Pest & Crop

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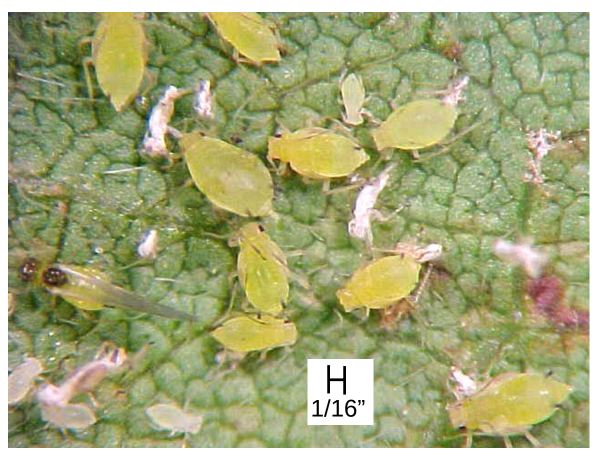
Insects, Mites, and Nematodes

Soybean Aphid Showing Up in Indiana Soybean Fields – (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- This new pest quickly being confirmed throughout the Midwest
- There are more questions than answers at this time
- Brief information on history, damage, and biology given
- No treatment thresholds established
- Late planted soybean with poor soil fertility levels may express damage first



Soybean aphids (*Aphis glycines*)

We knew it was just a matter of time, finally field inspections this past week revealed soybean aphid (*Aphis glycines* Matsumura) in several northern and west central indiana soybean fields (Elkhart, Kosciusko, Marshall, Noble, Porter, and Tippecanoe Counties). Every field sampled had some level of infestation, ranging from 7-23%. Most densities per plant were very low. These findings are similar to other states from Iowa to New York and Ontario to Kentucky confirming their presence. No question soybean aphid appears established in the Midwest, now the many hard questions are beginning. The following is some of what we know.

Soybean aphid is native to Asia, and its distribution includes China, Korea, Japan, Philippines, Thailand, Vietnam, Australia, and Eastern Russia. In July of 2000, researchers in Wisconsin discovered aphids feeding on soybean. The 2000 discovery was the first report of this species in North America. By the end of the 2000 growing season, soybean aphid was confirmed in eight Midwestern states, with highest populations in areas bordering Lake Michigan. In Indiana, the aphid was found on soybean in every county surveyed (46), with the highest infestation levels in Northwestern Indiana.

The soybean aphid feeds by using a needle-like, sucking mouthpart to remove plant sap. Plant damage occurs from large numbers of aphids removing a significant amount of water and nutrients as they feed on leaves and stems. In some fields in Northwestern Indiana, in 2000, plants were covered with aphids, and leaves were curled and wilted. Leaves on the bottom-third of plants were covered with shed aphid skins (resembling white powder) and aphid secreted honeydew, both of which are signs of aphid presence. Gray sooty mold, growing on the honeydew, also covered these leaves. Plants covered with aphids were often stunted compared to plants from other parts of the field. In some cases, heavily infested plants showed dramatic leaf yellowing. This yellowing may have been associated with potassium (K) deficiency, because symptoms can be more pronounced in fields where both high numbers of aphids and deficient levels of K are found.

Little data are currently available on yield losses due to soybean aphid in the US because soybean aphid was found too late in the field season to conduct replicated field trials. However, what is known is that soybean aphid caused significant reduction in plant height and 28% yield reduction in Chinese field studies and that this species transmitted soybean viruses in Asia. Reports from Wisconsin and Michigan in 2000 indicated that heavy aphid infestations caused stunting and poor pod fill, as well as yield reduction in replicated and unreplicated strip trials.

Soybean aphid has a very complicated, but typical, aphid lifecycle. In the US, as in China, it feeds and reproduces in the summer on soybean. The summer aphid population can be non-winged or winged (dispersal phase), but all are females. No males are present or needed for reproduction during this time period! The females reproduce parthenogenetically (egg development without fertilization). Females give birth to female offspring, so aphid numbers can increase quickly on soybean. In the fall, as temperatures drop and days grow shorter, a generation of winged females (gynoparae) and males are produced. Both migrate from soybean to their overwintering host plant *Rhamnus*, a shrubby tree also known as buckthorn. Gynoparae give birth to non-winged females called oviparae. Oviparae mature, mate with the males, and lay eggs on the buckthorn. Eggs overwinter and hatch in the spring. Aphids emerging in the spring are females. After several generations on the overwintering host, winged spring migrants fly to soybean to establish new colonies.

A striking feature of soybean aphid infestation in soybean fields in 2000 was the large number of beneficial organisms. Predatory insects, especially lady beetles, lacewings, and syrphid fly larvae, were very abundant in infested fields. Parasitic wasps, which lay eggs directly into aphids, were less abundant, but still present. Although not observed in Indiana, several different fungal pathogens infected and killed high numbers of aphids in Wisconsin and Michigan. All of these biocontrol agents have the potential to dramatically reduce aphid numbers in Indiana to below economic levels, but sometimes this does not occur soon enough to prevent damage to soybean.

Based on experience with soybean aphid in 2000 and with aphids in other crops, spraying for this insect is not recommended, except in cases of high infestations. Economic yield loss has not yet been documented in the US, and treatment guidelines are sketchy at best. If fields are sprayed for aphids late in the season, be sure to obtain good coverage of leaves. Remember that infested fields tend to have large numbers of natural enemies and that spraying may kill them, but not all of the aphids. This can result in a resurgence of aphid numbers. Fungal pathogens did a good job of killing soybean aphids in Wisconsin and Michigan in 2000, and populations crashed in a matter of days at many locations without the application of insecticides.

Further information with many color pictures can be found in extension publication E-217, *Soybean Aphid* (new May 2001). A hard-copy of this publication can be obtained by calling 1888-EXT-INFO or an electronic copy viewed at <http://www.entm.purdue.edu/entomology/ext/targets/e-series/e-list.htm>.

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Silk Damage, Not Beetle Numbers – (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

- Monitor pollinating fields for silk damage
- Concentrate on silk length and amount of pollen yet to shed
- Treatment after 50% pollination is not economical, only revenge

Rootworm and Japanese beetles continue to emerge throughout the state, some heavy populations (see "Corn Rootworm and Japanese Beetle Survey in Pollinating Corn Fields") have been reported. If beetles are present in commercial cornfields during pollination, control may be necessary if the silks are clipped off to within 1\2 inch or less of the tip of the ear before 50% pollination is completed. It has been suggested that 5 beetles per plant can result in the need of control, however, many fields have had higher numbers during pollination with little or no interference with corn fertilization. So, do not judge the need for treatment based on beetle numbers. On the other hand, research with inbreds in seed production fields has shown that 2 to 3 rootworm beetles per plant can significantly reduce ear fill. For additional information on rootworm beetles see Extension Publication E-49, *Managing Corn Rootworms - 2001* (Rev. 1/01). A hard-copy of this publication can be obtained by calling 1888-EXT-INFO or an electronic copy viewed at <http://www.entm.purdue.edu/entomology/ext/targets/e-series/e-list.htm>.

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Corn Rootworm and Japanese Beetle Survey in Pollinating Corn Fields, July 10, 2001 (Ron Blackwell)

County (Fields) Sampled	# Adult CRW/plant*	# Adult JB/plant*
Clinton	11.1	0.1
Clinton	0.7	0.2
Fountain	3.6	0.2
Vermillion	5.6	0.4
Vermillion	5.9	0.9
Vermillion	8.1	0.0
Warren	4.0	0.1
Warren	4.3	0.0
Warren	0.7	0.0

*Average for ten plants examined/field.

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Black Light Trap Catch Report (Ron Blackwell)

County/Cooperator	6/26/01 - 7/2/01							7/3/01 - 7/9/01						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	3	2	1	0	0	0	1	1	0	0	0	0	0	0
Dubois/SIPAC	55	9	0	3	0	0	11	15	8	0	2	0	0	3
Jennings/SEPAC	54	4	0	0	0	0	10	17	2	0	5	0	0	3
LaPorte/Pinney Ag Center	66	4	39	1	0	0	22							
Lawrence/Feldun Ag Center	28	2	0	0	0	0	0	12	2	0	4	0	0	10
Randolph/Davis Ag Center	100	29	7	0	0	0	53	39	23	1	3	0	0	11
Tippecanoe/TPAC	227	33	6	1	0	0	52	22	11	0	0	0	0	6
Whitley/NEPAC	66	4	3	4	0	0	80	82	14	4	1	0	0	28

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

Foxtail Soup – (Glenn Nice, Thomas Bauman, Case Medlin)

- What are the foxtails?
- How do I tell them apart?

No, I would not suggest making soup out of the foxtails, but they sometimes can get confused. Bristly, Knotroot, Giant, Green, and Yellow foxtail are all members of the grass genus *Setaria* sp. These should not be confused with Carolina foxtail (*Alopecurus carolinianus*), which has a long (3-5 mm) membranous ligule (the little membrane or fringe of hairs at the base of each leaf). Foxtails of the *Setaria* genus all have short membranous ligules fringed with or without hairs. The seed heads are densely packed cylindrical panicles, resembling a foxtail. Below is a table breaking out the characteristics of four foxtails (table 1).

Several herbicides can be used to control foxtail in corn or soybean PRE. The selection becomes a little more limited when using POST applications. For information on the control of foxtail please see the 2001 Weed Control Guidelines for Indiana (<www.btny.purdue.edu/Pubs/WS/WS-16.pdf>). Please remember to read the label before using a pesticide.

Table 1. Characteristics of Bristly, Green, Yellow, and Giant Foxtail[1]

Name	Leaf blade	Ligule	Seed head	Stem	Other
Bristly foxtail *S. verticillata*	10-40 mm long, 5-20 mm wide. Sometimes hairy at base	1-2.2 mm fringed membrane	2-11 cm long, 0.6-1.5 cm wide	Glabrous, many branches at base, round	Seed head bristles downward barbed
Green foxtail *S. viridis*	30 cm long, 5-15 mm wide No hairs	2 mm long membrane fringed with hairs	Cylindrical panicle tapering to head 2-15 cm long 1-1.5 cm wide	Glabrous and possibly bent at the nodes and round. Also maybe branched at base.	3 or less bristles per spikelet
Yellow foxtail *S. glauca*	30 cm long, 4-10 mm wide, hairs at base to mid way up the leaf	2 mm long membrane fringed with hairs	Cylindrical panicle 3-15 cm long; can be yellowish when mature.	20-130 cm long and semi-flattened	5 or more bristles per spikelet
Giant foxtail *S. faberi*	10-30 cm long, 3-20 mm wide and hairy upperside	1.5-2 mm long membrane fringed with hairs	5-20 cm long, 1-2.5 cm wide; cylindrical panicle. generally nodding.	Round	3-6 bristles per spikelet. Nodding seed head.

[1]Information referenced from the Southern Weed Science Society's Weed I.D. book and can be obtained through the Weed Science Society of America, PO Box 1897, Lawrence, KS 66044-8897.

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Soybean Leaf Cupping and Strapping – (*Glenn Nice, Thomas Bauman, Case Medlin*) -

- Drift
- Tank contamination
- Volatility
- Environment

There has been a number of calls and samples of soybean showing leaf cupping or strapping. These symptoms are suggestive of herbicides that regulate the plants growth as a mode of action (dicamba, and 2,4-D). However, some of the cases are somewhat curious. In some of the cases reported, there have not been any herbicides of this type used anywhere near the soybean crop. Also, in one case, although the soybeans were showing growth regulator injury, a garden of sensitive plants (such as tomato) did not show any symptoms. Other fields, where these herbicides were not used, are showing symptoms uniformly across a field suggesting that drift may not be the culprit. It is believed that soybean can also show these symptoms in response to adverse growing condition, a situation we experienced this spring. Below are some scenarios that may lead to leaf cupping/strapping in soybean.

Drift – if there is suspected drift, hopefully there will be some kind of pattern in the field. For instance severity will be higher from the direction that the drift came in. Do the symptoms cross rows? Look at sensitive weeds (pigweed, common ragweed, lambsquarters, and velvetleaf) in the area; are they controlled or injured in the same pattern as the soybean symptoms?

Leaf strapping from 2,4-D drift.

Tank contamination – again, if there is tank contamination there should be some kind of pattern. Are other fields also showing symptoms? Do the symptoms get better or worse with tank loads. Generally the first load should show greater symptoms than the later loads. If there is contamination the symptoms may follow the sprayer direction or row.

Volatility – everything can volatilize. Certain formulations have higher volatility characteristics than others. Esters of 2,4-D are generally more volatile than the amine formulations. Injury from volatility often follows low areas in the field.

Environment – in periods of rapid growth, soybean may be able to show leaf cupping or slight strapping as a physiological response to rapid growth. This rapid growth is possibly due to some kind of hormonal misbalance causing leaf distortion. This year's cold wet spring followed by hot temperatures may have induced this reaction. Are the symptoms also in growth regulator sensitive weeds? If not, then the symptoms may be a specific physiological response by the soybean. Are the symptoms evenly distributed through out the whole field?

If the new growth after symptoms appear is normal, affect on soybean yield will probably be small or none. However, take record of the symptoms (severity, location, date of appearance, etc) or call your county educator. Then at harvest keep track of yield in that area compared to the rest of the acreage for future references. If you would share these results with us it would be greatly appreciated.

Leaf cupping from dicamba drift.

Short Corn at Tasseling - (*Bob Nielsen*) -

- Some tasseling corn is shorter than normal
- Likely caused by early planting and cold snap back in May

Early-planted corn in Indiana is well into, if not beyond, the pollination stage. Some folks have noticed that the height of plants in these fields is noticeably shorter than they normally expect to see. The causes of shorter than normal corn can be traced back to planting date and temperature during stalk elongation.

Remember that stalk elongation begins at about the V5 stage of development (five visible leaf collars). Prior to that stage, most of the plant's energy is directed to root development and leaf initiation. After that stage, the plant enters its so-called grand growth phase wherein above- and below-ground growth accelerates to an exponential pace that peaks near tasseling.

Elongation of the stalk occurs primarily by cell expansion near the bases of the internodes at what are called the intercalary meristems. Stalk elongation is influenced by a number of factors, among which are light/shade/dark relationships and temperatures. Shade or longer nights (shorter daylength) tend to increase levels of the plant growth regulator auxin, which, in turn, encourages greater elongation of internodes. The 'shading effect' contributes to the greater plant heights of densely planted corn. Intense and/or lengthy periods of solar radiation are thought to result in photodestruction of auxin, which leads to less internode elongation, which results in shorter plants. Cold temperatures are thought to increase the rigidity of basal internode cell walls, thus limiting cell expansion and internode elongation.

Given these two physiological causes of short plants, one can think about this year's corn crop and begin to understand why some of it is pretty darn short at tasseling. Indiana's corn planting progress finished six days ahead of the previous record pace set in 1988. Early-planted corn normally reaches the V5 stage at dates earlier than later-planted corn. Stalk elongation in early-planted corn, therefore, begins in a time period that is characterized by a) longer nights, b) less intense solar radiation, and c) generally cooler temperatures than corn planted later in the season. As described above, all these factors contribute to shorter internodes and plant heights.

Now consider the two- to three-week period beginning in mid-May when temperatures were significantly lower than normal throughout much of the state. Much of the early-planted corn was beginning or well within the stalk elongation period while most of the later-planted crop was younger than V5. This extended period of cool temperatures influenced the elongation of internodes in the lower third of the stalk and accentuated the expected typically shorter heights of early-planted corn.

Are there yield consequences of unusually shorter corn? There are probably no negative consequences, unless the short height is dramatic enough to significantly reduce crop canopy cover and harvest of sunlight. Conversely, shorter corn is usually a benefit from the standpoint that the risk of stalk lodging is decreased due to the lower center of gravity.

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

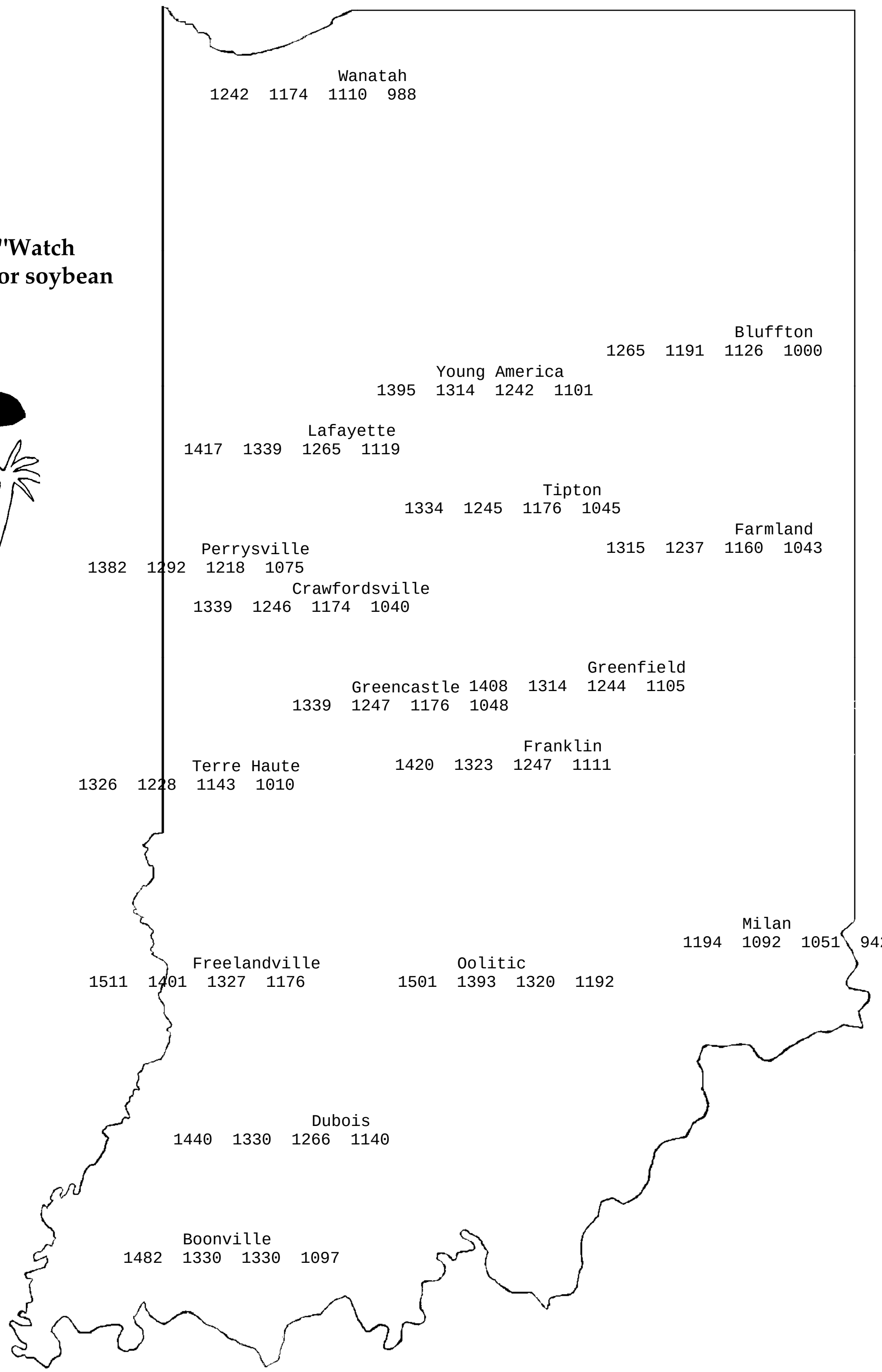
Temperature Accumulations from Jan. 1 to July 11, 2001

MAP KEY

Location
GDD(3) GDD(11) GDD(40) GDD(90)

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
GDD(90) = Growing Degree Days from May 6 (90% of Indiana's corn planted), for corn growth and development

Bug Scout says, "Watch soybean fields for soybean aphids!"



4" Bare Soil Temperatures 7/11/01

Location	Max.	Min.
Wtfd Mills	80	71
Wanatah	90	72
Columbia City	77	73
W Laf Agro	90	72
Tipton	80	71
Farmland	88	69
Perrysville	84	76
Crawfordsville	83	74
Trafalgar	82	75
Liberty	73	72
Oolitic	88	77
Dubois	95	72

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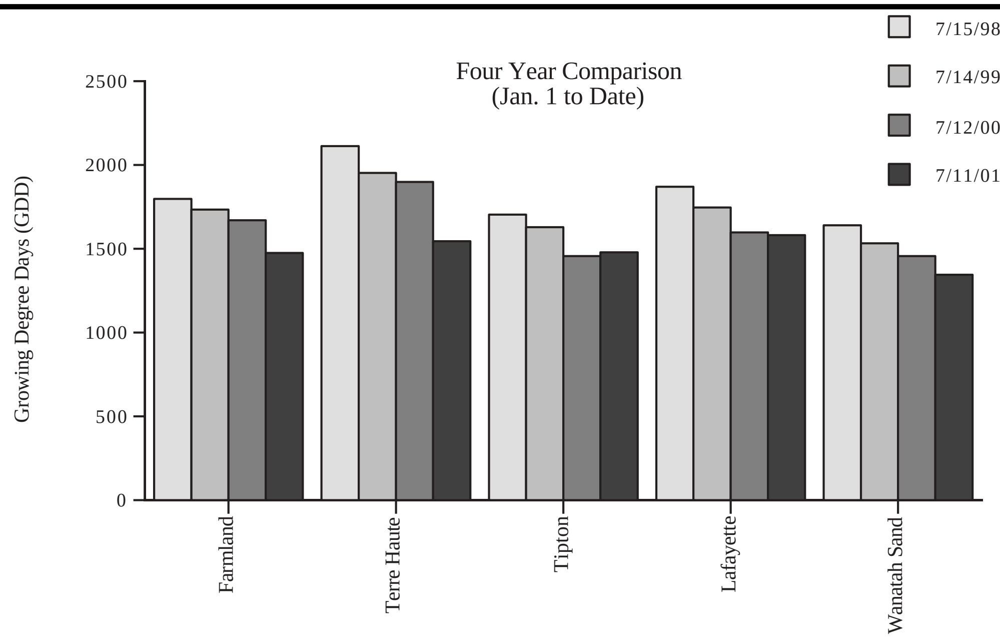

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