Pest & Crop

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In This Issue

Insects, Mites, and Nematodes

Alfalfa Weevil Management Guidelines and Control Products – (*John Obermeyer and Larry Bledsoe*) –

- Pest managers are finding weevil tip feeding throughout the state.
- Weevil hatch is extended, controls should be carefully timed for best efficacy.
- Use damage and heat unit accumulation information as a guide in making management decisions.

Cooler temperatures (and some snow in southern counties!) at the beginning of the week did not significantly slow alfalfa weevil development and feeding. Cooperators reporting their sampling results from southern Indiana have seen a range of damage from 4 to 88% tip feeding (thanks to Don Biehle, Frankie Lam, Ron Moore, and Betsy Smith). Lyle Busboom reports that tip feeding in Jasper and Newton Counties, northwestern Indiana, is beginning in wind-protected and sandy areas of fields. As field crop activities increase, devoting time to monitor and properly manage this major forage pest will be a challenge. As pest managers have found in the past that you cannot ignore this pest and expect high quantity and quality of hay.

In most years, extended hatch of weevil larvae occur in Indiana, with as many as four population peaks seen in southern Indiana during the spring. Due to the phenomenon of multiple peaks, the application of controls should be delayed somewhat to reduce the

**Alfalfa Weevil Management Guidelines, 2004
Southern Indiana**

Heat units	% Tip feeding	Advisory
250		Begin sampling. South facing sandy soils should be monitored earlier.
300	25	Re-evaluate in 7-10 days using the appropriate HU or treat immediately with a residual insecticide if 3 or more larvae are noted per stem and % tip feeding is above 50%.
400	50	Treat immediately with a residual insecticide.
500	75	Treat immediately.
600	75+	If cutting delayed more than 5 days, treat immediately.
750		If harvested or harvesting shortly, return to the field in 4 -5 days after cutting and spray if 1) there is no regrowth and weevil larvae are present OR 2) feeding damage is apparent on 50% of the stubble and weevil larvae are present.

likelihood that multiple applications of an insecticide will be needed. In other words, if an insecticide is applied too early and there are weevils yet to hatch, the insecticide may not control the later hatching larvae.

Producers can manage this pest most effectively by utilizing heat unit accumulations data (base 48°F) to determine when sampling should begin and when an action should be taken, The management guidelines listed below should be used to determine when alfalfa weevil should be controlled in southern Indiana. Refer to heat unit information in each week's *Pest&Crop* "Weather Update."

Insecticides For Alfalfa Weevil Larval Control

Insecticide	Formulation and Amount per Acre	Harvest or Pasture Restriction	Remarks
carbofuran (Furadan)[1,2]	1/2 pt. 4F 1 pt. 4F 2 pt. 4F	7 days 14 days 28 days	Use only on pure stands of alfalfa. Use higher rate where residual control is needed. Do not make more than one application per season.
chlorpyrifos (Lorsban)[1,2]	1 pt 4E 2 pt. 4E	14 days 21 days	Some yellowing may be observed on young, rapidly growing alfalfa. Alfalfa will outgrow the yellowing and no yield loss should occur.
cyfluthrin (Baythroid 2)[1,2]	1.6 - 2.8 fl oz. EC	7 days	Use higher rates for heavy populations. Do not use on alfalfa grown for seed.
cyhalothrin (Warrior)[1,2]	2.56 - 3.84 fl oz. EC	1 day-forage 7 days-hay	Use higher rates for increased residual control. Avoid application when bees are actively foraging. Use only on pure stands of alfalfa.
permethrin (Ambush)[1,2] (Pounce)[1,2]	 12.8 oz. 2EC 8 oz. 3.2EC	 14 days 14 days	Avoid application when bees are actively feeding. Do not apply more than 12.8 ounces (2EC) or 8 ounces (3.2EC) per acre per cutting. Do Not use in fields with more than 2 larvae per stem and before 500HU (base 48∞F) have accumulated.
zeta-cypermethrin (Mustang Max)[1]	2.2 – 4.0 fl oz. EW	3 days	Use higher rates for increased residual control.

1 Restricted use pesticide.
2 Highly toxic to bees.

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Is This Going to be a Grub Year? - (*John Obermeyer and Larry Bledsoe*) -

- Early corn planting increases the likelihood of grub damage.
- Grub populations, soil temperatures, and soil types are other important variables.
- No rescue treatments are available for economic populations.
- Insecticides labeled for grub control or protection are listed below.

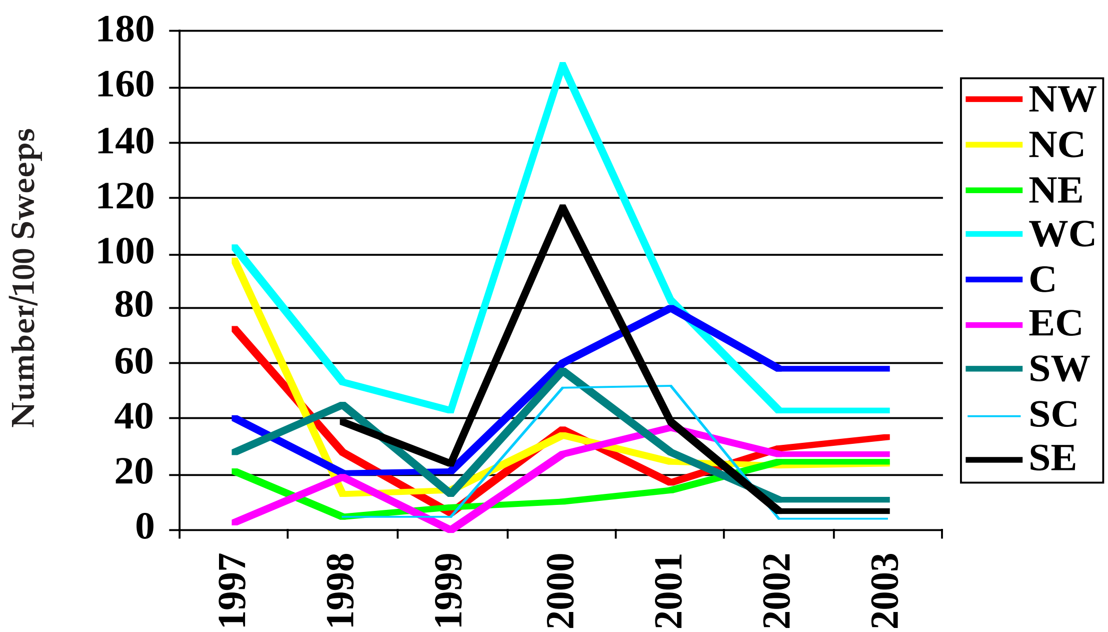
Grub complaints typically increase in frequency during an early planting season. We consider planting before the third week of April to be early. However, approximately 10% of last year's corn was planted before that period and we heard of very few grub problems. Obviously there's more to it than just planting date. Factors such as grub populations, spring's growing conditions, and soil type all likely play a part.

Japanese beetle is the predominant grub species found in field crops in Indiana. Eggs laid last summer and fall in the soil hatch into grubs that feed on living and decaying plant matter. Grubs overwinter as partially developed larvae about 4 to 6 inches deep in the soil. Little is known or understood about their ability to withstand extremes in soil temperature, moisture, and freezing/thawing action through the winter months. We believe there is a correlation between colder than normal fall and winter soil temperatures and fewer Japanese beetle the following summer. Refer to the following graph of Japanese beetle numbers from soybean sweeps taken in the years 1997 to 2003. There you can see that beetle numbers have been unimpressive the last several years when considering statewide abundance. Some local populations can be very large.

Seed already planted will be subjected to cooler soils and extended germination/emergence. If corn is slow to emerge and grubs are found nearby, it is often assumed that they are feeding on the seed/seedling. However, cool soil temperatures are usually the reason for slow plant emergence. Even with their presence, grubs may or may not be damaging the crop because they too are less active in cool soils. Once soils warm up... you can bet grubs will feed on roots but they are also feeding heavily on organic matter in the soil too. The length of the feeding period and grub population will govern to a large degree as to whether economic damage will occur. In other words, the longer the interaction between grub and seedling, the greater the likelihood of damage. This interaction increases as soil temperatures decrease.

Japanese beetle grubs feed on both living and dead material when they crawl to the upper soil profile in the spring. Soils low in organic matter and crop residues will encourage grubs to move horizontally in the soil profile until suitable food sources are found. Corn or soybean roots within their "grasp" certainly will be fed on. Should you visit a field with suspected grub damage, be certain to dig between rows as well as underneath crop residues. There you will likely find as many, if not more, healthy grubs in the soils that have significant organic material. Grubs in sandy or timber soils (i.e., low O.M.) will concentrate in root zones.

Japanese Beetle Populations 1997 - 2003, Soybean Sweeps



Since rescue treatments are not available, the most effective way to control grubs is to apply a soil insecticide at planting (see table below). If an economic grub population is observed in a field that has already been planted and the stand is threatened, a soil insecticide could be used as part of a replant operation. Replanting, however, is not recommended unless a critical level of plants is being significantly damaged or destroyed by grubs. Remember that a number of factors can cause stand reductions. If a stand is declining due to grub activity, make sure that the grubs are still actively feeding on the roots before making a replant decision.


Different sizes of white grubs

Products Labeled for Grubs at Planting*

Product	Label Claims:	Additional Label Notes:
Aztec 2.1 & 4.67G	control	
Capture 2 EC	control	
Counter CR	control	
Cruiser	protection	Early season protection
Force 3G	control	Use higher labeled rate in-furrow for heavy infestations.
Fortress 2.5 & 5G	control	In-furrow application provides optimal control.
Gaucho	protection	Reduces feeding damage during emergence and seedling stages.
Lorsban 4E	control	
Lorsban 15G	control	Control at 1.5X rootworm rate for severe infestations.
Poncho	protection	Aid in the protection of seeds and seedlings against injury
Regent	control	

* Products labeled for grubs often do not perform satisfactorily under heavy infestations. If grubs are causing economic damage in fields where products labeled for "control" are used, producers should be contacting their dealer and/or sales representative for a performance evaluation. Producers should be cautious using products labeled "protection" where high economic grub pressure is expected. Be sure to read the label for use and application information.

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Black Cutworm Adult Pheromone Trap Report
Week 1 = 4/1/04 - 4/7/04 Week 2 = 4/8/04 - 4/14/04

County	Cooperator	BCW Trapped Wk 1	BCW Trapped Wk 2	County	Cooperator	BCW Trapped Wk 1	BCW Trapped Wk 2
Adams	Roe/Price Ag Services	0	0	Marshall	Shanks/Plymouth Pioneer (3)	0	0
Allen	Gynn/South Wind Farm	0	0	Newton	Babcock/Jasper Co. Co-op	0	6
Benton	Babcock/Jasper Co. Co-op	1	0	Putnam	Nicholson Consulting	2	1
Clay	Smith/Growers Co-op (Brazil)	1	0	Randolph	Boyer/Davis-Purdue Ag Center	-	0
Clay	Smith/Growers Co-op (Clay City)	1	2	Raldolph	Derek Calhoun	0	3
Elkhart	Kauffman/Crop Tech Inc.	0	0	Rush	Tacheny/Pioneer Hi-Bred	-	3
Fayette	Schelle/Spring Valley Farms	2	2	Shelby	Gabbard/Shelby Co. CES	-	13*
Fountain	Hutson/Purdue CES	0	-	Sullivan	Smith/Growers Co-op (New Lebanon)	4	1
Fountain	Mroczkiewicz/Syngenta	0	0	Sullivan	Smith/Growers Co-op (Sullivan E)	0	3
Gibson	Hirsch Farms	11	-	Sullivan	Smith/Growers Co-op (Sullivan W)	0	3
Greene	Maruszewski/Worthington Pioneer	1	0	Tippecanoe	Obermeyer/Purdue CES	0	1
Johnson	Kessler/Ag Excel	1	-	Tipton	Johnson/Pioneer	0	-
Knox	Smith/Growers Co-op (Fritchton)	0	0	Vermillion	Hutson/Purdue CES	0	-
Knox	Smith/Growers Co-op (Oaktown)	2	0	Vigo	Smith/Growers Co-op (Terre Haute)	0	6
Lake	Kliene Farms (1)	0	0	Warren	Babcock/Jasper Co. Co-op	5	2
Lake	Kliene Farms (2)	0	0	White	Reynolds/Vogel Popcorn	0	2
Marshall	Shanks/Plymouth Pioneer (1)	0	0	Whitley	Walker/NE-Purdue Ag Center	0	0
Marshall	Shanks/Plymouth Pioneer (2)	0	0				

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

Glyphosate-Tolerant/Resistant Marestail is Widespread in Southeastern Indiana Counties – (*Jeff Barnes, Bill Johnson, and Glenn Nice*)

In last week's *Pest & Crop* we discussed results of a survey and screening effort aimed at identifying counties with populations of marestail that have resistance or increased tolerance to glyphosate. In this article, we will begin discussing our efforts to locate specific areas within a county where resistant/tolerant populations are occuriung. This article is the first in a series of articles which will show locations of tolerant/resistant populations in specific counties in Indiana. Only four counties in southeast Indiana had confirmed sites with resistant-marestail at the beginning of the 2003 growing season. Following our intensive survey efforts in southeast Indiana and a few selected counties in the northeast and west central portions of the state, we have concluded that 19 counties have marestail populations with some degree of increased tolerance or resistance to glyphosate.

A component of the survey project was to not only identify new pockets of resistance but also to establish the frequency and distribution patterns of resistance at the county level. The survey effort targeted soybean fields and was conducted in the fall of 2003. Random soybean fields were identified through aerial imagery and land use maps complied by the Purdue Center for Advanced Applications in Geographic Information Systems. Within each county, the number of survey sites was selected so that the survey scale fell within the range of 1 field for every 2,500 to 4,000 acres. Driving routes were developed that linked the random GPS selected fields. Seed samples were collected from marestail plants observed within the randomly selected soybean fields. Random sampling was supplemented by collecting seed samples from non-cropped sites and from soybean fields with marestail plainly visible above the crop canopy which were observed along the driving route. Supplemental samples were meant to ensure that pockets of resistance were not missed by the random site selection method.

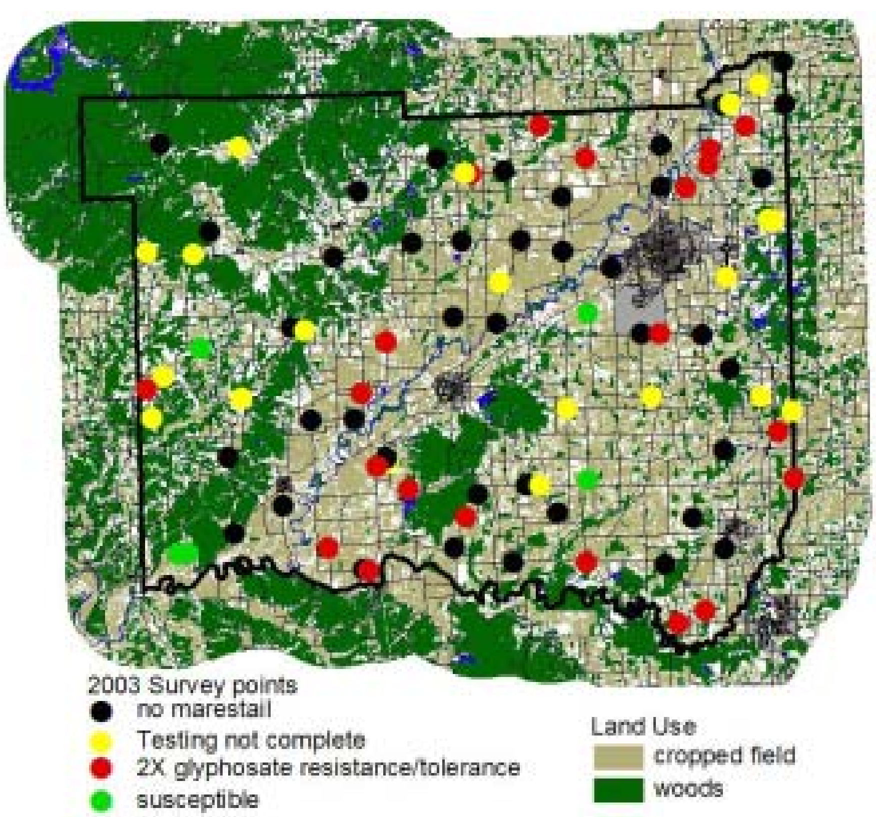


Figure 1. Distribution of glyphosate-resistant/tolerant marestail in Jackson County at the conclusion of the 2003 growing season. Distribution patters are similar for other southeast Indiana counties as far west as Jackson County and as far north as Shelby County.

Maps showing specific locations of glyphosate-resistance/tolerance within a county are currently being developed as results of greenhouse trials become available. While these maps are not complete and some samples have yet to be tested, they will be beneficial in identifying resistance pockets at the county level. Unfortunately most of the counties in southeast Indiana appear to have widespread resistance as depicted in Figure 1. Marestail populations that were tolerant/resistant to a 2X glyphosate application are shaded in red. Throughout the major cropping regions of Jackson county marestail populations were discovered that are resistant or tolerant to glyphosate. This map is not complete as many samples are still in the testing process (yellow dots) so the situation could actually be worse than this map currently depicts. The situation in Jackson County is representative of what we observed during the survey effort last fall in throughout southeast Indiana even as far north as Shelby County.

We also noted last week that new resistant pockets have been found in southwest, west central, and northeast Indiana. In these areas resistance appears to be rather isolated and is confined to a localized region. Figure 2 depicts the pocket of resistance in Wells County where our survey efforts examined 53 sites for the presence of marestail, but only 10 samples were collected. Of these ten samples, three were from soybean fields and one of those (represented by the red dot) was tolerant to a 2X application of glyphosate.

As we finish off our screening efforts in the greenhouse, we will develop more of these maps and eventually place them on the Purdue Weed science website in a section dedicated to the topic of herbicide resistance.

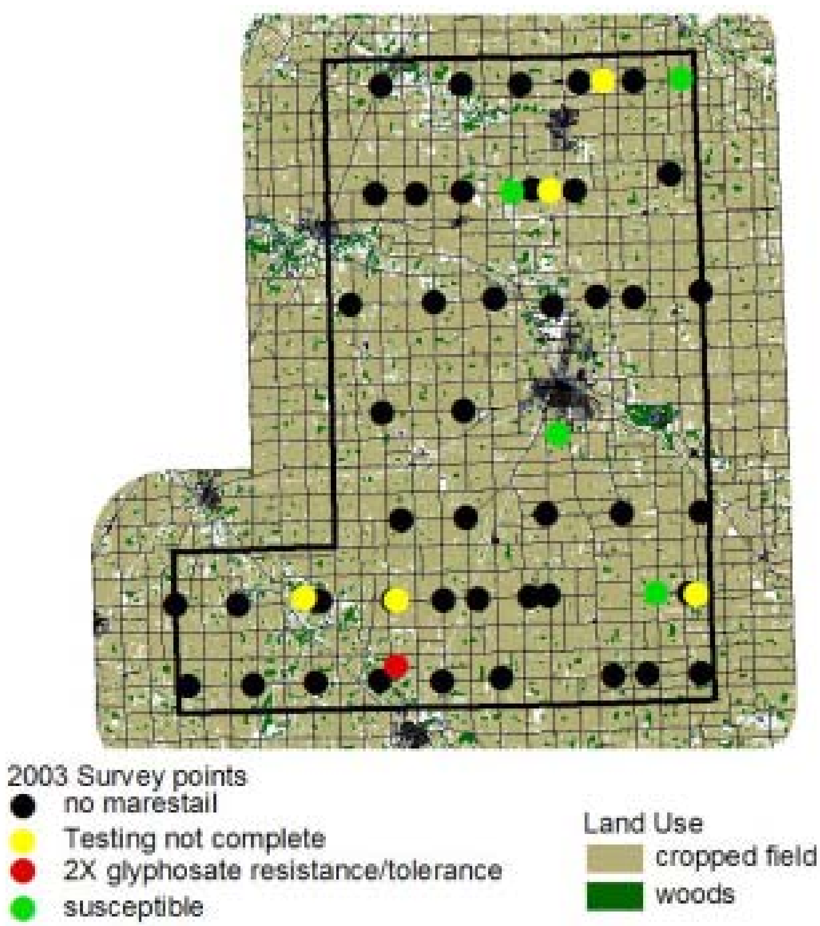


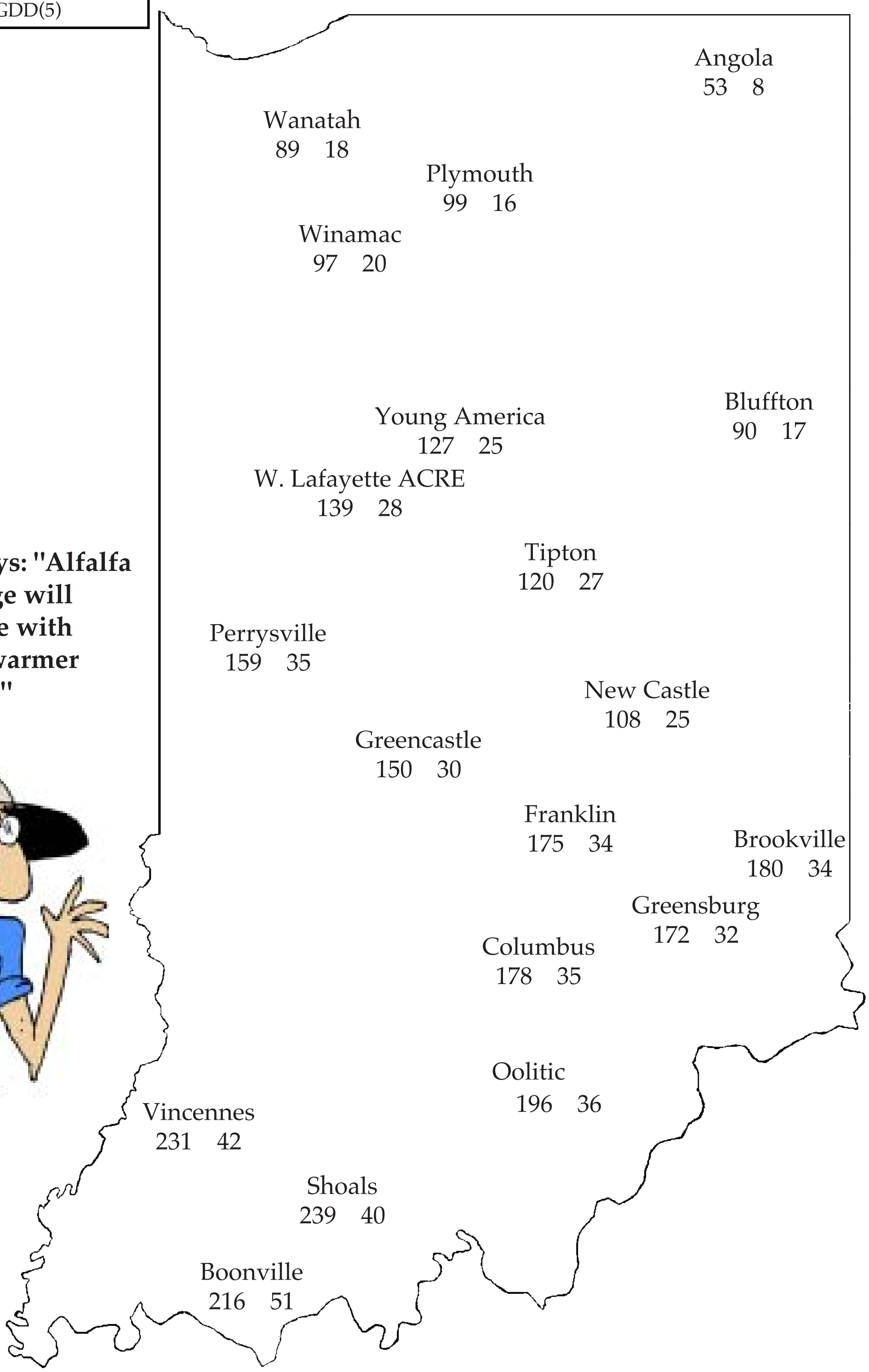
Figure 2. Distribution of glyphosate-resistant/tolerant marestail in Wells County at the conclusion of the 2003 growing season. Resistance/tolerant populations appear to be isolated to the lower portions of the county. Isolated resistance has also been discovered in Montgomery County in the West Central region of Indiana and in Spencer County in the Southwest corner.

Weather Update

Temperatures as of April 14, 2004

HU48 = heat units at a 48°F base from Jan. 1, for alfalfa weevil development (begin scouting at 200)
GDD(5) = Growing Degree Days from April 7 (5% of Indiana's corn planted), for corn growth and development

MAP KEY
Location HU48 GDD(5)



4" Bare Soil Temperatures 4/14/04

Location	Max.	Min.
Wanatah	46	38
Winamac	47	39
Bluffton	42	40
Chalmers	48	43
W Laf Agro	50	40
Tipton	44	39
Perrysville	47	45
Crawfordsville	44	40
Liberty	43	39
Oolitic	42	36
Dubois	42	36

Bug Scout Says: "Alfalfa weevil damage will really increase with these recent warmer temperatures!"

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