Pest & Crop

May 11, 2001 - No. 8

In This Issue

Insects, Mites, and Nematodes

Black Cutworms Are Active, Scout Now – (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

- Black cutworms are now cutting
- Scout NOW, cutworms won't wait

Several individuals have called to report that black cutworms are damaging corn up to the 3-leaf stage in Indiana. We appreciate we much your bringing this situation to our attention. Most, but not all fields have had significant populations of winter annual weeds (e.g., chickweed, henbit) growing in them this spring. If you had any weeds in these fields prior to planting and during critical moth flight periods, **NOW** is the time to be scouting for cutworms!

The following table gives the approximate developmental rate of the black cutworm in the eastern Midwest (Luckmann et al., Illinois). The information in this table shows how quickly cutworm larvae can developing into serious plant "eating machines." Warmer temperatures even make this happen at a faster rate. Although it necessary to catch infestations early in their developmental cycle to reduce the potential for damage, it is the 5th and 6th instars stages that do the majority of damage.

Instar (stage)	Approx. length of worms (in.)	Avg. number of days per stage at varying temp. 70 ℉	80 ℉
1	1/16	4.9	1.9
2	1/4	3.0	2.1
3	3/8	3.0	2.2
4	1/2 - 1	3.6	2.4
5	1 - 1-1/2	4.2	3.3
6	1-1/2 - 2	6.0	4.6
7	1-1/2 - 2	6.0	3.8
Total days for larvae		30.7	20.3

Scout for cutworms and feeding activity by inspecting 20 consecutive plants in each of 5 areas of a field (100 plants). 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, record how

many leaves are fully unrolled (the collar of the leaf is visible on a fully unrolled leaf). Control of black cutworm may be necessary if 3 to 5% of the plants are damaged and the average larval instar stage is from 4 to 6. See last week's *Pest&Crop* for management guidelines and suggested controls.

Black cutworm next to cut plant

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Stalk Borers Are Hatching and Damaging Corn - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- A stalk borer infestation found
- Giant patches of ragweed attracted egg laying moths
- Larval establishment on crops can lead to economic damage
- Management guidelines are given

Thanks to Dan Childs, Monsanto, for notifying us about a cornfield in White County with newly hatched stalk borer damaging corn. It was evident during inspection, that giant ragweed pulled the egg laying moths of the stalk borer into this field.

Some of the plants will grow out of the initial infestation. As larger larvae move to new corn plants, which occurs during the period from 1,400 to 1,700 degree-days (HU41), severe damage can occur. Research conducted at Iowa State University shows that once larger stalk borers have tunneled in the corn (causing "dead heart"), grain yield reductions are about 59% for primary plants (first plants infested) and 74% for secondary plants (second plants infested). The damage obviously intensifies as the larvae increase in size. Refer to *Pest&Crop* #6 for scouting information.

Early instar stalk borers can be controlled before they enter the plant if a sufficient number of plants show leaf feeding (see following chart). Control of populations moving into a field from field borders is also possible with a broadcast treatment along the edge of the field and in infested areas within a field. If 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.

Economic Injury Levels for Corn Damaged by Stalk Borer*

Leaf Stage	Value of Corn ($/bu) $2.00 Percent of Plants Infested	$3.00 Percent of Plants Infested
1 leaf	10%	7%
2 leaf	12%	8%
3 leaf	15%	10%
4 leaf	16%	11%
5 leaf	17%	11%
6 leaf	34%	23%
7 leaf	100%	100%

* Chart is for management costs of $13/acre, and 80% control with an insecticide. Modified from Iowa State University.

Early instar damage to seedling

Dead heart damage

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Armyworm in Wheat - (*John Obermeyer Rich Edwards, and Larry Bledsoe*) -

- Larvae observed in Indiana wheat fields
- Wheat defoliation and head clipping can result from feeding

We've received reports of armyworm larvae feeding on wheat. This does not come as a surprise considering the number of moths flying 2 to 3 weeks ago. Pest managers should examine plants in several areas of a field, especially where plant growth is dense. Look for flag leaf feeding, clipped heads, and armyworm droppings (excrement) on the ground. Shake plants and count the number of armyworm on the ground and under plant debris. On sunny days, the armyworm will take shelter under crop residue or soil clods. If counts average approximately 5 or more per linear foot of row, the worms are less than 1-1/4 inches long and not parasitized or diseased, and leaf feeding is evident, control may be justified. If a significant number of armyworm is present and they are destroying the upper leaves, or the heads, treat immediately.

Clipped head and larvae on the ground

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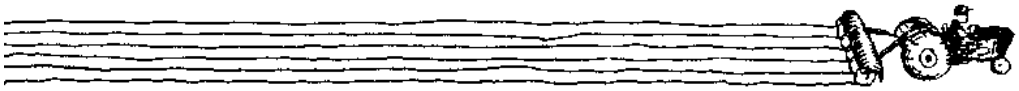
Inspect New Alfalfa Growth for Weevil Damage - (*John Obermeyer Rich Edwards, and Larry Bledsoe*) – Keith Johnson, Purdue forage specialist, informs us that regrowth on early harvested alfalfa is being severely damaged by weevil in southern Indiana. Producers that have or soon will be taking the first cutting should examine their alfalfa 4 to 5 days after cutting to determine if the weevils are present and actively feeding. Occasionally, weevils will retard the new growth to the point that economic damage occurs. If weevils are present and new growth is not apparent or if 50% of the new growth shows feeding activity and weevils are present, a stubble spray may be needed. See *Pest&Crop #5.*



Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	4/24/01 - 4/30/01							5/1/01 - 5/7/01						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	1	1	0	0	0	0	3	1	2	0	0	0	0	0
Dubois/SIPAC	1	1	1	0	0	0	6	2	0	1	1	1	0	12
Jennings/SEPAC	0	0	0	0	0	0	3	0	0	3	0	0	0	8
LaPorte/Pinney Ag Center	0	1	0	0	0	0	32	10	5	0	0	1	0	97
Lawrence/Feldun Ag Center	0	1	0	0	0	0	11	2	0	4	0	0	0	20
Randolph/Davis Ag Center	1	0	0	0	0	0	18	5	5	2	0	0	0	70
Tippecanoe/TPAC	1	1	0	0	0	0	10							
Whitley/NEPAC	1	0	0	0	0	0	332	5	1	4	0	0	0	351

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

Black Cutworm Adult Pheromone Trap Report
Week 1 = 4/26/01 - 5/2/01 Week 2 = 5/3/01 - 5/9/01
(Ron Blackwell)

County	Cooperator	BCW Trapped		County	Cooperator	BCW Trapped	
		Wk 1	Wk 2			Wk 1	Wk 2
Adams	Roe/Price Ag Services	1	3	Johnson	Truster/Ag Excel Inc.	13*	1
Bartholomew	Ludwig/Growers Service	0		Lake	Lake/Kliene (1)	7	6
Benton	Schellenberger/Jasper Co. Co-op	9	0	Lake	Lake/Kliene (2)	9	9
Clay	Kramer/PK Agronomics	0	0	Marshall	Barry/Marshall Co. Coop	9*	1
Clay	Smith/Growers Coop (Bzl)	2	0	Porter	Mueller/Agriliance	1	1
Clay	Smith/Growers Coop (CC)	0	3	Putnam	Nicholson Consulting	1	7
Clay	Smith/Growers Coop (BG)	0	2	Randolph	Jackson/Davis-Purdue Ag Center (S)	1	2
Clinton	Blackwell/Purdue	48*	10	Randolph	Jackson/Davis-Purdue Ag Center (N)	1	2
Decatur	Miers Farm/Pioneer	6	5	Rush	Peggs/Pioneer	4	20*
Elkhart	Kauffman/Crop Tech (1)	6	1	Sullivan	Smith/Growers Coop (W)	2	0
Elkhart	Kauffman/Crop Tech (2)	1	1	Sullivan	Smith/Growers Coop (E)	0	0
Fayette	Schelle/Falmouth Farm Supply	0		Sullivan	Smith/Growers Coop (NL)	0	0
Gibson	Hirsch Farms	0		Sullivan	Smith/Growers Coop (Crle)	0	0
Hamilton	Dobbins/FMC (1)	26*		Tippecanoe	Obermeyer/Purdue	37*	6
Hamilton	Dobbins/FMC (2)	22*		Vigo	Smith/Growers Coop	0	2
Hamilton	Mroczkiewicz/Syngenta	0		Warren	Schellenberger/Jasper Co. Co-op	5	0
Henry	Schelle/Falmouth Farm Supply	0		Washington	Ballard/Floyd Co. Extension	0	
Jasper	Manning/Jasper Co. Extension (W)	1		White	Reynolds/Orville Redenbacher 1P	0	
Jasper	Manning/Jasper Co. Extension (S)	4		White	Reynolds/Orville Redenbacher 2K	0	
Knox	Smith/Growers Coop (Edwdsprt)	0	0	Whitley	Walker/NEPAC	12*	
Knox	Smith/Growers Coop (Vncnns)	0	0				

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

Weeds

Guidelines for Use of a Rotary Hoe - (*Mark Loux, Ohio State University Extension*) -

The rotary hoe can be used to "buy some time" when rainfall within 7 to 10 days after planting has been insufficient to "activate" preemergence herbicides. The rotary hoe provides little incorporation of herbicide, but can effectively eliminate those weeds that are starting to emerge. Some tips on the effective use of a rotary hoe follow:

Ideal time for operation is after weeds germinate but before the shoot emerges (white stage). This may be as early as 3 to 7 days after planting, depending upon date of planting. Weeds germinate and emerge more rapidly at later planting dates.A second rotary hoeing 5 to 7 days after the first will improve control, and may be necessary if rainfall continues to be lacking.

Once weeds can be seen, they are probably past the stage of maximum rotary hoe effectiveness, especially large-seeded weeds such as velvetleaf and giant ragweed.

The rotary hoe is most effective when the soil surface is smooth, dry, and firm, or where a crust is present. Rain shortly before or after rotary hoeing can greatly reduce effectiveness.

For best results, operate the hoe in the same direction as crop rows at a minimum speed of 6 mph. Take precautions to reduce stand loss. Crop injury is more likely when the seed is not planted deep enough. Avoid covering the crop with soil as it emerges. Corn can be hoed up to a height of 4 to 5 inches. Avoid hoeing corn planted in loose soil from the spike to one-leaf stage to prevent covering plants.

Soybeans should not be hoed between the crook stage (just prior to emergence), until approximately 3 days after emergence. Hoeing soybeans during emergence results in 5 to 10% stand loss.If necessary, rotary hoe a test strip and evaluate crop damage before proceeding over the entire field.

Agronomy Tips

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.

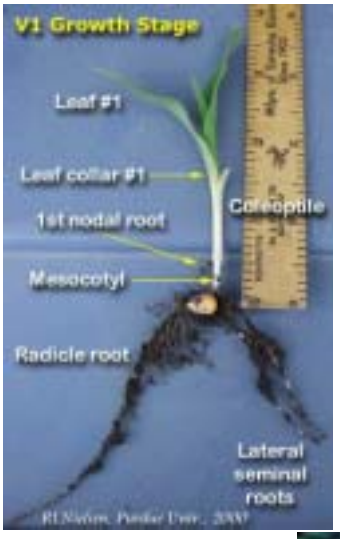
A young corn seedling depends primarily on the energy reserves of the kernel until permanent (nodal) roots develop. Within a few days after emergence of the coleoptile and first leaves from the soil, a second root system, the nodal roots, begins to develop from the crown or growing point. If damage occurs 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.

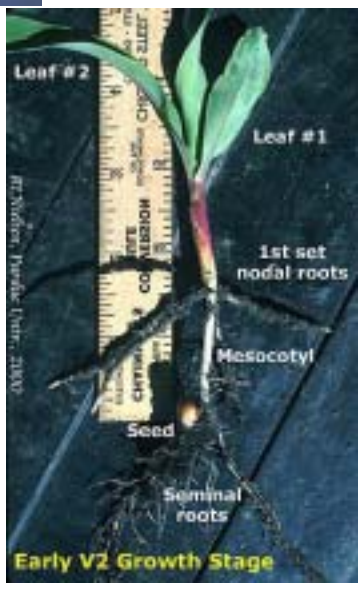
Nodal (Or Permanent) Root System

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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Be Alert for Floppy Corn - (*Bob Nielsen*) -

- **Excessively dry soils during early corn root development can lead to 'floppy corn'**

Rainfall has not been in abundance throughout parts of Indiana this spring, a fact substantiated by the exceptionally fast pace of corn and soybean planting. Early corn and soybean planting are usually positive for the development of yield potential. However, the significant drying of the upper soil profile is also conducive for the development of what some of us affectionately call the "floppy corn" syndrome.

Nodal root elongation that begins in exceptionally dry soil or in soil cracks caused by rapidly drying clay soils may quickly cease growth if the roots do not encounter adequate soil moisture within a certain period of time. Without adequate soil moisture, the root tips can dessicate and die. If the soil remains dry long enough, the entire young root may die. It's possible for all the roots developing from a particular stalk node to die in this manner. At this point, the plant's survival depends on improved soil moisture conditions and the development of the next set of nodal roots (see my accompanying article, Corn Root Development for a brief background on 'normal' root development.)

If dry soil and/or hot, dry weather prevail, several sets of nodal roots may fail to form, eventually giving rise to a "rootless corn" phenomenon. Affected plants somehow depend on the seminal roots and mesocotyl for nourishment, when normally this lifeline has already taken a backseat to the nodal root system.

In addition to the nutrient stress imposed on the plants by a woefully inadequate nodal root system, the rootless phenomenon can eventually result in the floppy corn syndrome, whereby plants simply 'flop' over at the soil surface at the slightest nudge from wind, tire traffic or even crop scouts walking down the row.

These plants are **NOT** technically root-lodged, they are simply broken over at the base of the stem near the crown area. The nodal roots will appear stubbed off but not eaten. The root tips will be dry and shriveled.

These symptoms are **NOT** like any associated with herbicide injury or insect feeding. Because several sets of roots may not have formed below-ground, the crown may "appear" to be at or above the surface.

The important thing to remember is that roots do **NOT** grow toward moisture on purpose. If the root tips of very young roots die before soil moisture is encountered, elongation of those roots will simply cease. If roots are already in moist soil, however, they may proliferate rapidly enough to appear to "follow" moisture down as the soil dries.

What Can Be Done? Unfortunately, very little can be done to avoid the situation once it begins developing. Row cultivation may encourage root development if moist soil is thrown around the bases of the plants. However, if the soil is dry enough to be causing the problem in the first place, there's probably very little moist soil shallow enough to be brought up by row cultivation. The ultimate solution to the problem is a good soaking rain or at least enough of a rain to sustain new nodal root development long enough to allow the roots to reach deeper and hopefully wetter soil conditions before the upper soil dries again.

A Useful Reminder. 'Rootless' corn can also be caused from extremely shallow seeding depths that result in nodal root initiation beginning at the soil surface rather than at the usual _ inch depth. This is one of several reasons that growers should avoid choosing seeding depths shallower than about 1 to 1_ inches.

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/chatchew.htm.> For other information about corn, take a look at the Corn Growers' Guidebook on the World Wide Web at >http://www.kingcorn.org/>.

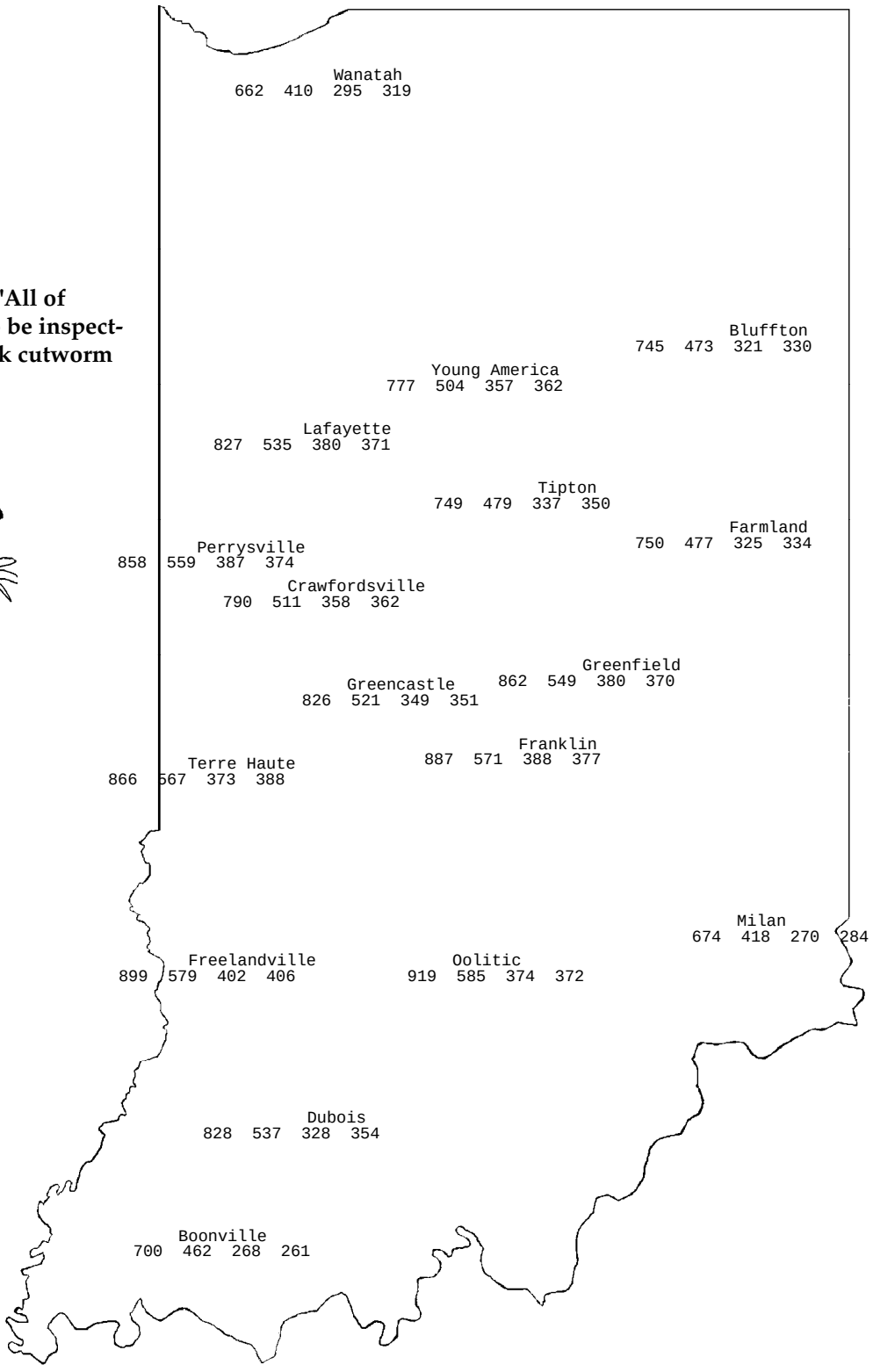
Weather Update

Temperature Accumulations from Jan. 1 to May 9, 2001

MAP KEY			
Location			
HU 41	HU48	HU50	GDD(3)

HU41 = heat units at a 41°F base from Jan. 1, larval movement begins at approx. 1,400
HU48 = heat units at a 48°F base from Jan. 1, for alfalfa weevil development (begin scouting at 200)
HU50 = heat units at a 50°F basefrom date of intensive moth capture, for black cutworm development (larval cutting begins about 300)
GDD(3) = Growing Degree Days from April 14 (3% of Indiana's corn planted), for corn growth and development

Bug Scout says, "All of Indiana needs to be inspecting corn for black cutworm damage!"



4" Bare Soil Temperatures 5/9/01

Location	Max.	Min.
Whitford Mills	68	59
Wanatah	72	57
Columbia City	69	57
Bluffton	65	65
W Laf Agro	71	59
Tipton	68	61
Farmland	70	55
Crawfordsville	70	60
Trafalgar	69	61
Terre Haute	74	60
Vincennes	78	58
Oolitic	71	64
Dubois	88	56

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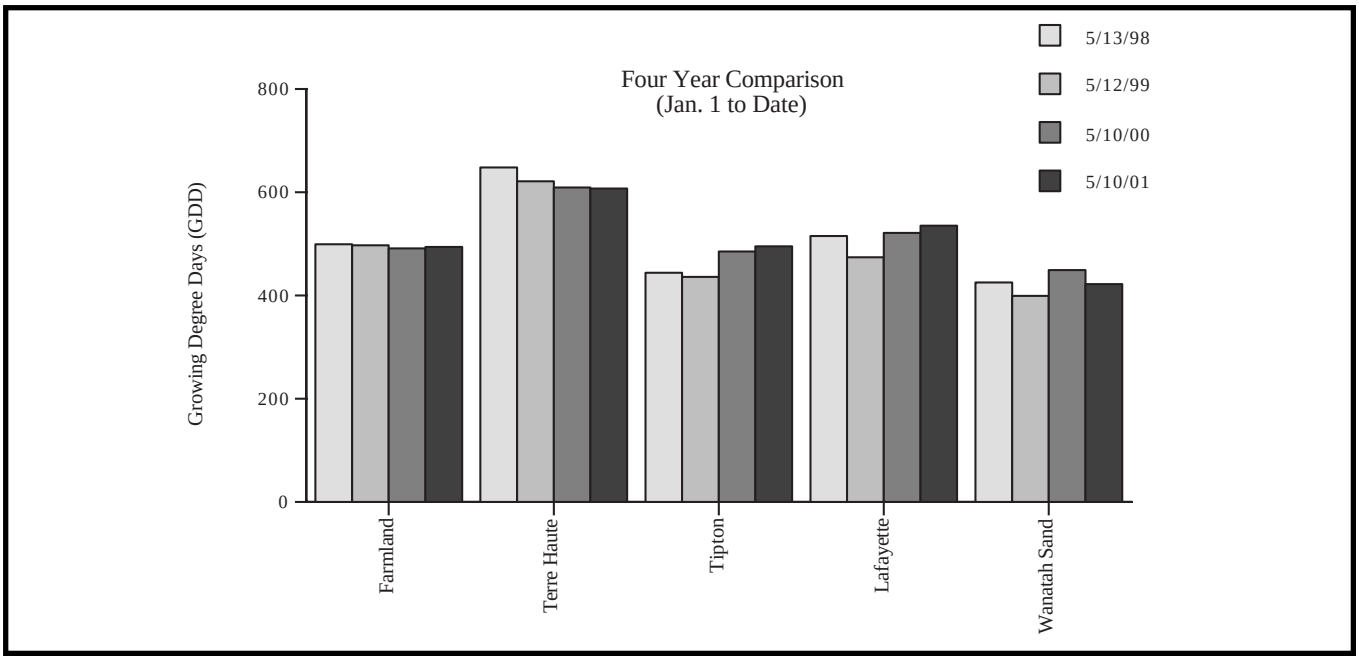

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