Pest & Crop

June 7, 2002 - No. 12

In This Issue

Insects, Mites, and Nematodes

Black Cutworm Rearing Its Ugly Head – (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

- Late moth flights obviously found idle, weedy fields hospitable for egg laying
- Some extreme damage found in east central Indiana counties
- Scouting guidelines and rescue insecticides given below

Ron Blackwell, IPM Survey Specialist, has been diligent in following up on some of the late black cutworm moth flights into the state. He tracked heat unit accumulations from late April intensive moth captures and then traveled to east central Indiana for field sampling. The following table, "Black Cutworm Larval Survey", shows that there are cornfields with significant and economic damage. Unfortunately, most pest managers are not scouting because they're so busy trying to catch up on other field activities.

Scout high-risk fields, i.e., weedy before or during planting, by inspecting 20 consecutive plants in each of 5 areas of a field (100 plants) for feeding activity and cutworms. Count and record the number of plants cut or damaged and determine the percentage of plants affected. Also collect black cutworm larvae and determine the average instar stage. While sampling, also record how many leaves are fully unrolled (the collar of the leaf is visible on a fully unrolled leaf). Use the following management guidelines and instar guide for treatment decisions. Suggested foliar insecticides for control of economic infestations are listed below.

Black cutworm and damaged plant

Black Cutworm Management Guidelines

Average Instar of BCW	Number of Plant Leaves Fully Emerged 6 or more	5	4	3	2	1
4.0	1%+	2%+	2%+	2%+	3%+	4%+
5.0	2%+	3%+	4%+	4%+	6%+	25%+
6.0	4%+	7%+	9%+	17%+	Don't	Don't
7.0	6%+	15%+	50%+	Don't	Don't	Don't

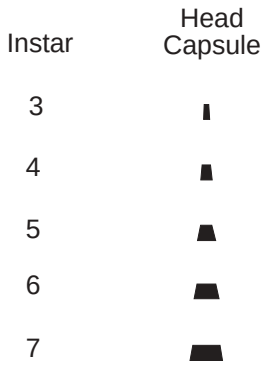
1. Look down the column at the left labeled "Average Instar of BCW" until you find the average instar of BCW found in the field. This column is called the Instar Row.
2. Look across the top of the table and find the number that best represents the "Number of Plant Leaves Fully Emerged" for the plants inspected. A leaf is fully emerged if the leaf collar is visible. The column of figures below this is called the Leaf Column.
3. Follow the Instar Row and the Leaf Column to the place where they intersect. This figure is the control threshold. If the percentage of cut or damaged plants in the field equals or exceeds this number, treatment may be advisable.

Insecticides Suggested for Foliar Application to Control Cutworms in Corn

Material	Amount Per Acre and Formulation
Bifenthrin (Capture)[1]	2.1 – 6.4 fl. oz. EC
chlorpyrifos (Lorsban)[1]	1 – 2 pt. 4E
esfenvalerate (Asana XL)[1]	5.8 – 9.6 fl. oz. EC
lambda-cyhalothrin (Warrior)[1]	1.92 – 3.20 fl. oz. CS
methyl parathion (Penncap–M)[1,2]	4 pt. FM
permethrin (Ambush)[1]	6.4 – 12.8 fl. oz. EC
(Pounce)[1]	4 – 8 fl. oz. 3.2EC
zeta-cypermethrin (Mustang)[1]	1.4 – 3.0 fl. oz. EW

[1] Restricted Use Insecticide
[2] Bee Caution

Black Cutworm Instar Guide



How to use the instar guide: Immobilize the larva by holding it with a forceps, by placing it in alcohol, or by grasping it tightly behind the head. Hold the larva flat against the paper and move it down until the head just fits inside one of the "keystone" figures. That is the most probable instar for that larva.

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Black Cutworm Larval Survey
June 4 &5, 2002
(Ron Blackwell)

County (Fields) Sampled	Leaf Stage of Corn	% of plants/field w/ damage	Average Larval Instar
Clinton 1	2 leaf	2%	4
Clinton 2	2 leaf	5%	4.5
Clinton 3	2 leaf	5%	4.5
Decatur 1	2 leaf	35%	5
Decatur 2	2 leaf	20%	5
Decatur 3	2 leaf	0%	n/a
Decatur 4	1 leaf	0%	n/a
Decatur 5	2 leaf	9%	4.5
Fayette 1	2 leaf	1%	4
Fayette 2	1 leaf	0%	n/a
Fayette 3	3 leaf	0%	n/a
Fayette 4	2 leaf	3%	5
Fayette 5	2 leaf	4%	4.5
Fayette 6	2 leaf	9%	5
Fayette 7	2 leaf	0%	n/a

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Stalk Borer Migrating - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- The key to stalk borer management is to prevent their migration
- A spot treatment is often all that is necessary

A phone call from west central Indiana alerted us to the fact that stalk borers are infesting 2 to 3-leaf corn. The small larvae were leaving corn plants with the typical "dead-heart" appearance, i.e., bottom leaves healthy and whorled leaf(ves) wilting. Once the stalk borer has either outgrown or killed one plant, they will then move onto another.

Research conducted at Iowa State University had shown that leaf feeding by early instar larvae had an insignificant effect on yield. However, once the stalk borer had tunneled, grain yield reductions were 59% for primary plants (first plant infested) and 74% reductions for secondary plants (second plant infested) sustaining dead-heart damage. The damage obviously intensifies as the larvae increase in size. If corn seedlings are being killed by stalk borers, the application of a insecticide with good residual activity may be beneficial to control the worms as they move from dying plants to new hosts. However, timing of such treatments is critical to increase the probability of success. Spot treatments where damage is prevalent, such as along waterways or where giant ragweed has been a problem, often controls further movement.

Dead-heart damage from stalk borer

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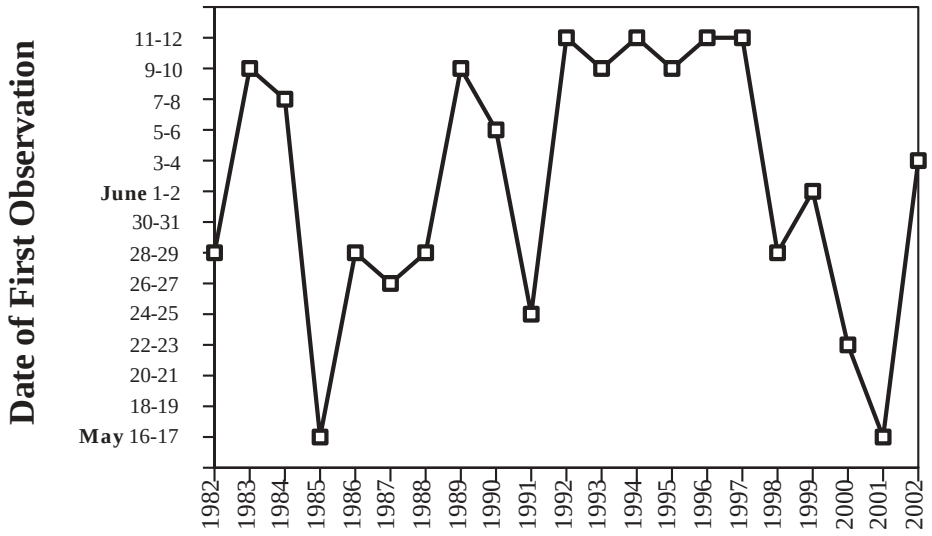
Corn Rootworm Hatch is Underway- (*John Obermeyer, Larry Bledsoe, and Rich Edwards*) -

- Hatch of rootworm in west central Indiana occurred around May 30
- Sampling for larvae in high-risk fields will be possible in mid June

Roots from 4-leaf corn collected on June 4 near Lafayette in Tippecanoe County revealed rootworm larvae. Because of the size of the worms, it is likely that they hatched in late May. Hatch in southern Indiana counties has occurred several days earlier, while hatch in northern counties is just beginning. Depending on soil temperatures, hatch will continue for a while.

It is too early to sample corn roots for the presence of larvae, as the worms are inside the roots. In a couple weeks, it will be possible to dig up and inspect for larvae and feeding scars on the roots. More on this in a future issue of *Pest&Crop*.

FIGURE 1. DATES CORN ROOTWORM LARVAE FIRST OBSERVED IN CORN ROOTS, TIPPECANOE COUNTY, INDIANA, 1982-2002



Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	5/21/02 - 5/28/02							5/29/02 - 6/3/02						
	VC	BCW	ECB	SWCB	CEW	FAW	AW	VC	BCW	ECB	SWCB	CEW	FAW	AW
Clinton/Blackwell	0	1	1	0	0	0	3	0	0	67	0	0	0	1
Dubois/SIPAC	0	0	13	0	0	0	3	0	1	5	1	0	0	2
Fountain/Mroczkiewicz	0	0	0	0	0	0	0							
Jennings/SEPAC	0	0	5	0	0	0	2	0	0	52	0	0	0	0
Knox/SWPAC	0	0	13	0	0	0	0	1	0	17	15	0	1	1
LaPorte/Pinney Ag Center	0	0	0	0	0	0	5	1	1	3	0	0	0	16
Lawrence/Feldun Ag Center	0	0	2	0	0	0	0	0	0	6	0	0	0	6
Randolph/Davis Ag Center	0	0	1	0	0	0	5							
Vermillion/Hutson	0	0	0	0	0	0	0	0	0	108	0	0	0	0
Whitley/NEPAC	2	5	0	0	0	0	152	0	0	31	0	0	0	12

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

Plant Diseases

Stratego Fungicide is Labeled for Corn - (*Gregory Shaner*) –

- An additional fungicide is added to the arsenal for control of leaf diseases of corn

Although foliar fungicides are rarely used on hybrid field corn, they are routinely used on seed corn. Growers of specialty hybrids may also use fungicides when disease pressure is great.

Stratego, a relatively new fungicide, has been labeled for use against common rust, eyespot, gray leaf spot, northern corn leaf blight, southern corn leaf blight, and northern corn leaf spot on field corn, field corn grown for seed, and popcorn.

Stratego is a combination product. It contains propiconazole (the active ingredient in Tilt) and trifloxystrobin, a member of the strobilurin class of fungicides (the active ingredient in Quadris is a strobilurin). Consult the labels for details about rates, times of application, safety issues, and environmental hazards.

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Update on Wheat Leaf Blights - (*Gregory Shaner*) -

- Leaf blights have not progressed rapidly, but this may change with hot weather

Septoria and *Stagonospora* leaf blights of wheat have been present in Indiana wheat fields for several weeks, but have not become as severe as might have been expected from the abundant rainfall we have experienced. I attribute this to the cool weather that prevailed over much of the state until recently. For the week ending May 26, temperatures throughout the state were running 8 to 10 ˚F below normal. However, conditions changed this past week. For the week ending June 2, temperatures were averaging 6 to 7 ˚F above normal. The hot weather continued through this past Tuesday. Although temperatures are a bit lower now, they are still within the favorable range for the leaf blight fungi. With the high humidity and rainfall that have accompanied this warm weather, severity of leaf blotch and glume blotch may increase rapidly.

Both of these diseases spread up the crop canopy during the season. The lowest leaves are infected first, either in the fall or early in the spring. Spores produced in lesions on these leaves are spread by rain splash to upper leaves. When leaves remain wet for long periods,

these spores infect. After a period of incubation, lesions develop. Cool weather reduces the likelihood of infection and extends the incubation period for infections that do take place. The warm weather of the past week will hasten the development of infections that occurred earlier. Where rain fell during the warm weather of the past week, there will be additional infection.

Agronomy Tips

Diagnosing Stand Establishment Problems in Corn - (*Bob Nielsen*) -

Stand establishment in corn does not simply refer to the success or failure of germination and emergence. Stand establishment also includes the critical initial formation of the nodal or permanent root system (see my related article on root development).

Until the nodal root system is well established, the corn crop is susceptible to various early season stresses that injure the seed, seed roots, and mesocotyl. These stresses include damage from below-ground insect feeding (wireworm, seedcorn maggot, grub), seedling blights, seed rots, fertilizer injury (starter fertilizer, anhydrous ammonia), excessively dry soils, excessively wet soils, and prying agronomists.

The establishment of a vigorous nodal root system is largely dependent on the initial nodal root growth from about the 2-leaf collar (V2) to 6-leaf collar (V6) stages of development. Severe stress during this time period can cause a corn field that emerged perfectly and initially looked great to go "down hill" (plant death or stunting) very fast over a few weeks' time.

The reason that early stress can so severely impact an establishing stand of corn is that corn seedlings depend primarily on the energy reserves of the kernel until the nodal roots are established. These energy reserves are translocated from the kernel through the connecting mesocotyl "pipeline" to the young stalk and leaf tissues. If damage to the mesocotyl or seed occurs prior to substantial nodal root development, seedlings will either die or be severely stunted. Therefore, a healthy kernel, seed roots, and mesocotyl are vital until the nodal roots are well established. As the nodal roots develop, the importance of the seed reserves and the mesocotyl declines.

Two of the major interacting factors that influence the extent to which early season stress affects stand establishment are soil temperature and moisture content. Early-planted corn this year (what little of it there was) endured 4 to 5 weeks of sustained cool soils after planting that greatly slowed early corn development of corn seedlings. Much of that time, the soils were also saturated, if not ponded, which further stunted corn development. Whenever early nodal root development is significantly delayed, other stress factors (especially soil insects and diseases) simply have more time in which to damage the seed and mesocotyl and, ultimately, injure or kill young seedlings.

Extended cool temperatures, slow corn sseedling development, and seedling blight

Live & dead plants, side-by-side

Seedling blight of coleoptile

Seedling blight of coleoptile

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.

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 with 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 seed-applied or 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.

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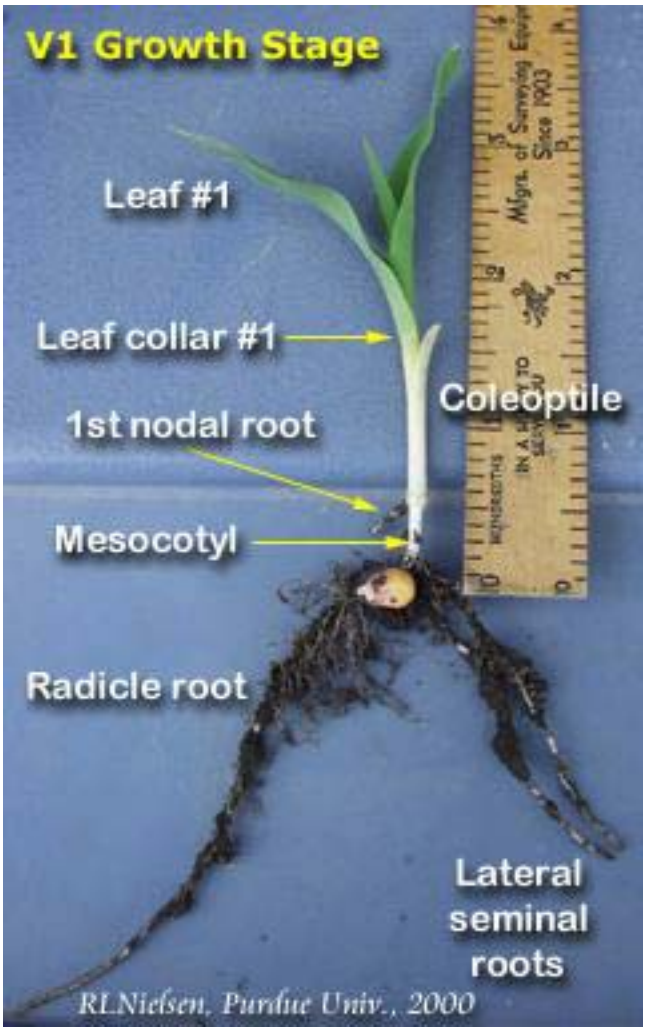
Corn Root Development - (*Bob Nielsen*) -

- Successful root development important to sustain good crop
- Conversely, poor root development often leads to stunted crop

Corn is a grass and has a fibrous type root system, as compared to soybeans or alfalfa which have tap root systems. Successful establishment of the corn plant's root system helps ensure successful establishment of the crop itself. One of the more critical periods for successful root establishment occurs from emergence to about the six-leaf collar stage of development.

Stunting or restriction of the root system during this time period (dry soil, wet soil, cold soil, insect damage, herbicide damage, sidewall compaction, tillage compaction) can easily stunt the entire plant's development. In fact, when you are attempting to diagnose the cause of stunted corn early in the season, the first place to begin the search is below ground.

To better understand rooting development and problems associated with root restrictions, it is important to understand that root development in corn can be characterized by root position relative to the seed.



The Seminal (Seed) Root System

Seminal roots originate near the seed and are comprised of the radicle and lateral seminal roots. The seminal root system anchors the young plant and absorbs minor amounts of water and nutrients for the first two to three weeks. Seminal roots cease new growth shortly after the coleoptile emerges at the soil surface.

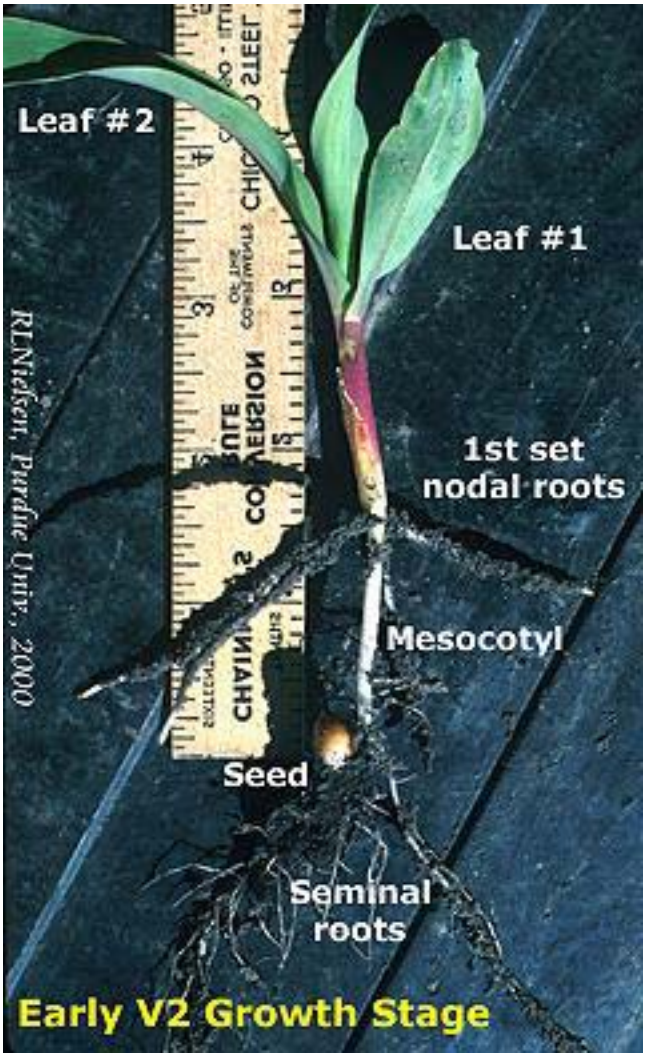
A young corn seedling depends primarily on the energy reserves of the kernel until permanent (nodal) roots develop. Within a few days after emergence of the coleoptile and first leaves from the soil, a second root system, the nodal roots, begins to develop from the crown or growing point. If damage occurs to seminal roots or the mesocotyl before nodal roots become established, stunting or death of the plant will occur. Examples of such damage include salt injury from excessive rates of starter fertilizer, seedling blight, herbicide injury and insect feeding damage.

Nodal (Or Permanent) Root System

Nodal roots begin to elongate from the coleoptile crown shortly after growth stage VE and are distinctly visible by growth stage V1. An individual set of roots forms at each stalk node below-ground plus one or more above-ground nodes. By growth stage V6, the nodal roots have typically become well established and have completely taken over the sustenance of the plant.

Four stalk nodes usually comprise the 'woody' triangle at the bottom of a corn stalk. The internode above the fourth node elongates about 1/2 inch, above which is found the fifth node (still below or just at the soil surface). Consequently, five sets of nodal roots will usually be detectable below ground (one set for each below ground stalk node).

Elongation of the internode above the fifth node 'pushes' the sixth node above ground. Continued elongation of subsequent stalk internodes will result in higher and higher placement of the remaining stalk nodes. Additional sets of nodal roots that form at above ground stalk nodes are usually assigned the 'fancy' name of brace roots, but are functionally identical to those nodal roots that form below ground. If surface soil conditions are suitable (moist and not excessively hot), brace roots can successfully enter the soil, proliferate and effectively scavenge the upper soil layer for water and nutrients.



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End-of-Season Planter Care - (*Bob Nielsen*) -

Uniform seed drop is an important contributor towards the achievement of optimum corn grain yield. Planter maintenance and adjustments are the primary factors that influence the uniformity of seed drop. Given the nightmarishly delayed 2002 planting season, many farmers may simply want to park their planters and forget about them until next winter.

Bear in mind, however, that planter maintenance for 2003 begins after the finish of the 2002 planting season. Here are a few pointers to consider. Consult your planter operations manual and equipment dealer for more details.

- Take the time to jot down notes on any planter operation problems that occurred during this planting season so that you won't forget about them later. If you are really ambitious, spend time during the next month to work on correcting those problems

while they are fresh in your mind. If you can't find the time now to actually work on the planter, file your notes away in a safe place where you can easily find them next winter.

- Clean out all the seed from the planter seed hoppers and metering units. Seed left in the planter attracts rodents. Seed left in the units may also rot and eventually "gum up" the metering units.

- While you cleaning out the seed from the metering units, take the time to actually open them up and clean out as much of the "caked on" seed treatment as possible.

- With vacuum planters, remove the seed discs to avoid constant pressure on the rubber seals that can lead to eventual failure. Hang the discs on a wall in the shop or down in the basement. Don't stack them on the workbench or shelf because of the risk of warping. Store the discs where temperatures will not drop below freezing next winter.

- With vacuum or other air planters, open up the air ductwork and tubes and blow out all the dirt and crap that accumulated during planting.

- Remove the various drive chains on the planter, clean all the dirt and grime from them, and lubricate them well before putting them back on the planter. Some folks go so far as to store the drive chains in a bucket of oil during the off-season. While you have them off, inspect them for worn chain links or rollers and replace as necessary.

- Clean all of this year's mud and crud off the coulters, disc openers, press wheels, depth gauge wheels, and fertilizer openers. Apply rust preventer to the coulters and disc openers.

- Clean off all the other dirt, grease, and grime from the rest of the planter. Relubricate all bearings as appropriate.

- While you are doing all of these housekeeping items, inspect the planter for broken or misadjusted parts or controls that will eventually need to be replaced or repaired. Add these items to the "to-do" list you began earlier.

- The final, and most important, thing you can do is to store the planter inside a building or other sheltered area to protect it from the weather for the ten months or so before you use it again.

Useful References

Nielsen, RL (Bob). 1994. Planting Speed Effects on Stand Establishment and Grain Yield of Corn (AGRY-94-02) [Online]. Purdue Univ. Agronomy Dept., W. Lafayette, IN. _<http://www.agry.purdue.edu/ext/pubs/AGRY-94-02_v2.pdf> (verified 6/1/02).

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Nielsen, RL (Bob). 2002. Corn Planter Tuneups: Why Bother? (A Microsoft Powerpoint presentation) [Online]. Purdue Univ. Agronomy Dept., W. Lafayette, IN. <http://www.agry.purdue.edu/ext/ppt/PSV-2002.ppt> (verified 6/1/02).

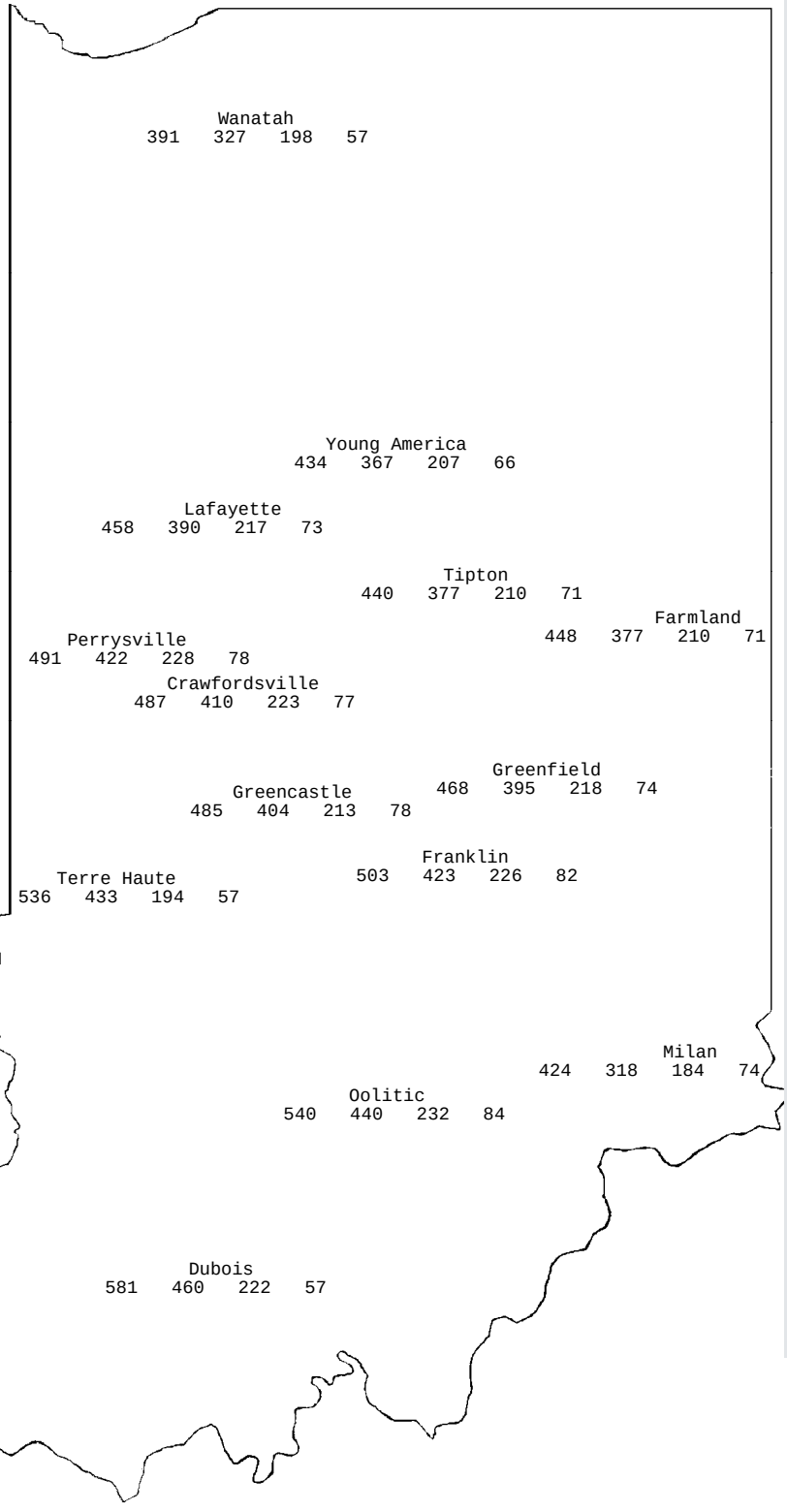
Don't forget, this and other timely information about corn can be viewed at the Chat 'n Chew Café on the World Wide Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the World Wide Web at <http://www.kingcorn.org/>.

Weather Update

MAP KEY
Location
GDD(2) GDD(10) GDD(43) GDD (75)

Temperature Accumulations from Jan. 1 to June 5, 2002

GDD(2) = Growing Degree Days from April 21 (2% of Indiana's corn planted), for corn growth and development
GDD(10) = Growing Degree Days from May 5 (10% of Indiana's corn planted), for corn growth and development
GDD(43) = Growing Degree Days from May 26 (43% of Indiana's corn planted), for corn growth and development
GDD(75) = Growing Degree Days from June 2 (75% of Indiana's corn planted), for corn growth and development



Bug Scout says, "Be scouting that corn for black cutworm!"

4" Bare Soil Temperatures 6/5/02

Location	Max.	Min.
Wanatah	74	66
Columbia City	71	61
Winamac	79	68
W Laf Agro	87	72
Tipton	77	71
Farmland	83	66
Perrysville	77	72
Crawfordsville	72	67
Oolitic	77	73
Dubois	94	74

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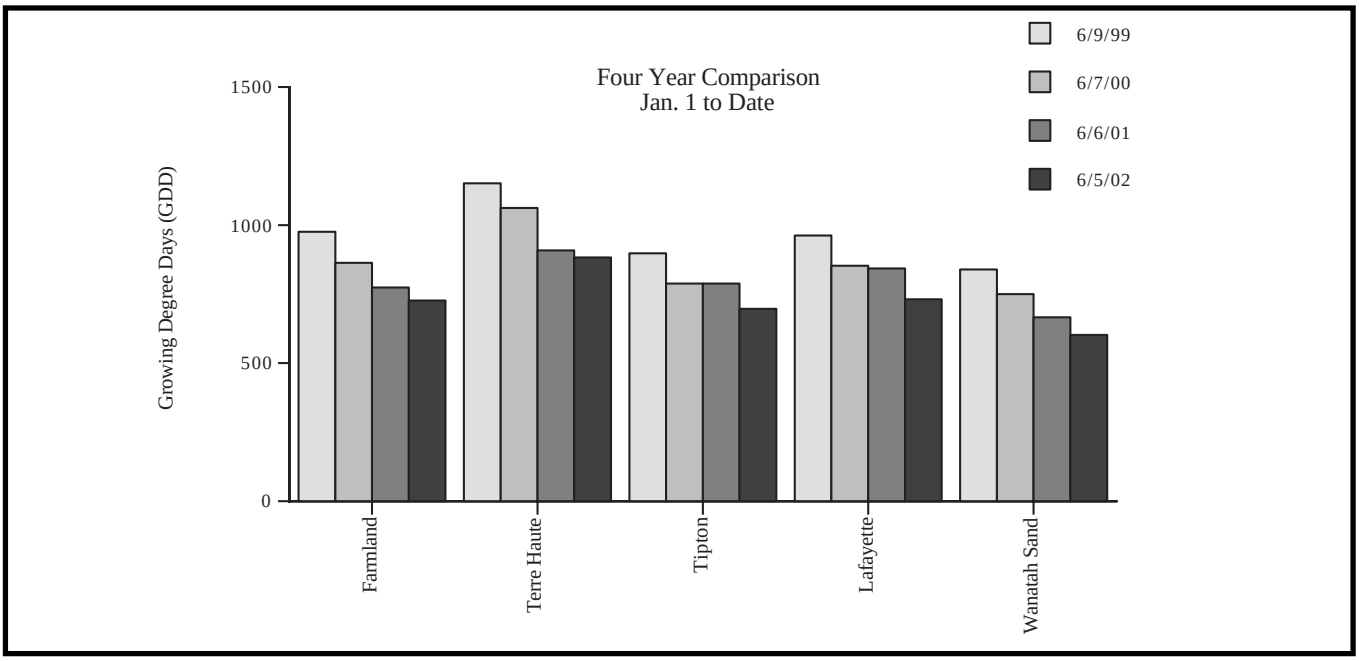
http://www.entm.purdue.edu/Entomology/ext/targets/newslett.htm



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