

Integrated Pest & Crop Management

Seed-Borne Wheat Diseases to Consider Before Using Saved Seed for Planting This Fall

By *Laura Sweets*

Wheat harvest is winding down in most of the state and some producers may be thinking of saving seed to use for planting this fall. This is a year when it would be wise to consider the possibility of seed-borne diseases and how they might impact seed quality and stand establishment. The Septoria/Stagonospora complex and bacterial leaf streak/black chaff both came on late in the season causing some head discoloration. After head emergence there were more questions than usual about loose smut. Finally Fusarium head blight or scab was fairly widespread in Missouri this season. All of these pathogens can be carried on or in the wheat seed, reducing germination, causing seedling blights or causing disease problems the next season. If any of these diseases were present at significant levels in a field, it would be best not to use seed from that field for planting this fall. If wheat is going to be saved for seed, this is certainly a year to pay careful attention to the quality of seed being saved.



Glume Blotch

Lesions of **Septoria leaf blotch** begin as light yellow flecks or streaks. These flecks expand into yellow to reddish-brown, irregularly shaped blotches. Dark brown specks (fruiting bodies or pycnida of the causal fungus, *Septoria tritici*) may be scattered within the centers of mature lesions. Lesions may coalesce killing larger areas of leaf tissue. **Stagonospora glume blotch** (formerly called *Septoria glume blotch*) may also begin as light yellow

flecks or streaks on leaves. The lesions also turn yellow to reddish-brown but usually have a more oval to lens



Black Chaff

shaped appearance than those of *Septoria leaf blotch*. Again, the dark brown specks or fungal fruiting bodies of the causal fungus *Stagonospora nodorum* may be evident within the lesions. Symptoms of *Stagonospora glume blotch* are more common on heads than foliage of wheat. Infected heads will have dark blotches on the glumes. *Stagonospora* is more likely to be seed-borne than is *Septoria*. Seed lots infected with *Stagonospora* may have a greater risk

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for stand establishment problems as the fungus can cause seedling blight under a range of soil temperatures.

Bacterial streak and **black chaff** are names for the same bacterial disease which produces symptoms on both leaves and heads. Water-soaked lesions may develop on young leaves. These develop into reddish brown to brownish black streaks on the leaves. Glumes and awns show brown-black blotches or streaks. Black chaff may be confused with glume blotch. Symptoms may not be evident on individual kernels but the bacterial pathogen can be seedborne. Since seed treatment fungicides are not effective against this bacterial pathogen, seed from fields which had bacterial streak and black chaff should not be used for planting.



Loose Smut

fill stages of growth. The kernels on infected heads are replaced with masses of powdery black spores. So the heads have a very obvious, black, powdery appearance. These spores are eventually dislodged by wind and rain, so later in the season the smutted stems are less evident and only the bare rachis will be left. Spores produced on smutted heads are wind carried to adjacent plants in the field and infecting through the flowers. The fungus that causes loose smut survives within the embryo of wheat seeds. Infected seed does not show visible symptoms and will germinate normally. However, if infected seed is planted, the plants growing from those seeds will be infected and develop smutted heads the next season. If seed from a field that



Fusarium Head Blight

This season there were more phone calls than normal related to **loose smut** of wheat. Loose smut would have been quite easy to see in the field at heading and early grain

fill stages of growth. The kernels on infected heads are replaced with masses of powdery black spores. So the heads have a very obvious, black, powdery appearance. These spores are eventually dislodged by wind and rain, so later in the season the smutted stems are less evident and only the bare rachis will be left. Spores produced on smutted heads are wind carried to adjacent plants in the field and infecting through the flowers. The fungus that causes loose smut survives within the embryo of wheat seeds. Infected seed does not show visible symptoms and will germinate normally. However, if infected seed is planted, the plants growing from those seeds will be infected and develop smutted heads the next season. If seed from a field that has a "small" amount of smut in one season is used for seed, the field planted with that seed may have a substantially higher level of smut. Loose

smut is best controlled by planting either disease-free seed or using the proper rate of a systemic fungicide seed treatment labeled for the control of loose smut.

Fusarium head blight or **scab** infection may result in shriveled and shrunken kernels, lightweight bleached or tombstone kernels or kernels that have a pinkish cast or discoloration. Lots with high levels of scab may have lower germination rates. The fungus that causes scab can also cause a seedling blight of wheat. If scab infected seed is used for planting, seedling blights and stand establishment problems may occur. Management of Fusarium seedling blight is through the planting of disease-free seed or a combination of thoroughly cleaning the seed lot, having a germination test run, adjusting the seeding rate to compensate for germination rate and using a fungicide seed treatment effective against seed-borne Fusarium or scab.

If any of the diseases covered in this article were present in a field this past season, it would be prudent not to use seed from that field for planting this fall. If seed must be used for planting it should be thoroughly cleaned to remove all shriveled, shrunken and lightweight kernels. A germination test would be recommended. For Stagonospora, loose smut and Fusarium head blight a fungicide seed treatment may be necessary. A number of fungicides are labeled for use as seed treatment fungicides on winter wheat. These seed treatment fungicides protect germinating seed and young seedlings from seed-borne and soil-borne pathogens. Seed treatment fungicides will not improve germination of seed that has been injured by



Fusarium Head Blight



Scabby Kernels

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environmental factors and will not resurrect dead seed. A correct assessment of the cause of poor seed quality or poor germination rates is the first step in deciding if a seed treatment fungicide is necessary.

Fungicide seed treatments for winter wheat are included in the 2013 Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat, Extension Publication M171. Printed copies of this bulletin are available from the Extension Publications Distribution

Center, 2800 Maguire Blvd., Columbia, MO, 573-882-7216 or on-line at <http://extension.missouri.edu/p/M171> through MU's Extension Publications.

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Missouri Soil Testing Association State Approved Labs for 2013

By Manjula Nathan

The Missouri Soil Testing Association (MSTA) Approval Program is designed to assure that results provided by participating public and private labs serving the citizens of Missouri agree with allowable statistical limits. This is accomplished by evaluating the soil testing laboratories in their performance through inter-laboratory sample exchanges and a statistical evaluation of the analytical data. Based on this premise, soil test results from MSTA approved labs will be accepted by the U.S. Department of Agriculture, Farm Service Agency (FSA) and Department of Natural Resources and Conservation Services (NRCS) in federally assisted cost share programs and nutrient management plans in the state of Missouri.

Beginning in 1999, MSTA combined its efforts with the North American Proficiency Testing Program (NAPT). In order to be approved by the Missouri State program, the participating labs should participate in all four quarter exchanges of the NAPT program and submit the MO State data release form each year to the NAPT coordinator. The NAPT coordinator in return sends soil test data from quarterly sample exchanges of the labs participating in MSTA program to the Missouri state coordinator. The MU Soil Testing Lab director serves as the state program coordinator and performs statistical analysis of the data as specified in the MSTA program. If a lab's results fall within the allowable limits, the lab will be placed on the Farm Service Agency's (FSA) list of approved labs. A lab that is not approved may re-apply after a year. An updated listing of Missouri State Approved Soil Testing lab list can be found at: <http://soilplantlab.missouri.edu/soil/msta.aspx>

List of Missouri State Approved Soil Testing Labs, 2013

- Custom Lab,
204 C St., Golden City, MO 64748
Telephone: 417-537-8337, Fax: 417-537-8337

- Delta Soil Testing Lab, University of Missouri,
PO Box 160, Portageville, MO 63873,
Telephone: 573-379-5431, Fax: 573-379-3383
- MU Soil and Plant Testing Lab, University of Missouri,
23 Mumford Hall, Columbia, MO 65211,
Telephone: 573-882-3250, Fax: 573-884-4288
- Perry Agricultural Lab,
State Highway 54 East, Bowling Green, MO 63334,
Telephone: 573-324-2931, Fax: 573-324-5558
- Ag Source Cooperative Services,
106 N. Cecil Street, PO Box 7, Bonduel, WI 54107,
Telephone: 715-758-2178, Fax: 715-758-2620
- Ag Source Harris Laboratories,
300 Speedway Circle #2, Lincoln NE 68502,
Telephone: 402-476-0300, Fax: 402-476-0302
- Ag Source Laboratories,
1532 Dewitt, Ellsworth, IA 50075,
Telephone: 515-836-4444, Fax: 515-836-4541
- A&L Analytical Laboratories, Inc.,
2790 Whitten Road, Memphis, TN 38133,
Telephone: 901-213-2400, Fax: 901-213-2440
- A&L Canada Laboratories, Inc.,
2136 Jet-stream Road, London, ON N5V 3P5, Canada
Telephone: 519-457-2575, Fax: 519-457-2575
- A&L Great Lakes Laboratory, Inc.,
3505 Conestoga Drive, Fort Wayne, IN 46808,
Telephone: 260-483-4759, Fax: 260-483-5274

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Missouri Soil Testing Association State Approved Labs for 2013

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- ✦ A&L Heartland Laboratory, Inc.
111 Linn St., PO Box 455, Atlantic, IA 50022
Telephone: 901-213-2400, Fax: 901-213-2440
- ✦ Brookside Lab Inc.,
308 S. Main St., New Knoxville, OH 45871
Telephone: 419-753-2448, Fax: 419-753-2949
- ✦ Ingram's Soil Testing Center,
13343 Fitschen Road, Athens, IL 62613
Telephone: 217-636-7500, Fax: 217-636-7500
- ✦ Midwest Laboratories, Inc.,
13611 B St., Omaha, NE 68144-3693
Telephone: 402-334-7770, Fax: 402-334-9121
- ✦ SGS-Toulon Labs,
117 East Main St., Toulon, IL 61483-0518
Telephone: 309-286-2761, Fax: 309-286-6251
- ✦ MVTL Laboratories Inc.-New Ulm
1126 North Front St., New Ulm, MN 56073-0249
Telephone: 507-233-7139, Fax: 507-359-2890
- ✦ Olsen's Agricultural Laboratory,
210 East First St., PO Box 370, McCook, NE 69001
Telephone: 308.345.3670, Fax: 308-345-7880
- ✦ Spectrum Analytical,
1087 Jamison Road, PO Box 639,
Washington Court House, OH 43160
Telephone: 740-335-1562, Fax: 740-335-1104
- ✦ Ward Laboratories,
4007 Cherry Ave., PO Box 788, Kearney, NE 68848
Telephone: 308-234-2418, Fax: 308-234-1940
- ✦ Waters Agricultural Laboratories, Inc.,
257 Newton Highway, PO Box 382, Camilla, GA 31730
Telephone: 229-336-7216, Fax: 229-336-0977
- ✦ Waters Agricultural Laboratories, Inc.,
2101 Old Calhoun Road, Owensboro, KY 42301
Telephone: 270-685-4039, Fax: 270-685-3989
- ✦ SGS Belleville
1511 East Main St, Belleville, IL 62221
Telephone: 618-233-0445, Fax: 618-233-2792

Note: Approval of soil analysis does not imply approval of fertilizer and limestone recommendations by the individual labs. The approval allows the clients to use the University of Missouri soil fertility recommendations as required by the federal and state agencies for cost share and nutrient management planning programs. In order to use the University of Missouri soil fertility recommendations and get meaningful results, it is recommended that the labs use the soil test procedures required by the MSTA program.

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Japanese Beetle Adults Continue to Emerge Across Missouri

By Wayne Bailey

During the past two to three weeks Japanese beetle adults have been emerging in many Missouri counties. Although beetle numbers remain high in some regions of Missouri, in general numbers emerging statewide in 2013 are reduced from numbers observed in years 2011 and 2012. Although the exact cause for reduced Japanese beetle adult numbers remains unknown, the drought of 2012 may be a factor. Female adult Japanese beetles generally lay about 40 to 60 eggs in groups of 1 to 8 eggs during each egg laying event. Typically the female will feed prior

to each egg laying session. After feeding, females will fly to the soil surface close to their feeding site, burrow 2-4 inches into the soil, and deposit eggs. Researchers have speculated that very dry soils may inhibit the ability of the female beetles to efficiently complete egg laying activities. In contrast, lighter soils or soils with elevated sand content may be more optimal egg laying sites and often support heavier beetle populations. Another factor that has been suggested is a shorter survival time of Japanese beetle adults when exposed to severe drought

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conditions. Hot dry conditions reduce the quantity and quality of many host plants resulting in increased beetle completion for limited resources. Similarly, much of the growth of the three white grub Japanese beetle stages takes place during summer into fall following egg hatch. If drought conditions exist during this time, survivorship of these grub stages also may be decreased. As in most biological systems, numerous factors interact to regulate insect populations. The importance of drought conditions in regulating populations of Japanese beetle adults and grubs remain to be determined.

Beetles often gather and feed high (often in full sunlight) on host plants which exude strong odors. Several tree species such as linden, many flowering shrubs, roses, and mature fruit are all favored hosts of this pest. In the United States the Japanese beetle is known to feed on over 400 plant species. Some soybean and corn fields have been sprayed during the past three weeks for this pest. Due to late planting of corn fields in several areas of the state, silks and to a lesser extent tassels have not been available as feeding sites. If beetles emerge into corn fields prior to silk emergence, adult beetles will often feed on corn leaves. Unless infestations are extremely high or silks production will occur within the next few days, this minor defoliation of corn leaves is generally considered non-economic. In contrast, Japanese beetle adult feeding on emerging and recently emerged green corn silks can reduced pollination and subsequent production of kernels. In field corn, an insecticidal treatment is justified if during the silking period an average of 3 or more beetles are present per ear tip, silks have been clipped to ½ inch or less in length from the ear tip, and pollination is less than 50% complete. Beetles often move as a group from ear to ear as they feed. It is common for some ears to exhibit major feeding damage whereas other nearby ears may not be damaged by Japanese beetle adults. If beetle infestations are intense, then most ears in an area will exhibit feeding damage. It is common to find 25 to 30 beetles feeding on silks of individual ears when pest infestations are high.

In soybean, feeding damage of adult Japanese beetle is often observed on the tallest soybean plants as a lace-like pattern of defoliation which avoids leaf veins. Foliage feeding on soybean may exceed economic threshold levels, especially on late planted or double-crop soybean. The grub stage of this pest will feed on plant roots of both corn and soybean with most feeding occurring

after egg hatch into fall. Damage to plant root hairs may result in poor uptake of water and nutrients or be more severe and cause reduced stands through plant mortality. Limited information is available concerning the impact of root feeding by Japanese beetle grubs under summer and fall field conditions. Cool soil temperatures during spring of 2013 slowed grub development and pupation resulting in later than normal emergence of adult beetles. In the past two to three weeks foliar damage to soybean (greater than 20% defoliation) has forced the application of insecticides on some Missouri soybean fields in order to control damage from this pest. For soybean, an insecticide treatment is justified if foliage feeding exceeds 20% - 30% prior to bloom and 10% - 20% from bloom through pod fill. Use the lower threshold numbers if soybean plants are under drought stress. Numerous insecticides are labeled for control of Japanese beetle adults on corn and soybean crops.

Historically, the Japanese beetle was first found in the United States in Riverton, New Jersey in 1916, following its accidental introduction from its native country of Japan. It is thought that grubs of this pest were introduced in pots of exotic iris plants imported into the US prior to the initiation of federal plant and animal inspections in 1918. In Missouri, infestations of Japanese beetles were first found in the southern portion of the City of St. Louis in 1934. A Missouri Department of Agriculture bulletin list 51 different tree, shrub, vegetable, and field crop species being damaged by Japanese beetles in St. Louis by the summer of 1936. For many years the Japanese beetle infestation stayed in the St. Louis area although by the early 1960's infestations were reported in the urban centers of Kansas City, Columbia, and Springfield. These urban infestations were initially associated with golf courses and plant nurseries where grubs of this pest were again introduced in soil and plants imported from states with earlier Japanese beetle infestations. Populations of this pest remained mainly in these urban area until the late 1990's when this pest began spreading mainly west and south into more rural areas of the state. The Japanese beetle in Missouri is still in a colonization stage of population growth with continued dispersal in most counties of the state. At present, most rural areas of Missouri will experience increasing populations of this pest for the next 7 - 10 years and maybe beyond. Beneficial biological pathogens and agents will eventually slow these

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expanding populations, resulting in annual population fluctuations at levels below peak populations experienced in earlier years.

Japanese beetle adults are approximately 1/2-inch in length, metallic green in color with bronze or copper colored wing covers. An excellent diagnostic characteristic for the adult of this insect is the presence of twelve white tufts of hair or bristles located around the edge of the shell (five running down each side and two located at the very back end). Without magnification, these structures are seen as white dots. Japanese beetles can be confused with adult green June beetle, but are smaller in size. Adult beetles typically begin emerging from the soil in early June, reach peak numbers in late June into early July and then diminish during late July into August. Adults emerge, mate and feed for approximately 45 days with some individual beetles living for up to 60 days. During this time each beetle female typically lays 40 to 60 eggs in groups of 1 to 8 into the soil with larvae emerging in about 2 weeks. Larvae will feed on plant roots and decaying material and grow through 3 larval instars (worm or grub stages) before overwintering in the soil. Following increases in soil temperature in spring, larvae quickly finish development, pupate, and usually begin emerging as beetles in early June in most years. Peak emergence in Missouri generally occurs during the first two weeks of July in most years. Wayne Bailey 573 864-9905 (cell)

Potato Leafhopper in Alfalfa. Potato leafhopper adults are greenish-yellow in color, wedge shaped and about 1/8-inch in length. Adult leafhoppers are very mobile and quickly move sideways, jump, or fly when disturbed. This is a native insect which migrates into Missouri each spring from more southern states and Mexico. The potato leafhopper is often transported into the state by early spring storms, especially those that contain hail. Migrating leafhoppers are thought to actively fly into storm fronts and be carried great distances by low level winds (jets) which approach 100 mph in speed. After a storm passes, high numbers of leafhoppers often can be found in the trail of the storms. In Missouri, the potato leafhopper adults generally arrive in early May of each year, but may also arrive with storms occurring in June and July. The arriving adults typically feed initially on several tree species before moving to alfalfa to feed and reproduce. Two to three generations of potato leafhopper are often produced with

economic damage generally occurring on alfalfa following removal of first and possible second harvests.

Damage is caused when both adult and nymphal (immature) leafhoppers use their piercing-sucking mouthparts to penetrate alfalfa leaflets and stems. They remove plant juices and often cause yellowing "hopperburn" of established plants, stunted plant growth, and sometimes mortality of seedling alfalfa. Both forage quality and quantity are reduced by this alfalfa pest. Potato leafhoppers typically arrive in Missouri about May 5th each year, although their arrival in Missouri was delayed in 2013 with peak arrival occurring around the last week of June. Populations of this pest have exceeded the threshold level in many central Missouri fields during the past two weeks. Many fields were harvested to reduce pest numbers with others receiving insecticide applications. Fields most at risk are fields seeded to alfalfa during spring 2013, although all ages of plants can be severely affected by potato leafhoppers. Scouting is best accomplished using a 15-inch diameter sweep net. Take 10 pendulum sweeps at five random locations in the field. If the average number of potato leafhopper adult + nymphs per sweep reach or exceed the threshold numbers listed below, treatment is justified. Adults PLH have wings with nymphs similar in appearance, but without fully developed wings. The economic threshold for potato leafhopper in alfalfa depends on the height of the alfalfa and whether the alfalfa is a potato leafhopper resistant variety or a traditional alfalfa variety. Second and third cutting alfalfa crops are most at risk. Leafhoppers often cause severe plant loss to newly seeded alfalfa stands so monitor these fields often to determine potato leafhopper numbers and/or the presence of "hopperburn". Traditional alfalfa varieties are more susceptible to damage from PLH adults and nymphs than newer PLH resistant varieties. See economic threshold table.

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Economic Threshold for Potato Leafhopper in Alfalfa

Alfalfa Stem Length – inches	Ave # PLH/Sweep (traditional variety)	Ave # PLH/Sweep (PLH Resistant Variety)
<3	0.2 (2 in 10 sweeps)	0.6 (6 in 10 sweeps)
6	0.5 (5 in 10 sweeps)	1.5 (15 in 10 sweeps)
8-10	1.0 (1 per sweep)	3.0 (30 in 10 sweeps)
12-14	2.0 (2 per sweep)	6.0 (60 in 10 sweeps)

Recommended Insecticides for Potato Leafhopper Adult and Nymphs in Alfalfa- 2013 Potato Leafhopper Adults and Nymphs

Chemical Name	Common Name	Rate of formulated material per acre	Preharvest Intervals
Beta-cyfluthrin	*Baythroid XL	0.8 to 1.6 fl oz/acre	7 days
Lambda-cyhalothrin + chlorantraniliprole	*Besiege	5.0 to 8.0 fl oz	1 day forage 7 day hay
Chlorpyrifos + gamma cyhalothrin	*Cobalt	7 to 13 fl oz/acre	7-14 days
Dimethoate	Dimethoate/Dimate	see specific label	10 days
Chlorpyrifos	*Lorsban Advanced	0.5 to 1.0 pts/acre	7-14 days
Chlorpyrifos	*Lorsban 4E *numerous products	1 to 2 pts/acre see specific labels	7-21 days
Methyl Parathion	*numerous products	see specific labels	15 days
Zeta-cypermethrin	*Mustang Max	2.24 to 4.0 fl oz/acre	3 days
Permethrin	*numerous products	see specific label	7 - 14 days
Gamma-cyhalothrin	*Proaxis	1.92 to 3.2 fl oz/acre	1 day forage 7 day hay
Zeta-cypermethrin	*Respect EC	2.24 to 4.0 fl oz/acre	3 days
Carbaryl	Sevin 4F	1 qt/acre	7 days
Carbaryl	Sevin XLR Plus	1 qt/acre	7 days
Zeta-cypermethrin + chlorpyrifos	*Stallion	5.0 to 11.75 fl oz	7 days
Cyfluthrin	Tombstone	1.92 to 3.2 fl oz/acre	7 days forage/hay
Lambda-cyhalothrin + chlorantraniliprole	*Volian xpress	5.0 to 8.0 fl oz	1 day forage 7 day hay
Lambda-cyhalothrin	*Warrior II	0.96-1.60 fl oz/acre	1 day forage 7 day hay
Lambda-cyhalothrin	*Numerous products	see speciic labels	1 day forage 7 day hay

Read and follow all label direction, precautions, and restrictions.

* Designated a restricted use product.

Aerial tour shows that a minority of north Missouri corn fields have nitrogen deficiency

By Peter Scharf

Most of Missouri received over 16 inches of rain from April to June. My rule of thumb is that well-drained soils will lose a substantial amount of preplant N when this occurs.



Many north Missouri cornfields look pretty darn good considering what they've been through.

preplant N when this occurs.

But the proof is in how the corn looks, and a lot of the corn in northern Missouri looked green when I did an aerial tour on July 4. The tour started in Columbia,

traveled up the Missouri River to Glasgow, cut across to Marshall, then up to Salisbury, Moberly, Macon, Monroe City, and Hannibal, then turned and returned to Columbia via Vandalia and Mexico. Thank you Bob Boyes for taking me on this tour.

Along this route, I would say that only 20% of corn fields had visible N deficiency, and probably only half of these fields would be economical to treat with an additional N application. This is far lower than the proportions seen in the wet springs of 2008, 2009, and 2010. The highest proportion of N-deficient



Although many fields look good, there are also plenty like this one with N deficiency. This can be corrected by applying more N until a week or two after tassal.

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MU IPM Pest Monitoring Network

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Aerial tour shows that a minority of north Missouri corn fields have nitrogen deficiency

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I saw lots of stand problems. These will probably cost Missouri corn producers as much as N problems in 2013.

fields were in the river bottom, but the upland claypan soils had quite a few too. Deep loess soils in the Marshall area showed very little N deficiency.

One reason for less N deficiency than 2008-2010 is that a lot of fields have received N since planting. Some of these applications were planned, others in response to the wet weather. Talking with around a dozen sources (including Iowa and Illinois), my impression is that somewhere near half of all corn fields have had some N applied since planting. These in-season N applications provide very effective delivery to the crop even in a wet year, and I expect that all of these fields are among those that are nice and green.

Rainfall intensity is another likely reason. More of the rain came in big chunks this year, meaning that more of it ran off. This is more likely to cause soil loss than N loss. Two people (in two states) have told me that erosion in their area is the worst they have ever seen it.

Rain that ran off is not in the field, and therefore not saturating the soil and stimulating denitrification. In Columbia, May-June rainfall in events less than 2.5 inches was about 7 inches this year (of almost 12 inches total), compared to 9.5 to 12.5 inches in 2008-2010. Total May-June rainfall was within an inch of the same for these four years, but much more of it came in intense storms in 2013.

A cool first week of May may also have contributed, since denitrification is temperature sensitive.

Whatever the reason, it looks to me like the number of producers losing yield and money due to N deficiency is going to be much lower in 2013 than it was in 2008-2010.

For those who have fields with deficiencies, there is still plenty of time for the corn to respond to additional N if you can find a way to get it applied. Broadcasting urea (highboy or airplane), dropping N solution between the rows, or injecting N in irrigation water are the best application methods at this stage. Drop nozzles for N need to be long enough to get the N below the ear leaf if the corn is far enough along to have one.

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Weather Data for the Week Ending July 30, 2013

By Pat Guinan

Station	County	Weekly Temperature (°F)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	July 1-30	Departure from long term avg.	Accumulated Since Apr.1	Departure from long term avg.
Corning	Atchison	79	59	85	50	69	-8	1.42	-3.47	2076	+75
St. Joseph	Buchanan	78	61	83	53	70	-7	1.51	-2.91	1985	-3
Brunswick	Carroll	80	59	84	51	70	-6	1.29	-2.86	2145	+119
Albany	Gentry	80	55	88	45	68	-9	0.86	-3.88	1936	-17
Auxvasse	Audrain	79	57	85	48	68	-9	1.31	-2.51	1999	-56
Vandalia	Audrain	79	56	84	48	68	-9	1.71	-2.54	1974	-25
Columbia-Bradford Research and Extension Center	Boone	81	58	86	51	69	-9	1.61	-2.45	1950	-156
Columbia-Capen Park	Boone	81	58	86	49	69	-9	1.88	-2.64	1979	-197
Columbia-Jefferson Farm and Gardens	Boone	80	60	87	53	69	-9	1.43	-2.62	2022	-89
Columbia-Sanborn Field	Boone	79	62	83	55	70	-8	1.45	-2.74	2153	-28
Columbia-South Farms	Boone	79	60	84	52	69	-9	1.34	-2.77	2004	-103
Williamsburg	Callaway	79	58	84	50	69	-8	2.12	-1.88	2019	+18
Novelty	Knox	79	56	84	50	68	-8	1.90	-2.17	1863	-111
Linneus	Linn	79	57	84	48	69	-7	1.24	-3.41	1915	-26
Monroe City	Monroe	78	57	83	50	68	-8	1.90	-1.92	1955	-67
Versailles	Morgan	83	64	91	56	73	-5	1.56	-2.59	2321	+161
Green Ridge	Pettis	80	61	88	53	71	-5	0.84	-3.24	2034	-34
Lamar	Barton	81	64	88	59	73	-6	3.65	-0.85	2158	-80
Cook Station	Crawford	78	58	82	51	69	-8	2.71	-0.65	1984	-178
Round Spring	Shannon	78	60	8	55	68	-8	3.99	+0.23	1945	-128
Mountain Grove	Wright	77	61	84	55	69	-8	4.13	+0.02	1911	-113
Delta	Cape Girardeau	78	59	81	53	69	-10	2.53	-0.52	2242	-188
Cardwell	Dunklin	*	*	*	*	*	*	*	*	*	*
Clarkton	Dunklin	79	63	84	59	71	-9	2.41	-1.06	2384	-225
Glennonville	Dunklin	80	63	83	59	72	-8	5.27	+1.81	2421	-178
Charleston	Mississippi	80	62	83	56	71	-9	2.87	-0.67	2348	-98
Portageville-Delta Center	Pemiscot	80	65	85	62	73	-7	3.66	+0.44	2526	-107
Portageville-Lee Farm	Pemiscot	80	65	84	60	73	-7	3.66	+0.21	2509	-107
Steele	Pemiscot	81	66	86	62	73	-7	3.23	-0.27	2567	-80

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

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