Pest & Crop

http://www.entm.purdue.edu/Entomology/ext/targets/newslett.htm

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In This Issue

Insects, Mites, and Nematodes

Rootworm Feeding (Drowning) Time – (*John Obermeyer and Larry Bledsoe*)

- Peak rootworm hatch and root feeding are here.
- Above-ground symptoms of damage occur a in a couple of weeks.
- High-risk fields should be sampled for rootworms and feeding now.

Rootworm larvae have been hatching for at least four weeks throughout the state and this process will continue for several more weeks. Peak hatch has occurred when about equal numbers of different size larvae can be found feeding on roots. It is also a time when few producers realize that root damage is occurring. Later in June or early July, when most rootworm feeding is complete and stormy weather hits, is when damage becomes apparent ... lodged corn.

First, the larvae are very small and live mostly within the roots. As they increase in size, so does their appetite. They will feed both inside and outside of the roots, causing tunnels, channels, and pruning. When rootworms weaken and/or remove nodal and brace roots, and when saturated soils and strong winds are present, severe plant lodging may occur. Though plants are often able to upright themselves ("goose necking"),

Different rootworm sizes on a finger

there are physiological stresses (root regrowth and infection by soil pathogens) that may lead to yield loss. Losses can be substantial should lodging occur just before or during pollination. If soils become excessively dry and root regrowth is inhibited, grain yield tends to be reduced. If however moisture is adequate, some minor feeding can actually stimulate root growth and occasionally results in over-compensation of root masses producing little or no loss.

Fields at high risk to rootworm damage should be sampled for rootworm and their feeding. Also, this would be a good time to compare rootworm control treatments (e.g., granular, seed-applied, liquid, transgenic) if producers have comparisons in their fields. To sample for rootworms, use a shovel and lift out the root mass and surrounding soil and place on a dark surface (black plastic garbage bags work well). Carefully break up the clods and sort through the soil. Look for 1/4 to 1/2 inch long, slender, creamy-white larvae with brownish-black heads and tails. Inspect the root mass for root scarring and pruning. You may find the larvae under the lower leaf collars that are close to nodal roots; tear these leaves away to check. Also, you may even observe the rootworms sticking out of roots. Repeat this process with several plants representing different areas of a field. A QuickTime movie of rootworm larval sampling can be viewed at <www.entm.purdue.edu/entomology/ext/fieldcropsipm/videos.htm>. Applying rescue insecticides where rootworm numbers are averaging over two per plant is still possible where high clearance sprayers can direct product to the base of the plant.

Recent heavy rains in areas of the state may have had a detrimental effect on larvae. Extended periods of flooded, or very wet soils cause larval death in one of two ways. Larvae can either drown from lack of oxygen (anaerobic conditions) or starve from lack of food because the corn plants have succumbed to flooding. What does this mean for the corn producer? Expect to see fewer adult beetles feeding on corn silk and tassels in areas where rain was extensive and prolonged. This occurrence was very obvious in some areas following extensive heavy rains in June of 1998 and in early July of 2003. In 2004, regional mortality of rootworm may be more pronounced than what was observed in either of these two previous episodes because of the greater extent of saturated soils across the State. Monitoring corn rootworm adults in soybean in 2004 will indicate which fields have reduced risk to rootworm in 2005 and pest management may be adjusted accordingly (See publication E-218, *Monitoring and Decision Rules for Western Corn Rootworm Beetles in Soybean* <www.entm.purdue.edu/entomology/ext/targets/e-series/EseriesPDF/E-218.htm>).

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Japanese Beetle Season Begins - (*John Obermeyer and Larry Bledsoe*)

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

Reports of adult Japanese beetle sightings have been received from southern Indiana. Northern counties will begin seeing these notorious pests in the next few days.

This year's adults are the result of eggs deposited in soil last summer. After these eggs hatched, the grubs immediately began to feed on roots and decaying organic matter. They continued feeding until cold temperatures prompted them to move deeper in the soil profile. Early this spring, the surviving grubs returned to near the soil surface to feed. Spring root feeding by the grubs can result in serious damage to early-planted crops, especially corn. Surprisingly very few calls have been received concerning grub feeding this spring, even with the early planting season. This could indicate that fewer grubs successfully overwintered and would result in fewer adults this summer.

Japanese beetles feed on more than 350 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 and mating in the upper plant 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. Look for more on this pest in future issues of *Pest&Crop*.

Japanese beetles feeding on soybean foliage

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Black Light Trap Catch Report - (John Obermeyer)														
County/Cooperator	56/1/04 - 6/8/04							6/9/04 - 6/14/04						
	VC	BCW	ECB	SWCB	CEW	FAW	AW	VC	BCW	ECB	SWCB	CEW	FAW	AW
Dubois/SIPAC							11							1
Jennings/SEPAC			9				2			1				4
Knox/SWPAC		1	13				2		1	15				8
LaPorte/Pinney Ag Center			25				2			90				7
Lawrence/Feldun Ag Center			4									2		2
Randolph/Davis Ag Center			48				6			4				1
Tippecanoe/TPAC Ag Center														
Vermillion/Hutson			3				2							
Whitley/NEPAC	1		192				13			64				7
VC = Variegated Cutworm, BCW = Black Cutworm, ECB = European Corn Borer, SWCB = Southwestern Corn Borer, CEW = Corn Earworm, FAW = Fall Armyworm, AW = Armyworm														

Weeds

Creeping Yellow Water-cress and Yellow Water-cress – (*Glenn Nice*)

Recently, I have been asked to identify some mustards that I have not had to deal with in the past. Not surprising since I have only been in Indiana for just over three years. Over the span of three weeks, I have seen three specimens that have turned out to belong to the cress group of mustards. As I became acquainted with these plants I found that they were two different plants.

The two plants I have dealt with, according to *An Illustrated Flora of the Northern United States and Canada* (Britton and Brown, 1970), were creeping yellow-cress (*Radicula sylvestris* [L]), Figure 1, and yellow water-cress (*Radicula palustris* [L.] Moench.), Figure 2. However, in the USDA Plant Data Base, the same two plants are referred to as being in the *Rorippa* genus. Plants often are placed in new genera as the plant's categorization changes through time, sometimes making identification and reference tricky.

The predominant difference between these two plants is that creeping yellow water-cress is a perennial and yellow water-cress is annual or biennial when the environment allows.

Both plants have small yellow flowers with four petals. Yellow water-cress flowers (4-6.4 mm* wide) are slightly smaller than creeping yellow water-cress (6.4-9 mm* wide). Both plants bloom from May to August. Both plants have leaves that are deeply lobed, ranging from 7.5 to 112 cm* in creeping yellow water-cress and

Figure 1. creeping yellow-cress – Britton and Brown (1970) taken off the USDA plant data base web site (2004)

Figure 2. yellow Water-cress – Britton and Brown (1970) taken off the USDA plant data base web site (2004)

I don't see many of these plants, because they generally don't interfere with soybean and corn production. They tend to grow in wet places. In *An Illustrated Flora of the Northern States and Canada*, 1970, Britton and Brown report creeping yellow water-cress growing from Ontario, Canada, to Virgina. The USDA reported creeping yellow water-cress in most Eastern US states. Yellow water-cress can be found throughout the US. In 1940, C. Deam reported yellow water-cress being found in almost every county in Indiana. It appeared in 1940 to be fairly evenly distributed throughout Indiana. Dean also reported creeping yellow water-cress in 24 Indiana counties throughout Indiana. Yellow water-cress is native to the US, but creeping yellow water-cress is introduced.

Figure 3. yellow water-cress (bog yellow-cress). Taken from <www.delawarewildflowers.org/1710.html>

The floods we experienced last year in certain areas may have deposited seed in areas that are not flooded out this year. This may have increased peoples awareness of these two plants this year.

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*1 inch = 25.4 mm and 1 inch = 2.54 cm.

Sources:

Deam, C.C. Flora of Indiana 1940. Department of Conservation, Division of Forestry Indianapolis, Indiana. 494 and 1052.

Britton N. and A. Brown. 1913. An Illustrated Flora of the Northern United States and Canada Vol. 2. Dover Publications, Inc., New York. 1970. 3 vols. 160-161.

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New Publication from University of Wisconsin Discusses Sources of "Puckered Soybean Leaves" – (*Bill Johnson and Glenn Nice*)

Weed Scientists at the University of Wisconsin have developed an excellent publication that discusses potential sources of puckered soybean leaves. This issue is quite common in Indiana every year and information in this publication would be very pertinent to soybean grown in this state.

"Dicamba Injury to Soybeans" is a new publication that discusses the three most common sources of dicamba exposure to soybeans, symptoms of dicamba exposure on soybeans and the potential for yield loss. This publication contains a photo gallery of dicamba injury symptoms and dicamba injury mimics on soybean. It is available from the Nutrient and Pest Management Program at (608) 265-2660. Or you can check it out on the web at <http://ipcm.wisc.edu/>.

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2004 Purdue Weed Day – (*Tom Bauman, Bill Johnson, Glenn Nice, Mike White, and Reece Dewell*)

You are invited to attend the **2004 Purdue Weed Day** sponsored by the Department of Botany & Plant Pathology, Purdue University. The 2004 Weed Day tour is scheduled for **Tuesday, June 29, 2004**. The program will begin at 8:30 AM Eastern Standard Time (Central Daylight Time) at the Purdue University Agronomy Research Center (located 7 miles NW of West Lafayette on US 52 W). Parking will be at the main entrance of the farm. Come a little early and have coffee and a doughnut with us. Water and soft drinks will be available during the tour.

Even with this being a wet spring we have everything planted and all the soybeans, popcorn and corn have emerged. Weed pressure is quite good and early post treatments will soon be applied.

The herbicide plots will give a look at "What's Coming" and a comparison of some new herbicides. You will be able to compare new corn, popcorn and soybean herbicides with those commonly used, and evaluate the effects of adjuvants on herbicide performance. Graduate students will be available to discuss their research plots.

In the afternoon several of the Purdue staff will be around to visit and review in more detail the research plots seen during the morning tour. See the agenda for a look at the day's activities <www.btny.purdue.edu/weedscience/>.

The Purdue weed scientists that will be present include: Tom Bauman, Mike White, Bill Johnson, Reece Dewell, and Glenn Nice.

For those attending the 2004 Purdue Weed Day, we have applied for CCH's for category 1A.

Please note there will not be a lunch this year, so please plan your day accordingly.

Several motels are available in the West Lafayette-Lafayette area. A few are listed for your convenience.

Budget Inn (St. Rd. 26 East), Phone: 765-447-7566
Hilton Garden Inn (St. Rd. 26 East, W. Laf.), Phone: 765-743-2100
Holiday Inn Select (St. Rd. 26 East), Phone: 765-423-1000
Radisson (St. Rd. 26 East), Phone: 765-447-0575
Ramada Inn (St. Rd. 26 East), Phone: 765-447-9460
Red Roof Inn (St. Rd. 26 East), Phone: 765-448-4671
Signature Inn (St. Rd. 26 East), Phone: 765-447-4142
University Inn (U.S. 52 N. at Cumberland, W. Laf.), Phone: 765-463-5511

Please return the enclosed attendance form <www.btny.purdue.edu/weedscience/2004/WeedDayAtt04 .pdf>, if possible, to allow us to maintain a mailing list and to estimate coffee, doughnuts, and soft drinks needs for the Weed Day.

AGENDA - PURDUE WEED RESEARCH FIELD DAY

8:30 AM - 12:00 PM Purdue Agronomy Research Center (U.S. 52 North)

- Corn weed management - New herbicides, expanded look at available herbicides, combination treatments, etc.
- Soyben weed control - New herbicides, expanded look at available herbicides, combination treatments, etc.
- No Till weed management in corn and soybeans (three trials)
- Compare the performance of weed management systems in conventional and herbicide resistant corn hybirds
- Popcorn tolerance to several herbicides
- Interactions of stalk boring insects and glyphosate on giant ragweed
- Giant ragweed interference in corn
- Interactions between winter annual weeds and SCN
- Update on glyphosate resistant marestail

Diseases

Crazy Top of Corn – (*Gregory Shaner and Andreas Westphal*)

- Will recent flooding cause crazy top in corn?

Crazy top gets its name from the symptoms produced in the tassel. Instead of producing tassels, infected plants produce a proliferation of small leaves. Other symptoms include excessive tillering and rolling or twisting of upper leaves. Ears may also develop masses of small leaves.

Crazy top is normally limited to a few plants in low-lying areas of a field where flooding occurs. The disease is sometimes widespread in river bottom fields that have been flooded. Crazy top is usually more of a curiosity than a real problem in Indiana. Sometimes a few plants in low-lying areas show symptoms, but it is unusual to see large numbers of diseased plants.

Sclerophthora macrospora, a fungus-like organism, causes crazy top. Overwintering spores (oospores) of this organism germinate in saturated soil and produce a second type of spore (zoospore) that swims for short distances. Zoospores that land on a corn plant attach themselves and then infect. Saturation of soil for 24-48 hours is sufficient for spore production and infection. One common avenue of infection may be through the whorl of young leaves when corn is under water for a day or two. The vulnerable period of infection is from shortly after planting until corn has reached the 3- to 4-leaf stage.

Given the recent heavy rains and subsequent flooding in many fields this year, will we see more crazy top than normal? Once corn is past the 4-leaf stage, the likelihood of infection is thought to be less. Therefore, corn planted in April, which was well past the 4-leaf stage when the deluge hit last week, will probably not become infected. However, there are some fields with very young corn, and crazy top may show up in these.

If many plants are infected, yield may be significantly reduced. There is no remedy that can be applied to plants once they are infected, so the only recourse would be replanting—not an option this year given how far along the season already is.

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Top Rot of Corn – (*Gregory Shaner and Andreas Westphal*)

- Flooded corn may develop top rot

The recent heavy rains flooded many corn fields in Indiana. Some have been flooded long enough that corn will die or be severely injured by the long immersion in warm water. Other areas were evidently flooded for briefer periods, and aside from muddy leaves, the plants appear to be healthy. However, some of these plants might develop the top rot phase of bacterial stalk rot.

Bacterial stalk rot is caused by *Erwinia chrysanthemi* pv. *zeae*. Leaves in the whorl of infected plants will wilt and die. They can be easily pulled out and their bases will be rotted and slimy. Top rot can be diagnosed with the nose as well as the eyes—the rotted tissue has a foul odor.

The bacterium overwinters in surface corn residue. The disease sometimes appears where corn is sprinkler-irrigated with surface water. More often, it shows up when plants are flooded and surface water gets down into the whorl. Bacteria that become established in the whorl will progress down into the growing point and kill the plant.

It's unlikely that this will be a widespread problem, but if water that inundated corn came from a field with corn residue on the surface, it may have contained the bacterium in high enough concentration to infect some plants.

Agronomy

Water, Water Everywhere... – (*Bob Nielsen*)

The rain storms of the past week left a lot of things floating or submerged throughout Indiana, including corn fields. Total rainfall over the several day period was greater than 10 inches for some areas in northern Indiana. The consequences of such extreme weather events on crops this late into the growing season are often severe, with few available remedies to recover lost yield potential. Here are a few thoughts to consider relative to water-damaged crops.

1. Given the warm soil temperatures, young corn will not tolerate more than several days of outright ponding before whole plant death occurs. Oxygen deprivation quickly results in significant deterioration and death of above- and below-ground plant tissue. See my earlier article for more info (Nielsen, 2004a).

2. Older plants will technically tolerate ponding or saturated soil conditions somewhat longer than young corn before death occurs. Crops that survive bouts of ponding and saturated soils will nonetheless suffer significant damage to their root systems. The immediate effects will be stunting of plant development. In the longer term, root systems compromised by ponding and saturated soils today will be less able to sustain the crops IF drought conditions develop later in the growing season.

3. For corn, damage to its root system today will predispose the crop to the development of root and stalk rots later in the season by virtue of the photosynthetic stress imposed by the limited root system during the important grain filling period following pollination. Monitor affected fields later in August for the possible development of stalk rots and modify harvest-timing strategies accordingly (Nielsen, 2003).

4. Ponding or flooding over the top of young corn plants increases the risk of infection by the soil borne fungus, *Sclerophthora macrospora*, that causes Crazy Top disease (Lipps and Mills, 2000).

5. Once the water recedes, deposits of sediment and crop residues that remain on crop plants either outright smother any surviving plants or greatly reduce their ability to capture sunlight and photosynthesize carbohydrates. Ironically, more rain later on may be beneficial to help wash off these deposits.

Flooded corn - an all to common sight this week

6. Given the warm soils, loss of nitrate nitrogen due to denitrification can easily approach 4 to 5% per day of saturated soil conditions (Hoeft, 2004). Loss of nitrate nitrogen on coarse-textured, sandy soils is also very rapid. Pre-plant or early side-dress applications are at most risk. More recent sidedress applications of nitrate-containing fertilizers (e.g., liquid 28%) are at more risk of N loss than are applications of anhydrous ammonia (Nielsen, 2004b).

7. Many cornfields in the affected area are "smack dab" (a Nielsen term, meaning "exactly") in the middle of their rapid growth phase prior to pollination when nitrogen uptake rates are at their peak. Assessing the need for supplemental nitrogen is complicated by the fact that the yield potential of (surviving) ponded corn will be less than normal. Where estimated nitrogen loss is significant (60 lbs or greater) in fields not yet tasseling and yield potential is still reasonable, corn may respond to an additional 50 – 80 lbs of applied fertilizer N up to or shortly after tasseling (Hoeft, 2004).

8. Replant considerations for damaged or destroyed corn fields will not be easy decisions, particularly in the northern half of Indiana, given that many damaged fields will not be dry enough to replant for another week. Technically, corn could still be replanted in northern Indiana through the end of June by selecting unusually early maturity hybrids (Table 1). However, such late replanting is not without risk itself, including the fact that unusually early maturity hybrids are often unadapted to diseases common to an area of the state (Nielsen & Thomison, 2003).

Table 1. relative hybrid maturities "safe" for replanting in late June throughout Indiana.

Area of Indiana	Replanting June 21	Replanting June 28
Northwest	96	92
Northcentral	95	91
Northeast	94	90
Westcentral	104	100
Central	102	98
Eastcentral	96	92
Southwest	117	112
Southcentral	108	104
Southeast	109	105

Listed hybrid maturity values aim at reaching maturity (kernel black layer) about 1 week prior to the date of an average fall frost for a given area of the state.

Related References

Hoeft, Robert. 2004. **Predicting and Measuring Nitrogen Loss.** Univ. of Illinois "the Bulletin". Available online at <www.ipm.uiuc.edu/bulletin/article.php?issueNumber=10&issueYear=2004&articleNumber=8> (URL verified 6/14/04).

Lipps, Patrick E. and Dennis R. Mills. 2000. **Crazy Top of Corn.** Ohio State Univ. Coop. Ext. Service publication AC-0034-01. Available online at <http://ohioline.osu.edu/ac-fact/0034.html>. (URL verified 6/14/04)

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Nielsen, R.L. (Bob). 2004b. **Soggy Soils, N Loss, & Supplemental Nitrogen Fertilizer for Corn**. Corny News Network, Purdue Univ. Available online at <www.kingcorn.org/news/articles.04/Flooding-0507.html>. (URL verified 6/14/04)

Nielsen, R.L. (Bob) and Peter Thomison. 2003. **Delayed Planting & Hybrid Maturity Decisions.** Purdue Univ. Cooperative Extension Publication AY-312-W. Available online at <www.agry.purdue.edu/ext/pubs/AY-312-W.pdf>. (URL verified 6/14/04).

For other Corny News Network articles, browse through the CNN Archives at <www.kingcorn.org/news/index-cnn.html>.

For other information about corn, take a look at the Corn Growers' Guidebook at <www.kingcorn.org>.