Pest & Crop

June 22, 2001 - No. 14

In This Issue

Attached is our new publication E-218 entitled: "Monitoring and Decision Rules for Western Corn Rootworm Beetles in Soybean." We hope you find it useful.

Insects, Mites, and Nematodes

Western Corn Rootworm Beetles Emerging - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- Western corn rootworm beetles can now be seen
- Beetles should not be a concern until fields are pollinating
- Late planted fields could be a "trap crop" for beetles and egg laying

A male western corn rootworm beetle was seen in Knox County on Friday, June 15. Generally the first beetles to emerge are males, female emergence begins a few days later. Once the females emerge, feed, and mate, they tend to disperse to other fields. If both western and northern species are present in a field, the western beetles emerge first.

After emerging, beetles will begin to feed on corn leaves if pollen is not available. This leaf feeding damage is usually of no economic importance. Growers should be made aware that pollinating plants, which have high beetle populations, could suffer economic losses from the beetles clipping silks prior to the completion of pollination. Producers should closely watch their fields for this type of feeding activity when pollination begins.

Producers should also remember that the latest planted fields in an area are attractive to egg-laying beetles in late July when pollination is taking place in these fields. These fields should not only be closely watched for silk clipping, but the numbers of beetles present should be noted for determining the need for a soil insecticide the next year if going back to corn. More on this pest in future issues of the *Pest&Crop*.

Japanese Beetle Becoming a Common Sight - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- Grub feeding is over, now it's the beetle's turn
- Watch for activity on soybean, and later on corn silks

Japanese beetle adults are emerging throughout most of Indiana. These adults developed from grubs feeding in lawns, other grassy areas, and agricultural crops. This year's infestation of adults is the result of eggs that were laid by female beetles last summer. After these eggs hatched in 2000, the grubs immediately began to feed on roots and decaying organic matter in the soil. They continued feeding until cold temperatures prompted them to move deeper in the soil profile to overwinter. Early this spring the surviving grubs returned to near the soil surface to feed on organic matter or root systems. Spring root feeding by the grubs can result in serious damage to early-planted crops, especially corn.

Japanese beetles will feed on more than 300 different species of plants, but are especially fond of roses, grapes, smartweed, soybeans, corn silks, flowers of all kinds, and overripe fruit. Beetle damage to cultivated crops is often minimal and defoliation (leaf removal) on soybean looks much worse than it is. The beetles often congregate in several areas of a soybean field, feeding on and mating in the upper canopy. The beetles' iridescent, metallic color catches the attention of those doing "windshield" field inspections. Closer inspections will often reveal that weeds such as smartweed have made fields even more attractive to the beetles. More on this pest in future issues of the *Pest&Crop*.

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All Quiet On the Armyworm Front - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

Record numbers of armyworm moths continue be captured in black light traps throughout the state. We continue to take a wait and see approach to how well they establish on grassy plants for these next few weeks. We're still counting on natural enemies to finish the job they started late with the first generation, that is keeping them below economic levels.

Please call and inform us of any suspected armyworm infestations (765-494-8761). Remember your sightings and reports are going to help us be better prepared for future years even if it is another half century away!

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European Corn Borer Survey - June 19, 2001
(Ron Blackwell)

County (Fields) Sampled	Extended Leaf Height (in.)	% of Plants/Field w/ Damage	Avg. # Egg Masses/ Plant	Avg. # Larvae/ Damaged Plant
Allen	37.9	10%	0.0	0.5
Allen	35.4	17%	0.0	1.0
Dekalb	37.5	22%	0.1	2.3
Dekalb	35.6	25%	0.1	1.2
Dekalb	34.0	28%	0.1	0.8
Noble	42.8	26%	0.1	1.9
Noble	45.6	41%	0.0	2.4

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Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	6/5/01 - 6/11/01							6/12/01 - 6/18/01						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	186	191	95	0	0	0	3196	67	16	26	0	0	0	4232
Dubois/SIPAC	89	46	3	4	0	0	1335	68	34	0	5	0	0	1144
Jennings/SEPAC	76	7	31	9	0	0	310	26	8	4	1	0	0	412
LaPorte/Pinney Ag Center	28	4	54	0	0	0	216	5	0	161	0	0	0	223
Lawrence/Feldun Ag Center	18	11	0	9	0	0	214	90	32	13	1	0	0	2504
Randolph/Davis Ag Center	25	6	70	7	0	0	361	10	10	62	0	0	0	948
Tippecanoe/TPAC	41	12	80	2	0	0	613	84	16	170	0	0	0	1070
Tippecanoe/P. J. Boeve			38							41				
Whitley/NEPAC	30	18	217	3	0	0	401							

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

Weeds

How Big is Big Enough? – (*Glenn Nice, Case Medlin, and Thomas T. Bauman*) -

Pulling the trigger. I have often heard of applying herbicides as pulling the trigger. In a way this is appropriate in the sense that once you have sprayed, you are at the point of no return. The money has been spent. With this in mind, it is important to get the biggest bang for your buck. Many times, a person will wait as long as possible before spraying. Several reasons may cause this to happen. Not least of which, time restraints, equipment break down, or herbicide availability. However, sometimes it is the idea that if I wait long enough, then I will get more weeds. This makes good sense, but sometimes you enter into a gambling game.

When should I spray? That is not an easy answer. Most POST herbicides are more effective when weeds are young and growing. In many herbicide labels, as the weed gets larger, herbicide rate increases. Also, the optimum weed size for control often is when the weed is small and young. Table 1 is a small example of some of the optimum sizes mentioned on labels.

Why is this? Young actively growing plants can be more susceptible to herbicides due to many reasons. Some of these can be that the young plants have not developed an efficient metabolism to break down the toxic components to the plant. In other cases the young plant does not have enough growth to sequester the herbicide away keeping it from the sight of action. Also, often the young plant has not had enough time to develop effective cuticle waxes allowing the herbicide to absorb more easily into the leave tissue.

How will this effect yield? Crops are fairly competitive plants in themselves. A soybean canopy can be utilized to aid in the suppression of weeds if given time to close. Hence, some of the interest in narrow row soybeans. Corn also can shade and out grow some plants if given the head start. In the case of soybean, some research has suggested that weeds emerging 2 to 4 weeks after soybean emergence does not affect soybean yields. Also, as indicated in "More Than You Wanted to Know About Giant Ragweed" (Pest & Crop No. 11) killing large weeds once they have pushed out the crop, may not reclaim the loss from early- and mid-season weed competition. Even if the weed is killed later, a fairly large hole is left in the crop canopy.

In general, it's probably best to hit the weeds when the label recommends it, when they are young. However, as we have seen this year, it just is not always possible.

Herbicide	Weed	Size (in)	Herbicide	Weed	Size (in)
Accent	Foxtail	2 – 4	Celebrity plus	Barnyardgrass	2 – 4
	Jimsonweed	1 – 3		Lambs quarters	> 3
	Pigweed	1 – 4		Foxtail	2 – 4
Firstrate	Wild Mustard	Max 2	Basis Gold	Foxtail	Max 3
	Giant ragweed	Max 10		Pokeweed	Max 4
	Jimsonweed	Max 4		Crabgrass large	Max 1

Agronomy Tips

Ear Initiation & Size Determination in Corn - (*Bob Nielsen*) –

- Ear shoots are initiated at many stalk nodes very early in the corn plant's development
- Ear size determination of the uppermost, harvestable ear begins by the time a corn plant has reached knee-high and finishes 7 to 10 days prior to silk emergence

The potential size of the ear (number of kernels) is an important factor that contributes to the grain yield potential of a corn plant. Severe plant stress during ear formation may limit the potential ear size, and thus grain yield potential, before pollination has even occurred. Optimum growing conditions set the stage for maximum ear size potential and exceptional grain yields at harvest time. The size of what will become the harvestable ear begins by the time a corn plant has reached knee-high and finishes 7 to 10 days prior to silk emergence.

Ear Shoot Development. An axillary meristem forms at each stalk node (behind the leaf sheath) beginning at the base of the stalk and continuing toward the top (*acropetally* for you wordsmith fans) except for the upper six to eight nodes of the plant. Each axillary meristem initiates husk leaves at the nodes of the ear shank and eventually an ear itself at the tip of the ear shank.

By about the V5 or V6 stages of development (five to six visible leaf collars), the growing point (apical meristem) of the corn plant finishes the task of initiating leaf primordia and completes its developmental responsibilities by initiating the tassel primordium of the plant. At about the same time that the tassel is initiated, the final and uppermost axillary meristem that will give rise to the harvestable ear is also initiated.

Careful removal of the leaves from a stalk, including leaf sheaths, at about growth stage V10 (10 visible leaf collars) will usually expose 8 to 10 identifiable ear shoots. Each ear shoot is attached at a stalk node, behind its respective leaf sheath. At growth stage V10, these tiny ear shoots are composed primarily of husk leaf tissue. The developing ears themselves are only a fraction of an inch in length.

Initially, the ear shoots found at the lower stalk nodes are longer than the ones at the upper stalk nodes because the lower ones are created earlier. As time marches on, the upper one or two ear shoots assume priority over all the lower ones and become the harvestable ears. Development of the upper ears is favored over the lower ones because of hormonal 'checks and balances', plus the proximity of the upper ear to the actively photosynthesizing leaves of the upper canopy. The uppermost (harvestable) ear will normally be located at the 12th to 14th stalk node, corresponding to the 12th to 14th leaf.

Ear Size Determination. The number of kernel rows and the number of kernels per row determine total kernel number. Row number is one of several yield components in corn. Every pair of rows is generally equal to 20 bushels per acre (for average populations and ear lengths). Kernel number per row is another yield component of corn. For a 16-row ear, one kernel per row is equal to about five bushels per acre (for average populations). Typically, from 750 to 1000 ovules (potential kernels) develop on each ear shoot. Actual (harvestable) kernel number per ear averages between 400 and 600.

Kernel row number determination of the uppermost ear begins shortly after the ear shoot is initiated (V5 to V6) and is thought to be complete by growth stage V12. Like so many other processes in the corn plant, kernel row number determination on an ear proceeds in an acropetal fashion (from base to tip).

Kernel rows first initiate as 'ridges' of cells that eventually differentiate into pairs of rows. Thus, row number on ears of corn is always even unless some sort of stress disrupts the developmental process. True row number is often difficult to visualize in tiny ears dissected from plants younger than about the 12-leaf stage.

Row number is determined strongly by plant genetics rather than by environment. This means that row number for any given hybrid will be quite similar from year to year, regardless of growing conditions. Some exceptions to this include potential injury from the postemergence application of certain sulfonylurea herbicides or nearly complete defoliation by hail damage prior to growth stage V12.

The potential number of kernels per row is complete by about one week before silk emergence from the husk. Kernel number (ear length) is strongly affected by environmental stresses. This means that ear length will vary dramatically from year to year as growing conditions vary. Severe stress can greatly reduce potential kernel number per row. Conversely, excellent growing conditions can encourage unusually high potential kernel number.

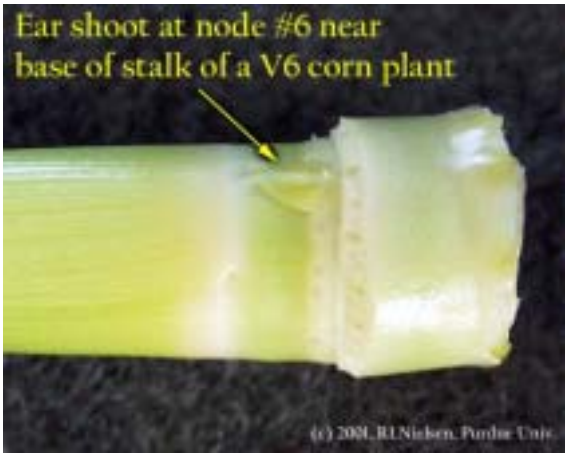
Some Related References:

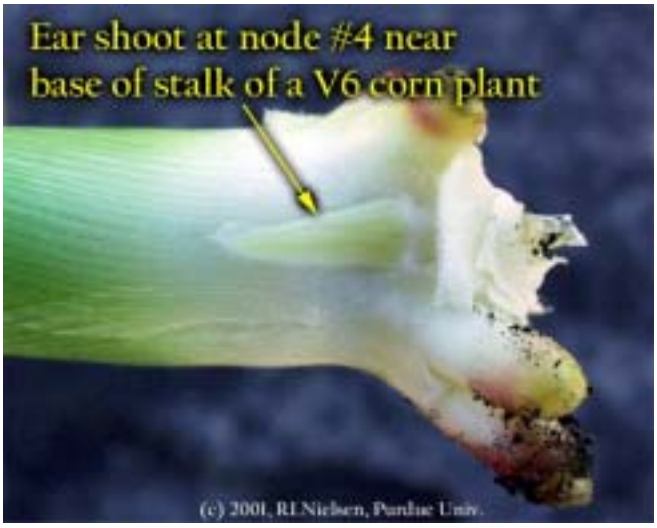
Bonnett, O.T. 1966. Inflorescences of Maize, Wheat, Rye, Barley, and Oats: Their Initiation and Development. Bulletin 721. Univ. of Illinois, College of Ag., Agricultural Expt. Sta.

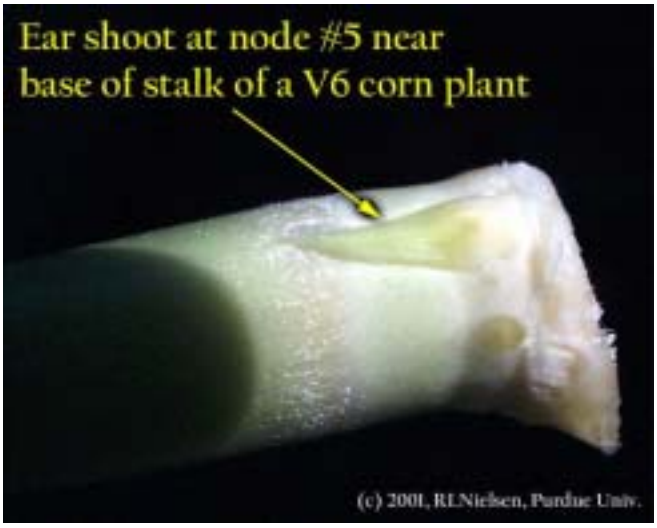
Lejeune, P. and G. Bernier. 1996. Effect of environment on the early steps of ear initiation in maze (Zea mays L.) Plant, Cell and Environment, 19:217-224.

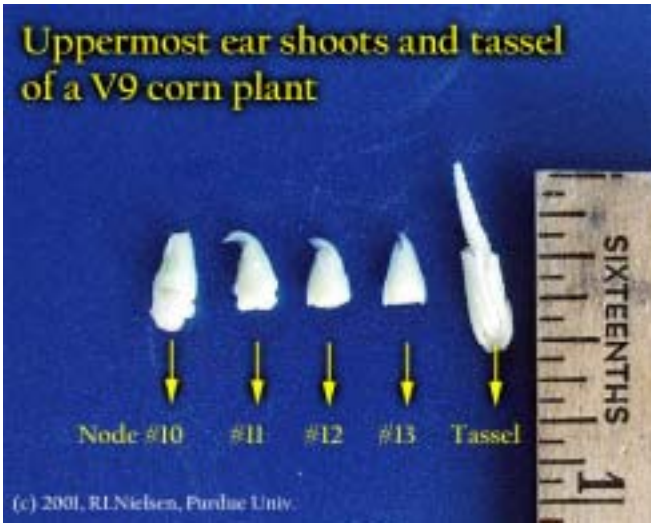
Ritchie, S.W., J.J. Hanway, and G.O. Benson. 1993. How a Corn Plant Develops. Iowa State Univ. Sp. Rpt. No. 48. On the Web at <http://maize.agron.iastate.edu/corngrows.html> (last verified 6/18/01).

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/>.









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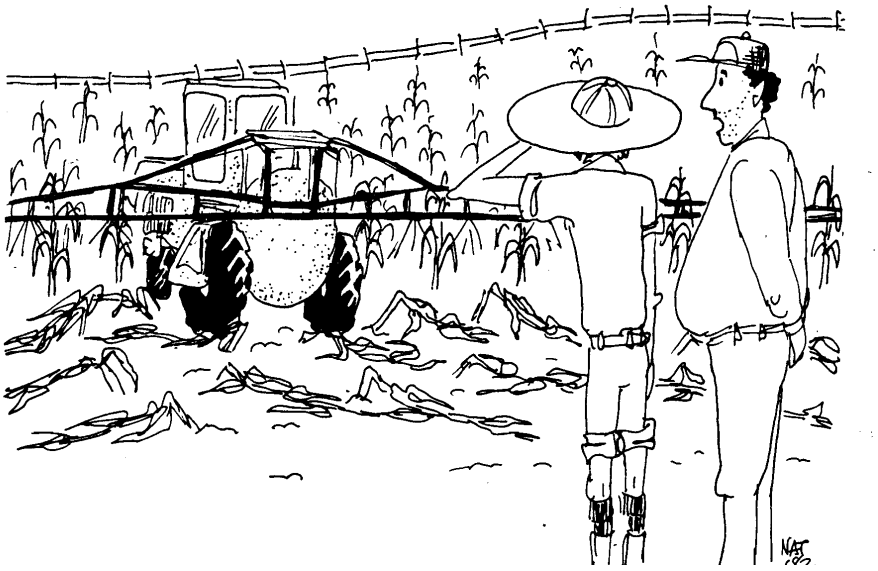
Weather Conditions Favorable for "Green Snap" - (*Peter Thomison, Ohio State University*) -

The strong winds which accompany thunderstorms this time of the year may cause stalk breakage in corn fields depending on stage of plant growth. Such stalk breakage is often referred to as "green snap" or "brittle snap". Corn plants are more prone to snapping during the rapid elongation stage of growth. According to studies in Iowa, Minnesota, and Nebraska, the V5 to V8 stages (corn approx. 10-24 inches in height) and the V12 stage through tasseling are the most vulnerable stages.

Breaks in the stalk usually occur at nodes (along nodal plates) below the ear. When soil moisture and temperature conditions are favorable for growth during this stage of plant development, plants elongate rapidly but stalks are unusually brittle. Stalk brittleness is greatest in rapidly growing corn under high temperature and high soil moisture conditions. There is speculation that rapidly growing plants are more susceptible to snapping-off for several days during the few weeks before tasseling because there has been little time for plants to develop lignified tissues at the nodes. Although we've observed green snap periodically in Ohio, it's a more serious problem in the western Corn Belt. In Nebraska, where wind storms are more common, green snap has caused major stand losses. Based on studies in 1993 and 1994, Nebraska researchers observed that it was often the most productive fields with the highest yield potential that experienced the greatest green snap injury. They concluded that cultural and environmental factors promoting rapid growth early in the growing season predisposed corn to greater green snap injury.

Vulnerability to green snap damage does vary among hybrids. However, all hybrids are at risk from wind injury when they are growing rapidly prior to tasseling. The use of growth regulator herbicides, such as 2,4-D or Banvel, have also been associated with stalk brittleness, especially if late application or application during hot, humid conditions occur. Once tassels begin shedding pollen. green snap problems generally disappear.

Bug Scout



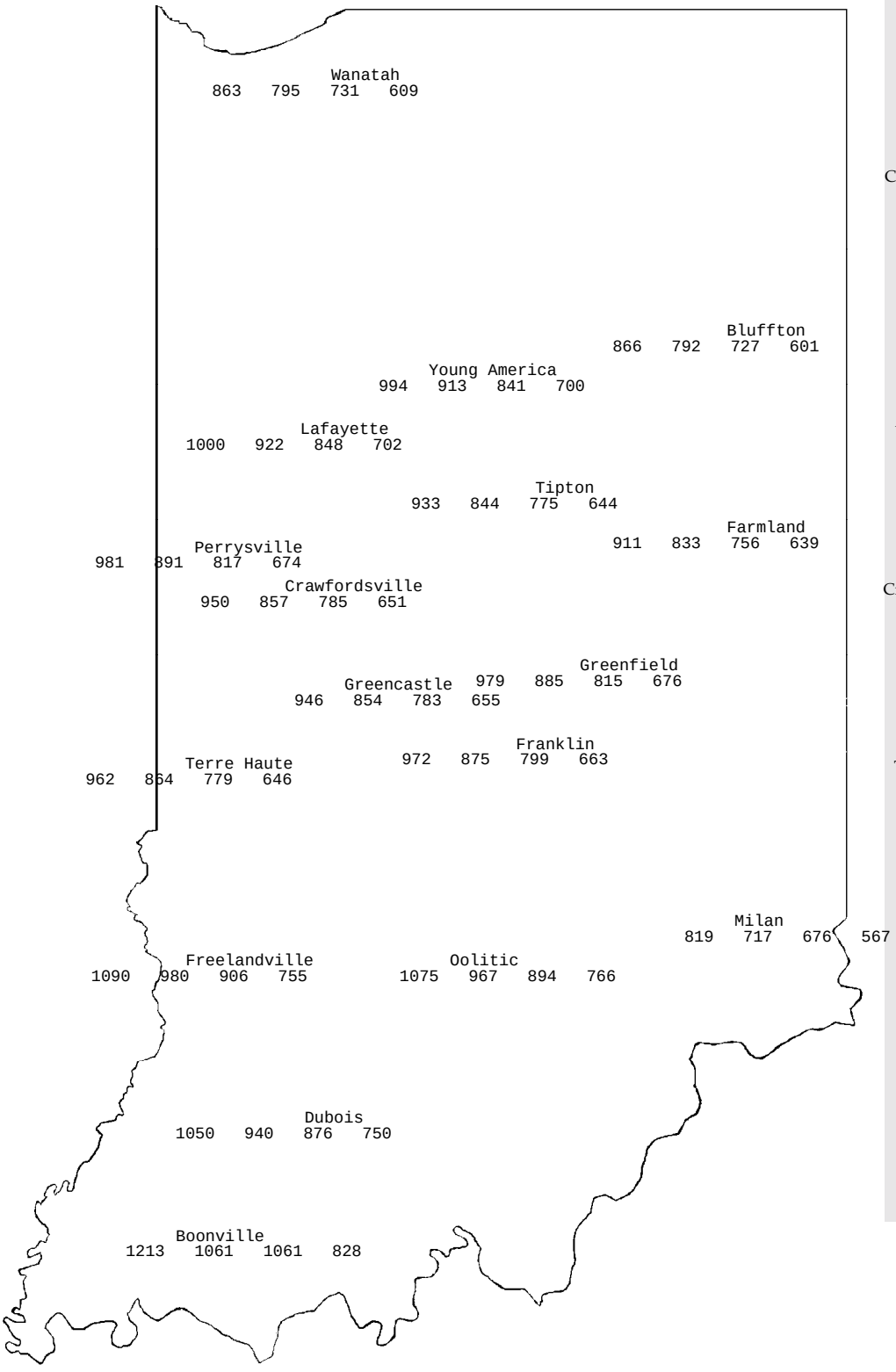
"Hey Bug Scout, does that have anything to do with green snap?"

Weather Update

Temperature Accumulations from Jan. 1 to June 20, 2001

MAP KEY
Location
GDD(4) GDD(10) GDD(60) GDD(90)

GDD(4) = Growing Degree Days from April 14 (4% of Indiana's corn planted), for corn growth and development
GDD(10) = Growing Degree Days from May 1 (10% of Indiana's corn planted), for corn growth and development
GDD(60) = Growing Degree Days from May 5 (60% of Indiana's corn planted), for corn growth and development
GDD(90) = Growing Degree Days from May 12 (90% of Indiana's corn planted), for corn growth and development



4" Bare Soil Temperatures 6/20/01

Location	Max.	Min.
Wtfd Mills	76	71
Wanatah	87	71
Columbia City	82	67
Bluffton	75	74
W Laf Agro	90	74
Tipton	75	71
Farmland	82	65
Perrysville	79	72
Crawfordsville	82	73
Trafalgar	77	72
Liberty	85	69
Terre Haute	80	75
Oolitic	79	74
Dubois	96	72

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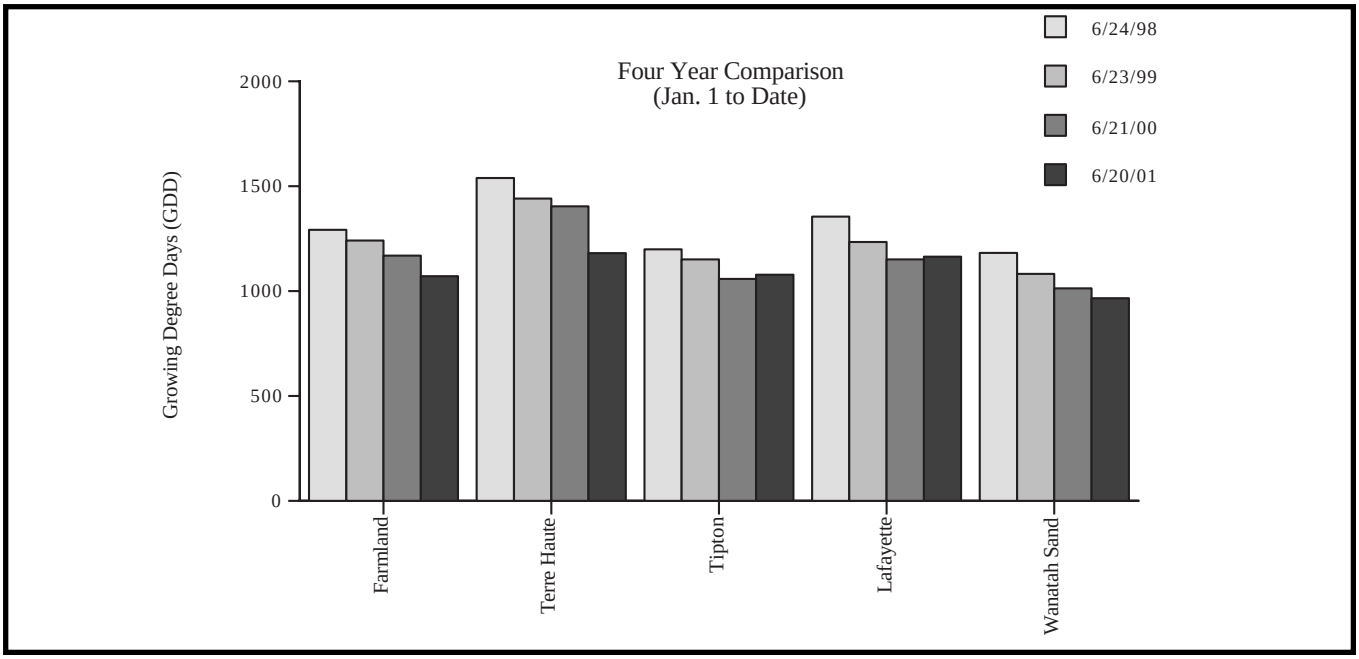

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