Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

Root-Knot Nematodes Damage Missouri Cotton

By Allen Wrather

Crop-threatening levels of root-knot nematodes (RKN) are present in some cotton fields in southeast Missouri. The symptoms of RKN injury will initially be visible 6-8 weeks after cotton emergence and may include yellow-green leaf color, stunt, and these plants may wilt more quickly than healthy plants during a hot afternoon. Plants injured by these nematodes will have swollen areas, galls, visible on infected roots dug from the ground 6-8 weeks after emergence or soon after harvest. Farmers and/or consultants should be cautious about diagnosing the cause of yellow-green leaf color and stunt of midseason cotton because other factors such as low soil pH and drought may cause this, but only RKN causes galls on roots.

There are no reliable methods to test soil in fields for the presence of root-knot nematodes during the winter. These nematodes are dormant in eggs during this time and will not begin to hatch until the soil warms up in late May. Current tests for these nematodes can't detect eggs in the soil but rely on detecting the newly hatched worms. So soil can be tested for them from early June through October. We learned from experiments in southeast Missouri that the best method for detecting the location of yield-robbing RKN in fields is to examine cotton roots for RKN galls soon after harvest. This method was more reliable, more rapid, and less expensive than analysis of soil samples for root-knot nematodes.

Cotton farmers can take action to protect their crop against these nematodes during 2010, but their options are limited. There are no cotton varieties highly resistant to RKN although some varieties are more tolerant than others. Growers should consider using a nematicide such as Telone prior to planting, Temik at planting, or a seed treatment such as Avicta or Aeris. The crop may be sprayed with Vydate a few weeks after emergence for nematode suppression, but a nematicide such as Temik should have been applied at planting. There are advantages and disadvantages to the use of each of these products.

Following these suggested procedures will give cotton farmers a better chance of producing higher yields and greater profits in 2010. For more information contact Allen Wrather at the University of Missouri Delta Center (Phone: 573-379-5431, E-mail: wratherj@missouri.edu) or check the Delta Center Web Page (aes.missouri.edu/delta).

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Minimizing Stand Establishment Diseases in 2010

By Laura Sweets

It is difficult at this point in the year to know what conditions will be like during the upcoming planting season. However, much of the state was unusually wet during both 2008 and 2009 with some areas and cities setting all time records for the amount of precipitation received. For much of the state the fall of 2009 was wet and the winter brought ice, snow and rain. Currently soils throughout much of the state are saturated. If spring conditions are wet or the spring is a cool, wet one, the potential for seed decay, seedling blights and root rot problems in both corn and soybeans could be higher than normal.

Many of the seed decay, seedling blight and root rot problems on both corn and soybean are caused by fungi present in the soil. *Pythium* species can cause early-season diseases on both corn and soybean. Many of the *Pythium* species are favored by cool, wet conditions at planting. Seed decay and seedling blight tend to be more severe in low-lying areas in a field, and in soils that have been compacted or remain wet for an extended period of time. Low soil temperatures (below 50-55 degrees F) favor seed rot and seedling blight. Disease severity is also affected by planting depth, soil type, seed quality, mechanical injury to seed, crusting, herbicide injury or other factors which delay germination and emergence of seedlings. Planting under good seedbed conditions and using an appropriate fungicide seed treatment (products containing either metalaxyl or mefenoxam as an active ingredient are particularly effective against water mold fungi such as *Pythium spp.*) are important management options.

Phytophthora sojae is another soil-inhabiting fungus that causes seed decay, preemergence or postemergence damping-off and seedling blight of soybean but not of corn. Phytophthora root rot is more severe in areas that are low or poorly drained, in compacted areas or in clay or heavy soils, but the disease can appear on plants growing in lighter soils or higher ground if the soil remains wet after planting. When soils are flooded or saturated, the fungus releases spores which are attracted to the growing soybean root tip where infection occurs. Planting varieties with either race-specific resistance or tolerance or a combination of race-specific resistance and tolerance in fields with a history of Phytophthora is a critical management strategy. Planting under good seedbed conditions and using an appropriate fungicide seed treatment (products containing either metalaxyl or mefenoxam as an active ingredient are particularly effective against water mold fungi such as *Phytophthora sojae*) are also important management options.

Rhizoctonia solani and several *Fusarium* species may also cause seedling blights on corn and soybean. *Rhizoctonia solani* can survive under a wide range of soil moistures and soil temperatures but may decline when soils are flooded or soil temperatures are unusually high. Fusarium root rots may be most severe when the soil is saturated and soil temperatures are around 57 degrees F. Crusting, hard pan layers, herbicide injury, deep planting, poor seed quality, insect damage, mechanical injuries, poor fertility or other factors which delay germination and emergence favor the development of these early-season diseases. Planting under good seedbed conditions and using an appropriate fungicide seed treatment (products containing active ingredients other than metalaxyl or mefenoxam such as captan, fludioxonil, azoxystrobin, carboxin, PCNB, thiram, trifloxystrobin, etc. are effective against *Rhizoctonia* and *Fusarium spp.*) are also important management options.

The bottom line is that 2010 may be a season to take precautions to minimize stand establishment problems caused by diseases in both corn and soybean. Planting high quality seed with a high germination rate is always recommended but may be especially important this season. Corn seed comes with fungicide seed treatments already applied. Be sure that the fungicides on the seed purchased are active ingredients and rates that will be effective against the early-season diseases described above. Seed treatment fungicides are not as standard on soybean seed. If the soybean seed purchased is not treated, it may be wise to consider appropriate fungicide seed treatments applied prior to seed delivery or to use on-farm treatments. The 2009 Missouri Pest Management Guide University of Missouri Extension Publication M171 contains tables of fungicides labeled for use as seed treatments on corn and on soybean. Monitoring soil temperatures and soil moisture conditions as planting approaches will also be important. Ideally, corn and beans would be planted under the best possible seedbed conditions. Mother Nature doesn't always allow that luxury but following field conditions and weather forecasts may lead to planting under the best possible conditions for 2010. Finally, avoiding any other stresses which delay germination or emergence may reduce the incidence and severity of the early-season diseases. Proper planting depth, avoiding conditions that would lead to crusting or herbicide injury, proper fertility and preventing insect damage can reduce the damage from early-season diseases.

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2010 Missouri Crop Insurance Updates

By Ray Massey and Seanicaa Edwards

The USDA Risk Management Agency has enacted several changes to crop insurance this year. Perhaps the most important of these changes regards initial planting dates for coverage. Crops planted before the initial planting date are not covered by replant coverage. If replanting needs to occur on a field planted before the initial planting date, the farmer is totally responsible for the cost of replanting. The maps below show the initial planting dates for corn and soybean in Missouri.

Another change is that Group Income Program (GRIP) and Group Risk Program (GRP) is no longer offered for selected crops due to low participation. No Missouri counties have GRIP and GRP coverage for grain sorghum. In addition, Barton and Cole counties deleted polices for corn and Ripley and St. Louis counties deleted policies for soybeans.

The Biotechnology Yield Endorsement (BYE) for corn has been expanded. BYE hybrids enjoy a crop insurance premium discount. Selected Monsanto and Syngenta hybrids have been approved for irrigated and non irrigated practices. For more information on specific hybrids visit the Risk Management Agency (RMA) website: http://www3.rma.usda.gov/apps/behybrids or contact your county agent.

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Figure 1. Initial Planting Dates for Corn in Missouri

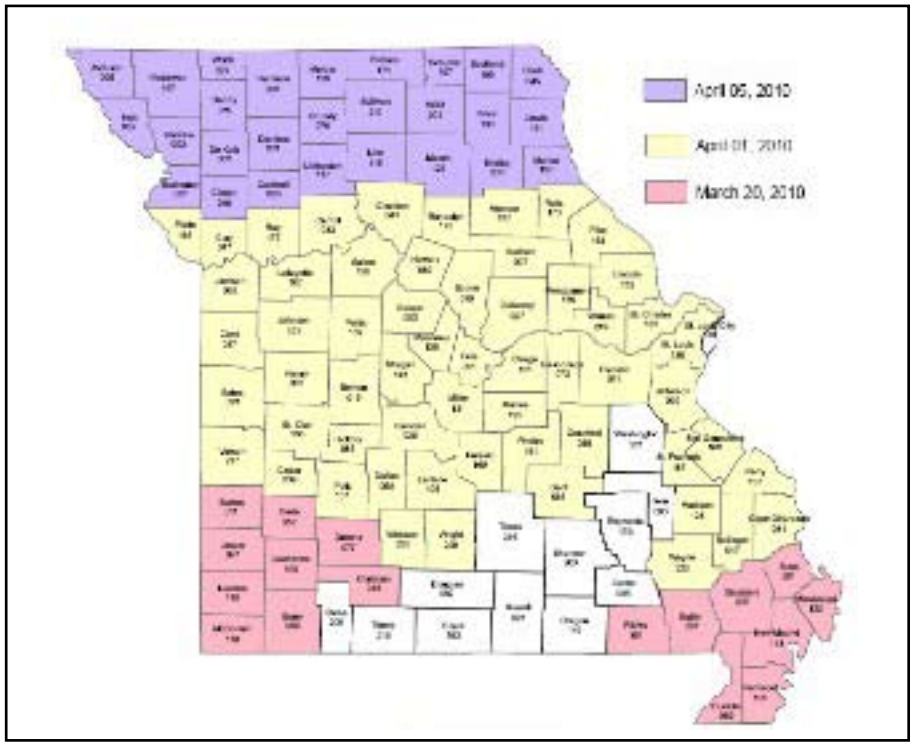
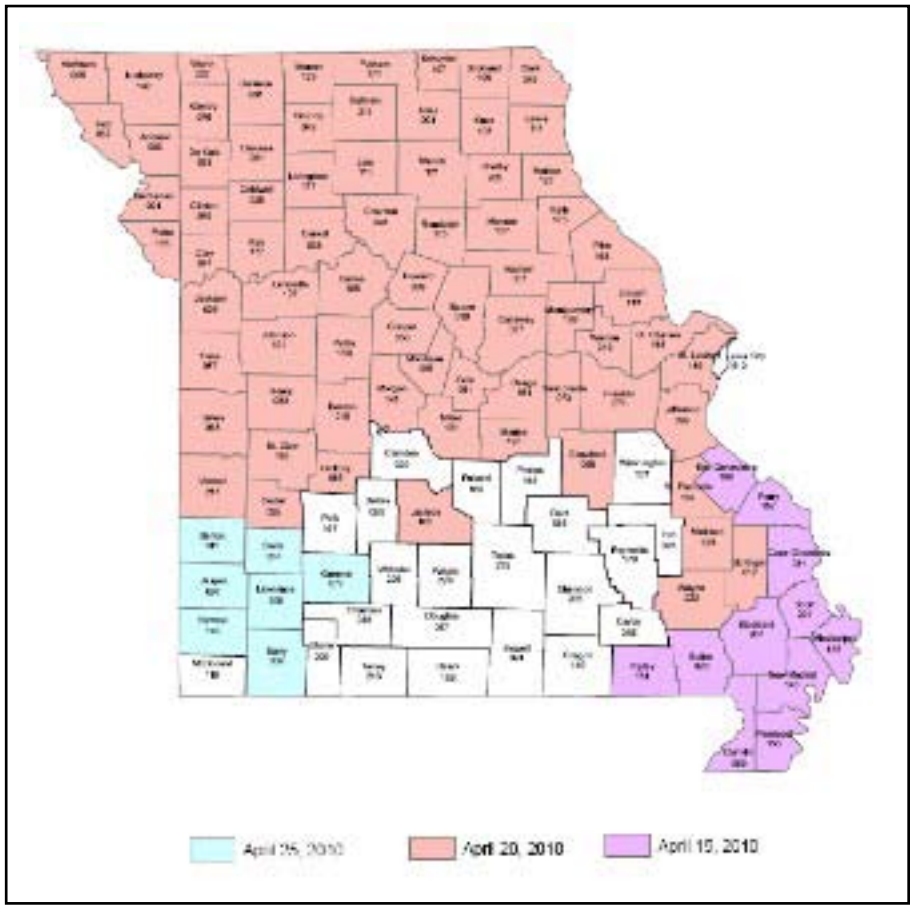


Figure 2. Initial Planting Date for Soybean in Missouri



2010 Regional Grazing Schools

By Craig Roberts (MU) and Mark Kennedy (NRCS)

It is time for Missouri to begin holding its regional grazing schools. These schools are conducted with Natural Resource Conversation Service and the University of Missouri. They begin April 1st and run through October 31st. Producers who complete these multi-day schools and apply for cost-share funding; this cost-share supports fencing and watering systems.

In 2009, there were 27 schools. This year, there are 32 scheduled (See below). They will be held in 9 different regions. For more information, write or call the coordinator for each school, the contact information is listed in the right-hand column, or contact Joetta at the MFGC/GLCI office. If there are questions or comments related to the overall program, contact Craig Roberts or Mark Kennedy.

Northwest Region		
Town	***Date***	***Contact***
Saint Joseph	June 4-5	**Curt Walker** - Phone: (816) 232-6555, Ext. 139 • E-mail: curt.walker@mo.usda.gov **Jim Humphrey** - Phone: (816) 324-3147 • humphreyjr@missouri.edu
King City	September 21-22	**Curt Walker** - Phone: (816) 232-6555, Ext. 139 • E-mail: curt.walker@mo.usda.gov **Jim Humphrey** - Phone: (816) 324-3147 • E-mail: humphreyjr@missouri.edu

East Central Region		
Warrenton (Warrenton Extension Center)	April 1-2	**Sarah Szachnieski** - Phone: (636) 456-3434, Ext. 3 • E-mail: sarah.szachnieski@mo.usda.gov
Callaway	September 1-2	**Callaway County FO** - Phone: (573) 592-1400
Union	September 21-22	**Lori Nowak** - Phone: (636) 538-2303

Central Region		
Rolla	April 15-16	**Phelps Co. SWCD. Paula Wade** - Phone: (573) 364-6202, Ext. 3
Tri-County School - Osage County	May 13-14	**Osage County SWCD. Cindy DeOrnellis** - Phone: (573) 897-3797, Ext. 3
Wurdack (Advanced Grazing School)	June 17-18	**Dent County Extension** - Phone: (573) 729-3196
Maries River Wtshd.	September 9-10	**Maries County SWCD. Sandy Hutchinson** - Phone: (573) 422-3342
Wurdack	September 30-October 1	**Crawford County Extension** - Phone: (573) 775-2135

Southwest Central Region		
Mountain Grove (Fruit Experiment Station)	May 11-13	**Missy Wollard** - Phone: (417) 741-7343, Ext. 3 • E-mail: missy.wollard@swcd.mo.gov **Ted Probert** - Phone: (417) 741-6134 • E-mail: probertt@missouri.edu
West Plains	May 25-27	**Stacy Hambelton** - Phone: (417) 256-2391 • E-mail: hambeltons@missouri.edu **Jamie Kurtz** - Phone: (417) 256-7117, Ext. 3 • E-mail: jamie.kurtz@mo.usda.gov
Alton	July 19-21	**Sarah Kenyon** - Phone: (417) 778-7490 • E-mail: kenyons@missouri.edu **Melissa Welch** - Phone: (417) 778-7561 • E-mail: melissa.welch@mo.usda.gov
Houston	July 28-30	**Sandy Wooten** - Phone: (417) 967-2028 Ext. 4 • E-mail: sandra.wooten@swcd.mo.gov **Robert Rouse** - Phone: (417) 967 2028 Ext. 4 • E-mail: robert.rouse@mo.usda.gov
Squires (Sale Barn)	August 2-4	**Stacy Hambelton** - Phone: (417) 256-2391 • E-mail: hambeltons@missouri.edu **David Harrison** - Phone: (417) 683-4816 or 1-800-434-0366, Ext. 3 E-mail: david.harrison@mo.usda.gov
Willow Springs	September 1-3	**Amber Comstock** - Phone: (417) 256-7117, Ext. 3 • E-mail: amber.comstock@swcd.mo.gov **Jamie Kurtz** - Phone: (417) 256-7117, Ext. 3 • E-mail: jamie.kurtz@mo.usda.gov

Southeast Region		
Farmington (MAC North College Center)	May 12-13	**Patricia Roth** - Phone: (573) 883-3566, Ext. 3 • E-mail: patty.roth@mo.usda.gov

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2010 Regional Grazing Schools *continued from page 18*

Southwest Region		
Arcola (Arcola Lion's Club)	April 22 (evening), April 23-24 (daytime)	**Cedar County SWCD** - Phone: (417) 276-3388, Ext. 3
Halfway (Halfway Lion's Club Center	May 7, 11, 12, & 18 (evenings, 6:30 to 9:30 p.m.) May 15 (Saturday 9:00 a.m. to 3:00 p.m.)	**Dallas County SWCD** - Phone: (417) 345-2312, Ext. 3
Mt. Vernon (MU Southwest Center)	May 25-27 (daytime)	**MU Southwest Center** - Phone: (417) 466-2148
Neosho (Crowder College)	June 15-17	**McDonald/Newton County SWCD** - Phone: (417) 451-10070, Ext. 3
Bois d-Arc (MDC Dalton Shooting Range	October 19-21 (daytime)	**Greene County SWCD** - Phone: (417) 831-5246, Ext. **3**

Southwest Central Region		
Versailles (Morgan County Courthouse)	April 6-7	**Patty Wittrock** - Phone: (573) 378-5822, Ext. 3
Lincoln (4-H Building)	April 14-15	**Tina Hovendick** - Phone: (660) 547-2353
Lowry City (Boy Scouts Building)	April 21-22	**Margie Best** - Phone: (417) 646-8108, Ext. 3
Nevada (Fairgrounds)	April 27-28	**Mark Curtis** - Phone: (417) 667-8137, Ext. 3
Hermitage (University of MO Extension Meeting Room	September 8-9	**David Wright** - Phone: (417) 745-6613, Ext. 3

Northeast Region		
Livonia	May 7-8	**Darla Campbell** - Phone: (660) 457-3469
Macon	May 14-15	**Mark Collins** - Phone: (660) 385-2616, Ext. 3
Kahoka	August 27-28	**Robert Conley** - Phone: (660) 727-2955, Ext. 3 or **UM Extension** - Phone: (660) 727-3339

Linneus Schools		
Linneus (State grazing school)	September 14-16	**Joetta Roberts** - Phone: (573) 499-0886

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Nitrogen Loss Cuts Into 2009 Corn Profits

By Peter Scharf

Missouri produced a near-record corn crop in 2009, but not without some struggle. Late planting, widespread replanting, nitrogen loss, and harvest delays were some of the challenges that faced Missouri producers due to high rainfall throughout the season. Although it made for difficult logisitics, the wet year guaranteed an adequate supply of water to most corn fields in the state. Water is usually the factor that most limits the yield of corn in Missouri, and the abundant supply created very high yield potential.

Unfortunately, a substantial part of our potential yield was not realized due to widespread deficiencies of nitrogen. Wet weather can lead to loss of N, both fertilizer N and soil N, through leaching and denitrification. Visual deficiency symptoms were widespread across the state in windshield surveys and aerial surveys that I conducted in August 2009. Based on these surveys and my estimates of how much yield potential was lost due to the deficiency symptoms I saw, I estimate that N deficiency reduced Missouri's corn crop in 2009 by about 100 million bushels. Compared to the 438 million bushels that we did produce, this suggests that we could have grown at least 20% more if the crop had not been limited by N deficiency.

There was a wide range of severity, from few or no symptoms to severely yellowed fields. It was not unusual to see adjacent fields in which one had a much greater deficiency than the other, showing that N management affected the degree of deficiency.

I'm not too sure which N management strategies were most successful, except to say that N applied in-season to growing corn worked very well in 2009. In an experiment near Columbia, 153 pounds N per acre applied to knee-high corn gave yields 68 bushels per acre greater than when 180 pounds N was applied on the day of planting. Ammonium nitrate was the N source.

Spring-applied anhydrous ammonia was probably the most successful all-preplant program this year. All N fertilizer is converted to nitrate in the soil, but ammonia takes longer than other N sources to convert. Nitrate is the form of N that is vulnerable to loss.

Figure 1.

How extensive was this problem?

My rule of thumb is that more than 16" of rain from April through June (or more than a foot in May & June) will lead to nitrogen deficiency problems in a substantial number of corn fields. In 2009, nearly all of Missouri, Arkansas, Kentucky, and Tennessee, most of Illinois, southern Indiana, and eastern Kansas all had more than 16" of rain from April through June. This suggests the possibility of nitrogen deficiency across a wide area. During August, I drove about 2000 miles through Missouri, Illinois, Indiana, and Wisconsin, and had about 1500 aerial photographs taken in Missouri, Illinois, and Indiana. My conclusions from these observations was that N deficiency problems in most of Illinois were serious, causing over 20 bushels per acre yield loss on average. This translated into an estimated yield loss of 250 million bushels over the state of Illinois. My estimate for yield loss in Indiana was slightly lower, around 15 bushels per acre on average in the affected areas. Over eight states (Illinois, Missouri, Indiana, Iowa, Kansas, Kentucky, Arkansas, and Tennessee) I estimate yield loss of over 500 million bushels. This is on top of 2008 yield losses due to N deficiency that I estimated at just short of 500 million bushels across the midwest, giving a 2-year total estimated yield loss of around 1 billion bushels.

How did N deficiency affect profit?

Ray Massey and I put together a corn production budget for 2009 of $490 per acre. This means that, if you were able to sell corn at $3.80 (which was an average price for 2009), it took a yield of 130 bushels per acre to cover the cost of production. State-average corn yield

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Figure 2.

for 2009 was a near-record 151 bushels per acre, meaning that 151 - 130 = 20 bushels per acre went to pure profit for corn producers. This is an excellent profit level.

However, I believe that profit would have been more than twice this amount if all our corn acres had had a sufficient nitrogen supply. I estimate that average yield loss due to N deficiency was 30 bushels per acre for Missouri.

Risk of N loss with different management strategies

Anhydrous ammonia is the source with the lowest risk of loss due to wet weather. This is because it is the slowest to convert to nitrate in soil. Nitrate is the form of N that is susceptible to loss during wet weather. All nitrogen fertilizer eventually converts to nitrate in the soil, but more slowly for anhydrous ammonia.

Sidedress application of anhydrous ammonia is virtually loss-proof. Sidedress application of other forms of N fertilizer also has a very low risk of loss because the time between application and uptake is short.

Preplant application of anhydrous ammonia within a month of planting has the lowest risk of loss among all-preplant systems. Preplant applications of other forms of N can succeed in many years, but probably did not provide adequate delivery of N in 2008 or 2009. Limited evidence suggests that applying dry or liquid N a month before planting creates a substantially greater risk of loss than when applied just before planting. I would rate fall application of anhydrous ammonia in the same risk category as early-spring applications of dry or liquid N, which is the highest-risk category. However, even fall application of anhydrous ammonia is a successful N management system in many years and soils.

The solution: Rescue applications of nitrogen

Rescue applications of nitrogen fertilizer can be highly profitable when earlier N applications have been lost due to wet weather. Wayne Flanary increased corn yield by 50 bushels per acre with rescue N in northwest Missouri in 2009. The corn had been fertilized with 180 pounds of anhydrous ammonia N in late November, but appeared N-deficient during spring growth. It went on to produce 170 bushels per acre, but where Wayne applied additional topdress urea in June it produced 220 bushels per acre. This illustrates the excellent yield potential for much of this year's corn crop. It also shows that the good yields produced in many fields could possibly have been substantially better by correcting N deficiency.

Another example comes from eastern Kansas in 2005. Rescue N was applied in late June to 7-foot tall corn as liquid N dribbled between rows at 40 pounds N per acre. Between each 100-foot pass of the applicator, the producers left a 100-foot pass without rescue N. Comparison of the yields between passes with and without N revealed a 35-bushel response in the half of the field where N deficiency symptoms were visible.

Many producers can be discouraged and think, "It's too late," when they see deficiency symptoms in their corn fields. My research suggests that the corn can respond to N very effectively at surprisingly late application timings. Up until four feet in height, average corn yield from a single application did not depend on timing. That is, a single application of N gave the same yield on average if it was applied at planting, when corn was two feet tall, or when corn was four feet tall. This finding is backed up by extensive data from Nebraska, Minnesota, Iowa, and Oklahoma. Even at tasseling, yield was still above 90% of its full potential if rescue N was applied at that stage. Limited data suggests that a profitable yield response is likely to happen until two weeks after tassels emerge in corn that is experiencing significant N stress.

My conclusion is that the logistics of getting the N applied is a much greater obstacle than the ability of the crop to use the N. High-clearance applicators, airplanes, and pivot irrigation systems can all be effective ways to deliver N to stressed corn. Among these options, sprayers are the most widely available

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option in Missouri but many are not plumbed to accommodate drop nozzles between rows. And this represents the biggest obstacle to making rescue N applications that I have seen: lack of preparation. My firm belief after the last two years is that every producer and every retail organization needs to have a plan for making rescue N applications in place before the season starts. Getting the necessary preparations done during the season just isn't going to happen. Whether it's plumbing sprayers or making contact with aerial applicators, now is the time to make your plan.

Broadcast applications of dry N can be a fast and effective way to apply rescue N. We conducted a series of experiments around the state to see how much leaf burn would affect yield. We found that with good-quality (not dusty) urea applied when there was no water on the leaves, burn was quite visible but caused no more than 4 bushels of lost yield (compared to dropping the urea between the rows). Agrotain treatment of urea gave a profitable yield response when urea was broadcast on corn up to two feet tall, but not when corn was three or four feet tall. Ammonium nitrate burn reduced yield by about 20 bushels per acre when broadcast over 3- or 4-foot-tall corn, thus urea is the product of choice when broadcasting N on corn this size. UAN solution caused even larger yield losses, up to 70 bushels per acre, and should only be applied between corn rows using drop nozzles.

Diagnosis: Do I need to apply rescue N?

Last year, I initiated a feature on my website called 'Nitrogen Watch.' I plan to have this feature again this year, starting in late April and continuing through the end of June. This product is based on maps of cumulative rainfall (based on radar records) and identifies areas that are on track to have problems with N loss. However, being 'on track' in mid-spring will not necessarily mean problems by the time the growing season is in full swing–this will depend on whether above-normal rainfall continues to accumulate.

The appearance of the corn crop is an excellent diagnostic tool. Corn that is light green or yellow-green is N-deficient nearly 100% of the time in Missouri. However, corn growing in waterlogged soil will be N-deficient even if the N has not been lost. This makes correct diagnosis more difficult. Sometimes this yellow corn will 'green up' when the soil dries out, and no additional N is needed. By the time you've been able to walk through the field for a week, the corn should look substantially better if the N is still in the soil. If not, a rescue N application is called for. However, waiting for that week of drying can reduce the window of time available to treat the corn.

Aerial photographs are my top choice as a diagnostic tool for N deficiency. You can get through all your acres much more quickly and thoroughly based on aerial photos than by ground-based inspection. At fairly early stages (knee-high), aerial photos can help you identify likely problem areas, but should be ground-truthed. At later stages (waist-high or later), aerial photos provide reliable indicators of which areas are experiencing N stress, and how severe it is.

My research suggests that aerial photographs can be translated into yield loss maps to help producers understand the magnitude of the problem. This makes it a lot easier to decide how much can be spent to correct the problem. Aerial photographs can also be translated into variable-rate N maps that can be plugged into a variable-rate applicator. Nitrogen loss is nearly always patchy, resulting in some areas of the field that need high rates of rescue N to reach their full yield, and other areas where no additional N is needed.

This year we partnered with the AgriVision consulting company to offer a service called NVision to provide producers with yield loss maps and variable-rate N maps based on aerial photos. I believe that this product will continue to be offered in 2010 if the season warrants it.

Deep soil samples are another option for diagnosis, but are slow and labor-intensive. Samples need to be at least two feet deep. If it's been wet enough to cause N loss, it's certainly been wet enough to move N out of the topsoil. You should expect to find the fertilizer that you applied plus 50 pounds of N that is normally present in the soil before any fertilizer is applied.

Computer models may provide a way to integrate weather data with information on soils and N management to evaluate possible N loss. Such a system is currently available in New York state. Although I doubt that this approach will have the accuracy of assessing visual symptoms in each field, it will have the advantage of potentially providing an 'early warning' system. This could make the logistics of getting rescue N applied considerably easier.

Summary

2009 was a year with very good growing conditions for corn, resulting in a near-record harvest in Missouri and the U.S. Unfortunately, the abundant rainfall caused widespread N loss, reducing production by over 500 million bushels in the southern corn belt and the mid-south. Profits from corn production were good in Missouri but could have been twice as large if additional N had been applied to all fields that needed it.

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IPM Publications, Information You Can Use! IPM1023: Missouri Weed Seeds

By Steven Kirk

The positive identification of pests is the first step in a sound Integrated Pest Management (IPM) program. Identification of weed species by knowing the plants morphology, such as leaf and stem shape, flower type and color, and the presence of hairs can make identification relatively easy. Knowing the physical characteristics of weed seeds can be more difficult. Because agricultural producer and other professionals will sometimes be challenged to identify a weed by the features of its seed, *IPM1023: Missouri Weed Seeds* was created to assist in this often difficult procedure.

IPM1023 is a photo compendium designed to help agricultural professionals, as well as hobbyists, such as FFA members in the sometimes daunting task of visually identifying weed seeds. Included in this publication are dozens of color photographs of a wide variety of broadleaf, grass and grass-like weed seeds to assist in identification. In addition to the photo tools provided in this manual, an index of common names is also included to help make this difficult procedure easier.

The MU Plant Protection Programs publishes a series of IPM manuals and guidesheets that focus on a wide variety of topics important to individuals engaged in making sound pest management decisions. From 'Weed Management Systems for Environmentally Sensitive Areas (IPM1018)', to 'Crop Nutrient Deficiencies and Toxicities (IPM1016)', IPM guidesheets offer something for everyone involved in pest management; from crop production, to landscape maintenance, to homeowners to hobby gardeners.

IPM publications are free to view online: (http://ppp.missouri.edu/ipm/pubs.htm) and copies can be printed for your convenience. Print copies of most IPM publications can be purchased for a nominal fee. To order copies of our IPM publications online go to: (http://extension.missouri.edu/publications/order.aspx). To order print copies by phone with a credit card, call: 573-882-7216 or 800-292-0969.

Because Missouri's citizens are concerned about pesticide use, pest managers need to put social and environmental considerations at the forefront of their decision making process. IPM strives to safeguard our natural resources, and protect our environment by reducing pollution that can affect human health, non-target organisms and food safety. IPM is important because a degraded environment is not a conducive atmosphere for a healthy life!

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Weather Data for the Week Ending March 1, 2010

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.	Feb 1-Feb 28	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	31	7	38	-5	20	-14	0.66	-0.26	*	*
St. Joseph	Buchanan	31	12	37	0	21	-15	0.83	-0.28	*	*
Brunswick	Carroll	31	10	38	2	20	-16	1.11	-0.56	*	*
Albany	Gentry	31	1	39	-13	17	-17	0.38	-0.86	*	*
Auxvasse	Audrain	35	14	42	6	24	-13	2.41	+0.53	*	*
Vandalia	Audrain	35	15	41	6	25	-22	2.34	+0.41	*	*
Columbia-Bradford	Boone	38	15	48	7	26	-12	2.29	+0.06	*	*
Columbia-Jefferson Farm	Boone	39	16	46	7	26	-12	2.23	0.00	*	*
Columbia-South Farms	Boone	38	16	46	7	26	-12	2.48	+0.25	*	*
Williamsburg	Callaway	38	17	45	8	26	-11	1.99	-0.31	*	*
Novelty	Knox	31	5	37	-8	18	-17	0.89	-0.77	*	*
Linneus	Linn	32	4	39	-12	19	-16	0.73	-0.75	*	*
Monroe City	Monroe	34	10	40	-1	21	-15	1.28	-0.34	*	*
Versailles	Morgan	41	18	48	10	28	-12	2.33	+0.25	*	*
Green Ridge	Pettis	39	17	45	9	27	-11	1.94	+0.09	*	*
Lamar	Barton	42	22	48	15	31	-10	1.37	-0.93	*	*
Cook Station	Crawford	43	17	52	7	29	-12	1.75	-0.58	*	*
Round Spring	Shannon	46	19	55	10	31	-9	1.46	-0.96	*	*
Mountain Grove	Wright	43	19	51	11	30	-9	1.18	-1.69	*	*
Delta	Cape Girardeau	44	24	52	17	33	-9	1.35	-1.93	*	*
Cardwell	Dunklin	45	27	52	20	35	-9	1.44	-2.23	*	*
Clarkton	Dunklin	44	25	51	17	34	-10	1.48	-1.75	*	*
Glennonville	Dunklin	45	27	52	20	35	-9	1.47	-1.74	*	*
Charleston	Mississippi	43	25	50	17	34	-9	1.24	-2.47	*	*
Portageville-Delta Center	Pemiscot	44	27	51	21	35	-9	1.66	-2.07	*	*
Portageville-Lee Farm	Pemiscot	44	27	50	20	35	-9	1.61	-2.03	*	*
Steele	Pemiscot	45	28	51	21	36	-8	1.39	-2.41	*	*

* Complete data not available for report

‡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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