Pest & Crop

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# In This Issue



# Insects, Mites, and Nematodes

**Controlling WCR Beetles in Soybean Fields Where First-Year Corn Rootworm Problems Exist** - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- "Dead beetles don't lay eggs"
- WCR beetle suppression in soybean to prevent egg laying is possible, timely and diligent scouting is necessary
- Costs are probably more than using soil insecticide next spring
- Check soybean fields for WCR beetles!

Where problems with western corn rootworm (WCR) in first-year corn (corn/soybean rotation) have shown up, some have asked about controlling the rootworm adults in this year's soybean fields. The idea behind this strategy is to control the adults in soybean before they have laid sufficient eggs to create a rootworm larval problem in next year's corn. Although this strategy sounds good, and in theory is possible, it requires a knowledge of beetle biology and a *very* high level of management. You don't just spray fields and forget them when it comes to adult control! Fields need to be scouted before to determine beetle presence and after treatment to determine if a second treatment is needed. Even 100% attention to detail will not guarantee that failures will not occur. Of course, one can argue that this is also the case with soil insecticides. However, soil insecticides are more consistent in their control based on timing and the level of management that is required.

The idea of controlling adults to prevent egg laying and subsequent larval damage is not new, the management of rootworm adults in continuous corn using this strategy has been around since the 1970's. Many midwestern states researched this strategy with varying degrees of success. The primary problem was the timing of the application and the amount of field monitoring that was required to ensure that the rootworm beetles were adequately controlled, and, if an economic reinfestation occurred, that these new beetles were quickly controlled. Also, follow-up was needed the next year to make sure that rootworm larvae were not present in high enough numbers to result in economic root damage. If a critical larval population was detected the next year, a cultivation application to rescue the field was required.

At this time, it is *not* possible to utilize this strategy at the same level in soybean since we do not have beetle threshold information. We have research underway that will hopefully provide these numbers. However, since these numbers are not presently available, we are reluctant to recommend this as a control strategy. It could be that without these thresholds many fields will be sprayed and no economic return will be realized. Another possible concern is that preliminary results from a new study indicate that more WCR eggs are laid in soybeans earlier than first believed. Should this be the case, adult control to prevent egg laying may be next to impossible.

How about the economics of adult suppression in soybean versus larval control in corn? As previously mentioned, it will likely take two foliar insecticide applications to prevent enough egg laying in soybean to cause economic damage to next year's corn. Therefore, when comparing foliar insecticide and application inputs, it is about the same cost if not more, as granular insecticides at planting. Knowing that precise scouting and insecticide timing are critical over the rootworm beetle's egg laying period (mid-July through August), it seems that money is best put toward larval control in the spring.

Refer to last week' *Pest&Crop* article "*Monitoring and Decision Rules for Western Corn Rootworm Beetles in Soybean*," for monitoring adults to determine the need for a rootworm insecticide in next year's corn.

• • P&C • •

**Soybean Aphid Update** – (*John Obermeyer*) – So far, so good! Soybean aphid numbers have been very low. This is not only true for Indiana but surrounding states are reporting much the same. A population explosion in August is certainly possible. Watch for future updates.

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**Soybean at a Critical Stage for Defoliation** - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

Soybean plants can withstand high amounts of defoliation (leaf removal) before economic losses occur. During the vegetative stage of growth, defoliation above 40% will not significantly affect yield. During pod set and fill, defoliation of greater than 15% can result in economic losses. Determine the average defoliation level throughout the plant, not just in the tops of plants where most of the damage is noted. Remember, defoliation always looks worse than it really is. Refer to the table below for treatment thresholds for insect defoliated soybeans.

Refer to Extension Publication E-77-W, *Soybean Insect Control Recommendations-2002* (Revised 1/2002) for abbreviated treatment thresholds and control materials. This publication can be downloaded at: <http://www.entm.purdue.edu/entomology/ext/targets/e-series/fieldcro.htm>.

**TREATMENT THRESHOLDS FOR INSECT DEFOLIATED SOYBEANS**

PERCENTAGE DEFOLIATION*

| Soybean growth stage | Market price - $5/bu Cost of treatment $6/A | $8/A | $10/A | $12/A | $14/A | Market price - $6/bu Cost of treatment $6/A | $8/A | $10/A | $12/A | $14/A |
|---|---|---|---|---|---|---|---|---|---|---|
| V1-2 | 40-50 | 45-55 | 50-60 | 45-55 | 55-65 | 35-45 | 40-50 | 45-55 | 45-55 | 50-60 |
| V3-4 | 40-50 | 45-55 | 50-60 | 55-65 | 55-65 | 40-50 | 45-55 | 45-55 | 50-60 | 50-60 |
| V5-6 | 45-55 | 45-55 | 50-60 | 55-65 | 55-65 | 40-50 | 45-55 | 50-60 | 50-60 | 50-60 |
| V7+ | 40-50 | 40-50 | 45-55 | 50-60 | 55-65 | 35-45 | 40-50 | 40-50 | 45-55 | 50-60 |
| R1 | 25-35 | 30-40 | 35-45 | 40-50 | 40-50 | 25-35 | 25-35 | 30-40 | 30-40 | 35-45 |
| R2 | 20-30 | 25-35 | 30-40 | 35-45 | 35-45 | 20-30 | 25-35 | 25-35 | 25-35 | 30-40 |
| R3 | 15-25 | 20-30 | 20-30 | 25-35 | 25-35 | 10-20 | 15-25 | 20-30 | 20-30 | 20-30 |
| R4 | 10-20 | 15-25 | 15-25 | 20-30 | 20-30 | 10-20 | 10-20 | 15-25 | 15-25 | 20-30 |
| R5 | 15-25 | 15-25 | 20-30 | 20-30 | 25-35 | 10-20 | 15-25 | 15-25 | 15-25 | 20-30 |
| R6 | 15-25 | 20-30 | 25-35 | 25-35 | 30-40 | 10-20 | 20-30 | 25-35 | 25-35 | 30-40 |

PERCENTAGE DEFOLIATION*

| Soybean growth stage | Market price - $7/bu Cost of treatment $6/A | $8/A | $10/A | $12/A | $14/A | Market price - $8/bu Cost of treatment $6/A | $8/A | $10/A | $12/A | $14/A |
|---|---|---|---|---|---|---|---|---|---|---|
| V1-2 | 35-45 | 40-50 | 40-50 | 40-50 | 45-55 | 30-40 | 35-45 | 40-50 | 40-50 | 45-55 |
| V3-4 | 35-45 | 40-50 | 45-55 | 45-55 | 45-55 | 35-45 | 40-50 | 40-50 | 40-50 | 45-55 |
| V5-6 | 40-50 | 45-55 | 45-55 | 45-55 | 50-60 | 40-50 | 40-50 | 45-55 | 45-55 | 45-55 |
| V7+ | 35-45 | 35-45 | 40-50 | 40-50 | 45-55 | 35-45 | 35-45 | 40-50 | 40-50 | 45-55 |
| R1 | 20-30 | 25-35 | 30-40 | 30-40 | 30-40 | 20-30 | 25-35 | 25-35 | 30-40 | 30-40 |
| R2 | 15-25 | 20-30 | 25-35 | 25-35 | 25-35 | 15-25 | 20-30 | 20-30 | 25-35 | 25-35 |
| R3 | 10-20 | 15-25 | 15-25 | 15-25 | 20-30 | 10-20 | 15-25 | 15-25 | 15-25 | 20-30 |
| R4 | 10-20 | 10-20 | 10-20 | 15-25 | 15-25 | 5-15 | 10-20 | 10-20 | 15-25 | 15-25 |
| R5 | 10-20 | 10-20 | 15-25 | 15-25 | 20-30 | 10-20 | 10-20 | 15-25 | 15-25 | 15-25 |
| R6 | 15-25 | 15-25 | 20-30 | 20-30 | 25-35 | 10-20 | 15-25 | 20-30 | 20-30 | 20-30 |

* The defoliation level needed before a control is applied will vary somewhat depending on insect numbers and stage of development, growing conditions, variety grown, expected yield, economic factors, and plant population counts. All of these factors must be taken into consideration when making control decisions. The defoliation figures are shown as a range in each category. This range is included so that limiting factors can be considered. When few limiting factors are present, the control decision value will normally be at the higher end of the scale. Under some circumstances or conditions management guidelines given above may need to be adjusted from what is given. Based on 50 bushel per acre yield.

**Black Light Trap Catch Report**
**(Ron Blackwell)**

| County/Cooperator | 7/16/02 - 7/22/02 | | | | | | | 7/23/02 - 7/29/02 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VC | BCW | ECB | SWCB | CEW | FAW | AW | VC | BCW | ECB | SWCB | CEW | FAW | AW |
| Clinton/Blackwell | 2 | 10 | 21 | 0 | 0 | 0 | 34 | 0 | 0 | 56 | 0 | 0 | 0 | 11 |
| Dubois/SIPAC | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| Jennings/SEPAC | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Knox/SWPAC | 3 | 1 | 11 | 2 | 0 | 2 | 6 | 1 | 0 | 16 | 3 | 0 | 0 | 2 |
| LaPorte/Pinney Ag Center | 1 | 10 | 3 | 0 | 0 | 0 | 15 | 1 | 7 | 2 | 0 | 0 | 0 | 2 |
| Lawrence/Feldun Ag Center | 0 | 1 | 0 | 0 | 0 | 0 | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Randolph/Davis Ag Center | 11 | 6 | 2 | 0 | 0 | 0 | 64 | 2 | 2 | 15 | 0 | 0 | 0 | 11 |
| Vermillion/Hutson | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Whitley/NEPAC | 3 | 3 | 2 | 0 | 0 | 0 | 43 | 0 | 2 | 5 | 0 | 0 | 0 | 25 |

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

# Agronomy Tips

**Some Droughty Fields Experiencing Silk Emergence Delay** - (*Bob Nielsen*) -

Not unexpectedly, silk emergence has been delayed in some drought-stressed corn fields throughout the state. Lengthy silk emergence delays relative to pollen shed disrupts the pollination process, resulting in ears with varying degrees of barrenness. What caught my eye this week in several fields was the appearance of ears with unusually long fresh (unpollinated) silks.

One of the consequences of severe drought stress near pollination is a delay in silk emergence. Sometimes the length of the delay is great enough that little to no pollen remains in the tassels by the time the silks finally appear.

The good news is that unpollinated silks will continue to elongate for about 10 days after they first appear from the ear husks before they finally deteriorate rapidly. The bad news is they do become less receptive to pollen germination as they age and the rate of kernel set success decreases towards the end of the 10 days.

Unusually lengthy silks that are still "fresh" during the pollination period are therefore a symptom that pollination has not been successful. Drought-stressed fields exhibiting visibly long fresh silks should be inspected for possible pollination failure.

I recently described the "ear shake" technique for evaluating silk detachment to verify the extent of pollination success soon after pollen shed is complete (P&C Newsletter, 26 July). It doesn't take long to check a number of ear shoots for silk detachment. Also look at the tassels for evidence of anthers and pollen yet to be released.

If the "ear shake" technique indicates that little successful pollination has yet occurred AND if there is little visual evidence that pollen remains in the tassels, then the prospect for complete kernel set on the ears is unfortunately very dismal. If, on the other hand, there appears to be pollen yet remaining in the tassels, then the opportunity still exists for some degree of kernel set.

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/>.

**MSU Research Examines Soybean Aphid Predation** - (*Tyler Fox and Doug Landis, Entomology and Center for Integrated Plant Systems*) -

To determine the effects of natural enemies in Michigan soybean fields we have been conducting experiments on soybean aphid predation for the past two years. Our studies have attempted to answer the following questions: 1) What predators are present in Michigan soybean fields? 2) Do they have a significant impact on soybean aphid establishment? 3) Can predation alone prevent soybean aphids from building to damaging levels?

**Who are the Predators?**

When soybean aphids begin their migration from the overwintering host (Buckthorn) onto soybeans in the spring, a large array of potential predators await them in Michigan soybean fields. Our studies indicate that over 14 species of predators are regularly present in soybean fields at that time. Among the most abundant and potentially important groups are the lady beetles (Coccinellidae), minute pirate bugs (Anthocoridae) and ground beetles (Carabidae). In 2001, our studies showed that the multicolored Asian lady beetle (*Harmonia axyridis*) was particularly abundant. In 2002, *Harmonia* seemed to emerge earlier than the soybean aphid and few were found in soybean fields when aphids arrived. In contrast, the seven-spotted lady beetle (*Coccinella septempunctata*) and convergent lady beetle (*Hippodamia convergens*) that were less abundant in 2001 were more prevalent in 2002. The minute pirate bug (*Orius insidiosus*) feeds on soybean aphids in both its immature and adult stages and has been abundant during both years. These tiny predators are often seen searching the newest soybean leaves, which are favored spots for soybean aphid reproduction.

**Predators Impact Soybean Aphid Establishment**

In a series of studies over two years we have examined the ability of predators to reduce establishment of the soybean aphid. By confining adult aphids on young soybean plants we can mimic aphid migration. We then protect some groups of aphids from predators with small cages and leave others open to predation. By looking at aphid survival and reproduction over the next 24 hours, we can determine the impacts of predators on aphid establishment. We have conducted six such trials over the past two years. On average only about 52.7 percent of the aphids we release survive for 24 hours in the open treatments while 74.7 percent survive in the closed cages.

**Predators Can Prevent Soybean Aphid Build Up**

The results from an ongoing 2002 experiment clearly show the impact that predators can have on establishing aphid colonies. We established three treatments in a soybean field using one-meter square cages. Treatments included predator exclusion cages (Exclusion), where both flying and ground predators were denied entry by a combination of fine mesh screen and clear plastic barriers. There was also an open treatment that had both the mesh screen and plastic, but they were not connected, thus predators could enter these cages (Control). Finally, there was a cage exactly like the open treatment, but it lacked the plastic and mesh screen (Frame). This allowed us to see if the plastic and screening had an effect on the soybean aphids, plants, or predator community. We infested each cage with an average of 110 adult aphids on June 26, 2002. We then collected data on the number of aphids on ten randomly selected plants every three to four days. We found that at the end of two weeks, the aphid population increases dramatically in the exclusion treatment, because these cages effectively excluded predators. In the control and frame cages, however, the aphid population remained low because predators regularly foraged on these plants removing aphids from developing colonies before they built up. The most common predators observed in the control and frame treatments included the multicolored Asian lady beetle, minute pirate bugs, seven-spotted lady beetles, damsel bugs (*Nabis* spp.), green lacewing larvae (*Chrysoperla* spp.) and the convergent lady beetle.

**Conclusions**

Overall these studies show there is a diverse set of early-season predators in Michigan soybean fields that can reduce soybean aphid establishment. In addition, these and other predators can under some circumstances continue to suppress aphid populations so that they do not build up to damaging levels. We continue to study the impacts of predator communities on soybean aphid in the hope that we will be able to provide producers information on what conditions favor effective suppression of this new insect pest.

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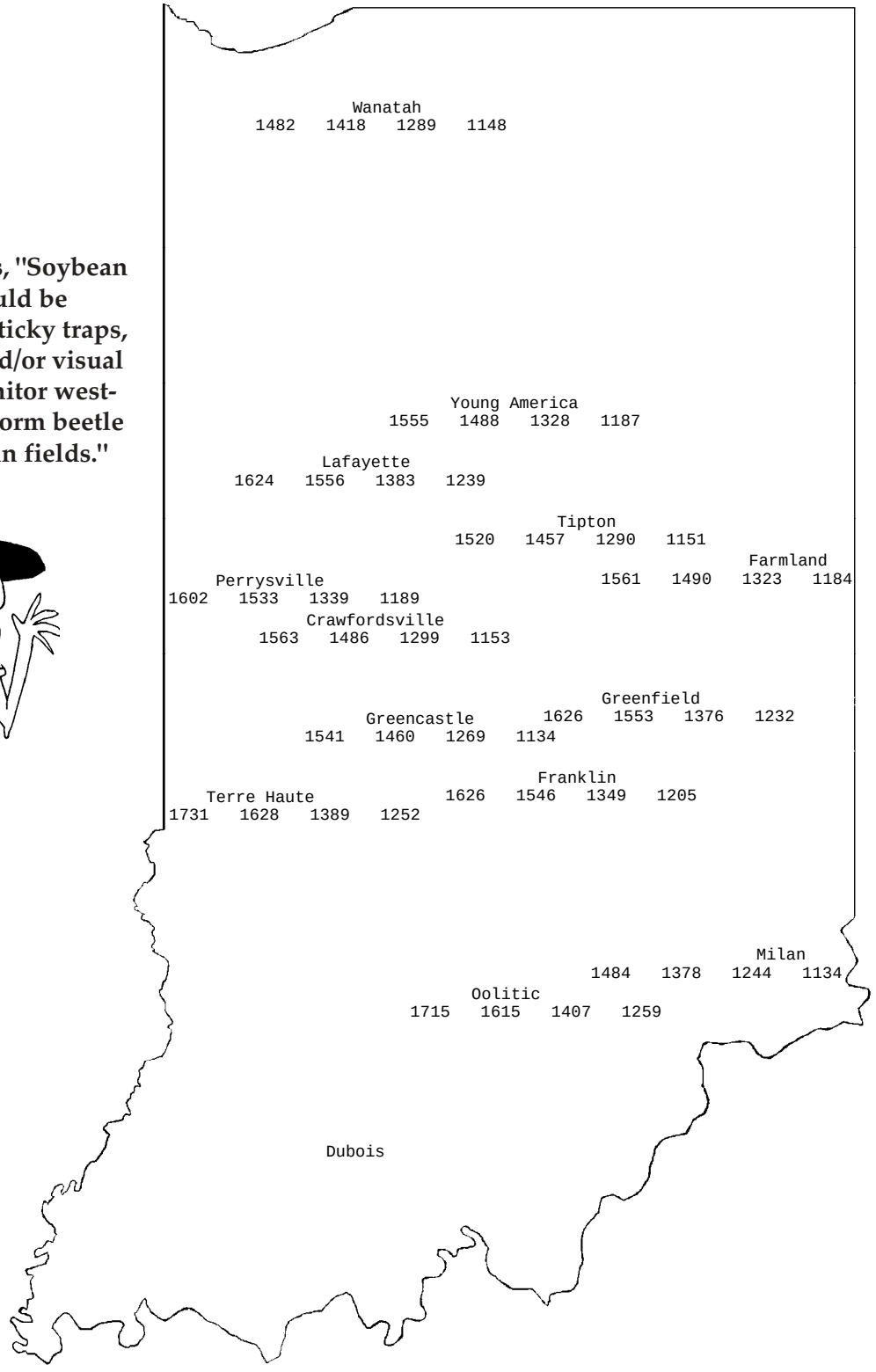
# Weather Update

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

Temperature Accumulations from Jan. 1 to July 31, 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, "Soybean producers should be using yellow sticky traps, sweep nets, and/or visual surveys to monitor western corn rootworm beetle in their soybean fields."**




**4" Bare Soil Temperatures 7/31/02**

| Location | Max. | Min. |
|---|---|---|
| Wanatah | 91 | 72 |
| Columbia City | 84 | 72 |
| Winamac | 89 | 72 |
| W Laf Agro | 87 | 74 |
| Tipton | 87 | 78 |
| Farmland | 84 | 70 |
| Perrysville | 85 | 76 |
| Crawfordsville | 87 | 77 |
| Terre Haute | 90 | 75 |
| Oolitic | 84 | 75 |
| Dubois | 95 | 73 |

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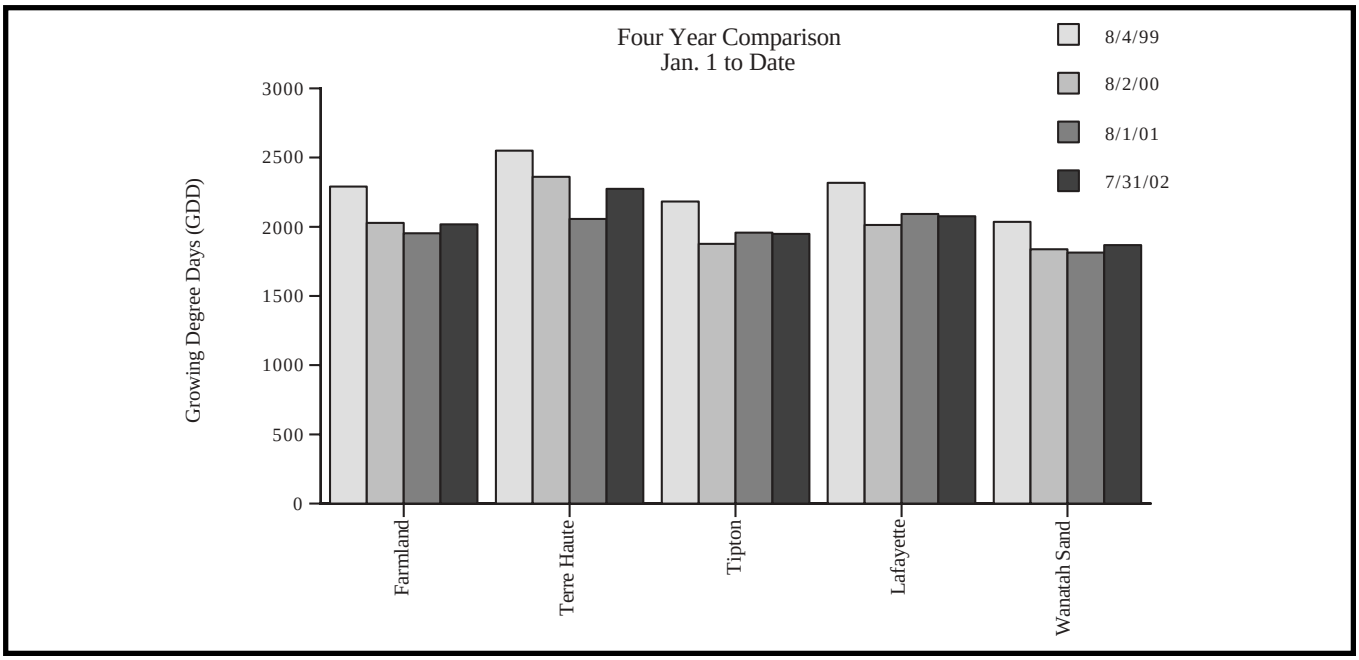


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