Pest & Crop

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Insects, Mites, and Nematodes

Bean Leaf Beetle Returning for Late Season Feast - *(John Obermeyer, Rich Edwards, and Larry Bledsoe)* -

- Inspect for bean leaf beetle feeding on pods
- Pod damage may result in poor seed quality
- Green pods are more attractive than yellow ones
- Management threshold depends on several factors
- Discussion on bean pod mottle virus

While sweeping soybean fields for western corn rootworm beetles this week, we saw a surprisingly high number of bean leaf beetles. Though the numbers don't rival last year's, they are still quite noticeable. Soybeans grown for seed should be monitored as leaves begin to yellow and pods remain green. Bean leaf beetles scar the surface of pods, but only occasionally feed through the pod to the developing beans. During pod maturation, this scar often cracks leaving an entry hole for air borne plant pathogens that may cause discolored, moldy, shriveled, and/or diseased beans.

It is important for pest managers to be able to predict whether economic damage will occur based on the types and numbers of beetles that are present and the stage of pod development (i.e., green, yellow, yellow-brown, or brown pods). Once the pods turn yellow to yellow-brown, they become less attractive and less susceptible to damage. Control is normally not warranted from this point on (see the following table).

Randomly select 2 plants in each of 5 areas of the field and count the number of pods per plant and the number that show damage (10 total plants). Figure the percentage of damaged pods per plant for the field as a whole. Note if the pods are green, beginning to turn yellow, or are yellow/brown. Also determine the number of beetles per sweep using an insect sweep net. Take 5 sets of 20 sweeps in the field. Determine the number of bean leaf beetles per sweep. Additionally, note whether beetles are still actively feeding while surveying the field.

There has been considerable interest in bean leaf beetle and its association with bean pod mottle virus. Bean leaf beetle is one of several known beetle-vectors of this disease. They spread the virus by feeding on infected plants, ingesting the virus with plant tissue, and then regurgitating gut content after moving to and feeding on an uninfected plant. Bean pod mottle virus symptoms at harvest include green stem and hilum bleeding. There are many more questions than there are answers concerning this disease complex. This disease has been known to exist in the Midwest for decades and the bean leaf beetle has been around for a log time. One false perception is that the disease and beetle are the major cause for the diminished soybean seed quality and seed supply noted over the last couple of years. Treatment for bean leaf beetle to reduce bean pod mottle virus this time of the year is not recommended.

Use the following table to determine when a treatment may be necessary.

Treatment for Bean Leaf Beetle

	No. of beetles per sweep in 30 inch (7 inch) row spacing		
Pod Injury Level	**Less than 4(3)**	**4(3) to 7(5)**	**More than 7(5)**
0 to 8%	Discontinue sampling	Sample again in 5 days	Control (preventive) if pods still green
8 to 12%	Sample again in 5 days	Control if pods are still green	Control if pods are green to yellow
Over 12%	Control if pods are still green and beetles are present	Control unless pods are completely dry	Control unless pods are completely dry

Table modified from the University of Illinois.

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Harvest Restrictions for Soybean Insecticides - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

The following listing includes many of the insecticides registered for soybean insect control, including rate per acre and harvest restrictions (refer to the label for insects controlled and specific rates and application information):

Soybean Insecticides and Harvest Restrictions

Product	Rate and Formulation	Days Before Harvest
carbaryl (Sevin)	2/3 lb 80WSP	21
	1 - 2 pt 4F, XLR+	21
chlorpyrifos (Lorsban)	1 pt 4E	28
dimethoate (Dimethoate)	1 pt 400, 4EC	21
esfenvalerate (Asana XL)*	5.8 - 9.6 oz 0.66EC	21
lambda-cyhalothrin (WarriorT)*	1.9 - 3.2 or 1CS	45
methyl parathion (Penncap-M)*	2 - 3 pt 2FM	20
methomyl (Lannate)*	1/4 lb 90SP	14
permethrin (Ambush)*	3.2 - 6.4 oz 2EC	60
(Pounce)*	2 - 4 oz 3.2EC	60
thiodicarb (Larvin)	18 - 30 oz 3.2F	28

* Restricted Use Pesticide

Agronomy Tips

Sexual Dysfunction in the Corn Field - (*Bob Nielsen*)

- Pollination failure, especially on ear tips, is common in some fields
- Kernel abortion has also occurred in some fields
- Scattered kernel set due to pollination failure and kernel abortion is common in some fields
- Causes of sexual dysfunction are multiple

Déjà vu or serendipity? Several weeks ago I shared with readers the ins and outs of the corn pollination process (P&C Newsletter, 29 July) and the ways in which the pollination process or subsequent grain filling period could go wrong (P&C Newsletter, 11 Aug). Since that time, quite a few reports have come in describing pollination or grain filling problems in fields around the state.

For the record, let's remember that pollination failure in corn is caused by either lack of viable pollen, failure of silks to emerge or non-receptive silks. Kernel abortion is most likely to occur early in the kernel development process when photosynthesis is restricted (cloudy days, leaf disease, hail damage, severe N deficiency) or when photosynthate availability to the kernels is limited (excessively warm nights, competition with older kernels).

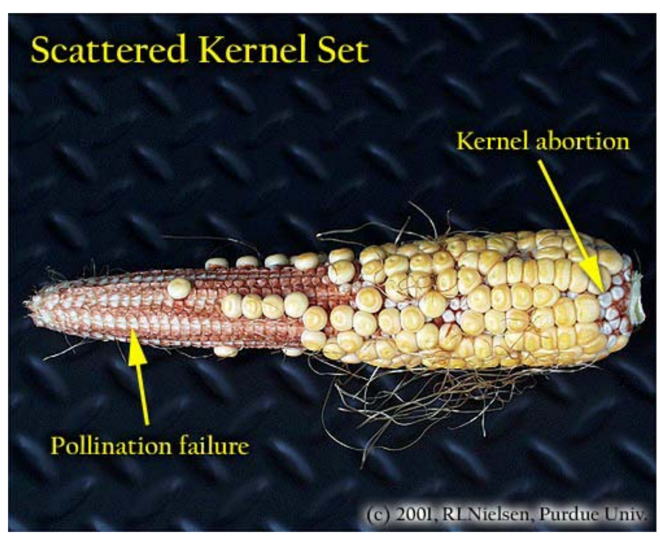
There seems to be a perception that one or two hybrids are especially affected this year. This may not be correct; especially if folks are concentrating on walking fields of those hybrids and ignoring fields of other hybrids. Indeed, I have observed serious tip fill problems and severely scattered kernel set in more than one hybrid and from more than one seed company.

Many fields exhibit some degree of pollination failure or minor kernel abortion near the tip of the ears. Typically, one finds one to two inches of barren cob. The bad news is that the yield loss is about five bushels for every absent 'ring' of kernels around the cob. The good news is that ear length potential this year was often quite exceptional owing to the generally favorable growing conditions prior to flowering.

In such fields, ear length potential was so long that the tip silks likely emerged after pollen shed was complete. The number of successfully developing kernels in these affected fields is still 'normal' (from 30 to 35 kernels per row), even though one or two inches of the ear tip are barren. So, count your kernels before you get all bent out of shape with the poor tip fill in your fields.

In some fields, the poor tip fill includes some number of aborted kernels in addition to simply blank portions of cob. Kernel abortion can be caused by any number of stresses, including excessively warm nights (low to mid-70's) during silking or severe moisture deficits. Some areas experienced several days of heavy overcast clouds during or shortly after the pollination process. Such excessive shading or lack of intense sunlight soon after fertilization of the ovary occurs can easily abort kernels. Instances of all three climatic conditions occurred in areas throughout the state during pollination. The cause of the abortion revolves around a limited photosynthate supply to the younger developing kernels.

Unfortunately, the tip fill problems in other fields are not related to exceptionally long ears or simply to warm nights or limited photosynthate supply. Harvestable kernels per row of ears in some fields sometimes number only 15 to 20. Moreover, varying degrees and frequencies of severely scattered kernel set also exist in many fields.



In the fields I've walked, the more severe kernel set problems are usually associated with significant levels of clipped silks. In most cases, it is unclear whether corn rootworm (CRW) or Japanese beetles were the culprits, although goose-necked plants in many of these fields were a good indication that serious CRW larvae feeding injury to roots was a problem earlier in the season.

The kernel set problems seem to be most prevalent in fields where uneven plant development occurred due to uneven emergence or uneven seedling growth. In the fields I've walked, severe silk clipping and resulting kernel set problems were most evident in delayed plants than in 'normally' developing plants. Normal and delayed plants side-by-side typically exhibit ears that are night and day different in the success of pollination. Plants in fields with more uniform plant development exhibit less silk clipping in general and fewer problems with severe scattered kernel set.

Uneven stands or plant development can be attributed to a) uneven seedling emergence, b) injury from the Mother's Day frost event, c) uneven plant development catalyzed by late May/early June cold snap, d) injury from postemergence herbicide applications, e) chilling injury from the mid-June cold snap, f) chilling injury from the early July cold snap, or g) injury from CRW larvae root feeding. Any combination of the above stresses could have set back plant development unevenly throughout a field. The delayed plants would silk later and be more attractive to CRW or Japanese beetles than would 'normal' plants.

The severe tip fill problems or scattered kernel set associated with insect silk clipping are interesting because few people, including yours truly, thought it was much of an issue back in early July when fields were pollinating. Maybe we were simply avoiding corn fields during the heat and humidity and did not notice the problem.

There are also indications that earlier planted fields and earlier maturity hybrids are less affected than later planted fields or later maturity hybrids. My own planting date study at the Purdue Agronomy Farm illustrates the worst-case scenario for CRW/Japanese beetle silk clipping in late-planted corn. Over many years of conducting planting date studies, I have never seen such extensive CRW beetle feeding on the silks in later-planted corn.

There are also a couple of weather-related issues that may have played a role in setting up the corn plant for pollination failure. Above normal temperatures experienced in some areas during pollen shed could have caused faster pollen shed completion at the expense of later silk emergence from tip ovules of long ears or delayed silk emergence due to excessive CRW/Japanese beetle silk damage.

An admittedly farther stretch of imagination suggests that it is possible that the one or two cold nights in early July (remember the frost injury in low-lying muck fields) interfered with normal pollen maturation, resulting in less total pollen or some frequency of unviable or defective pollen. Similarly, the late May/early June cold snap may have interfered with initiation of tassel branches and spikelets due to the timing of the chilling injury with the initiation of tassels occurring in corn that was at growth stages V5-V6. Interference with either tassel development or pollen maturation would have left the corn plant more vulnerable to the effects of severe silk clipping by insects.

Related Research References:

Bechoux, N., G. Bernier, and P. Lejeune. 2000. Environmental effects on the early stages of tassel morphogenesis in maize (Zea mays L.). Plant, Cell & Environment. 23(1):91-98.

Cantarero, M.G., A.G. Cirilo, and F.H. Andrade. 1999. Night temperature at silking affects kernel set in maize. Crop Sci. 39(3): 703-710.

Reed, A.J., G.W. Singletary, J.R. Schussler, D.R. Williamson and A.L. Christy. 1988. Shading effects on dry matter and nitrogen partitioning, kernel number, and yield of maize. Crop Sci. 28(5): 819-825.

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Late-Season Hail Damage to Corn - (*Bob Nielsen*) -

- Recent hailstorms caused extensive defoliation and minor bruising
- Good news is that grain fill is near completion and yield losses will be minimal

Recent hailstorms in areas of the state caused some defoliation, a lot of leaf tattering, some stalk bruising and some ear bruising in corn fields unfortunate enough to be in their paths. Yield loss from such late season hail damage is due primarily to the defoliation, but the extent of the defoliation can be tricky to quantify.

Hail damage to leaves typically looks worse than it really is, because most of us tend to assume tattered leaves will no longer function. This assumption is correct if the tattered leaves actually dry up and wither away. However, if the tattered leaves don't actually die, they can still contribute to the continued functioning of the photosynthetic factory. Most of the hail-damaged fields I visited today in westcentral Indiana were 20 to 50 percent defoliated and only a few were greater than 50 percent defoliated. For the sake of argument, though, let's assume on average the defoliation was 50 percent.

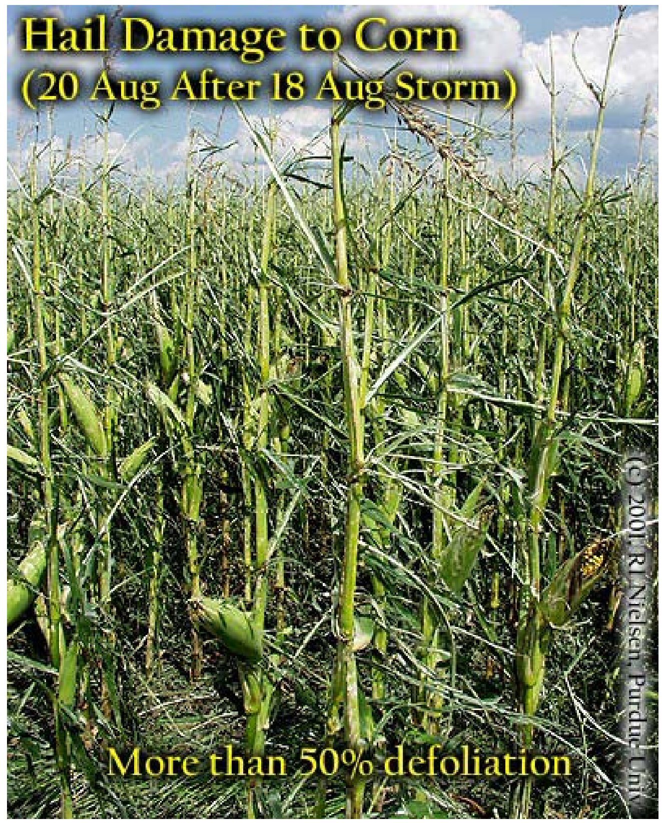
Yield loss to defoliation is dependent on the growth stage of the crop. Corn that is pollinating is at most risk of yield loss to hail damage and becomes increasingly less susceptible to yield loss as grain maturation nears. The good news is that most of the fields I walked today ranged from early dent to late dent (half-milkline) and not younger. Using my average defoliation estimate of 50 percent and the range of growth stages observed, the average yield loss from the storms over the weekend would be in the neighborhood of five to nine percent.

Minor bruising of the stalk or ear husks will be of little consequence and should not result in any appreciable development of stalk or ear rots. Where hailstones were large or intense enough to actually gouge into the stalk, then the physical structural integrity of the stalk is compromised and standability may be an issue before harvest. None of the fields I walked today, however, exhibited anything other than minor bruising.

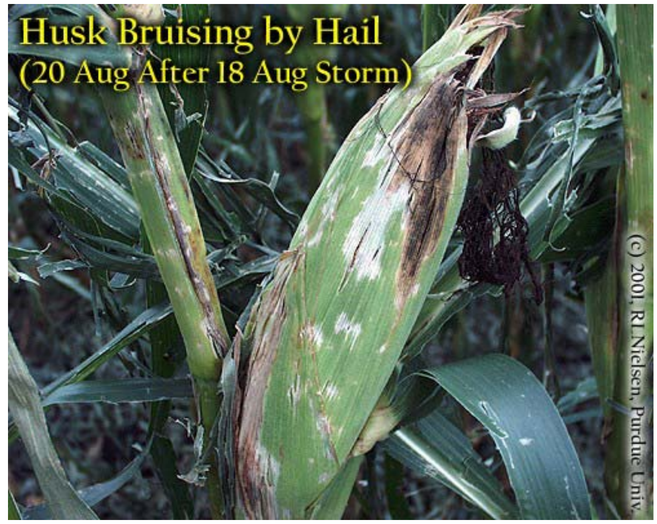
The hailstorms packed quite a bit of wind and significant stalk lodging occurred in some fields from the wind, especially where the corn rows were oriented perpendicular to the direction of the wind. The good news, though, is that most of the lodging appears to be more of a stalk leaning and not actually stalk breakage.

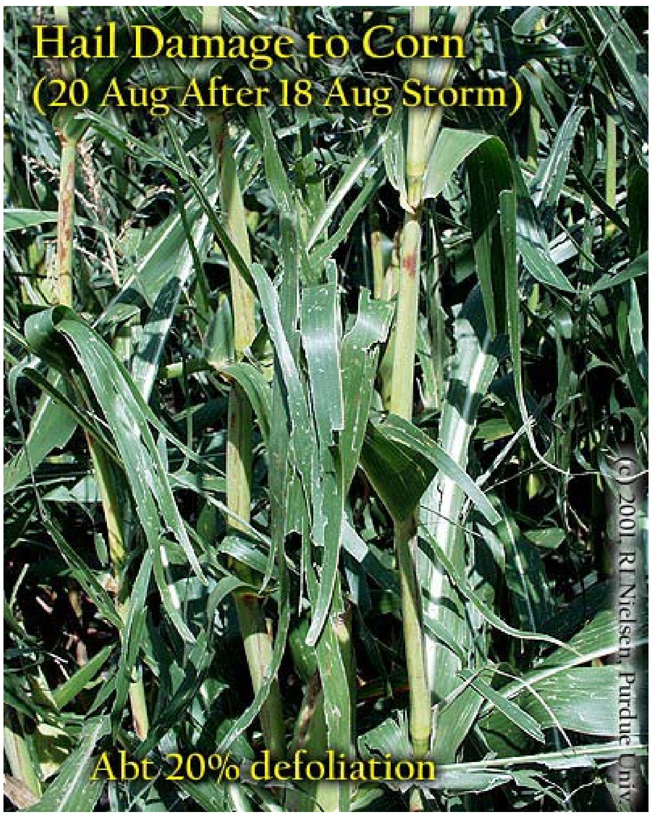
A minor bit of good news is that the significant defoliation in these hail-damaged fields may actually contribute to faster grain drydown because of better wind movement through the damaged crop canopy. Grain maturation timing may be hastened a bit, also.

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/>.




No Visible Damage to Ear
(20 Aug After 18 Aug Storm)
(c) 2001, RL Nielsen, Purdue Univ.


Husk Bruising by Hail
(20 Aug After 18 Aug Storm)
(c) 2001, RL Nielsen, Purdue Univ.


Hail Damage to Corn
(20 Aug After 18 Aug Storm)
Abt 20% defoliation
(c) 2001, RL Nielsen, Purdue Univ.

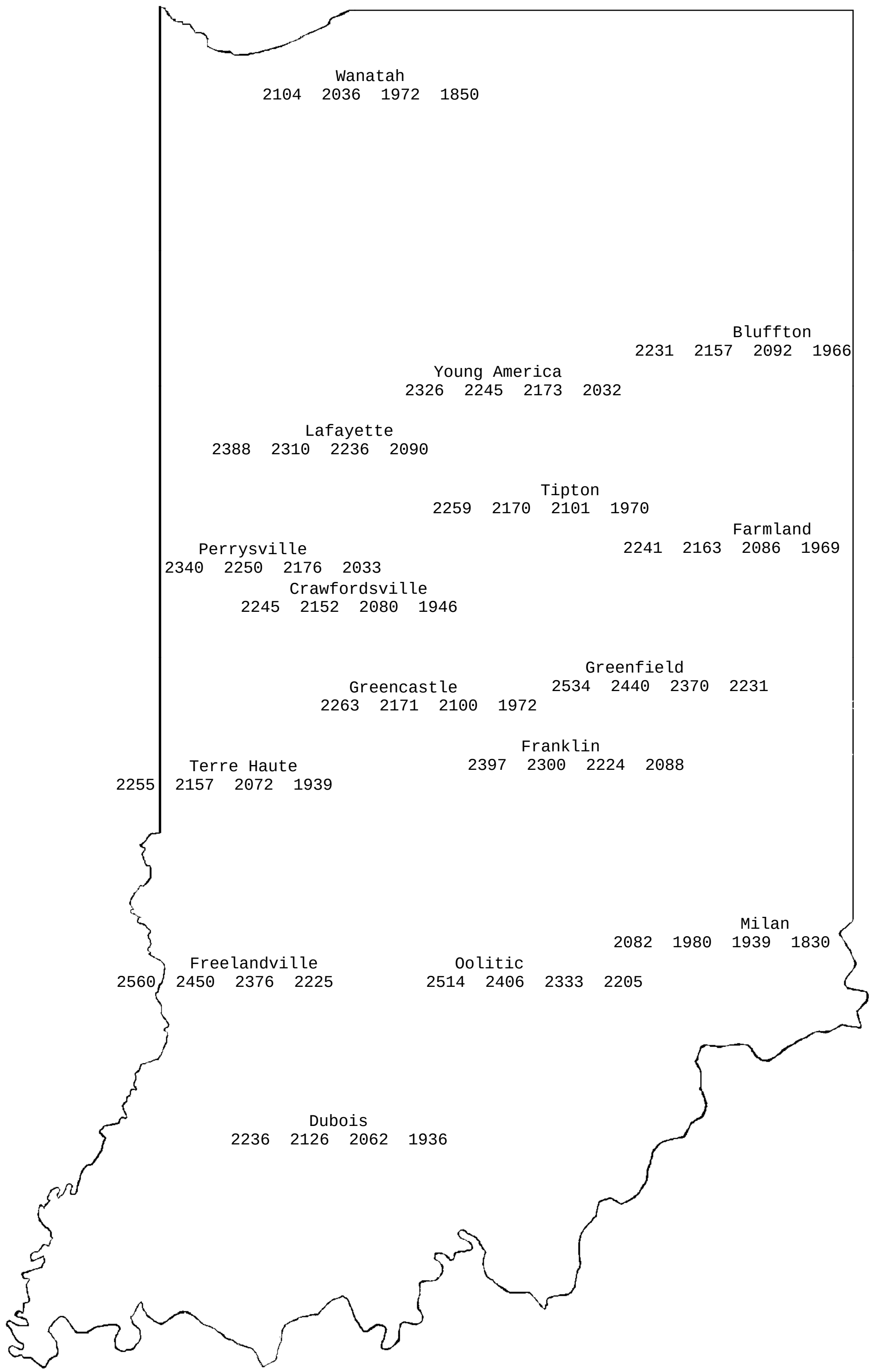

Late Dent Stage of Development
(Half-milkline)
(c) 2001, RL Nielsen, Purdue Univ.

Weather Update

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

Temperature Accumulations from Jan. 1 to August 22, 2001

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 april22 (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



4" Bare Soil Temperatures 8/22/01

Location	Max.	Min.
Wtfd Mills	74	67
Wanatah	81	66
W Laf Agro	83	66
Tipton	85	61
Perrysville	79	71
Crawfordsville	74	69
Liberty	81	64
Terre Haute	77	71
Vincennes	75	64
Oolitic	77	69
Dubois	85	65

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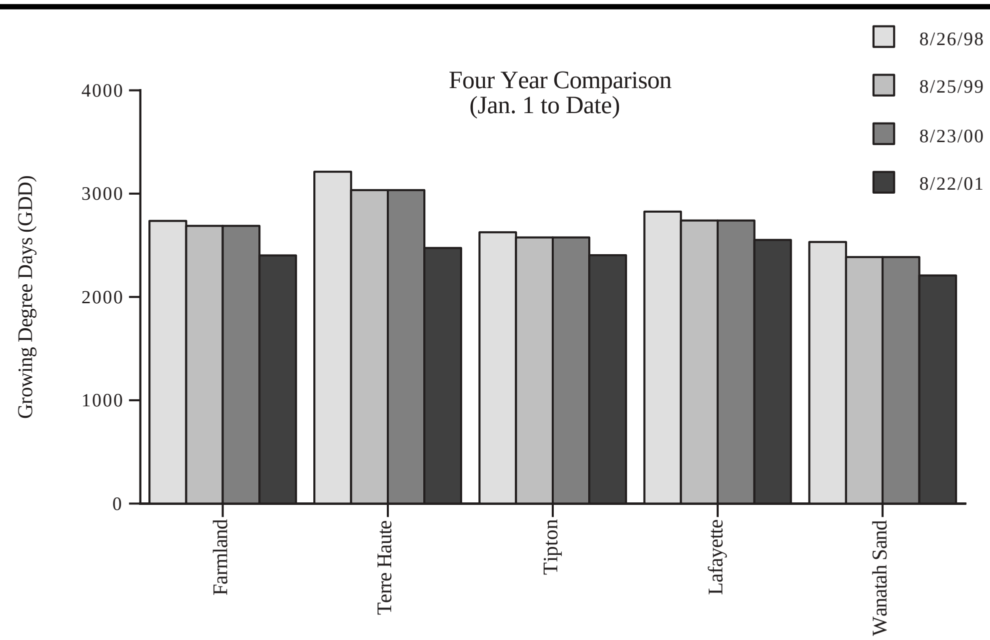

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