Pest & Crop

June 8, 2001 - No. 12

In This Issue

Insects, Mites, and Nematodes

Lots of Moths, They're Likely Armyworm – (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) –

- Large numbers of armyworm moths are being spotted at night, even downtown Indianapolis
- This probably is the beginning of the second generation
- Diseased worms being seen throughout the state
- Pounce 3.2EC has received a 24(c) for use in grass pasture with 0 day harvest restriction

We've been seeing and hearing of a surge of moth activity at night. The warmer temperatures, after many consecutive cools days and nights, have encouraged armyworm flights. We've received several observations of flowering landscape bushes appearing to be alive in the evening with thousands of moths as they obtained nectar. David Clamme, Brown County CES, reported a commercial greenhouse being inundated with moths at night. An unprecedented number of armyworm moths have been captured in this past week's black light traps (refer to "Black Light Trap Catch Report"). Most likely, as you mow the lawn or weed whip the ditches in the next few days you will kick up armyworm moths. Yes, armyworm moths are flying in big numbers throughout the state…again!

There have been many questions about whether this is the beginning of the second generation. We don't know for certain, but it's likely. Comparing black light captures over the last seven weeks has shown a steady stream of moth activity. In other words, we haven't seen a clear demarcation of first and second brood armyworm. The important matter is that egg laying and larval feeding will follow. Tall growing, lush grasses will be high risk sites for egg laying. Be aware that this is true not only for agriculture but urban landscapes as well.

As reported last week, diseased larvae continue to be found, now into the northern counties. Characteristics of the dying/dead worms led us to believe that a viral disease was at work. However, Lee Solter, University of Illinois insect pathologist, has inspected samples submitted and has isolated a fungal pathogen. The important issue is that fungal epizootics are favored by wet conditions coupled with warmer temperatures. Should we get the warmer temperatures that are forecasted for this coming weekend, this disease may quickly "kick into gear." Even with the tremendous number of moths presently flying., we are hopeful that these diseases will keep second and third generation larvae well below economic levels.

FMC Corporation has received (June 7, 2001) a Special Local Needs 24(c) for the use of Pounce 3.2EC in grass pasture to control armyworm (0 day harvest). We are supporting this labeling because of the consistently poor control that malathion and carbaryl have provided. You must have a copy of the special label 24(c) before applying. **Caution:** this approval is only for **0.4 ounces per acre** (compared with 4 to 8 ounces for corn) of Pounce 3.2EC. It is questionable whether this rate will provide sufficient control, especially of larger larvae. You may call Tammy Luck, Extension Administrative Assistant at (765) 494-8761 for a faxed copy of this special label.

Armyworm moth and larva

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Warmer Temperatures Should Increase Potato Leafhopper Numbers - (*John Obermeyer, Rich Edwards, and Larry Bledsoe*) -

- Sample newly cut alfalfa fields for leafhoppers
- If yellowing has already occurred, it is too late to prevent damage this cutting
- Management guidelines are given

Potato leafhoppers are small, wedge-shaped, yellowish-green insects that remove plant sap with their piercing-sucking mouth parts. Leafhopper feeding will often cause the characteristic wedge-shaped yellow area at the leaf tip, which is referred to as "hopper burn." Widespread feeding damage can cause a field to appear yellow throughout. Leafhopper damage reduces yield and forage quality through a loss of protein. If left uncontrolled for several cuttings, potato leafhoppers can also significantly reduce stands.

Potato leafhopper damage can be prevented by spraying alfalfa with an insecticide. It is critical to note, however, that treatment is preventative rather than curative. Thus, to effectively prevent economic losses, treatments must be applied before yellowing occurs. Usually the best results are obtained when treating small alfalfa, so be sure to watch the alfalfa regrowth for leafhoppers after cutting.

The need to treat for leafhoppers can be determined prior to the appearance of damage if fields are surveyed on a regular basis. To assess leafhopper populations and the potential for damage, take at least 5 sets of 20 sweeps with a 15" diameter sweep net in representative areas of a field. Carefully examine the contents of the sweep net, count the number of adults and nymphs, and calculate the number of leafhoppers per sweep. Use the guidelines given below to determine the need for treatment. For insecticides see Extension Publication E-220, *Alfalfa Insect Control Recommendations* (New 5/01) at WEB PAGE ADDRESS NEEDED.

Management Thresholds for Potato Leafhoppers

Stem Height in Inches	Average Number Leafhoppers (Adults & Nymphs) Per Sweep
under 3	0.2
4 - 6	0.5
7 - 12	1.0
greater than 12	1.5

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European Corn Borer Survey - June 6, 2001 (Ron Blackwell)

County (Fields) Sampled	Extended Leaf Height (in.)	% of plants/field w/ damage	Avg. # Egg masses/ plant
Clinton	34.5	0%	0.0
Clinton	41.5	0%	0.0
Grant	30.0	0%	0.0
Grant	26.3	0%	0.0
Howard	24.0	0%	0.0
Tipton	25.5	0%	0.0

Black Light Trap Catch Report
(Ron Blackwell)

County/Cooperator	5/22/01 - 5/29/01							5/30/01 - 6/4/01						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	1	3	2	0	0	0	14	46	46	24	2	0	0	964
Dubois/SIPAC	2	1	0	1	0	0	28	8	6	0	9	0	0	76
Jennings/SEPAC	5	1	9	5	0	0	28	11	4	8	4	0	0	35
LaPorte/Pinney Ag Center	1	0	0	0	0	0	9	0	0	0	0	0	0	28
Lawrence/Feldun Ag Center	0	2	0	1	0	0	59	9	32	3	6	0	0	331
Randolph/Davis Ag Center	2	6	18	1	0	0	41	4	3	7	0	0	0	85
Tippecanoe/TPAC	0	0	1	0	0	0	9	146	8	71	3	0	0	1056
Tippecanoe/P. J. Boeve			2							72				
Whitley/NEPAC	0	0	12	0	0	0	34							

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

Weeds

Herbicide Applications on Stressed Corn – (*Bob Hartzler, Mike Owen, and Brent Pringnitz, Iowa State University*) –

The prolonged cool, wet weather has complicated application decisions for postemergence herbicides. The stressful conditions may have reduced crop tolerance and prevented timely herbicide applications. Most persons realize that it would be wise not to treat corn under these conditions, but they may not have the flexibility to delay applications because of time limitations, crop stage or weed size.

A frequent question is how many days of warm weather are needed before the crop will regain its vigor. Unfortunately there is not a simple answer since many interacting factors will affect the crop's recovery. However, the following are guidelines that may help in the decision process.

1. Treat fields in which weeds are reaching maximum size for effective control first. Maximum size is dependant upon your herbicide selection. Weeds should be more susceptible than normal because of the environment, and this may provide a little flexibility. Also consider crop stage when making decisions.

2. Consider relative safety of herbicide treatment. Combinations of ALS inhibitors and dicamba pose the greatest risk to corn under stress.

3. Contact herbicides generally should create less stress than systemic herbicides, but the contact herbicides will cause greater leaf burn than normal because of the environmental conditions.

4. Two days of favorable growing conditions should significantly improve corn tolerance to postemergence herbicides. Delay applications until this time if possible.

A second consideration is the effect of the weather on corn development. Due to the prolonged cool period the corn may be more physiologically mature than it appears based on corn height. For example, a 5" corn plant may be at the V4 stage (four leaf collars visible) where typically it would only be at the V3 stage. This influences crop injury potential since small plants may be initiating reproductive structures at the time of herbicide application. Ear shoot initiation and tassle formation are completed around the V5 stage. Many herbicide labels specify application timing based on both corn height and leaf number. For example, the Accent Gold label specifies application to corn up to 12" tall or with five collars, whichever is more restrictive. Ensure that the stage of the corn is within the restrictions of the herbicide label in order to avoid significant risk of crop injury.

Plant Diseases

Corn Anthracnose - (*Gregory Shaner*) -

It is possible to see corn anthracnose every spring on young corn plants. Typically, lesions are seen only on the first couple of leaves, and then the disease goes into abeyance. This year, I have seen some fairly severe anthracnose in a few fields, on the fourth leaf or higher.

The anthracnose fungus (*Colletotrichum graminicola*) survives in corn residue. Anthracnose stalk rot was widespread last year, which means that there is a lot of the fungus in the field this spring. Under moist conditions the fungus produces spores on the surface of the residue. Splashing raindrops disperse these spores, so they tend not to move too far from where they are produced. This is why the disease is most conspicuous in corn fields that have residue from a previous corn crop on the soil surface.

The fungus produces small, circular to oval, tan spots on leaves. When these are numerous, they coalesce into large irregular patches. Dark red or yellow borders usually surround the tan spots. The plants I have seen this spring have dark red borders around the spots. The fungus produces spores on the surface of older lesions. It also produces stiff, black "hairs" (setae) that stick straight up from the leaf surface. These can be seen with a 10x hand lens and are a good field diagnostic character. Sporulation occurs in wet weather.

We have definitely had the wet weather that is conducive for spore production and infection. Moisture is only part of the story. We have not had much sunshine during the past 2 weeks. Low light intensity makes plants more susceptible to anthracnose. The biochemical process in corn that leads to resistance to anthracnose requires light. When light intensity is low, the corn plant is not able to synthesize compounds that confer resistance to the fungus in sufficient quantity even if it has the genetic potential for resistance.

When corn is in its vigorous vegetative period of growth, all but the most susceptible hybrids are fairly resistant to anthracnose. When corn reaches the reproductive stages of development, anthracnose can again develop, both as a blight of upper leaves and a stalk rot, as happened in much of Indiana last year. Considering the abundance of inoculum in the field (from all the anthracnose stalk rot last year) and the wet, cloudy weather this spring, it is not surprising to see more than the usual amount of seedling blight.

Assuming that warmer and drier weather is on its way, development of the seedling blight phase of anthracnose should abate. In the meantime, the disease is placing additional stress on plants that are already struggling in the cool, wet, and cloudy conditions that have existed over much of Indiana for the past couple of weeks (or longer in some areas). Infection of young plants also may provide inoculum for later development of top blight and stalk rot.

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Update on Wheat Diseases - (*Gregory Shaner*) -

Three weeks ago, I thought we might be in store for a nearly disease-free season for Indiana's wheat crop. I was more concerned about insufficient soil moisture to allow grain to fill. With all the rain of the past couple of weeks, the situation is changing.

Leaf blotch, caused by both *Septoria tritici* and *Stagonospora nodorum*, is moving onto the upper leaves. In a variety trial at Davis Purdue Ag Center, the disease has progressed to the leaf below the flag, and lesions are just starting to appear on the flag leaf. At the Southeast Purdue Ag Center, as much as 50% of the flag leaf surface of susceptible varieties has been killed by leaf blotch, and the wheat is only in the late milk to early dough stage of development. I have not been in northern Indiana for several days, but I suspect that leaf blotch is moving up the plants there as well. Stagonospora nodorum is also capable of infecting heads (causing glume blotch). Glume blotch is just getting underway at SEPAC and Davis.

Many wheat fields in the northeastern part of the state were evidently sprayed with fungicide. This may prove to have been a wise management decision. Sprayed fields should be scouted and compared to unsprayed strips or nearby unsprayed fields to judge the efficacy of treatment.

Fusarium head blight (scab) is also showing up, but so far it appears to be strongly associated with the proximity of the wheat to corn residue (where the scab fungus overwinters). In research plots at SEPAC, where wheat was drilled into lightly disked corn stalks, head blight incidence (the percentage of heads affected) was about 5%. In other wheat on the same farm, not planted into corn stalks, head blight incidence was very low. Head blight is starting to appear in a fungicide trial at the Purdue Agronomy Research Center near Lafayette, also planted into corn residue. In a previous issue of Pest & Crop, I mentioned that county educators are assisting us in a head blight survey by collecting heads from fields throughout Indiana. Samples received so far, mainly from southwest Indiana, suggest that in that part of the state, head blight will be light or nonexistent.

I think the risk of head blight increases moving north. The most vulnerable period for infection of wheat by the head blight fungus is during flowering. In the north, rainy periods came while the wheat was flowering. Although flowering is the period of greatest vulnerability, infection can occur after flowering, perhaps into late milk. The appearance of head blight at SEPAC is likely the result of infection after flowering.

Fields should be scouted for first symptoms and signs of scab during the late milk stage of development. The May 25 issue of *Pest & Crop* includes more detail on diagnostic symptoms and signs. It is unlikely that fungicides applied for leaf disease control will provide any control of head blight

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Brown Spot of Soybean - (*Gregory Shaner*) –

- Brown spot is making an early appearance

Although soybeans are not growing well in this cool weather, the diseases are not sitting still. I saw some fields last Friday in Tipton County that had fairly severe brown spot. The plants had been sown a month earlier, but were only at the V1 stage of growth. About 10% of the plants had severe brown spot on the unifoliolate leaves and some spots on the first trifoliolate leaf. It is likely that the disease can be found anywhere in Indiana that has received frequent rainfall during the past 2 weeks.

Symptoms of brown spot consist of angular spots on both leaf surfaces. The color may range from light brown to a chocolate brown or reddish brown. Spots range in size from small, pinpoint lesions to 4 mm (~1/8 inch) wide. Often yellow tissue surrounds the dark spots. Spots may coalesce to form large, irregular blotches of dead tissue. Infected leaves may drop off early.

A fungus known as *Septoria glycines* causes brown spot. Once leaf spots have developed, the fungus produces fruiting bodies within the leaf. The fruiting body (a pycnidium) is globose and has an opening that protrudes above the leaf surface. Spores produced within the pycnidium are released during wet weather and dispersed by splashing rain. This fungus survives in soybean residue. Consequently, the disease is likely to be more severe in fields where residue from a previous soybean crop is on the soil surface. In tillage-rotation plots at the Purdue Agronomy Research Center near Lafayette, brown spot was more severe in a no-till, continuous soybean plot than in a plowed, continuous soybean plot. Nonetheless, some brown spot can probably be found in fields where there is little or no soybean residue. Strong winds that accompany rain may disperse spores for a considerable distance.

Infected tissue that I collected in Tipton County was not yet producing pycnidia or spores when it was examined under the microscope. The same was true for some samples from the Purdue Agronomy Farm. However, when the tissue was incubated in a moist chamber overnight, pycnidia and spores developed. This suggests that the lesions that are appearing now are not yet old enough to produce spores, but they will probably start to do so soon. Production of spores in lesions is important for subsequent disease development. Lesions on the unifoliolate leaves and lower trifoliolate leaves are the source of spores for infection of upper leaves. As long as wet weather persists, the disease will continue to develop. If we enter a period of dry weather, the progress of the disease will be halted. Brown spot is reported to develop when temperatures fall between 59 and 86°F, with an optimum of 77°F.

Brown spot is a common disease of soybean in Indiana. Normally, it does not become conspicuous until later in the season, and then only on older leaves. For that reason, it is usually not considered to be of economic importance. However, the early establishment of brown spot in a field will provide abundant inoculum to infect upper leaves. Whether this will happen or not depends on weather.

Varieties differ in degree of resistance, but there are no known sources of complete resistance. Fields should be scouted to see if they show severe brown spot, and if so, should be scouted throughout the season to monitor disease progress. If young plants are severely affected, the stress might predispose their roots to infection by soil-borne pathogens, particularly the fungus that causes sudden death syndrome.

Agronomy Tips

FEARMONGER ALERT! Be Alert For Twisted Whorls in Corn - (*Bob Nielsen*) -

- Conditions are ripe for development of unusual twisted growth of whorls
- Yield effects are minimal, if any

Most everyone agrees that Indiana weather conditions during the past 14 days or so can only be described as 'crappy' for the growth and development of the state's corn crop. Daily high temperatures have been primarily in the 60's and low 70's. Daily low temperatures have been in the 50's and even 40's. About the only good news overheard down at the Chat 'n Chew Café is that surface soil moisture levels have been replenished in most areasof the state, although in some areas rainfall has been excessive.

We know that warm, sunny weather will eventually return to the Hoosier state. We also know that corn, being a temperature-dependent crop, will respond to that onset of warm, sunny weather by shifting to a faster rate of development. Therein lies the cause for issuing this fearmonger alert. When periods of slow corn growth (typically, cool growing conditions) are followed by a sharp transition to periods of rapid corn growth (typi-

cally, warm weather plus ample moisture), scattered plants throughout fields may begin exhibiting symptoms of unusual twisted growth. The whorls of the affected plants are tightly twisted, often bent over severely, and not unfurling on a timely basis.

One's natural instincts would blame the twisted growth on herbicide injury, especially those characterized by the cell growth inhibitor mode of action. Where such herbicides are applied pre-plant or pre-emergence, shoot uptake of the herbicide by the emerging seedling can result in twisted growth. While, indeed, this season's conditions are conducive for this type of herbicide injury, twisted growth of corn may appear in fields where none of this herbicide chemistry has been applied.

Certain genetic backgrounds react to the change in growing conditions described above by basically going 'bonkers'. The upper whorls of the plants don't unfurl properly. Younger leaves deeper in the whorl continue to grow rapidly, but are unable to emerge from the unfurled upper leaves. The now tightly twisted whorl then bends and kinks from the pressure exerted from the younger leaves' continued growth. The growth stage where I've observed this phenomenon in past years was around four to six visible leaf collars (about knee-high). That growth stage accurately describes many of the state's corn fields right now.

At the peak of the problem, the appearance of these plants is indeed unsettling and one would think that the whorls would never unroll properly. Given another week, though, the majority of the affected plants does unroll and continue to grow normally.

If you didn't notice the twisted growth to begin with, you may notice the appearance of 'yellow tops' across the field after the whorls unroll. The younger leaves that had been trapped inside the twisted upper leaves emerge fairly yellow due to the fact that they had been shaded for quite some time. In addition to being fairly yellow, the leaves will exhibit a crinkly surface caused by their restricted expansion inside the twisted whorl. Another day or two will green these up and the problem will no longer be visible.

The Good News: Yield effects from periods of twisted growth due to weather-related causes are minimal, if any.

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Hail Damage in Corn: Moving Beyond Grief to Damage Assessment - (*Bob Nielsen*) -

- Yield loss from hail caused by both stand reduction and leaf area reduction
- Give a damaged field time to show its recovery ability

The onset of the 2001 'monsoon' season has included numerous hailstorms throughout Indiana with more apt to come in the future. Looking out the kitchen window the morning after such a storm can be one of the most disheartening feelings in the world to a farmer.

Yield loss in corn due to hail damage results primarily from 1) stand reduction caused by plant death and 2) leaf area reduction caused by hail damage to the leaves. Assessing hail damage in corn therefore requires the grower or consultant to estimate the severity of each of these factors.

Assessing Plant Death

As with most early-season problems, evaluation of hail-damaged fields should not be attempted the day after the storm hit because it is too difficult to predict survivability of damaged plants by simply looking at the

damage itself. Corn has an amazing capacity to recover from early season damage and you need the patience to allow the damaged plants to visibly demonstrate whether they will recover or not. Viable plants will usually show visible new growth within 3 to 5 days with favorable weather and moisture conditions.

One thing that can be done shortly after the storm, however, is to determine the relative condition of the growing point area of the stalk. The main growing point (apical meristem) of a young corn plant is an area of active cell division located near the tip of the pyramid-shaped stalk tissue inside the stem of the plant. All the leaves and the tassel are formed at the growing point.

You can determine the position of the growing point by splitting the stalk down the middle and looking for the pyramid-shaped area of the upper stalk. If hail has damaged the growing point or cut off the stalks below the growing point, then those plants should not be counted as survivors.

Remember that yield loss in corn is not directly proportional to the reduction in the number of plants per acre when the damage occurs early in the growing season (Table 1). The surviving plants surrounding an absent plant can compensate by increasing their potential ear size or by developing a second ear. A 25 percent reduction in plant population should reduce yield by less than 10 percent. A 50 percent reduction in plant population should reduce yield by less than 25 percent.

Assessing Defoliation

Leaf damage by hail always looks worse than it really is. Shredded leaves that remain connected to the plant and remain green will actually continue manufacturing photosynthates for the 'factory'. It takes a practiced eye to accurately estimate percent leaf death by hail. With that caution in mind, percent damage to those leaves exposed at the time of the hailstorm can be estimated and used to estimate yield loss due to defoliation alone.

The effects of leaf death on yield increases as the plants near silking, and then decreases throughout grain fill. Therefore, the grower needs to determine the growth stage of the crop when the hail damage occurred (see my earlier article: What Exactly Do You Mean by 'Leaf'?, *P&C 27 April*).

If you are walking damaged fields many days after the storm, you can stage the crop that day and backtrack to the day of the storm by assuming that leaf emergence in corn occurs at the rate of about 1 leaf every 85 GDDs from emergence to V10 (ten fully visible leaf collars) or every 50 GDDs from V10 to the final leaf (see my earlier article: Predicting Leaf Stages in Corn, *P&C 27 April*). Given recent temperatures and the fact that little if any of Indiana's corn crop is yet beyond leaf stage V10, this rate of leaf emergence translates to about 1 leaf every 6 days.

Once percent leaf damage and crop growth stage have been determined, yield loss can be estimated by using the defoliation chart provided in Table 2. This table is a condensed version of the season-long table published in the Purdue Extension publication ID-179, Corn and Soybean Field Guide (pp. 13-14) or in NCH-1, Assessing Hail Damage in Corn.

Assessing Consequences of Whorl & Stem Bruising

The eventual yield effects of severe bruising of leaf tissue in the whorl or the stalk tissue itself in older plants are quite difficult to predict. Consequently, one often is unsure whether to count severely bruised plants as survivors or whether they should be voted off the field. The good news is that recently reported observations from an Ohio onfarm study suggest that bruising from hail early in the season does NOT typically result in increased stalk lodging or stalk rot development later in the season.

Early season bruising of leaf tissue or stem tissue may, however, have other consequences on subsequent plant development; the occurrences of which are hard to predict. Areas of bruised whorl leaf tissue often die and can then restrict continued expansion of whorl leaves, resulting in the type of 'knotted' whorl reminiscent of frost damaged plants. These same bruised leaves would be more susceptible to secondary invasion by bacteria contained in splashed soil that might have been introduced into the damaged whorls if the hail storm was accompanied by driving rains. If the plant tissue bruising extends as deep as the plant's growing point, that important meristematic area may die; thus killing the main stalk and encouraging the development of tillers. If the plant tissue bruising extends into the area near, but not into, the growing point; subsequent plant development may be deformed in a fashion similar to any physical damage near the hormonally active growing point (stinkbug, stalk borer, drill bits used by malicious agronomists).

Example of Assessing Damage

Let's say that after walking your field of corn that is at leaf stage V4 and assessing the damage, you have determined that of your original 30,000 plants per acre, only 20,000 will survive the hail damage. If your original planting date was 20 April, you began the season with a yield potential of only 99% of optimum to begin with (Table 1). Your surviving stand of 20,000 now has an upper yield potential of 91% of optimum. Because you did not begin with 100% of optimum yield potential in the first place, the yield loss due to stand reduction by hail is only 8% of optimum (99 minus 91). Fortunately for you, the corn was young enough that any defoliation of the surviving stand will not result in any additional yield loss (Table 2, on the following page).

Table 1. Expected Grain Yield Due to Various Planting Dates and Final Plant Populations.

Plant date	Plant population per acre					
	10,000	14,000	18,000	22,000	26,000	30,000
10-Apr	62	73	82	88	92	94
15-Apr	65	76	85	91	95	97
20-Apr	67	78	87	93	97	99
25-Apr	68	79	88	94	98	100
30-Apr	68	79	88	95	99	100
5-May	67	79	87	94	98	99
10-May	65	77	86	92	96	97
15-May	63	74	83	89	93	95
20-May	59	71	80	86	90	91
25-May	55	66	75	81	85	87
30-May	49	61	70	76	80	81

Source: Nafziger. 1994. J. Prod. Ag. 7:59-62

Table 2. Estimates of Percent Yield Loss in Corn Due to Leaf Defoliation.

Growth stage	Percent leaf defoliation			
	25	50	75	100
7-leaf	0	2	5	9
8-leaf	0	3	6	11
9-leaf	1	4	7	13
10-leaf	1	6	9	16
11-leaf	2	7	12	22
12-leaf	2	9	16	28
13-leaf	2	10	19	34
14-leaf	3	13	25	44

Note 1: Growth stage equals the 'droopy leaf' method.
Note 2: Adapted from the National Crop Insurance Associations's "Corn Loss Instruction" (Rev. 1994).

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Commonly Asked Questions on "Late" Applications of Nitrogen to Corn - (*Peter Thomison, Ohio State University*) -

Excessive rainfall this year may force many growers to sidedress their nitrogen (N) in corn this year much later than what is considered normal. Other growers may be supplementing their earlier N applications to replace N lost from denitrification and leaching. The following includes some suggestions from extension soil fertility specialist at Ohio State and Purdue University that address various questions concerning N applications to corn after planting.

HOW LATE CAN N BE APPLIED? Corn utilizes large quantities of N during the grand growth stage. From the 8 leaf stage through tasseling N uptake is 4 to 8 pounds per day. For most corn hybrids N uptake is completed shortly after pollination. So, most of the N should be applied prior to the 10 leaf stage, with any supplemental applications complete by or shortly after tasseling. Under conditions of severe N deficiency, some response would be expected to low rates of N (30 to 60 pounds) as late as three weeks after pollination.

WHAT IS THE BEST N SOURCE TO USE? Ammonia or N solutions knifed in, or ammonium nitrate over the top are preferred in most situations, especially high residue fields. Granular urea can also be applied over the top in clean tilled situations. Both granular urea and ammonium nitrate broadcast in standing corn will cause some foliar burn when granules fall into the whorl. While it may appear unsightly, little yield decrease normally occurs if the fertilizer is applied prior to the 10-leaf stage.

HOW MUCH N SHOULD BE APPLIED? If the corn has gotten too tall to sidedress by this point (late June and early July), it has probably not been severely stressed and yield potential is still good. An example would be rotation corn after beans which had some starter or 28% applied with herbicides with good green color. Supplemental N rates at this point should probably be in the 0.5 to 0.7 pounds N per bushel of expected yield. For additional guidance on assessing N needs, consult last week's C.O.R.N. article (2001-15, issue of May 29 to June 3, 2001) by Ed Lentz, "Estimating Nitrogen Losses".

CAN I BROADCAST UREA AND 28-0-0 SOLUTIONS "OVER THE TOP"? Using broadcast applications of urea and 28% N solution to sidedress N will cause some burn to foliar tissue of corn plants. Damage results when urea granules or 28% UAN solution get inside the leaf whorl of corn plants.

The severity of injury is determined by the plant's stage of growth, the amount of N used and form of N. If the plant growing point is at or below the soil surface (or when plant has six fully expanded leaves or less), the extent of foliar injury caused by burn will usually be negligible if the N rate is kept below 50 lb/acre. Even at higher N rates and later vegetative growth stages (up to V6) the injury from leaf burn is normally not so severe that it outweighs the potential benefits received from the N addition. The degree of this plant burning is less with urea granules than with other N products.

Dribbling 28% solution with drop nozzles as a narrow band on the soil surface is an alternative approach that can help reduce foliar burning. Dribbling 28% is also a more efficient use of N than broadcast surface application because it helps reduce N volatilization.

CAN I APPLY N TO EVERY OTHER ROW? Research in Indiana, Illinois and Iowa has all shown that farmers can knife ammonia or N solutions in every other row middle (60 vs. 30 inch spacing) with no reduction in yield. The only caution is that extra attention must be paid, especially in wet conditions, that no knives plug with soil. A plugged knife in 60 inch spacing gives 4 rows with no N and will seriously reduce yields.

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Hybrid Performance: Take Notes Now - (*Bob Nielsen*)

- Cool, crappy growing conditions can highlight hybrid vigor differences
- Take time to record hybrid differences for early vigor and appearance in variety plots

Time and time again, complaints about how ugly the corn looks during a period of cool, crappy weather like we've been experiencing are sprinkled with observa-

tions that some hybrids seem to tolerate these conditions better than others. Indeed, such stressful growing conditions often highlight genetic differences among corn hybrids for traits such as early vigor or tolerance to stress in general.

If you have planted a corn variety test plot of your own, take the opportunity to walk those plots now and record your observations on general crop appearance and uniformity of growth among the hybrids in the plot. If the individual hybrid strips are not currently labeled with flags or stakes, then begin on one side of the plot with the first hybrid strip and work your way across one hybrid at a time; labeling the hybrid strips on paper as #1, #2, etc. At the end of the season or whenever the plots are officially labeled, you can relate your notes to the actual hybrids.

Recording such hybrid performance information now can help later on when you are trying to make heads or tails of the yield data. Too often, we ignore hybrid ratings for traits such as early vigor when making hybrid selections for the coming year. Yet, the kind of start to the season we are experiencing now should reinforce why such ratings should play a role in hybrid decision-making.

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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Cold Weather Impacts on the Soybean Plants – (*Ellsworth P. Christmas*) -

- Why are my soybeans growing so slowly?
- Will my soybeans recover?

A number of extension personnel and farmers have expressed concerns regarding the very slow growth of soybeans over the past two weeks. The name of the game is low temperatures, both of the air and the soil. For the past 15 days, Chalmers and Laporte had low nighttime temperatures at or below 50°F while the Agronomy Research Center, Milan, Columbia City and Wanatah had similar temperatures 13 out of the 15 nights at or below 50°F. Temperatures in southwestern Indiana were slightly higher with the low temperatures at Dubois, Oolitic and Vincennes reaching 50°F or less 9 of the 15 nights. Soil temperatures fared a little better with nighttime lows at or below 60°F across most of the state, but in all cases above 50°F.

Soybean seed will begin the process of germination at soil temperatures of 50°F or above, but the process is very slow. The most rapid emergence occurs at soil temperatures of 70 to 80°F. It is quite typical that at current soil temperatures, three or more weeks may be required for emergence. The major risk of slow emergence at low temperatures is the increased probability of injury to the seedling from fungi and/or insects.

Low nighttime air temperatures can cause injury to the soybean plant or can result in very slow vegetative growth. Many times a soybean plant can tolerate temperatures as low as 28°F without injury, but under certain conditions temperatures well above freezing can result in plant injury or death. Cold conditions can result in water stress in the plant and can be one of the causes of low temperature injury to the soybean plant depending on the length of time exposed to the low temperatures and the relative humidity. Research data shows that chilling the soybean plant for one week at temperatures close to the temperatures of the past two weeks can result in reduced leaf elongation, rate of leaf emergence, and CO_2 uptake. Usually, all of these will return to normal when temperatures return to levels at or above 75°F.

Low soil temperatures also result in a reduction of nodule formation and activity. Soybean plants that had just emerged prior to the cold soil temperatures may exhibit nitrogen deficiencies once air temperatures return to normal and the plants grow rapidly. This is the result of a demand by the plant for nitrogen greater than that available from the cotyledons and the soil. Once soil temperatures warm to a level suitable for nodule activity, the leaves well become a darker green color and the plant will resume normal growth.

All of these stresses may result in a plant with the lower internodes that are shorter than normal. Most of the stresses discussed above should not have any long term effects on the soybean crop with the exception of the fungal disease potential.

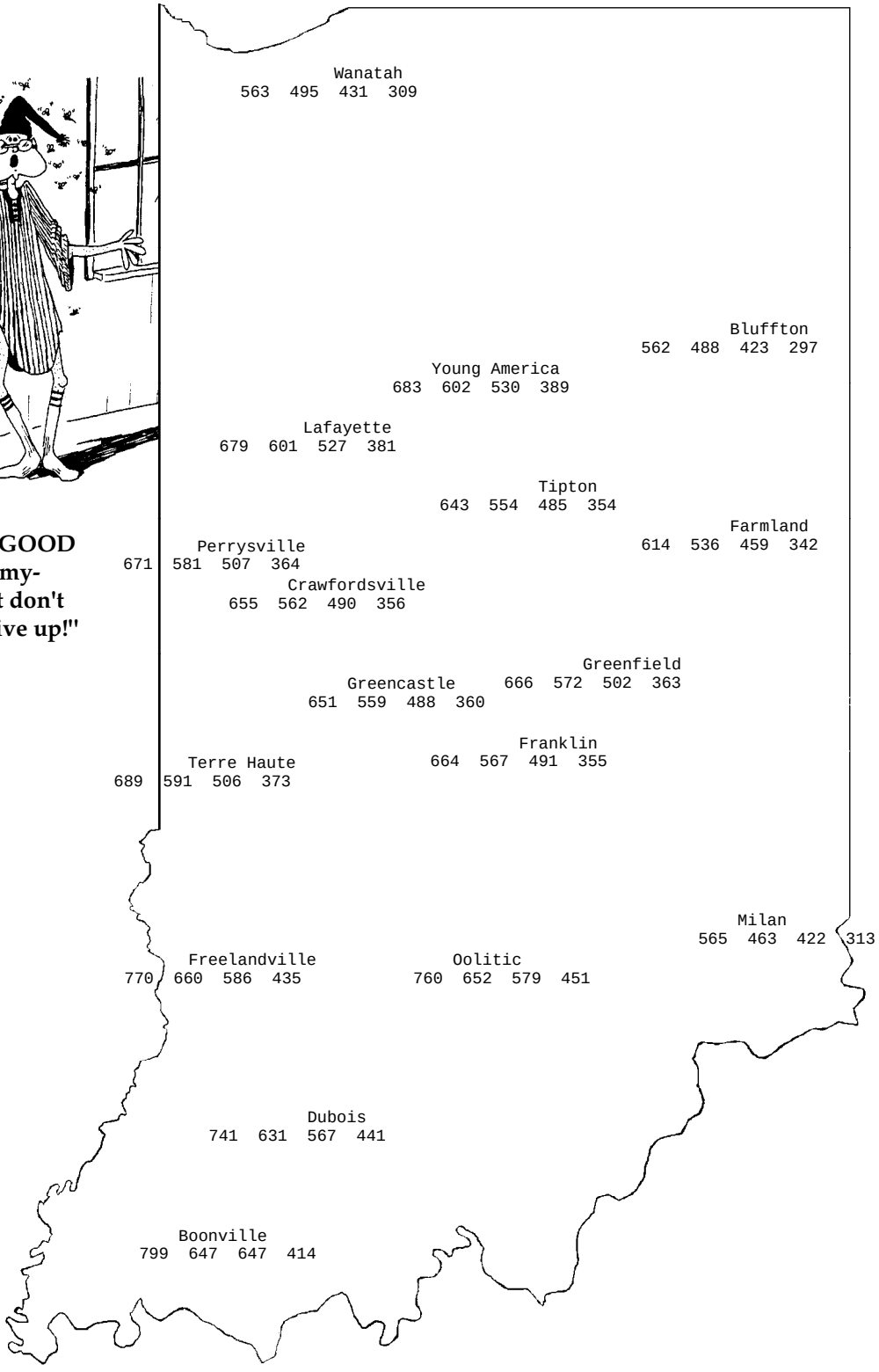
Weather Update

Temperature Accumulations from Jan. 1 to June 6, 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 "GOOD GRIEF - those army-worm moths just don't know when to give up!"



4" Bare Soil Temperatures 6/6/01

Location	Max.	Min.
Wtfd Mills	59	57
Wanatah	60	56
Columbia City	56	53
W Laf Agro	65	57
Tipton	60	57
Farmland	61	53
Perrysville	62	60
Crawfordsville	63	60
Trafalgar	73	68
Liberty	60	58
Terre Haute	67	64
Oolitic	79	67
Dubois	83	66

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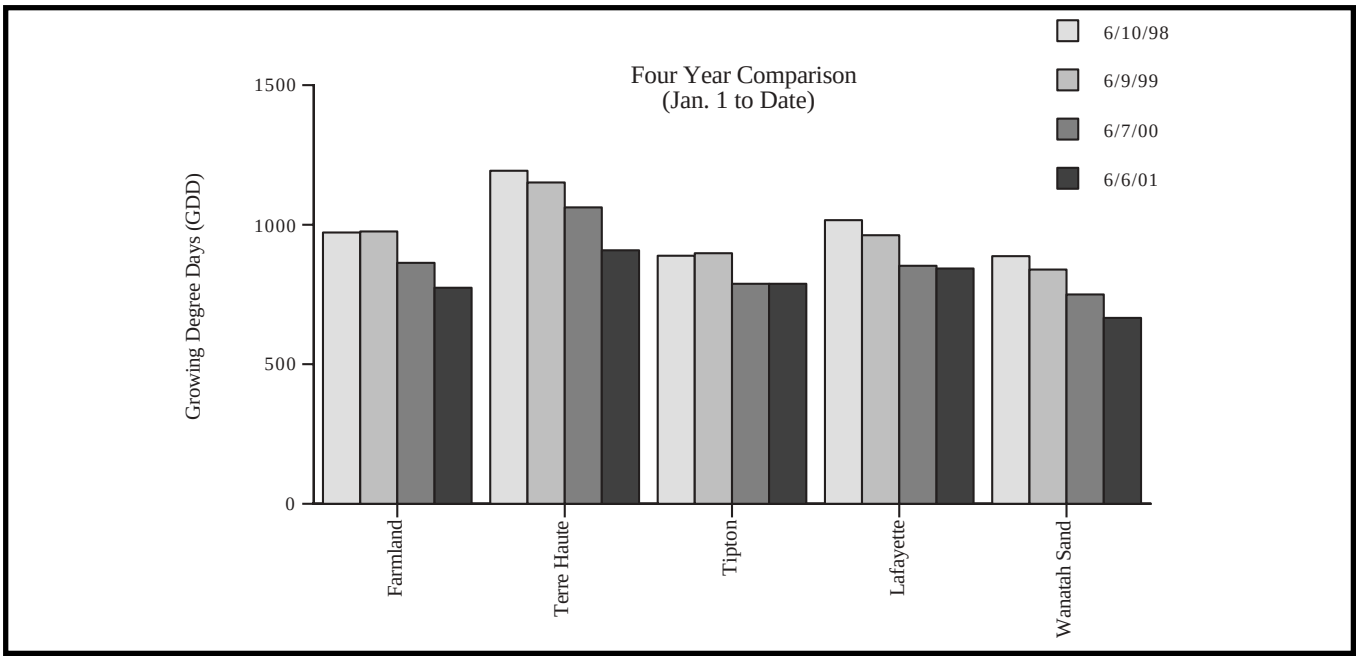

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