Pest & Crop

June 1, 2001 - No. 11

In This Issue

Insects, Mites, and Nematodes

Armyworm, Natural Control to the Rescue? – (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

- Dead larvae being found in damaged fields
- Diseases can be good
- Natural control should keep next generation at bay

As reported last week, discolored and dead armyworm from apparent diseases were being noted as far north as Interstate 70. Unfortunately, this after most of the damage was done. Producers in the west central counties are now noting black and shriveled armyworm high on stems of leafless or highly damaged grasses. Again, this is showing up about a week after most of the damage has already been done. This trend will likely continue northward through the state.

We have submitted samples to Dr. Lee Solter, University of Illinois Insect Pathologist, for positive identification of the pathogen involved in this apparent epizootic. This should help us to better understand the environmental conditions that allow this pathogen(s) to flourish within the armyworm population. Preliminary diagnosis is that this is a viral disease. The following information on nuclear polyhedrosis viruses is from the Midwest Institute for Biological Control web site, which can be viewed at <http://www.inhs.uiuc.edu/cee/biocontrol/home.html>.

"Insect larvae infected with nuclear polyhedrosis viruses (NPV) usually die within 5 to 12 days after infection depending on viral dose, temperature, and the larval instar stage at the time of infection. Just before dying, larvae often crawl to the tops of plants or any other available structure where they die and decompose. Millions of polyhedra are contained in the fluid mass of the disintegrating larvae and fall into feeding zones (leaves, leaf litter, etc.) where they can be ingested by other conspecific larvae. NPV epizootics are very impressive and, although they are important as naturally occurring

mortality factors for many insect species, they often occur after the pest insect has exceeded the economic injury level. This is especially true when the crop that is being damaged by the insect has a relatively low economic threshold."

Though it seems that little good is coming from this epizootic, we suspect that second and/or third generation armyworm in 2001 will be greatly impacted by this event. We believe that even with the historic proportions of armyworm this year, we will see little to no damage from this pest for the rest of this year. Let this spring's armyworm epidemic be a lesson in insect dynamics and now appreciate the power of natural controls that are often taken for granted.

Diseased armyworm larvae

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European Corn Borer Keeping a Low Profile So Far - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

Ron Blackwell, IPM Survey Specialist, sampled "taller" cornfields (non-Bt) on May 30 in south central and southwestern counties for corn borer egg masses and whorl damage. This follows a couple weeks of moth captures in our black light traps. As you can see from the following table, Ron had very little to look at. The comment has been made that the armyworms ate them! Ha!

Black light traps have revealed the greatest number of captured corn borer moths in the northeastern region of the state. Producers, especially in this area, should soon be scouting their tallest most lush corn for "shothole" whorl feeding damage. 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 on the smaller corn.

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European Corn Borer Survey - May 30, 2001 (Ron Blackwell)

County (Fields) Sampled	Extended Leaf Height (in.)	% of plants/field w/ damage	Avg. # Egg masses/ plant
Greene	28.8	2%	0.0
Greene	35.7	0%	0.0
Greene	32.8	0%	0.0
Knox	43.9	0%	0.0
Knox	40.3	0%	0.0
Morgan	34.2	0%	0.0
Morgan	32.8	0%	0.0
Morgan	31.8	0%	0.0
Owen	26.7	0%	0.0
Owen	35.8	0%	0.0

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Southwestern Corn Borer Moths Flying in Southern Counties - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

It has been reported that a significant number of southwestern corn borer (SWCB) moths have been flying in the Evansville area. Producers in the southern tier of counties should be inspecting their taller corn for

whorl damage. It is important to note that the SWCB threshold of 35% fresh whorl feeding is much lower than that used for European corn borer. We would appreciate reports of economic SWCB infestations for this first generation, as well as the second generations, which will come later on. Please call 765-494-4563.

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Japanese Beetle Already! - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

Corey Gerber, Purdue entomologist, found a Japanese beetle on campus this morning, May 31. This is at least two weeks ahead of schedule! So far, we have not received any other sightings of this dreaded insect pest through the state. Speculation is that this beetle developed from a grub that was located next to one of Purdue's underground steam/utility tunnels (ever notice that there are no unsightly utility lines running through campus?). This of course would have accelerated the grubs development and eventual emergence. Hopefully, this pest will wait a few more weeks before lifting its ugly head. Maybe the population will be light, but don't bet on it.

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Lots of Little Red Bugs - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

Reports have come in from startled individuals scouting no-till fields and finding masses of little reddish bugs crawling all over the ground. Refer to the following article from Dr. Lee Townsend, in the *Kentucky Pest News*. Hopefully, this will alleviate any fears concerning these misplaced insects.

"Burrower bugs are 1/8 to 1/4 inch long insects with sucking mouthparts. The adults are black with a thin gray line around the edge of the body. The smaller nymphs, or immatures, are red and black. Both stages can be seen crawling over and under the soil and surface residue or accumulating in cracks in the soil surface. Burrower bugs can be abundant in and around no-till soybean and cornfields, as well as gardens and lawns. The species uses its sucking mouthparts to feed on sap from the roots of a wide variety of plants. There is no indication that burrowing bugs cause any injury to crops, but densities of several dozen of these bright insects per square foot have raised the concern of farmers, dealers, commercial applicators, and homeowners. In some cases, migrating burrowing bugs have covered the sides of buildings."

Burrower bug
Scott Gabbard, Shelby County, CES

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Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	5/15/01 - 5/21/01							5/22/01 - 5/29/01						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	0	12	37	0	0	0	97	1	3	2	0	0	0	14
Dubois/SIPAC	0	0	2	0	0	0	3	2	1	0	1	0	0	28
Jennings/SEPAC	0	0	25	2	0	0	10	5	1	9	5	0	0	28
LaPorte/Pinney Ag Center	4	3	0	0	0	0	36	1	0	0	0	0	0	9
Lawrence/Feldun Ag Center	6	1	13	0	0	0	166	0	2	0	1	0	0	59
Randolph/Davis Ag Center	7	8	47	3	0	0	144	2	6	18	1	0	0	41
Tippecanoe/TPAC	5	7	19	3	0	0	120							
Whitley/NEPAC	13	1	153	4	0	0	497							

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

Weeds

More Than You Wanted to Know About Giant Ragweed - (*Glenn Nice, Case Medlin, and Tom Bauman*) -

Giant ragweed (*Ambrosia trifida*) is a member of the aster family. This weed can reach a size of 12 feet tall if given the right conditions. It is a branching annual with a shallow taproot. You can usually identify giant ragweed by its large three (predominantly) to five (rarely) serrated lobed leaves. Visions of a pitchfork with three thick prongs come to mind (see Figure 1). The leaves are rough to the touch and arranged on opposite sides of the stem. Male flowers are located in slender racemes at the top of branches. However, the female flowers are located in the base of the upper leaves and produce the plant's seed, which are woody achenes that resemble an old-fashioned spinning top in the shape of a crown.

Giant ragweed is an effective competitor with crops during the early- and mid-seasons and, due to its stout stems, can severely complicate crop harvest. The most effective weed management strategies catch the weeds while they are young to avoid early-season weed competition. Therefore it is important to know the appearance of the seedling. Cotyledons (small immature leaves first to appear) are roundish to oblong on 2/8 to 3/8" long grooved petioles. First true leaves produced by seedlings may not have the distinct tri-lobed appearance common to mature leaves.

Post-mortem, windshield identification of this plant can be achieved by driving by many Indiana soybean fields during late July/early August. At this stage, corpses of giant ragweed plants will be 3 to 7 feet in height and 1 to 4 inches in diameter without any live tissue (Figure 2). This growth habit generally results from herbicides being applied too late during the growing season. The most common herbicides used to control these "too-large-to-spray weeds" include Flexstar or Reflex in conventional soybeans and glyphosate-containing herbicides (Roundup Ultra Max, Touchdown, Glyphomax, etc.) in Roundup Ready soybeans. Although these herbicides are effective as "salvage" treatments during the late-season, the already incurred yield loss cannot be reclaimed (Figure 3). In addition to yield loss from early- and mid-season competition, yield loss will also occur from (1) wheel-traffic due to the late-season application, (2) harvesting complications resulting from many late-maturing giant ragweed plants that were shielded from the herbicide spray that targeted the larger, more noticeable, giant ragweed plants, and (3) crop injury resulting from carryover of Flexstar or Reflex when applied within the 10 month plant-back-to-corn restriction window. Although these are very good products for control of giant ragweed in soybeans, they are most effective when used at the proper weed and crop stages. So, the next time you drive by your neighbor's field and notice all the dead ragweed plants, journey into his field, take out your pocket knife and remove the dead plants. You'll be amazed at the hole in the crop canopy (and your neighbor's pocket book) that you'll see.

There are several herbicides that have shown good control of giant ragweed in corn. Some suggestions are, atrazine (many trade names), or simazine (Princep) preemergence. Dicamba (Banvel, Clarity, Distinct), primisulfuron (Beacon, Exceed), bromoxynil (Buctril/Connect/Moxy/Stratos), and clopyralid (Stinger) can be used as postemergence applications. In Soybean, cloransulam (FirstRate, Amplify) or imazaquin (Scepter, Squadron) applied preemergence. Bentazon (Basagran), aciflurofen (Blazer, Status, Ultra Blazer), lactofen (Cobra), and fomesafen (Flexstar, Reflex) can be applied postemergence. In the case of 'Roundup Ready' crops glyphosate containing herbicides (Backdraft, Extreme, Glyphos, Glyphomax, Roundup Ultra Max, Touchdown) can be used postemergence, while in 'Liberty Link' corn glufosinate (Liberty) may be the herbicide of choice.

For more options please refer to the 2001 Weed Control Guidelines for Indiana at <http://www.btny.purdue.edu/Pubs/WS/WS-16.pdf>. You will need Adobe reader to view the document. To avoid injury to crops and self be sure to always refer to the complete label before using any pesticide.

Figure 1. Young giant ragweed showing characteristic three pronged leaves.

Figure 2. When left untreated until mid- to late-season, giant ragweed will out compete soybean and corn for space, light, and nutrients, and result in total yield loss for the occupied area.

Figure 3. Timely herbicide application(s) [i.e. 3 to 5 weeks after drilling] and crop canopy closure may result in near weed-fields at harvest (right side of photo) even without a late-season salvage treatment (which needed on the left).

Agronomy Tips

A Preponderance of Purple Plants Problematic for Producers - (*Bob Nielsen*) -

Following a week or so of cooler than normal temperatures, cloudy days, and (for some) excessive rainfall, some corn fields or areas of corn fields have taken on a startling reddish or purple discoloration, seemingly overnight. Naturally, most corn growers would rather see dark green when they drive past their corn fields and so wonder what on earth is going on with these puzzling purple plants. What can cause leaf purpling in corn and what yield losses can be expected from leaf purpling?

The purpling results from the accumulation of a purple pigment called anthocyanin. Whether or not a corn plant is able to produce anthocyanin is determined by the hybrid's genetics. A hybrid may have one or many genes that can trigger production of anthocyanin. Purpling can also appear in the silks, anthers and even coleoptile tip of a corn plant.

Well, you may say, that's fine but what triggers the production of the anthocyanin in young corn at this time of year? There are several causes, but all related to photosynthesis and use of the ensuing photosynthates.

Simple Genetic Response to Cool Temperatures. The last week or so has been characterized by intermittent periods of bright sunny weather and clouds, daytime temperatures in the 50's and 60's, nighttime temperatures in the 40's. Certain hybrids exhibit a genetic response to this combination of factors by turning purple. Hybrids with more anthocyanin-producing genes will purple more greatly. The purpling will slowly disappear as temperatures warm.

Excess Photosynthetic Sugars. During early stages of corn development, a fair amount of the photosynthate production is invested in root growth. Restricted root development limits the use of these plant sugars produced by photosynthesis and can result in an excess amount of sugars in the leaves. This increased level of plant sugars in the leaf tissue triggers a biofeedback mechanism from which anthocyanin is produced. Any leaf injury that restricts movement of sugars from the leaf (e.g., the purple tip of a broken leaf or the reddish leaves severely damaged by European corn borer late in the season) results in the same anthocyanin production in the affected tissue.

What factors have been limiting root growth this growing season? The list is lengthy and includes excessively dry soils (up until the rains started again), excessively wet soils (after the rains started again), anhydrous ammonia injury (encouraged by excessively dry soils), starter fertilizer injury (encouraged by excessively dry soils), and white grub injury (effects of which were aggravated by excessively dry soils). Throw in last week's cool nighttime temperatures for good measure and it's no surprise that purple is the color of the week.

Nutrient Deficiency, Especially Phosphorus. In my experience, I have not often diagnosed phosphorus deficiency as the primary cause of purple plants early in the season. Nonetheless, cold or dry soils inhibit root development and can aggravate a true phosphorus deficiency situation, frequently causing even more intense leaf purpling.

What About Yield Losses? Does the leaf purpling lead to yield losses later on? The cause of leaf purpling, not the purpling itself, will determine whether yield loss will occur by harvest time.

If the cause of the root restriction is temporary (e.g., cool temperatures), then the purpling should disappear as the plants develop further and yield losses should be minimal, if any. If the cause of the root restriction continues to affect plant growth for some time (e.g., soil compaction, grub feeding), then the purpling may continue for some time and some yield loss may result if the plants become stunted. Remember that the effects of early season damage to the seed or root system can be magnified when corn is already developing slowly due to cool, cloudy weather.

Closer looks at purpling

Patterns of purpling in a field related to wet/dry soils

When Good Corn Fields Turn Bad - (*Bob Nielsen*) -

- Some fields emerged unevenly. Others emerged uniformly, but subsequently turned ugly
- The causes are usually below ground. Typically, more than one cause is involved
- Growing conditions greatly influence the situation

Most corn growers will tell you that the maximum corn yield potential of a hybrid exists while the seed is still in the bag. Once the seed is in the ground, the challenge is to protect that yield potential from the many potential stresses that await the developing crop. This growing season is doing its best to reinforce that belief.

Around the state, folks are lamenting the fact that fields of corn that had emerged uniformly and initially developed uniformly are now fields that contain plants of uneven color and size. Other fields did not emerge uniformly to begin with. The recent spate of unusually cool temperatures and (in some places) excessive rainfall has contributed to the further development of fields that can only be labeled as ugly.

Why worry about uneven stands of corn? Simply put, it leads to unfair competition among adjacent plants and, ultimately, to a lower yield potential for the field. Research from Illinois and Wisconsin documented potential yield losses ranging from 8 to 20% due to uneven emergence, depending on the degree of delayed emergence timing and the extent to which the field was affected. Basically, if delayed emergers are two leaves or greater behind the original emergers, the delayed emergers will likely be barren at the end of the year. Yield losses to competition among plants of similar age but varying degrees of health or vigor is more difficult to document, but likely mimics that due to uneven emergence.

What causes uneven emergence? The three common causes are a) uneven soil moisture in the seed furrow, b) uneven seed to soil contact, and c) uneven soil temperature in the seed furrow. The order in which I listed these causes is probably the order of frequency in which they were responsible for uneven emergence in 2001.

I've seen more instances of delayed emergence due to soil moisture problems this year than in many recent years. In some cases, the problem was related to a) uneven seeding depth or b) uneven soil moisture at the selected seeding depth. In other cases, preplant tillage left a cloddy seedbed, especially in the tillage tire tracks, and those areas of the planted field had to wait for the recent soaking rains before germination occurred. It is not uncommon to find fields with plant variability for growth stage as great as four leaves, meaning that if the original emergers are at the V6 stage of development, the delayed emergers are at growth stage V2.

What causes fields that emerged uniformly to later turn ugly? Almost invariably the cause lies below ground. Several weeks ago, I briefly reviewed how roots are supposed to develop in corn (*P&C Newsletter*, 11 May). In that article, I emphasized the importance of maintaining the health of the seed and the mesocotyl until the nodal root system was successfully established. As the nodal roots develop, the importance of the seed reserves and the mesocotyl (the 'pipeline' to those reserves) declines.

For all practical purposes, the time from planting to about V4 to V6 can be labeled the 'critical stand establishment' period for corn. If a field of corn successfully develops to the V4 to V6 (four to six visible leaf collars) stages with no damage to mesocotyls or seeds, chances are that field will look very uniform. If, however, mesocotyl or seed damage occurs prior to substantial nodal root development, seedlings will either die or be severely stunted. Consequently, a field that may have emerged uniformly and initially looked quite uniform may become very uneven in appearance if initial seedling development has been affected by one or more stresses.

What stresses are we talking about? The list of potential stresses that can injure the seed, seed roots or mesocotyl is not particularly long, but deciding which ones to blame can be difficult since more than one is usually present in any given field. The list of possible offenders includes:

- Seed rot fungi
- Seedling blight fungi
- Excessively wet soils (death by drowning)
- Excessively dry soils (death by desiccation)
- Anhydrous ammonia fertilizer 'burn'
- Wireworms
- Seedcorn maggots
- Grubs of various types
- Prying agronomists
- Starter fertilizer 'burn'

Other factors that influence the effects of these early stresses include cool soils in general, sandblasting injury, herbicide injury, excessively dry conditions and ponding. All of these weather-related stresses slow or hinder the early growth of corn seedlings and make them more vulnerable to the above list of stresses. Similarly, while most herbicides that can injure corn do not do so to such young seedlings, later injury will subsequently hamper the recovery of an already struggling crop.

Seed quality and the hybrid's inherent seedling vigor also play an important role in determining the consequence of injury during stand establishment. Otherwise minor stresses during stand establishment can have major effects on overall plant health if seed quality is less than acceptable or if seedling vigor is simply average.

So, what's a guy to do? The bad news is that if stand establishment this year is crappy (an agronomic term meaning uneven), there is little you can do about it now. As you think about next year, there are a few things you can keep in mind to minimize the future risk of crappy stands.

- Create as little surface compaction as you possibly can prior to planting.
- Avoid working wet ground and creating cloddy seedbeds.
- Don't go hog-wild on earlier than normal planting. Recognize that seed fungicide treatments only provide 10 to 14 days of protection under "normal" conditions (*Illinois Pest & Crop Bulletin*, 15 May 1998).
- Plant your best-vigor hybrids first. (Requires homework on your part)
- Plant your best quality seed lots first. (Requires homework on your part)
- Plant your best-drained fields first.
- Consider planter-applied insecticide for protection against wireworm and seedcorn maggot if you are certain of their presence.
- If soil conditions are unusually dry at planting, aim for a seeding depth that maximizes soil moisture uniformity in the seed furrow.

A Final Comment. Any time that germination, emergence AND/OR stand establishment are delayed significantly, the developing crop is simply exposed to a lengthier period of stresses from the list above. The consequence of such stresses on a slowly developing crop is exactly the uneven stands of corn that some corn growers are lamenting about now.

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/>.

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A Recipe for Crappy Stands of Corn - (*Bob Nielsen*) - Every year, I get a lot of phone calls from folks wanting to know why their neighbor's fields of corn ended up with such poor stands. Since some seem so ecstatic about it happening to their neighbors, I figured they may want to know how to create a crappy stand of corn themselves. The following recipe will prepare one helping of crappy corn stand. Add more acreage as desired.

Ingredients:

- One (1) field, poorly drained, no-till is preferred.
- A hybrid of your choice, but poor seed quality and low vigor will ensure success of recipe.
- Plant early, when soils have yet to reach 50°F.
- Add minimum of 0.5 to 1.0 inch of rain per week after planting.
- Maintain average daily soil temperatures at 50°F or less for three weeks or more after planting.
- Add in a dash of seed rot or seedling blight organisms.
- Add in a pinch of wireworms or seedcorn maggots.
- Flavor with acetanilide herbicides as desired.
- Top off with a thick soil crust.

Will serve 6 people: (farmer, dealer, industry rep, seed dealer, Extension Educator, university specialist)

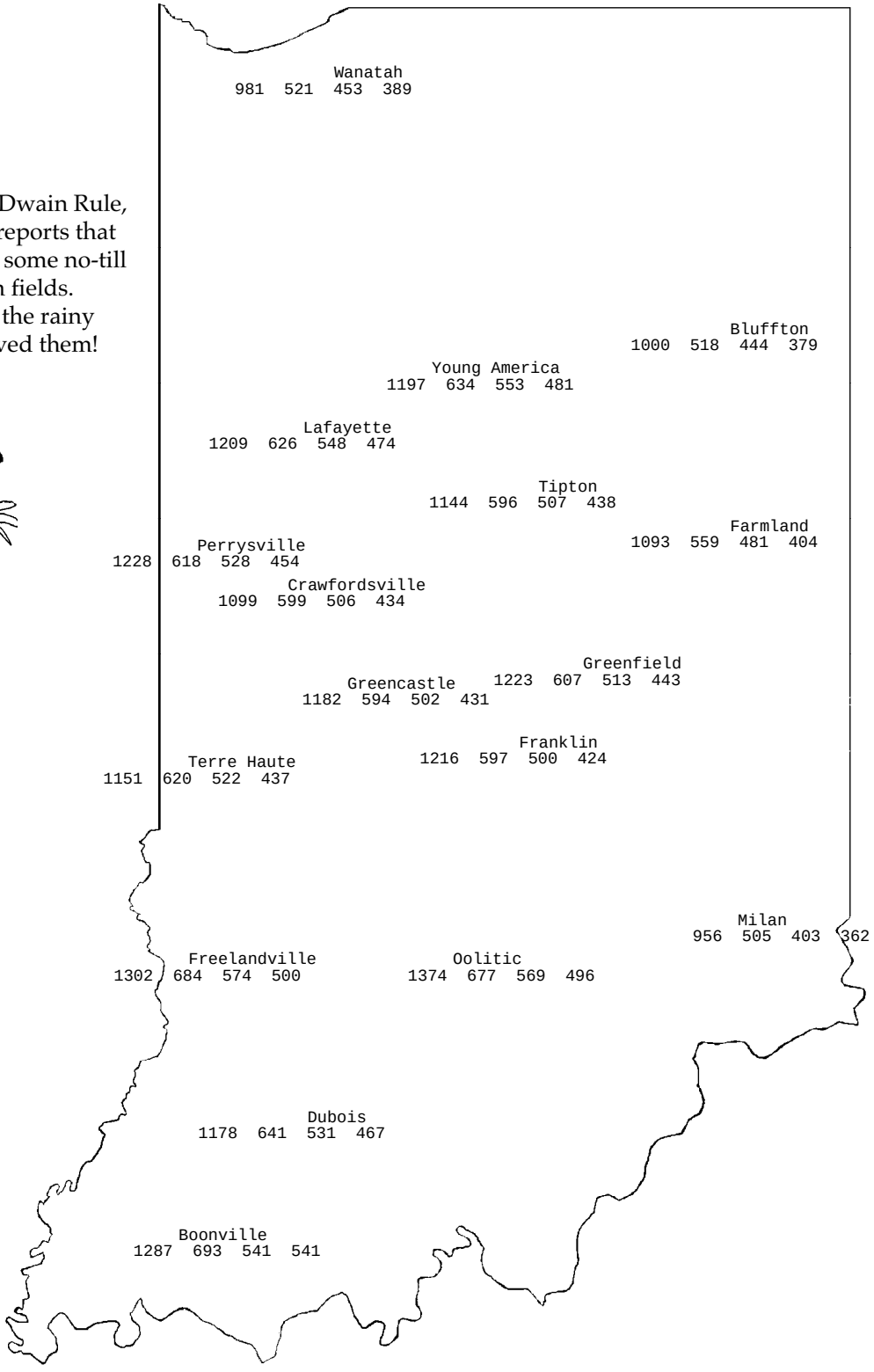
Weather Update

Temperature Accumulations from Jan. 1 to May 30, 2001

MAP KEY
Location HU 41 GDD(3) GDD(11) GDD(40)

HU41 = heat units at a 41°F base from Jan. 1, stalk borer larval movement begins at approx. 1,400
GDD(3) = Growing Degree Days from April 14 (3% of Indiana's corn planted), for corn growth and development)
GDD(11) = Growing Degree Days from April 22 (11% of Indiana's corn planted), for corn growth and development)
GDD(40) = Growing Degree Days from April 28 (40% of Indiana's corn planted), for corn growth and development)

Bug Scout says, "Dwain Rule, Syngenta Seeds, reports that slugs are sliming some no-till corn and soybean fields. Seems as though the rainy weather has revived them!



4" Bare Soil Temperatures 5/30/01

Location	Max.	Min.
Wanatah	73	56
Columbia City	66	52
Bluffton	59	59
W Laf Agro	72	57
Tipton	66	59
Farmland	66	53
Perrysville	70	60
Crawfordsville	71	60
Trafalgar	66	60
Liberty	65	55
Terre Haute	71	65
Oolitic	70	62
Dubois	84	60

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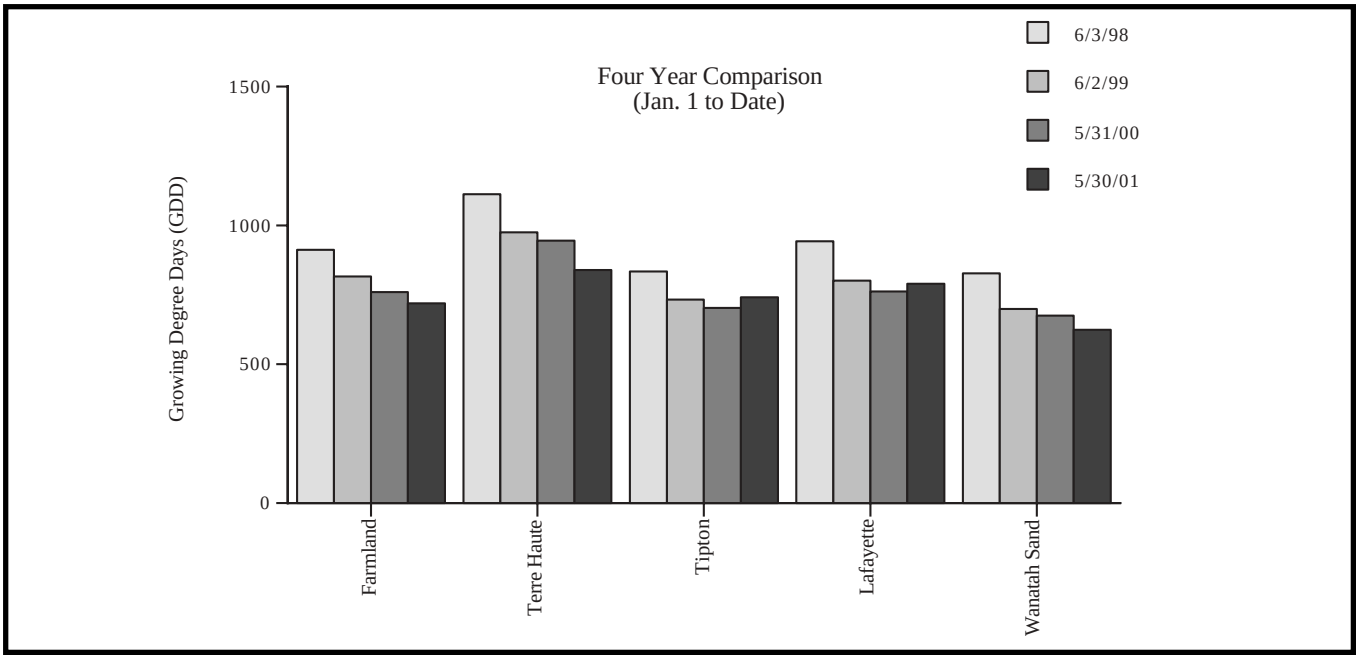

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