armyworm infestations are typically quite "spotty" within fields because of where moths laid their eggs. Therefore, it is extremely important to sample fields to determine the extent of infestations and identify specific areas with economic populations.

The head of the fall armyworm is gray, yellow, or brown, with a predominant white, inverted Y-shaped suture on the front. This feature distinguishes the fall armyworm from the similar-appearing true armyworm, whose head is pale gray or greenish-brown in color and covered with a network of dark lines. With either species, once worms are over 1 inch in length they are soon to complete their larval stage and feeding is nearing completion. Also, one should look for parasitized larvae, elongated white balls (eggs of a parasitic fly) usually near the back of the worms head. Parasitized larva will reduce feeding and eventually be killed.

Fall armyworm may damage corn from July to frost. Small larvae feed on the leaf surface, causing a "windowpane" effect. Whorl feeding by larger larvae appears as ragged-edged holes. Feeding on corn husks and kernels may also occur. If fall armyworm damage is noted, the field should be sampled by examining 20 consecutive plants in at least 5 areas of the field. Count and record the number of plants showing damage in each area. Determine the percent of fall armyworm-damaged plants for the field. Also, be sure to note whether the fall armyworm are still present and feeding. It may be necessary to pull some whorls and unroll the leaves to find the larvae. Estimate the size (length) of several of the worms.

In those corn fields where the yield is expected to be at least 60% of the normal yield, an insecticide may be necessary if 75% of the plants exhibit feeding damage and the larvae are less than 1-1/4 inch in length. If applying an insecticide, be sure to apply the insecticide in sufficient water to reach the target area. Fall armyworm will often form a "plug" with their frass in the whorl, making it difficult for insecticide penetration. Ground sprays directed over the row are generally more effective than broadcast sprays. Aerial applications are not recommended. Treatments to control fall armyworm in ear tips are not effective. Products labeled for fall armyworm control are Lannate SP, Lorsban 4E, and Sevin. Check the label for rates and restrictions.

• • P&C • •

Rootworm Beetle Monitoring in Soybean - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- Western corn rootworm beetles are active throughout Indiana
- Sampling soybean fields now for beetle presence and densities may prevent the use of insecticides for next year's corn
- Sampling doesn't require the use of nets or traps, visual inspections can be effective in assessing relative beetle numbers

Ron Blackwell, IPM Surveyor, is actively sweeping soybean fields to sample for western corn rootworm beetle populations. So far, he has found more beetles than expected in counties just south of Interstate 70. Stay tuned to future *Pest&Crop* issues as we report the catches by county.

Pest managers have seen the western corn rootworm variant making its move from corn to soybean fields. Knowledge of beetle numbers in soybean helps one to gauge the potential risk of rootworm damage to next year's corn. Few beetles means low risk, thus little need for rootworm protection next year. Many beetles means higher risk, the insecticide "insurance" will likely pay off. Several producers and agribusiness personnel throughout the state have initiated a sampling program (see *Pest&Crop* #16, "Monitoring Soybeans for Rootworm Beetles with Yellow Sticky Traps") for their soybean fields. Because of the variability of beetle numbers from field to field, those willing to inspect soybean now may reap the benefits next spring. Sampling for rootworm beetles in soybean fields does not require sticky traps or sweep nets, they only make the decision making more accurate. Visual inspections, while walking through the field and carefully observing the upper canopy, will help you reach a decision. Soybean fields should be visited weekly until early September. While monitoring, also consider the rootworm beetle's propensity toward pollen, corn or weeds. This was covered in last week's *Pest&Crop*.

• • P&C • •

Corn Borer Activity Picking Up – (*John Obermeyer*) –

The black light trap in Clinton County has captured a significant number of second generation European corn borer moths (see "Black Light Trap Catch Report"). These numbers should not cause one to panic. It does indicate that late planted and/or late pollinating fields should be monitored for egg laying and larval activity. This is especially important to seed production fields or late market sweet corn.

• • P&C • •

Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	7/11/00 - 7/17/00							7/18/00 - 7/24/00						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	0	0	6	3	1	0	3	0	6	198	48	0	0	4
Dubois/SIPAC	0	2	1	11	0	1	1	0	0	5	26	0	0	0
Jennings/SEPAC	4	0	16	4	0	0	0	0	0	35	11	0	0	0
LaPorte/Pinney Ag Center	0	2	0	0	0	0	2	0	0	0	1	1	0	2
Lawrence/Feldun Ag Center	0	0	23	1	0	0	1	0	0	27	4	0	2	1
Randolph/Davis Ag Center	3	0	1	3	0	0	0	0	0	22	10	0	0	0
Whitley/NEPAC	0	1	7	3	0	0	13	0	0	22	21	0	0	5

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

Dicamba Effects On Soybean Yields – (*Bob Hartzler, Extension Weed Scientist, Department of Agronomy, Iowa State University*) -

The widespread use of dicamba in corn, combined with the high sensitivity of soybeans to this herbicide, results in numerous cases of soybean injury each year. When dicamba injury occurs, whether from spray drift, volatilization, or sprayer contamination, the common question is, How much will yields be affected? As with any source of crop stress, it is impossible to accurately predict yield loss potential from dicamba injury that happens early in the growing season. This article summarizes results of controlled studies to help evaluate situations that occur in the field.

Behrens and Leushen (University of Minnesota) studied the volatilization of dicamba from cornfields into soybean fields and the resultant injury. They reported that significant injury to soybean due to volatilization from cornfields could occur up to 3 days after application (Dicamba volatility. 1979. Weed Science 27:486-493). In one of five experiments they observed minor injury due to volatilization on the fourth day after application. Rainfall events after application greatly reduced vapor movement of dicamba.

The researchers reported that low levels of foliar injury (leaf cupping) did not influence yield potential (Table 1). Soybean injury was evaluated 3 weeks after dicamba application (WAA) by using a scale of 0 (no injury) to 100 (complete kill). Slight leaf malformations (injury rating of 10) were observed up to 200 feet downwind of treated corn. More severe injury was observed closer to the corn (injury ratings of 60-70), with terminal bud kill and axillary bud release resulting in short, bushy beans and delayed maturity. Significant yield losses were not observed unless severe early-season injury was observed.

Weidenhamer and coworkers (Dicamba injury to soybean. 1989. Agronomy Journal 81:637-643) concluded that there was no yield reduction without height reduction, regardless of foliar symptoms. "Yield reductions greater than 10 percent were indicated by severe morphological symptoms of injury, such as terminal bud kill, splitting of the stem, swollen petioles, and curled, malformed pods. Symptoms such as crinkling and cupping of terminal leaves occurred at rates much lower than those required to cause yield reductions."

A third study was conducted in South Dakota during the mid-1970s by Auch and Arnold (Dicamba use and injury on soybeans in South Dakota. 1978. Weed Science 26:471-475).Similar experiments were conducted during 3 years, although soybean stage at dicamba application varied among the experiments. Dicamba was applied at rates of 0.001, 0.01, and 0.056 kilograms/hectare (equivalent to 0.03, 0.3, and 1.6 ounces Banvel/acre) (Table 2). The researchers did not provide information on early-season injury other than to say that all rates caused leaf cupping. The important points in this study are that the yield response varied widely from year to year, and that exposure of soybean to dicamba during the bloom stage is more likely to affect yields than exposure during the vegetative stage of growth.

The most recent study was conducted in Kansas (Al-Khatib and Peterson. 1999. Soybean response to simulated drift from selected sulfonylurea herbicides, dicamba, glyphosate and glufosinate. Weed Technology 13:264-270). Dicamba was applied to soybeans at the V2-V3 growth stage at 1/100, 1/33, 1/10, and 1/3 of the label rate (16 ounces/acre). Experiments were conducted in 1997 and 1998, data presented in Table 3 are averaged over the 2 years because results were similar. Visual injury ratings were higher 30 days after application (DAA) than at 7 DAA. As would be expected, the level of injury increased with increasing herbicide rates. The lowest dicamba rate resulted in 35 percent visual injury 30 DAA, but yields were reduced only by 2 percent. The 1/33 rate (0.5 ounces Banvel) resulted in a 10 percent yield loss. Several other herbicides (Beacon, Basis, Exceed, Roundup, and Liberty) were evaluated at equivalent fractions of their label rates (data not shown). Dicamba was the most injurious of the herbicides evaluated. Roundup and Liberty did not affect yields at 1/3 of the label rate, whereas Beacon and Accent caused less than a20 percent yield loss at this rate. Exceed was the second most damaging herbicide, but the yield loss differed significantly between the 2 years. In 1997 the 1/3 rate of Exceed reduced soybean yields approximately 35 percent, whereas in 1998 an 85 percent loss occurred.

In summary, dicamba injury on soybean is a common problem throughout Iowa in many years. Research has shown that minor distortion of soybean leaves that occurs prior to bloom usually does not affect soybean yields. However, each situation is different and it is impossible to predict the final impact on yield from symptoms that develop shortly after application. Remember that other factors can induce symptoms typical of dicamba, complicating diagnosis of this problem. There are no controlled studies of the effects of this phenomenon on soybean yields; however, it is likely that yields will not be affected if the symptoms are limited to a few trifoliolate leaves.

Table 1. Relationship between early-season dicamba injury and yields of two soybean varieties.

Soybean Injury Rating (3 WWA)	% Yield loss[a] Corsoy	Hodgson
0	0	0
10	0	(2)
20	(4)	(2)
30	2	(2)
40	(2)	5
50	8	11
60	(4)	16
70	—	23
LSD	NS	14

[a]Parentheses indicate increased yield compared with untreated control.

Table 3. Response of soybean to simulated dicamba drift.

Fraction of Label Rate[a]	% Visual Injury (7 DAA)	% Visual Injury (30 DAA)	% Height Reduction (60 DAA)	% Yield Loss
1/100	18	35	15	2
1/33	23	50	27	10
1/10	33	70	50	45
1/3	70	95	63	80

[a]Label rate: 16 ounces Banvel/acre; 0.5 pound dicamba/acre.

Soybean leaf cupping can be triggered by growth regulator herbicides.

Table 2. Influence of soybean stage of growth and dicamba rate on soybean growth and yield.[a]

	Soybean Height (cm) Dicamba Rate (kg/ha)			Soybean Yield (% of Control) Dicamba Rate (kg/ha)		
	0.001	0.01	0.056	0.001	0.01	0.056
1974						
Control	92	92	92	100	100	100
1-2 trifol.	93	88	77	100	108	100
3-4 trifol.	80	**69**	**59**	110	102	80
6-7 trifol.	93	**56**	**45**	118	103	79
Early bloom	80	**46**	**36**	114	91	**46**
1975						
Control	49	49	49	100	100	100
Early bloom	47	40	40	95	66	**64**
Early pod	54	47	50	97	102	**20**
1976						
Control	61	61	61	100	100	100
Early bloom	**46**	**38**	**36**	**58**	**40**	**33**
Mid-bloom	**46**	**43**	**38**	82	72	**37**
Early pod	56	**51**	53	94	55	42

[a]Data in bold significantly different from untreated control.

Agronomy Tips

Tips for Test Plots - (*Bob Nielsen*) -

- Test plots are not always perfect
- Use good judgement in assessing value of on-farm research data

Conducting agronomic field research is often complicated by the 'slings and arrows' of Mother Nature. The goal of most on-farm field plot studies is to identify differences among 'treatments' under 'real world' conditions. These 'treatments' may be corn hybrids, fertilizer rates, plus or minus fungicide, seeding rates, tillage practices, etc. The ultimate variable of interest is usually grain yield. The 'real world' conditions contribute to additional yield variability and often make it difficult to evaluate the true 'treatment' effects.

If the yield variability caused by 'real world' factors were distributed equally among the test plots, then 'treatment' comparisons could still be made confidently. When the 'real world' influences test plots unevenly, then 'treatment' comparisons become more confusing. In other words, you run the risk of incorrectly attributing a yield effect to a treatment when in fact it may have been unduly affected by a chance occurrence of an unrelated factor that influenced yield positively or negatively relative to other plots in the trial.

The upshot of this if you are conducting a field trial of any kind is that you should be walking the plots throughout the growing season and taking notes on odd things occurring out in the plots. In your role as a 'researcher', you have the responsibility to assess the quality of the test plots and the subsequent yield data that will be measured from them. Sometimes, you need to delete individual plots from the analysis of a study if you determine that they have been disproportionately influenced by some stress factor.

For example, let's say that you are conducting a simple corn hybrid evaluation trial in which you planted ten different hybrids in 12-row strips the length of the field interspersed with a check hybrid (we can debate in a later article whether check hybrids are worth anything). The field is perhaps a typical Indiana field containing a number of different soil types as well as variable topography and drainage. Frequent, heavy rains (technically known as 'goose-drownders') early in the growing season resulted in sizeable areas of drowned out corn and other areas of live, but stunted and yellow corn. These areas of dead or stunted corn are distributed rather randomly throughout the hybrid trial, such that the individual hybrid strips contain variable proportions of the soggy soil problem.

Either through extensive field walking or perhaps via aerial photographs, you really ought to try to determine the extent of the problem in each and every one of the 12-row hybrid strips. If some of the hybrid strips are unduly affected by this stress, then they should be considered for removal from the study. There is nothing shameful about tossing individual plots when your thorough field notes indicate excessive yield influence by non-treatment factors.

The advent of GPS-enabled mapping technologies offers growers/researchers the opportunity for accurately defining the boundaries of problems like wet areas within a test plot. Furthermore, some GIS software programs offer the option of editing the individual yield monitor data points. Technically, one could completely alter the test plot data for nefarious purposes. However, a more benign opportunity would be to delete those data points that lie within the mapped boundaries of the problem area, recalculate the average yield for the remaining data points in each 'treatment' strip and, thus, allow you to retain plots in a trial whose data would otherwise be suspect.

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/>.

Bits & Pieces

Purdue University Agronomy FIELD DAY

The 2000 Field Day will be Thursday, Sept. 7, 2000 at the Agronomy Research Center located 7 miles west of the Purdue campus on U.S. 52. Please forward requests and ideas for the Field Day to Ben Southard at: bsouthard@purdue.edu.

2000 Field Day

Planning for the 2000 Field Day began in January of 2000. The Field Day Committee has finalized tour topics and poster displays. This is the 50th year of research at the present Agronomy Research Center. The focus this year will be on research, past, present, and future.

Field Day tours will start at 7:30 a.m. and continue through 3:00 p.m. Lunch will be served from 11:00 a.m. to 1:00 p.m. At this year's field day there will be posters depicting several subjects and the area will have many commercial and agencies with exhibit booths. We will feature antique tractors and trucks. CCA and CCH will be available. Attendees may register at the start of the tours and the Field Day is free. Parking is available in front of the Center as you turn in off U.S. 52.

Contact Ben Southard at bsouthard@purdue.edu or Bob Nielsen at rnielsen@purdue.edu if you have additional questions on 2000 Agronomy Field Day.

Location:
Agronomy Research Center (ARC)
4540 U.S. 52 West
West Lafayette, IN 47907

Scheduled Tour Topics

Fifty Years of Agronomic Research
- Soybean variety improvement
- Sorghum variety improvement
- Forage improvement
- Corn hybrid improvement
- History of the Agronomy Farm
- Perennial weed control
- Long term tillage study

Crop Biotechnology
- Biotechnology tools for plant improvement
- Ag. biotechnology: What's all the fuss?
- Brown midrib sorghum & corn: Forage quality opportunities for biotechnology

Tillage System Issues
- Soil microbial life amongst tillage systems
- Soybean root rot issues
- Earthworm management
- Root issues beneath tillage systems

Soil Fertility & Plant Nutrition
- Soybean inoculants & soil nitrate issues
- Ca/Mg Ratios: Is it important for Indiana corn & soybean?

Site-Specific Crop Management
- Soil electrical conductivity mapping: What's it mean for you?
- Order 1 soil surveys: More information, more control?
- Measuring soil pH on-the-go
- Pitfalls & challenges of operating yield monitors
- Remote sensing - What is it?
- Directed crop scouting using GPS technologies
- Monitoring plant nitrogen status by remote sensing
- Monitoring crop health by remote sensing

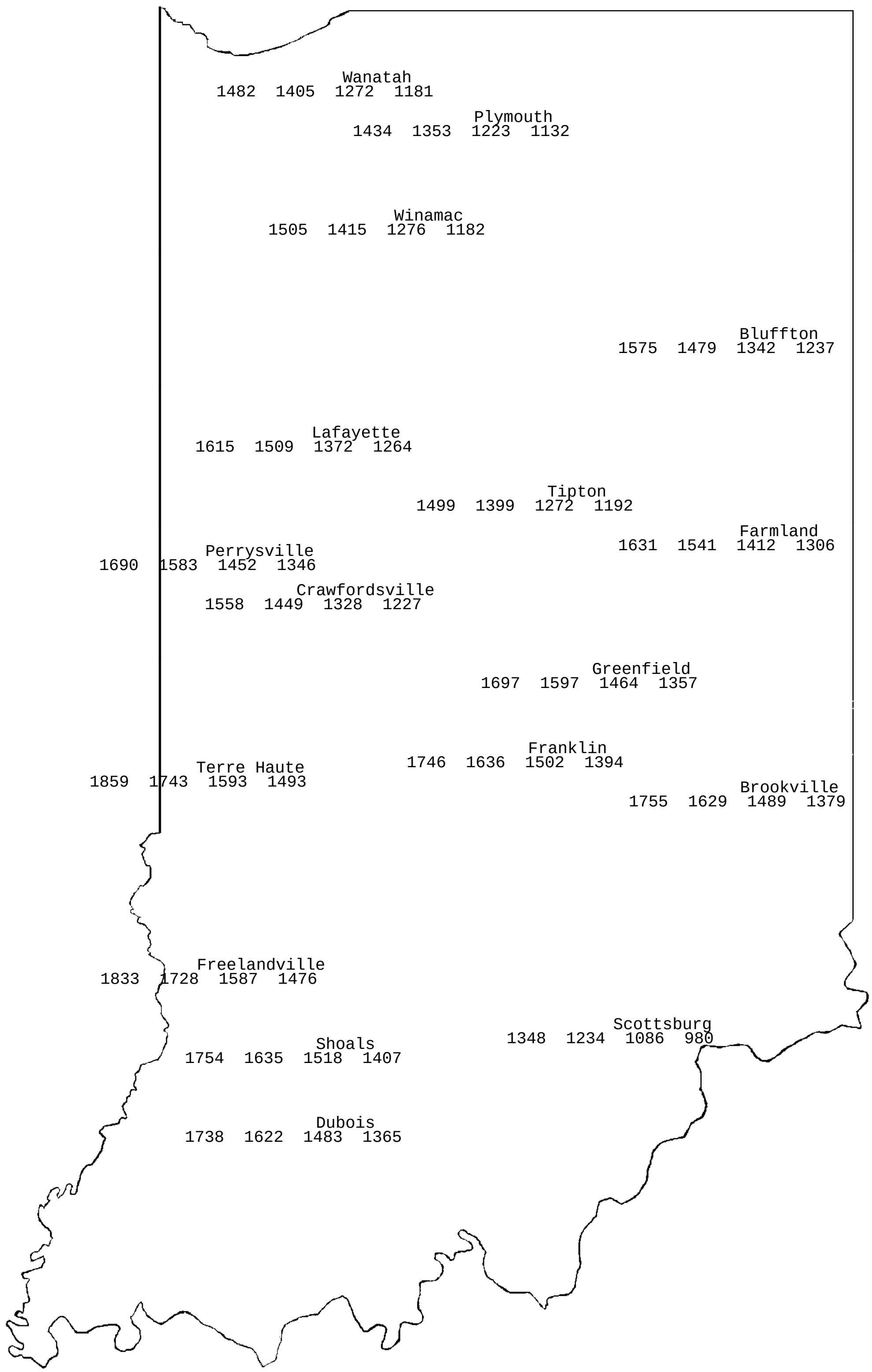
Insect Pests
- Soybean CRW thresholds for subsequent corn crops
- Rootworm feeding damage in soybean
- New ways to control an old pest (rootworm)
- Soybean cyst nematode issues

Weather Update

MAP KEY
Location GDD(4) GDD(10) GDD(60) GDD(90)

GDD(4) = Growing Degree Days from April 14 (4% of Indiana's corn planted), for corn growth and development
GDD(10) = Growing Degree Days from May 1 (10% of Indiana's corn planted), for corn growth and development
GDD(60) = Growing Degree Days from May 5 (60% of Indiana's corn planted), for corn growth and development
GDD(90) = Growing Degree Days from May 12 (90% of Indiana's corn planted), for corn growth and development

Temperature Accumulations from Jan. 1 to July 26, 2000

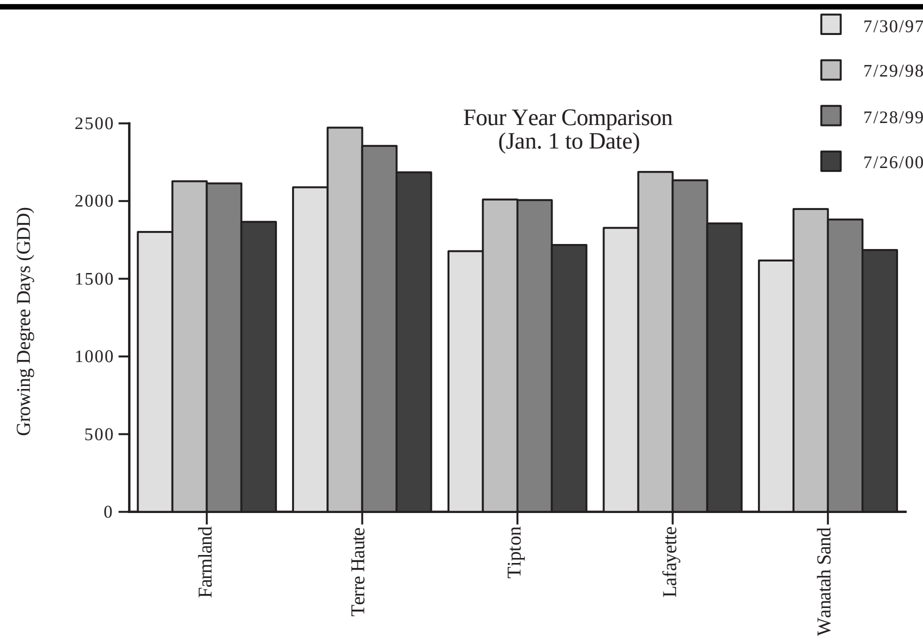


4" Bare Soil Temperatures 7/26/00

Location	Max.	Min.
Whitford Mills	77	68
Wanatah	90	69
Columbia City	86	65
Winamac	88	67
Bluffton	76	72
W Laf Agro	81	67
Tipton	83	65
Farmland	71	65
Perrysville	80	70
Crawfordsville	76	68
Liberty	83	67
Trafalgar	76	68
Terre Haute	76	70
Oolitic	77	71
Vincennes	83	64
Dubois	86	66

Pest Management and Crop Production Newsletter
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.