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Insects, Mites, and Nematodes

European Corn Borer, Bt Corn, and Planting – (John Obermeyer, Rich Edwards, and Larry Bledsoe) –

- Looks like a rough year for European corn borer
- Corn that was planted first may be at highest risk, depending on crop height at first generation egg laying
- Most corn will be late planted, effect of late brood should be diluted
- Bt resistance probably not needed for corn yet to be planted

Bt corn is an excellent management tool for corn borer species, both the European and southwestern. One drawback is that producers must anticipate and then actually have a corn borer infestation to gain financially from this technology. To help producers during the winter months ascertain where corn borer are likely to be a problem for the upcoming season we often share two bits of information, over-wintering numbers and highest risk corn.

Most are aware that European corn borer (ECB) numbers have been down over the last several years, the last significant outbreak being in 1996. Purdue's 2001 ECB over-wintering survey revealed that, except for northwestern counties, the population was rather unimpressive (refer to *Pest&Crop* #26, October 12, 2001). Since these over-wintering larvae become this year's threat, ECB aren't looking too ominous for the 2002 corn crop. This says nothing about larval mortality from tillage and, more importantly, natural pathogens that attack borers in the fall and early spring after the survey is conducted.

Surviving larvae are in the process of pupating and will soon emerge as moths to seek suitable egg laying sites. Fields targeted by this first generation are the tallest, lushest, greenest, corn in an area. Normally, only corn above 18+ inches in extended leaf height is threatened by corn borers. Smaller corn has a substance in the leaves called DIMBOA, a plant aglucone, which acts as a



“built-in insecticide.” The moths may lay eggs on the short corn, but larvae will not be able to establish. By the time moths are at their peak flight in early June, they aren’t going to find many fields of corn suitable for survival. On the other hand, the few fields planted before the rains, could be suitable for egg laying. Hind-sight being 20/20, these first-planted, “trap crop” fields should have been planted in Bt.

The second or late generation ECB moths are attracted to the late planted / maturing cornfields for egg laying. However, in 2002, 90% of Indiana’s corn will be late planted. This being the case, the moths won’t be limited to certain fields but rather diluting themselves among many late maturing fields. The need for ECB resistance in corn yet to be planted appears low. Therefore, any corn hybrid switching at this time should be with relative maturities in mind, not insects.

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Watch for Armyworm in Wheat - (John Obermeyer Rich Edwards, and Larry Bledsoe) -

- No damage reported, just a caution
- Wheat defoliation can be quick, but you already knew that!

This is being written on the one-year anniversary of receiving our first armyworm call during the outbreak of 2001. What a difference a year makes! So far, we’ve NOT had one phone call but let’s not be completely lax. Pest managers should be examining wheat in different

areas of a field, especially where plant growth is dense. Look for flag leaf feeding, head feeding, and armyworm droppings (excrement) on the ground. Shake the plants and count the number of armyworm on the ground and under plant debris. On sunny days, the armyworm will take shelter under crop residue or soil clods. If counts average approximately 5 or more per linear foot of row, the worms are less than 1-1/4 inches long, not parasitized or diseased, and leaf feeding is evident, control may be justified. If a significant number of armyworm are present and they are destroying the leaves, or the heads, treat immediately.

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Black Cutworm Report - (John Obermeyer Rich Edwards, and Larry Bledsoe) -

Ron Blackwell, IPM Surveyor Specialist, has randomly sampled emerging cornfields in southwestern and west central Indiana counties for black cutworm. Our thanks to Dwain Rule, Midland Co-op, and Betsy Smith, Growers’ Co-op, for serving as “safari” guides on this hunt. Only leaf feeding was found at this time, indicating that the larvae are still small. The larvae that were collected were early fourth instar, which soon will begin cutting. Damage ranged from 0 to 5% of plants damaged, with 0 - 2% being the norm. All fields sampled were considered high risk, that is, many winter annuals were present during moth flights. So far, this is good news concerning this pest! In addition some minor armyworm feeding was observed.

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Black Cutworm Adult Pheromone Trap Report							
Week 1 = 5/2/02 - 5/8/02 Week 2 = 5/9/02 - 5/15/02							
(Ron Blackwell)							
County	Cooperator	BCW Trapped		County	Cooperator	BCW Trapped	
		Wk 1	Wk 2			Wk 1	Wk 2
Adams	Roe/Price Ag Services	6	9	Knox	Smith/ Growers Co-op (Whtlnd 2)	8	0
Bartholomew	Ludwig/ Growers Service	0	0	Lake	Kliene (1)	0	4
Bartholomew	Weinantz Farm/ Pioneer	0	0	Lake	Kliene (2)	0	3
Benton	Schellenberger/ Jasper Co. Co-op	6		Marshall	Pinkowski/ Pioneer	20	9*
Clay	Smith/ Growers Co-op (Bzl)	12*	12*	Marshall	Barry/ Marshall Co. Co-op	21*	10*
Clay	Smith/ Growers Co-op (CC)	8	0	Newton	Babcock/ Jasper Co. Co-op	6	
Clinton	Blackwell/ Purdue	29*	19*	Parke	Rule/ Midland Co-op	2	15*
Decatur	Miers Farm/ Pioneer	1	11*	Porter	Mueller/ Agrilience	3	0
Elkhart	Kauffman/ Crop Tech (1)	4	2	Putnam	Nicholson Consulting	5	1
Elkhart	Kauffman/ Crop Tech (2)	6	2	Randolph	Jackson/ Davis-Purdue Ag Center (S)	3	3
Fayette	Schelle/ Falmouth Farm Supply	2	9*	Randolph	Jackson/ Davis-Purdue Ag Center (N)	1	0
Gibson	Hirsch Farms	6	2	Rush	Peggs/ Pioneer	17*	7
Fountain	Mroczkiewicz/ Syngenta	0	0	Starke	Pinkowski/ Pioneer	18*	7
Fountain	Hutson/ Purdue	0	0	St. Joseph	Pinkowski/ Pioneer	7	4
Hamilton	Dobbins/ FMC	15*	10	Sullivan	Smith/ Growers Co-op (W)	15*	5
Hendricks	Whicker/ Midland Co-op	2	0	Sullivan	Smith/ Growers Co-op (E)	24*	24*
Henry	Schelle/ Falmouth Farm Supply	0	10*	Tippecanoe	Obermeyer/ Purdue	64*	15
Jasper	Manning/ Jasper Co. Extension (S)	15*	0	Tipton	Johnson/ Pioneer	5	14*
Jasper	Manning/ Jasper Co. Extension (W)	0	0	Vermillion	Hutson/ Vermillion Co. Ext. (N)	0	0
Johnson	Truster/ Ag Excel Inc.	0	1	Vermillion	Hutson/ Vermillion Co. Ext. (S)	0	0
Knox	Smith/ Growers Co-op (Oaktown)	2	4	Vigo	Smith/ Growers Co-op	0	16*
Knox	Smith/ Growers Co-op (Edwardsport)	0	20*	Warren	Shields/ Jasper Co. Co-op	0	
Knox	Smith/ Growers Co-op (Whtlnd 1)	6	3	Whitley	Walker/ NEPAC	4	4

* = Intensive Capture.... An intensive capture occurs when 9 or more moths are caught over a 2-night period.

**Black Light Trap Catch Report
(Ron Blackwell)**

County/Cooperator	4/30/02 - 5/6/02							5/7/02 - 5/13/02						
	VC	BCW	ECB	GC	CEW	FAW	AW	VC	BCW	ECB	GC	CEW	FAW	AW
Clinton/Blackwell	0	9	0	0	0	0	14	3	6	0	0	0	0	62
Dubois/SIPAC	5	0	0	0	0	0	9	1	0	3	0	0	0	4
Fountain/Mroczkiewicz	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Jennings/SEPAC	1	0	3	0	0	0	3	0	0	2	0	0	0	4
LaPorte/Pinney Ag Center	0	0	0	0	0	0	1	0	0	0	0	0	0	9
Lawrence/Feldun Ag Center	0	1	0	0	0	0	26	1	0	3	0	1	0	24
Randolph/Davis Ag Center	0	0	0	0	0	0	21	0	1	0	0	0	0	64
Tippecanoe/TPAC	0	2	0	0	0	0	4							
Vermillion/Hutson	0	0	0	0	0	0	10	0	0	0	0	0	0	4
Whitley/NEPAC	0	0	0	0	0	0	83	0	7	0	0	0	0	183
BCW = Black Cutworm ECB = European Corn Borer GC = Green Cloverworm CEW = Corn Earworm AW = Armyworm FAW = Fall Armyworm VC = Variegated Cutworm														

Weeds

Weather Delays and Rotation Restrictions – (Glenn Nice and Thomas Bauman) -

Everybody is well aware of the fact that Indiana has had an over abundance of the water works. In a year like this, where planting may be delayed to the end of May, concerns and questions start to come in on herbicide rotation restrictions. Crop rotation restrictions are in place to limit crop injury the following year due to herbicide persistence and to limit the environmental impact due to seasonal weather patterns. They can range from two years to no waiting period at all. Several things can have an effect on a crop rotation restriction. In no order of importance are, crop the following year, rates used, how the herbicide degrades, and the specific soil characteristics. Some herbicides, such as glyphosate products (Roundup Ultra Max, Glyphomax Plus, Touchdown, etc) and Gramoxone Max (paraquat) have short to no rotational restrictions due to the fact that they both have very little residual activity. Herbicides containing acetochlor (Harness Xtra, Surpass, Topnotch) have long rotation restrictions for small grains (see Table 1). Some herbicides may have different rotation restrictions depending on soil pH. Steadfast (nicosulfuron and rimsulfuron) has a rotation restriction of 10 months to sorghum, but if the soil has a pH greater than 7.5 then it is 18 months. Increasing the rates of Valor (flumioxazin) increased the rotation restric-

tions of corn, wheat, sorghum, and sunflower from one month to two.

As the days tick by so does that time between application and planting next season. Furthermore, pushing back planting pushes back POST applications. A PRE application of Hornet WDG (10.5 month rotation restriction to soybean) on June 1st means that to comply with the label, a producer can't plant till April 15th the following season. Accent gold, Harness, Harness Xtra, Hornet WDG, and Stinger all have rotation restrictions to soybean over 10 months. Authority, Canopy XL/SP, Command Xtra, Flexstar, Guantlet, and Reflex all have rotation restrictions to corn of 10 months. However, there are many products in both corn and soybean that have small rotations intervals. In corn, Accent, Basis, 2,4-D, Celebrity Plus, Sencor, and Balance Pro all have rotation restrictions to soybean six or less months. In soybean, Assure II, Domain, Fusilade, Fusion, Pinnacle, Resource, Sonalan, and Valor all have rotation restrictions to corn or four or less months.

The following table gives rotation intervals for several of the herbicides used in Indiana. Included are the rotation intervals for field corn, soybean, and wheat. For other rotation restrictions for crops not listed please read specific product labels.

Table 1. Rotation restrictions to corn, soybean, and wheat for PRE and POST corn and soybean herbicides.

Herbicide	Active Ingredient	Field corn	Soybean	Wheat	Comments
----- Months -----					
2,4-D		3	3	3	
Accent	nicosulfuron	none	0.5	4*	*4 month for fall planted wheat, 8 months for spring planted
Accent Gold	nicosulfuron rimsulfuron flumetsulam clopyralid	none	10.5*	4	*18 months with soils with less than 2% organic matter receiving less than 15" of rainfall in the 12 months period following treatment
Aim	carfentrazone	none	none	none	
Assure II	quizalofop	4	none	4	
Atrazine		none	following season*	**	*Injury may occur to soybeans planted the following year on calcareous soils. **Do not plant the following year for injury may occur.
Authority	sulfentrazone	10	none	4	
Axiom	flufenacet metribuzin	none	none	12	
Axiom AT	flufenacet metribuzin atrazine	none	*	**	*May be planted the following year if 1X rate has been used. Injury may occur the following year on calcareous soils. **Do not plant the following year for injury may occur.
Balance Pro	isoxaflutole	none	6	4	
Basagran	bentazon	none	none	none	
Basis	rimsulfuron thifensulfuron	none	0.5	4	
Basis Gold	nicosulfuron rimsulfuron atrazine	none	10	10*	*Fall planted, 8 months for spring planted.
Beacon	primisulfuron	14 days	8	3*	*Injury may occur if dry weather prevails during much of the time between application and seeding of winter wheat.
Bicep II Magnum	metolachlor atrazine	none	*	**	*Injury may occur to soybean planted the following year on calcareous soils. **Do not plant following year or injury may occur.
Boundary	metolachlor metribuzin	8	none	4.5*	*Fall planted, 8 months for spring planted.
Buctril	bromozynil	1	1	1	
Bullet/Lariat	alachlor atrazine	none	*	**	*Injury may occur to soybean planted the following year on calcareous soils. **Do not plant the following year or injury may occur.
Callisto	mesotrione	none	next season	120 days	
Canopy SP	metribuzin chlorimuron	10*	none	4	*8 months for IR corn hybrids.

Table 1 (Con't). Rotation restrictions to corn, soybean, and wheat for PRE and POST corn and soybean herbicides.

Herbicide	Active Ingredient	Field corn	Soybean	Wheat	Comments
----- Months -----					
Canopy XL	sulfentrazone chlorimuron	10	none	4	
Celebrity Plus	nicosulfuron dicamba diflufenzopyr	7 days	4	4*	*Fall planted, 8 months for spring planted.
Clarity	dicamba	none	*	**	*May be planted the following season if 1X rate was used. **At 24 fl. oz. 15 days per 8 fl. oz. rates above 45 days per 8 fl. oz.
Classic/Skirmish	chlorimuron	10	none	4	
Cobra	lactofen	none	none	none	
Command 3 ME	clomazone	9*	none	12**	*9 months for with rate from 1.33 - 3.33 pt./A with the 3 ME formulation. **Maybe planted as a cover crop, but stands may be reduced. Do not graze.
Command Xtra	clomazone sulfentrazone	10	none	12	
Connect	bromoxynil	1	1	1	
Define	flufenacet	none	1	1	
Degree Xtra	atrazine acetochlor	*	**	***	*May be planted the following year if the 1 rate was used. **May be planted the following year if the 1X rate was used, however, injury may occur on calcareous soils. ***Do not plant the following year for injury may occur.
Distinct	diflufenzopyr dicamba	7 days	10	10	
Domain	flufenacet metribuzin	1	none	12	
Dual II Magnum	metolachlor	none	none	4.5	
Epic	flufenacet isoxaflutole	none	6	12	
Exceed	prosulfuron primsulfuron	1*	10	3	*No delay for IR or IMR corn hybrids.
Field Master	acetochlor atrazine glyphosate	*	**	***	*May be planted following season is 1X rate used. **May be planted following season if 1X rate used; however, injury may occur on calcareous soils. ***Do not plant the following year for injury may occur.
First Rate	cloransulam	9	none	3	
FlexStar	fomesafen	10	none	4	
Fusilade DX	fluazifop	2	none	2	
Fusion	fluazifop fenoazoprop	2	none	2	
Galaxy	bentazon acifluorfen	*	none	*	*May be planted the following season if the 1X rate was used.

Table 1 (Con't). Rotation restrictions to corn, soybean, and wheat for PRE and POST corn and soybean herbicides.

Herbicide	Active Ingredient	Field corn	Soybean	Wheat	Comments
----- Months -----					
Gauntlet	sulfentrazone chloransulam	10	none	4	
Gaurdsman Max/Leadoff	dimethanamid atrazine	none	*	**	*May be planted following season if 1X rate was used; however, injury can occur on calcareous soils. **Do not plant the following year for injury may occur.
Glyphosate products		none	none	none	
Harness	acetochlor	none	12	4	
Harness Xtra	acetochlor atrazine	none	12	12	
Hornet WDG	flumetsulam clopyralid	none	10.5*	4	*18 months on soils with less than 2% organic matter receiving less than 15" of rain fall in the 12 month period following application.
Liberty	glufosinate	none	none	2.5	
Liberty ATZ	glufosinate atrazine	none	9.5	*	*May be planted the following season is 2X rate was used.
Lightning	imazethapyr imazapyr	none*	9.5	4	*IMI corn hybrids only, 8.5 for non IMI hybrids.
Marksman	dicamba atrazine	none	10	*	*Do not plant the following year or injury may occur.
NorthStar	primisulfuron dicamba	14 days	8	3	
Outlook/Frontier	dimethenamid	none	none	4	
Permit	halosulfuron	1*	9	2	*For IT and regular hybrids, 0 months for IR or IMR hybrids.
Pinnacle	thifensulfuron	1.5	1.5	1.5	
Princep	simazine	none	1	*	*Do not plant the following year or injury may occur.
Prowl, Pentagon	pendimethalin	*	none	4	*May be planted following season if 1X rate was used.
Pursuit	imazethapyr	8.5*	none	3	*For non-IMI corn hybrids
Python	flumetsulam	none	none	4	
Raptor	imazamox	9	none	3	
Ready Master ATZ	glyphosate atrazine	*	**	***	*May be planted following season is 1X rate is used. **Injury may occur on soybean planted on calcareous soils ***Do not plant the following season for injury may occur.
Reflex	fomesafen	10	none	4	
Resource	flumiclorac	none	none	4	
Scepter	imazaquin	9.5*	none	3**	*Must be with Concept or Screen tested seed. **15 months following the last of a sequential application.

Table 1 (Con't). Rotation restrictions to corn, soybean, and wheat for PRE and POST corn and soybean herbicides.

Herbicide	Active Ingredient	Field corn	Soybean	Wheat	Comments
----- Months -----					
Select	clethodim	none	none	none	
Sencor/Lexone	metribuzin	4	4	4	
Sonalan	ethalfluralin	1	none	1	
Spirit	prosulfuron primisulfuron	1	10	3	
Stinger	clopyralid	none	10.5*	none	*18 months on soils with less than 2% organic matter receiving less than 15" rainfall in 12 months.
Storm	bentazon acifluorfen	*	none	*	*May be planted next season if 1X rate was used.
Surpass/TopNotch	acetochlor atrazine	none	*	4	*May be planted if 1X rate is used.
Synchrony STS	chlorimuron thifensulfuron	9*	none	3	*8 months for IR hybrids.
Trifluralin		*	none	*	*May be planted next season if 1X rate was used.
Ultra Blazer	acifluorfen	*	none	*	*May be planted next season if 1X rate was used.
Valor	flumioxazin	1*	NONE	1*	*At 2 oz./A or less rate, 2 months at the 2-3 oz./A rate.

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Nothing is Growing But the Weeds – (Glenn Nice and Thomas Bauman) -

- Delayed planting and large weeds
- Canada thistle

According to the National Agriculture Statistics Service USDA, by the week of May 12th only 11% of corn was planted and 4% had emerged in Indiana. From the same source, Indiana only has 3% of soybean in the field. The weather in Indiana has not been conducive for timely planting this year to say the least. Several weeks of wet cold weather has pushed back field preparation and planting for many. In the realm of weed control, burndowns, PRE, and POST are all likely to be late this year. Resulting in larger more difficult to control weeds. Also, these large weeds will have to be burnt down or removed to limit interference with planting.

Many of the fields already have large weed stands and size will be a factor. Burndown options for corn and soybean include glyphosate products (Roundup Ultra Max, Touchdown, Glyphomax Plus, etc) or Gramoxone Max (paraquat) sometimes with a pint of 2,4-D ester. Increase of weed size will lead to decreased weed control requiring increased rates with some products.

Roundup UltraMax rate recommendations are 24 to 48 oz./A to control giant ragweed that is from emergence to 11" tall. Be aware that glyphosate takes from 5 to 14 days to dry down controlled weeds. For the sake of speed, Gramoxone Max (paraquat) may be considered. Gramoxone Max's label recommends the use of 1.3-1.7 pt./A for 1 - 3" weeds, 1.7 - 2 pt./A for 3 - 6" weeds, and 2 - 2.7 pt./A for 6" weeds. However, this year many of the weeds will be beyond optimum size for control. The use of a disk may be needed to knock down large annuals and return things to a fair playing field. It is not recommended that you plant into a full bed of vegetation. This may interfere with your planter's efficacy.

If a burndown is applied, many producers might choose to skip the use of a PRE. However, many PRE applications can be applied after planting, but before emergence, possibly opening up a window in areas where it is needed. Several producers may be going to a complete POST program even if they have not done so in the past. The use of a POST applied product with some residual activity or tank mixing a product with some residual is recommended. Atrazine + oil, Basis, Bicep II Magnum, Bullet, Callisto, Dual II Magnum, FulTime, Guardsman Max, Hornet WDG, Pursuit DG, or TopNotch in corn. Aim, Backdraft, Extreme, FirstRate,

and Pursuit DG are herbicides that can be applied POST in soybean that have some residual components. See labels for rotation restrictions on specific products.

A good system for this year will be the Roundup Ready system. However, many people may take this stance, if not already planned, and Roundup Ready seed may be in high demand becoming scarce for those that are looking to buy seed this late in the season. Due to the size of weeds, two applications at higher rates may be required (see above). One application of Roundup UltraMax (see specific labels for other glyphosate products) at 32 fl. oz. / A then a second application at the same rate at least 14 days later. In the case of Roundup UltraMax, Touchdown, Glyphomax Plus do not apply more than 2.4, 3, 3 qt. / A / cropping season, respectively. No matter what is done certain weeds will still be problematic.

Canada Thistle

Canada thistle is a difficult perennial to control without the fact that these cool wet temperatures are optimum for growth. Many of the herbicides applied in a POST system may only suppress Canada thistle by burning the surface parts. Several applications of contact herbicides can wear down underground root systems or suppress Canada thistle; however, this year it

may be difficult enough to get two applications in the field. The use of translocating (herbicides that move through the plant) herbicides are required to control the underground portions. Work done at Purdue University by Dr. Merrill Ross suggested that the optimum time to treat Canada thistle in Indiana with glyphosate is in late May to early June, when the plant is at least 10" tall after flower buds are formed, but before flowers open. More than one application is recommended three to 12 months apart. During the hot dry part of summer, Canada thistle stops growing. At this time, efficacy on controlling the underground root system will be reduced greatly. If at this time it is impossible to apply herbicides or the Canada thistle is past the above point of development, applications can also be made when the fall regrowth occurs in late September and early October.

In corn, combinations of dicamba (Banvel, Clarity, Distinct), 2,4-D (many trade names), Beacon (primisulfuron), and Basagran (bentazone) can suppress Canada thistle. Stinger (clopyralid) is effective on Canada thistle applied at 1/3 to 2/3 pt. / A (dependent on infestation) from the rosette to the bud stage. This stage may already be past for much of the Canada thistle in Indiana this year. Also, Stinger has a 10.5 to 18 month rotation restriction into soybean depending on amount of organic matter and rainfall.

Plant Diseases

Leaf Blotch of Wheat - (Gregory Shaner) -

- The wet weather has persisted, so leaf blotch is likely to develop

Two weeks ago I wrote an article about leaf blotch of wheat. In this article, I discussed a weather-based model for predicting leaf blotch severity, but at the time did not yet have all the weather data required. I ran the model today, and it predicts a severity of 91%. This means that most of the flag leaf and all of the leaves below will be killed prematurely by infections of *Septoria tritici* and *Stagonospora nodorum*. This model was developed from data collected at Lafayette, and its applicability to other areas of the state has not been tested rigorously. Most of Indiana has had the persistently wet weather that favors leaf blotch. What makes disease prediction a tough call is the cool nights. At many stations, daily minimum temperatures over the past 3 weeks have dropped below 45°F on several nights. A minimum temperature of 45°F seems to be a lower threshold for the disease.

Leaf blotch symptoms were already on the third leaf down (Flag-2) of most varieties in a wheat trial located at the Southwest Purdue Ag Center last Thursday (5-9). Most varieties were in the early flowering stage. Leaf blotch will likely become severe on this wheat. In a

similar trial at the Southeast Purdue Ag Center (Jennings Co.), wheat was still in the boot stage (the trial was planted late, mid November). Obvious symptoms of leaf blotch were mainly confined to the fourth leaf down, but very small lesions were evident on Flag-2 and Flag-1. Given the prolonged periods of rainfall that have plagued much of the state, I think it is likely that leaf blotch will be widespread.

The article that appeared in issue no. 7 of *Pest&Crop* (May 3) discussed options for using fungicides to control leaf blotch.

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Scab of Wheat - (Gregory Shaner) -

- Be on the lookout for head scab

Scab (aka *Fusarium* head blight) of wheat is another wet weather disease. Long periods of wet, humid weather while wheat is flowering are conducive to the disease. Wheat in southern Indiana that was flowering during recent rains may have already been infected. Wheat farther north will be at risk if rains move into the

state again as the crop reaches the flowering stage. Wheat that is planted into corn residue or near a source of residue is at greater risk, but when weather is very favorable, even wheat at some distance from corn residue can be infected.

Scab is caused by any of several fungi in the genus *Fusarium*. In the Corn Belt, *Fusarium graminearum* is the species that is principally responsible. *Fusarium graminearum* is also a pathogen of corn, causing *Gibberella* ear rot and stalk rot (I won't go into the reason here why the same fungus has two different names). The fungus overwinters in residue of wheat or corn plants that were infected the previous year. With the far greater amount of corn residue compared to wheat residue in this part of the country at this time of year, corn residue is the main source of inoculum. Inoculum (the infective form of the fungus) consists of airborne ascospores produced on crop residue.

Moisture plays two roles in the epidemiology of wheat scab. It promotes the development and release of ascospores on corn residue and it provides the conditions necessary for these spores to infect wheat. The fungus infects wheat flowers directly. Anthers, which extrude shortly after pollen is shed, are the main site of infection, but spores can also infect the wheat ovary after flowering is complete. The fungus invades the developing wheat kernel, where it largely replaces the endosperm. Then it moves into the rachis and spreads up and down to infect other kernels in the head. An infected kernel is shriveled, the degree depending on how early in its development it was infected.

Symptoms may appear only a week or so after completion of flowering, depending on temperature. Often, only a few spikelets on a head will show symptoms initially. These will be bleached. Affected spikelets may be at the tip of head, at the base, or somewhere near the middle. It depends on what portion of the head was flowering when infection occurred. (Flowering begins near the middle of a wheat head, then progresses both up and down). Over the next couple of weeks, blight symptoms will spread throughout the head, as the fungus moves into the rachis. Spread will be restricted on varieties with some degree of resistance.

Scab can not only reduce yield and test weight, but result in grain that is contaminated with toxins produced by the scab fungus. The main toxin of concern is deoxynivalenol (DON, or vomitoxin). Elevators will dock wheat that contains more than a minimal amount of DON (~ 2ppm), and may reject wheat that has more than some upper limit (the upper limit is not precisely defined in the grain trade, so I am not putting in a number).

There are no currently registered fungicides that are effective against scab. Even if a field was sprayed with a fungicide (e.g., Tilt or Stratego, under a Section 24(c)

label) at full head emergence, for control of leaf diseases, there may be little or no control of scab.

Varieties with some degree of resistance to scab are starting to move into production, but most varieties adapted to Indiana are susceptible.

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Switching from Corn to Soybeans - (Gregory Shaner)

- Second year soybeans may result in some serious disease problems

If a field intended for corn cannot be planted before late May, a grower may elect to switch to soybeans. Because most of Indiana's field crop acreage is in a corn-soybean rotation, this will mean a second year of soybeans in a field. Soilborne microorganisms cause several major diseases of soybeans in Indiana, such as soybean cyst nematode, *Phytophthora* rot, sudden death syndrome, white mold, and brown stem rot. In fields with a history of soybean cyst nematode, sudden death syndrome, or white mold it is particularly important to avoid second year soybeans. A second year of soybeans in a field that has had any of these problems can lead to a much greater problem this year, and problems for many years to come. The pathogens responsible for these diseases build up during a year of soybean production, but will decline somewhat during the "off" year of corn. If soybeans are grown sequentially, this can result in a huge population of the pathogen in the soil. Even though a grower returns to the corn-soybean rotation after 2 years of soybeans, the higher pathogen population may persist for many years.

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Seedling Blight on Corn - (Gregory Shaner) -

- Wet, cool soils are ideal for fungi that attack corn seedlings

Seed or seedlings in the few cornfields already planted have been sitting in cool, wet (saturated) soils for 2 or 3 weeks. Stand thinning may occur through the activity of several soilborne fungi that infect sprouting seed or young seedlings. Plants do not need to be in ponded areas for this to occur. Seed infected early in the sprouting process may not produce a seedling. Seedlings infected somewhat later will grow slowly compared to neighboring healthy plants, turn pale green and yellow, and then usually die. Virtually all seed corn is treated with fungicides, but effectiveness of these products diminishes with time. It's a good idea to check planted fields, once it is possible to walk in them, to see if stand thinning is occurring.

Agronomy Tips

Toad Stranglers, Goose Drownders, and Corn Survival - (Bob Nielsen) -

- Young corn (V6 or less) can survive 2 to 4 days of flooding or saturated soils

Recent intense rainfall events (technically referred to as 'toad stranglers' or 'goose drownders') have left its mark on the 2002 corn and soybean planting season in Indiana. Of the very few farmers that have been able to plant corn in between the rainy spells, some are now wondering what to expect from corn fields that are under water or simply saturated.

Corn, like most crops, requires high levels of soil oxygen to successfully germinate. Flooded or ponded soils, or soils that are simply saturated, contain very little available soil oxygen. Germination won't occur until soils dry out sufficiently. Soil oxygen is also essential for the metabolic processes of a developing seedling, including the active absorption and transport of nutrients from the soil. Without oxygen, the plant cannot perform critical life sustaining functions; e.g. nutrient and water uptake is impaired, root growth is inhibited, etc.

Anyway you look at it, flooded or saturated soils are not conducive to good germination or early seedling growth of corn. How long can corn withstand the oxygen-depleting effects of saturated soils?

Prior to leaf stage V6 (six-leaf stage as measured by visible leaf collars), corn can survive only two to four days of flooded conditions. If temperatures are warm during flooding (greater than 77°F) such young plants may not survive 24 hours. Cooler temperatures prolong survival. Compounding the outright effects of depleted soil oxygen reserves is the risk of soil-borne diseases on seeds or seedlings that are already stressed.

Plants younger than V6 are susceptible to damage for two reasons. First of all, the growing point in such young corn is at or below the soil surface and therefore is also subject to the stress of oxygen-depleted conditions.

Secondly, plants younger than V6 are in the process of trying to successfully establish a vigorous root system. Stunting or death of roots by oxygen-depletion can be a major stress for a plant that is not yet fully established.

Obviously, only time will tell whether a corn field that has been under water or saturated for long periods of time will require replanting. As you walk or wade through your fields and dig plants or seed, look for the obvious discoloration of the seeds or seedlings that indicates disease or death of the plant tissue.

Other flooding/ponding on-line references:

- Hail and Flooding Damage in Corn (Univ. of Illinois, 1999) <<http://spectre.ag.uiuc.edu/cespubs/pest/articles/199913h.html>>
- Effects of Flooding and Ponding on Corn (AGF-118-95)(Ohio State Univ.) <<http://www.ag.ohio-state.edu/~ohioline/agf-fact/0118.html>>
- Genetic Help on the Way for Flood-Prone Corn (USDA-ARS, 1999) <<http://www.ars.usda.gov/is/pr/1999/990426.htm>>
- Corn survival in wet conditions (Iowa State Univ., 1999) <<http://www.ent.iastate.edu/ipm/icm/1999/5-24-1999/wetcorn.html>>
- Predicting Early Season N Loss (Purdue Univ., 1998) <<http://www.kingcorn.org/news/articles.98/smb9802.html>>

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Late-Planted Corn & Seeding Rates - (Bob Nielsen and P.R. Thomison, Hort. & Crop Sci. Dept, The Ohio State Univ., Columbus, OH) -

- What seeding rates are optimum for normal planting dates?
- General advice: Don't change from optimum rates
- Certain exceptions may call for increasing or decreasing rates

Among the many questions raised by Indiana & Ohio corn growers as the rain-delayed planting season continues is whether delayed planting should influence their seeding rate decisions for corn. As might be expected, several factors need to be considered.

First of all, what defines 'optimum' final population for corn in our two states? For most of our production areas, the answer is a range of final stands from 28-32,000 plants per acre (Nafziger, 1994; Paszkiewicz & Butzen, 2001). Some exceptions exist for that rule of thumb. Marginally yielding soils (consistently less than

about 120 bu / ac) probably respond best to final populations nearer to 24,000 plants per acre, while exceptionally high yielding environments (greater than 180 bu / ac) probably respond better at final stands approaching 34-36,000 plants per acre (Paszkievicz and Butzen, 2001).

So, the first step for Indiana & Ohio corn growers when considering late planting consequences for seeding rates is to determine whether they are normally seeding at rates that will achieve the optimum final stands for the productivity level of each field in their operation. Typically, seeding rates are calculated based on an assumed 90 percent success of germination, emergence, and seedling survival. For example, to achieve a targeted final stand of 30,000 plants per acre at harvest, one would seed at a rate equal to about 33,300 seeds per acre (30,000 divided by 0.90).

If you are already following these seeding rate guidelines, then delayed planting should not alter those seeding rates because the range of optimum final plant populations is similar for early and late planted corn. Table 1 illustrates the similarity of yield responses to population for corn planted at varying planting dates in research conducted by the Univ. of Illinois. Regardless of planting date, optimum grain yield occurs for most situations within a similar range of final populations.

Caveats: Choose What Fits Your Situation.

That said, it is important to recognize that no two farming situations are the same. Caveats and exceptions abound and should be considered when making a decision about seeding rates for late plantings.

Scenario #1: Soil temperatures for corn planted in late May or early June will be quite warm relative to that of usual late April or early May plantings. Couple that with the likely ample availability of soil moisture and the odds are that germination and emergence success will be greater than normal. Consequently, you may elect to reduce your seeding rate accordingly. Instead of planting 33,300 seeds to achieve 30,000 plants (90% success rate), you may elect to plant only 30,600 seeds per acre (98% success rate).

Scenario #2: If you eventually switch from your normal hybrid maturity to a much earlier maturity hybrid, you may actually want to increase your seeding rates by several thousand. Hybrid maturities (see Nielsen's article on hybrid maturities in the May 10 *Pest&Crop*) of 100-day CRM or less often respond better to higher final stands than later maturity hybrids. Instead of aiming for final stands from 28-30,000 plants per acre, these very short season hybrids may respond better to final stands of 34-36,000 plants per acre (Paszkievicz and Butzen, 2001). Consult your seed company sales representative for specific hybrid planting rate information.

Scenario #3: Later planted corn will be taller than early planted corn because its stalk elongation phase occurs during a time period that is relatively warmer (later in the season) than when early planted corn goes through the same phase. Not only will the plants themselves be taller, but ear placement will also be higher (same stalk node, but higher off the ground due to stalk elongation).

Consequently, a hybrid that is on the tall side to begin with will be even taller and its ears placed higher when planted unusually late. Such a combination of a tall hybrid and delayed planting will result in an increased risk of stalk lodging this fall if strong windstorms occur before harvest (anyone remember last October?).

One strategy to minimize this risk is to seed such a hybrid at rates closer to the low end of the optimum range in order to minimize the plant-to-plant competition that can cause etiolation (elongation under shade conditions) and thinner diameter stalks. Another strategy is to simply switch to a physically shorter hybrid.

Scenario #4: Later planting of corn, in and of itself, does not increase the risk of stalk rot development later in the season. However, taller, high-eared, late-planted corn will be more susceptible to the stalk lodging consequences of stalk rot IF stalk rot develops.

One of the primary factors that contributes to stalk rot development is severe stress (heat, dry soils, disease, hail, insects, cloudy weather, soil compaction) occurring early in the grain filling period that severely limits photosynthesis. The timing of that stress relative to grain filling is the critical determinant to whether stalk rots develop in corn of any planting date (anyone remember two years ago?). Planting strategies to minimize this risk would be similar to those of Scenario #3 above, as well as to avoid wet fieldwork (compaction) yet this spring.

Scenario #5: There will undoubtedly be a few fields tilled and planted on the wet side once field conditions get even close to being suitable for field work over the next few weeks. One consequence of doing so is a cloddy seedbed that does NOT promote good seed-to-soil contact for rapid and uniform germination.

IF the weather should suddenly switch from frequent rains to total dryness after such fields were worked and planted, germination would be extremely variable, if not disappointing (anyone remember 1991?). Along with the cloddy seedbed preparation, tilling and planting wet fields creates various forms of soil compaction (see T. Vyn's article in the May 10 *Pest&Crop*) that are not conducive for successful root development.

IF you are forced into this wet fieldwork scenario, you may want to increase your seeding rate beyond what you normally use, in anticipation of unsuccessful stand establishment. Similarly, IF you decide to forgo some tillage in fields where seedbed conditions are marginal (characterized by a cloddy surface, ruts, uneven residue distribution) and plant no-till, you may want to increase seeding rates to compensate for the higher probability of greater seedling mortality.

Related Information

Nafziger, E.D. 1994. Corn planting date and plant population. *J. Prod. Ag.* 7:59-62.

Paszkiwicz, Steve and Steve Butzen. 2001. Corn Hybrid Response to Plant Population [Online]. *Crop Insights*, Vol. 11, No. 6. Pioneer Hi-Bred Int'l Inc., Johnston, IA. Available at <http://www.pioneer.com/agronomy/corn/population_response.htm> (Verified 5/9/02).

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>>.

Table 1. Expected corn grain yield due to various planting dates and final plant populations.														
Planting Date	Plant population (final) per acre													
	10,000	12,000	14,000	16,000	18,000	20,000	22,000	24,000	26,000	28,000	30,000	32,000	34,000	36,000
Percent of optimum yield														
10-April	62	68	73	78	82	85	88	91	92	93	94	94	93	91
15-April	65	71	76	81	85	88	91	94	95	96	97	96	96	94
20-April	67	73	78	83	87	90	93	96	97	98	99	98	98	96
25-April	68	74	79	84	88	92	94	97	98	99	100	100	99	97
30-April	68	74	79	84	88	92	95	97	99	100	100	100	99	97
05-May	67	73	79	82	87	91	94	96	98	99	99	99	98	97
10-May	65	71	77	82	86	89	92	94	96	97	97	97	96	95
15-May	63	69	74	79	83	87	89	92	93	94	95	95	94	92
20-May	59	65	71	75	80	83	86	88	90	91	91	91	90	89
25-May	55	61	66	71	75	79	81	84	85	86	87	87	86	84
30-May	49	55	61	65	70	73	76	78	80	81	81	81	80	79

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



Use No-till in Delayed Planting of Both Corn and Soybean – (Tony J. Vyn, T. D. West and G. Steinhardt) -

Introduction:

In previous articles in the *Pest&Crop*, I made the assertion that there is even more reason to plant no-till the longer that planting is delayed by wet weather. That recommendation is consistent for both corn and soybeans, and for rotation or continuous cropping situations, as long as suitable equipment is used and management (including pests) are near optimum. Farmers are (understandably) reluctant to change their time-honored tillage practices in the face of adverse weather, but

are more likely to change when there are sound reasons for doing so. What follows is our attempt to explain some of the basis for our recommendation.

Evidence from Indiana:

Although there have been specific tillage trials conducted with multiple planting dates in other states, the local evidence supporting the recommendation for no-till in delayed planting situations is based on long-term experience. The best circumstantial evidence is our 27-year history of yield responses of corn and soybean to chisel plowing versus no-till planting on poorly drained, silty clay loam soils at the Agronomy Research Center (West Lafayette, IN) (see Tables 1 and 2). This

particular study has received careful management throughout that whole period.

Table 1. Tillage system effects on corn yields in various planting date ranges at the Agronomy Research Center, West Lafayette, IN (1975-2001).

Date*	Number of Years	Corn-Soybean			Continuous Corn		
		Chisel	No-till	Loss with No-till	Chisel	No-till	Loss with No-till
		-- Yield (bu./ac.) --	(%)		-- Yield (bu./ac.) --	(%)	
April 20-30	10	181.3	173.5	4.3	167.9	145.4	13
May 1-10	11	173.7	171.1	1.5	160.9	144.2	10
May 11-20	3	189.8	185.9	2.1	175.8	158.5	10
May 21-31	3	151.2	149.9	0.9	138.7	130.6	6

*May 11 to 20 range is represented by 1993, 1998 and 1999.

Table 2. Tillage system effects on soybean yields as influenced by planting date ranges at the Agronomy Research Center, West Lafayette, IN (1975-2001).

Date*	Number of Years	Corn-Soybean			Continuous Corn		
		Chisel	No-till	Loss with No-till	Chisel	No-till	Loss with No-till
		-- Yield (bu./ac.) --	(%)		-- Yield (bu./ac.) --	(%)	
May 1-10	5	51.9	49.2	5.2	45.1	43.7	3.2
May 11-20	15	52.5	51.2	2.5	47.2	47.4	0.4
May 21-31	5	48.4	49.4	-2.1	43.5	45.5	-4.6

*Note: Data from 25 years only; planting dates in June (1995 and 1996) were excluded.

The planting date each year was consistently the first available opportunity - based on soil moisture in the seedbed zone - to do satisfactory secondary tillage on plowed plots after the calendar date of April 20 for corn, and after May 1 for soybeans. The planting dates that we achieved represent the practical range of what area farmers experienced in that 27-year period on similar tile-drained soils. The interpretation of the data might also be aided if the reader is aware that 5 year average yields of both corn and soybeans have remained fairly constant with time (i.e., no general increase in that 27 year period). Rotation corn averaged 176 bushels and rotation soybeans averaged 51 bushels per acre from 1975 to 2001.

It is not fair to compare yield data in either Table 1 or 2 among planting dates because corn hybrids changed 9 times, soybean varieties changes 13 times, and because we don't have either multiple planting dates within a year or an equivalent number of years represented within each 10-day interval. However, the results can be used appropriately to compare relative crop responses to tillage system or rotation within the planting period.

With corn following soybeans or corn, it is quite clear that no-till is more likely to result in similar yields as after chisel plowing when corn is planted in late May versus late April (Table 1). Based on these results, no farmer can afford to do tillage for corn if yield responses are less than 4 bushels per acre. Furthermore, additional planting delays and cloddy seedbeds with tillage involve even more risk of yield loss.

For soybeans following corn, or for soybeans after soybeans, it is also quite clear that there is progressively more yield advantage with the no-till system as planting date is delayed (Table 2). In fact, soybean yields with no-till have averaged higher than those with conventional tillage with planting dates after May 20. So even if farmers decide to shift acreage into soybean from corn and, consequently, plant soybeans after soybeans, both income and time would be lost by doing unnecessary tillage.

Additional Suggestions for Moist Soil Situations:

1. For no-till corn, plant populations may be improved by the use of seed firmers if planting in moist soils.
2. Surface soil drying can be enhanced by residue cleaning with row cleaners from the row area or by residue disturbance with rotary harrows in advance of planting.
3. Chemical weed control is essential for system success. If rains have prevented timely burndown or residual herbicide application and certain problem weeds are beyond the stage for satisfactory chemical control, tillage may be required.
4. Banding of starter fertilizer for corn is less beneficial with progressively later no-till planting.
5. Achievement of a uniform planting depth and good closure of the seed furrow is essential (especially if dry weather follows planting into marginal soil moisture situations).

Summary:

No-till becomes a more and more expedient and practical system with progressively later planting of either corn or soybeans. Long-term success with no-till, fall strip-till and other high residue systems for corn will, or course, require careful attention to drainage, fertility and pest management. But even in this difficult spring, farmers might benefit from no-till or stale seedbed planting systems. In fact, planting delays makes conservation tillage more imperative.

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Agronomic Reasons Not to Switch From Corn to Soybean - (Tony J. Vyn, Robert L. Nielsen, and Ellsworth P. Christmas) -

Introduction:

Planting delays always involve difficult decisions, and one of the most involved is whether (or when) to switch intended corn acres to soybean. Factors include relative yield expectations, anticipated prices, livestock feed requirements, specialty production contracts, planting rate capabilities, seed supplies, and agronomic considerations. The latter will be discussed in this article as one way to assist producers in making that difficult decision. Our bias is reflected in the title; namely, most farmers shouldn't switch from corn to soybean until at least the end of May if the following agronomic factors are important to them:

1. Soybean Yield Loss in 2002.

For those farmers who are currently involved in a 50% corn, 50% soybean sequence, our long-term data suggest a yield reduction for soybeans after soybeans averaging 10%, and possibly as high as 20% in high stress years, relative to soybeans after corn. Late planting of soybeans doesn't usually reduce stress incidence, so factor in at least a 10% yield loss for fields where soybean follows soybean.

2. Soybean Yield Loss in 2003.

If conventional 50/50 farmers switch intended corn acreage to soybeans in 2002, then they will also experience a yield loss should they want to get back to the 50/50 cropping scheme in 2003. Thus, a 1000 acre farmer who plants 700 acres of soybeans, but only 300 acres of corn in 2002, will necessarily plant 200 of the 500 acres of soybeans in 2003 into previous crop soybean (if the 50% soybean base is resumed in 2003). Note that in this scenario, only 300 of the 500 soybean acres in 2003 would be planted following corn. In addition, the 200 acres of corn in 2004 after two years of successive soybean will experience no yield benefit from following two soybean crops versus one soybean crop.

3. Increased Risk of Soybean Disease.

Multiple years of soybean encourages more soil-borne diseases like soybean cyst nematode (SCN), sudden death syndrome, and white mold. The risk associated with soybean after soybean is not worth taking if a farmer already has significant SCN populations and seed of varieties with the appropriate resistance are not available. Farmers are advised not to proceed with second year soybean using a susceptible variety if they aren't confident about the lack of (or extent of) SCN presence in particular fields. Nematode numbers may jump dramatically with a susceptible variety, and soybean yields may be negatively affected for years. Was the soil tested

for SCN levels in 2001? If not, plan rotation changes with caution. Decisions on short-term economics may compromise income from soybean crops in future years.

4. Weed Control.

If residual herbicides specific to corn were applied last fall or this spring, then there is no alternative but to plant corn. Since the majority of the soybeans are Roundup Ready™ varieties, the risks of potential weed resistance to glyphosate only increase when glyphosate is the only herbicide used in successive years.

5. Yield Levels of Available Varieties.

The potential yields of any crop are limited by their inherent genetic capabilities. Obtaining seed of high yielding soybean varieties could be a challenge at this late date. The corn yield loss of 1 bu/acre/day of delayed planting (in May) of the elite hybrid still in the machinery shed will, in many cases, be a smaller economic sacrifice than planting potentially mediocre yielding soybean varieties (which are also losing 0.25 to 0.4 bu/acre/day in yield potential after May 20). Indeed, though the odds diminish as the calendar advances, yields in the 130 to 200 bushel per acre range are still theoretically possible for corn planted after May 20.

6. Nutrient Efficiency.

If nitrogen (N) fertilizer for corn was already applied, every attempt should be made to plant corn to avoid economic loss (N fertilizer and application costs) as well as inefficient nutrient utilization. Although soybeans can utilize available N from the fertilizer source (and, in the process, fix less of its own N via the nodules) there is little benefit to the soybean crop from doing so. Environmentally, corn roots will probably capture more of the mineralized N from the N fertilizer source than soybean roots will.

7. Reductions in Soil Quality.

Three factors of soil quality are threatened when the proportion of soybeans in rotation increases. One is the reduction in soil organic matter since less biomass is returned compared to grain corn. The second is poorer soil structural stability (less stable aggregates) because soybean root and shoot material decomposes so much faster than corn, and has historically not provided the same level of temporary soil "bonds". Third, soil residue cover persisting after soybean is much less than after corn. Thus, the soil erosion potential in the spring after 2 years of soybean production is higher than that after a corn-soybean rotation. An interesting footnote is that 2-year old corn residue makes up approximately 50% of the residue weight on the soil surface in the spring after no-till soybean follows grain corn.

Those who can least “afford” to plant soybean after soybean are those on sloping soils with low organic matter levels. Future crop yield potential is sacrificed when soil is lost.

Summary:

All seven of these agronomic factors should be considered before the decision is made to switch intended corn acres to soybean in May. If planting delays continue past early June, there are more economic reasons to switch corn acreage to soybean. The actual date in June when that occurs varies with the remaining season length in different areas of the state. However, in May at least, there are at least seven agronomic reasons in favor of retaining corn.

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A Collision is About to Happen as the Race to Farm Begins - (Keith Johnson) -

- Wet conditions are delaying corn and soybean planting, and hay harvest
- On-farm resources of labor and equipment likely not adequate to get procedures accomplished in short order
- Planning labor and equipment strategies could get more farm-related tasks accomplished when sunny weather returns

Most farmers have their tractors attached to the corn planter, soybean drill and/or hay mower-conditioner waiting for a break in the wet weather to get to the important farming tasks at hand. With the persistent wet weather and the increasing reality that delayed corn/soybean planting and forage harvest is reducing potential income, now is the time to lessen the effect of the “too much to do with too little time” collision by evaluating your labor and/or equipment needs.

The reduced income concern for forage crops is not primarily related to yield, but is related to loss of quality as the crop matures. As forages mature they increase in cell wall content (fiber) and, thus, are less digestible as compared to being harvested in a less mature stage of growth. Forages will also decline in crude protein content as they mature. As an example, alfalfa harvested at very early flower may have a value of over \$100 per ton, but will quickly devalue to less than \$80 per ton if harvested at mid-flower.

Part of the answer to reducing potential income lost is enlisting the help of capable people. Are there retired farmers or individuals that work the traditional 40 hours-per-week job, but willing to work more, within your

community that could be enlisted to get through the time crunch? With capable help it should be feasible to get more tasks accomplished during a day and be dollars ahead than “going it alone.”

Individuals that custom-harvest forages will struggle more than usual this year in getting the first hay crop packaged with high quality in timely fashion. Individuals that do not have a contract with a custom operator may want to seek other means of being “closer to the front of the line” in getting hay harvested so it has better quality than straw. Is there idle forage harvest equipment at a farm or at an equipment dealer’s lot that could be leased and operated by you or another person that has experience with safe use of the equipment?

Planning is an important part of any effective business. Some quick planning now regarding labor and equipment could help get more farm-related tasks accomplished when sunny weather occurs again.

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Improving Hay Drying Rates with Proper Mower-Conditioner Setup and Maintenance - (Jeremy Sweeten, Graduate Student in Agronomy) -

- Proper mower-conditioner setup improves hay drying rates
- The goal is to have 90% of the crop conditioned, with only 5% leaf bruising
- Check your mower-conditioner before each harvest

Indiana hay production can be very challenging due to the high humidity environment and unexpected rainfall. High quality hay is an important commodity in Indiana due to the demand brought on by the ruminant livestock and horse industry. Research (C.A. Rotz et al. 1987. Transactions ASAE 30(3):630-635) has shown that a properly set mower-conditioner can reduce the drying rate of first cutting alfalfa by 80% as compared to using a sickle bar mower. This research also indicates that a mower-conditioner is the best investment for reducing hay-drying time. Consider the following points for proper mower-conditioner setup and adjustment.

The first item to look at on a mower-conditioner is the cutting mechanism. There are two types offered by equipment manufacturers. The first type of cutting system is a sickle bar mower-conditioner and the second type is a disc mower-conditioner. Either type of cutting system is very effective when it is properly maintained. On sickle bar mower-conditioners it is important that the sickle knives are sharp and properly held down to the guards with the hold-down clips. It is also important to make sure the points of the guards are not bent and that the feather sheet, the place where the guards bolt on, is straight across the entire width of the machine.

Refer to the owner's manual on how to straighten or replace the guards. On disc mower-conditioners, it is important to make sure the knives are sharp. If they are dull, chipped, or worn, they need to be replaced. A properly maintained cutting system will enable the entire crop to be harvested at the correct height and then allow it to flow smoothly through the mower-conditioner.

The reel found on sickle bar mower-conditioners is the next item to adjust. The reel effects how the crop material is fed through the machine. If it is not set at the correct position and speed, you could experience bunching and wadding in front of the conditioning rolls or the forage wrapping around the reel. For down and tangled crops, such as a late-harvest first cutting of alfalfa, the reel speed needs to be set up to 25% faster than the ground operating speed. However, if the crop is short and light, then the reel should be set to match the ground speed. If the reel is wrapping forage around itself or throwing forage out in front of the mower-conditioner, then the reel is set too fast. If the reel is set too slow, the conditioning rolls will not feed smoothly and evenly. If the rolls result in clumps or slugs, then there is the potential for the hay to have moldy spots because the clumps or slugs will dry slower than rest of the windrow.

The final and most important item to examine is the conditioning rolls. The function of the conditioning rolls is to crimp or crack the stems of grasses and legumes (Figure 1).



Crimped Stem



Linear Crack

Figure 1. Crimped and cracked stems

The following is a list to follow when setting up the conditioning rolls on your mower-conditioner.

- Goal of mechanical conditioning: To have ninety percent of the crop's stems show some signs of being cracked or crimped.
- Conditioning roll gap ranges between 0.060 to 0.090 inch (1/16 to 3/32"). Ideally, it should be about the average diameter of the lower alfalfa stems that is to be cut. The conditioning rolls should not touch or they will wear prematurely and unevenly.
- Conditioning roll gap can be altered with the use of shims located on the roll stops or some type of crank adjustment. Refer to your owner's manual on how to set the specific machine.
- Conditioning roll pressure needs to be adjusted. This is usually set with some type of hand cranks. Refer to your owner's manual on how to set the specific machine.
- No more than five percent of the leaves should show signs of bruising or blackening from conditioning. This is especially important when working with legumes such as alfalfa. Five percent can be identified as the point where the plant leaves are starting to show signs of bruising.
- Crop variables, such as yield, stem diameter, plant moisture, and maturity stage, are always changing and will affect how your mower-conditioner performs. As a result, conditioning roll gap and tension need to be checked and the needed adjustments made for every harvest.
- Over conditioning will cost money because excess leaf loss during the drying process will occur and reduce the overall yield and quality of the crop.
- Under conditioning will increase the risk of rain damage and more mechanical manipulation of the hay will be needed to get it dry.

Weather Update

MAP KEY				
Location				
HU41	HU48	HU50	GDD(2)	GDD(10)

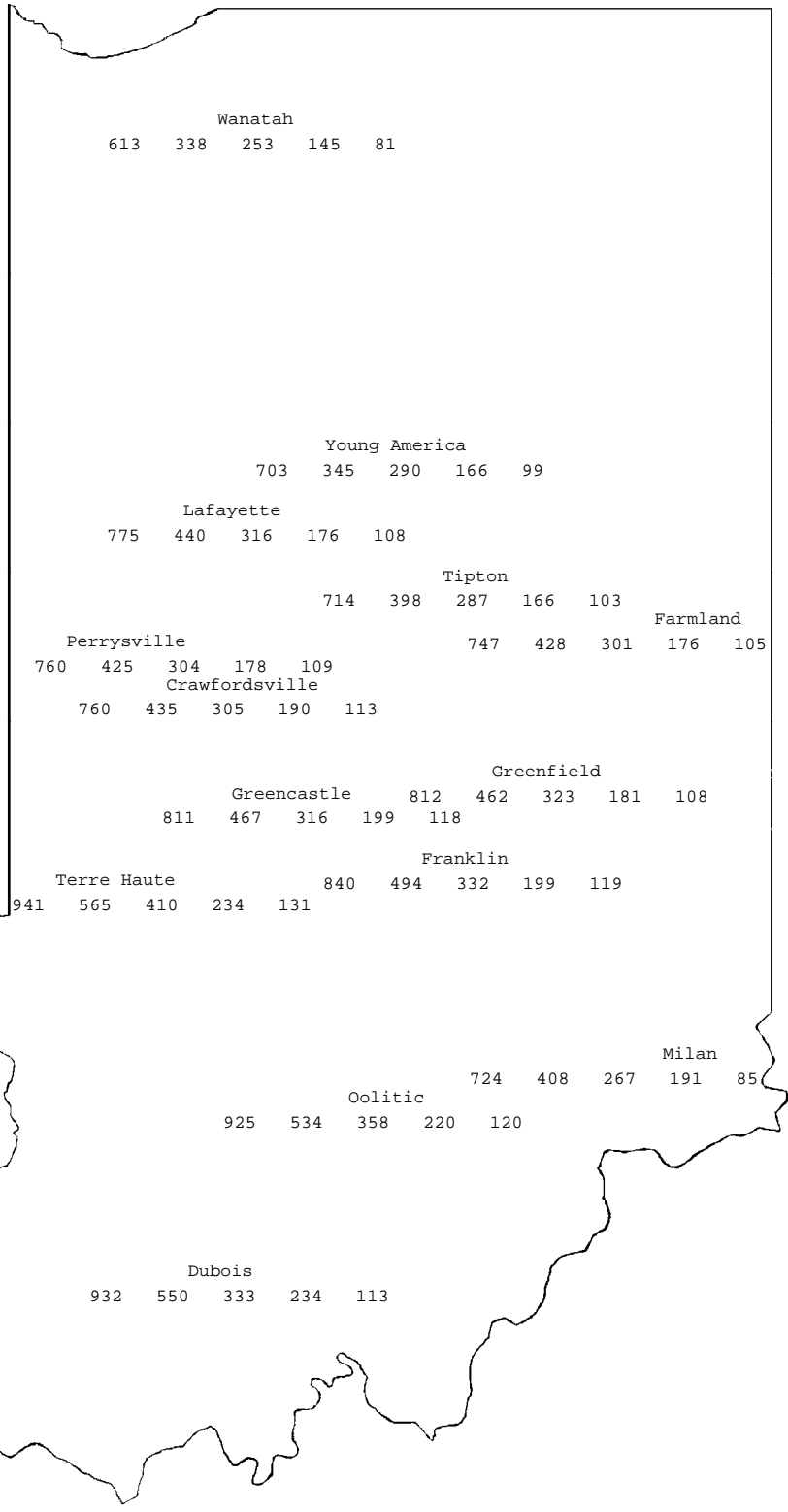
Temperature Accumulations from Jan. 1 to May 15, 2002

HU41 = heat units at a 41°F base from Jan. 1, stalk borer egg hatch begins by 600
 HU48 = heat units at a 48°F base from Jan. 1, for alfalfa weevil development (begin scouting at 200)
 HU50 = heat units at a 50°F base from date of intensive moth capture, for black cutworm development (larval cutting begins about 300)
 GDD(2) = Growing Degree Days from April 21 (2% of Indiana's corn planted), for corn growth and development
 GDD(10) = Growing Degree Days from May 5 (10% of Indiana's corn planted), for corn growth and development

4" Bare Soil Temperatures 5/15/02

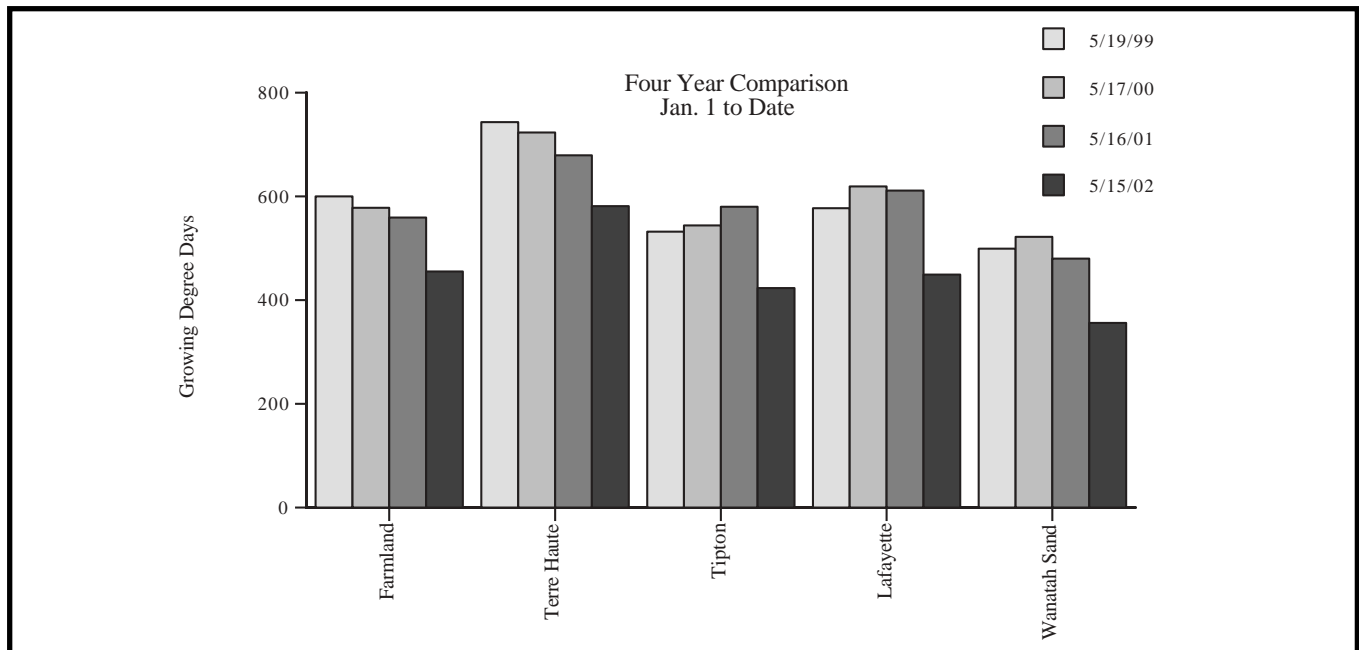
Location	Max.	Min.
Whitford Mills	55	53
Wanatah	67	50
Columbia City	58	45
Winamac	66	50
W Laf Agro	60	45
Tipton	60	56
Farmland	62	48
Perrysville	60	56
Crawfordsville	59	50
Terre Haute	68	49
Oolitic	64	57
Dubois	70	50

Bug Scout says, "Continual black cutworm moth flights indicate that any corn up should be scouted for leaf feeding and/or cutting!"



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