Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

Agriculture and Carbon Credits

By Ray Massey

According to the US Environmental Protection Agency's Inventory of Greenhouse Gas Emissions and Sinks, in 2006 the US released into the atmosphere 7,054 million metric tons of carbon dioxide equivalents (Note: a carbon dioxide equivalent is a measure of all greenhouse gas emissions reported in terms of the global warming potential of carbon dioxide). Table 1 provides a breakdown of where agriculture emitted and sequestered greenhouse gases (GHG).

Sector	*2006 Million Metric tons of CO2 Equivalents*
Total US Emissions	7,054
Total Direct Emissions from Agriculture	454
Crop and soil management	272
Enteric Fermentation	126
Manure Management	56
Total Sequestion	(778)
Land Use Changes	(33)
Forest Lands	(745)
Net Emissions from Land Management	(324)

Emissions from crop and soil management come predominately from nitrous oxide releases due to fertilization. Both dry and liquid manure management contributes to GHG emissions but liquid manure storage systems contribute the most GHGs and have the greatest potential to benefit from carbon reduction credits. Land use changes occur primarily from farming changes such as conservation tillage but also when land is taken out of crop production and put into grassland.

Several opportunities currently exist for being paid to reduce GHG emissions. Sequestering activities such as land use changes and forestry are obvious areas where getting paid to reduce GHG emissions would be welcome. With little or no change in management, land managers could receive payments for sequestering carbon. Currently, farmers adopting conservation tillage can receive a credit of .2 tons/acre in the Ozark region and .6 tons/acre in the rest of the state. For cropland in CRP or that is put into grassland, they can receive a credit of 1 ton/acre.

Though manure management is considered an emission of GHG by the EPA, livestock producers who lower their emissions can also receive credits. If livestock producers implement activities such as capturing and flaring off methane from their lagoons and pits they can receive a credit for the resultant reduction in GHG.

But what do you do with GHG credits? You sell them. In the US, the Chicago Climate Exchange is where carbon credits are traded. Entities that have agreed to reduce their emissions, but been unable to, buy credits from entities that have sequestered carbon or reduced their emissions below the level they agreed to attain. Because the quantities being traded are large (one contract = 100 metric tons of carbon dioxide equivalent), most farmers will use an aggregator to market their carbon credits.

An aggregated is a business that gathers lots of small credits, bundles them together and sells them on the exchange. The two most familiar aggregators in agriculture are AgraGate (http://www.agragate.com/) and the North Dakota Farmers Union (http://

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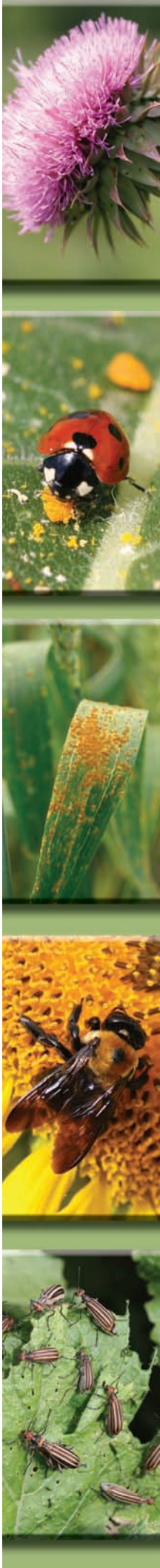

High Numbers of Alfalfa Weevil Larvae

By Wayne Bailey

Alfalfa weevil larval numbers have significantly increased during the past week in many fields in central and southern Missouri. In several fields surveyed this past week, numbers of small larvae were three to four times over the economic threshold level of an average of one or more larvae per stem. All sizes of larvae were present with most in the 2nd or early 3rd instar stage of development. As they mature as 3rd and 4th instars the amount of foliage they consume substantially increases. At this time, damage to most fields was confined to the upper whorl of leaflets at the plant terminal. This will quickly change as warm temperatures allow for rapid larval growth and increased consumption of leaf tissues. These larger instars readily move about the plant and feed on alfalfa foliage. They may consume significant amounts of leaf tissue which typically results in substantial economic loss of alfalfa yield and forage quality. In addition, heavy defoliation also reduces alfalfa competition with weeds and may result in increased weed populations. Producers are encouraged to scout alfalfa fields to determine weevil numbers. If the economic threshold of 1 or more larvae per alfalfa stem is reached or exceeded, then treatment is justified.

Proper scouting is the key to obtaining good estimates of weevil numbers. Alfalfa producers should scout alfalfa fields throughout the state as problems can quickly develop and result in substantial loss of forage yield and quality. Scouting for alfalfa weevil is best accomplished using a 3-5 gallon bucket and a sharp knife. Producers are encouraged to sample 10 alfalfa stems at each of five random locations in a field for a total of 50 stems per field. At each of the five locations the scout should carefully cup the terminal of each alfalfa stem and then cut the stem off near the soil surface. The stem is then carefully placed inside the bucket and vigorously tapped to dislodge any larvae present. It is necessary to cup the terminal with your hand during removal of the stem from of the plant to prevent the larvae from being flipped from the terminal during stem removal. If the alfalfa weevil population has reached the economic level of one or more larvae present per stem of alfalfa (50 or more larvae per 50 stems) and 30 percent or more of the alfalfa stems show feeding damage, then control is justified.

Several management options are available, although application of a foliar rescue insecticide is the most common management strategy used in most years. In addition to insecticides, early harvest, grazing, and biological control are other viable options depending on larval numbers, plant growth stage, and field conditions.

Insecticides

If an insecticide application is required in order to control alfalfa weevil larvae, select from the list of insecticides labeled and recommended for alfalfa weevil control on alfalfa. Rates are given as amount of product applied per acre.

Early Mechanical Harvest of alfalfa is an alternative to insecticide applications if the alfalfa is within 7-10 days of the normal harvest stage of 1/10 bloom. This season early harvest may be a viable option as alfalfa plants have grown rapidly with the cool, wet conditions experienced this spring. Early cutting will cause the death of most alfalfa weevil larvae through mechanical crushing by hay conditioners or dehydration from the sun following the removal of the alfalfa canopy. After forage removal, the field should be monitored to detect a possible resurgence in larval numbers.

Grazing is being used by some Missouri producers to reduce the numbers of alfalfa weevil eggs and larvae. Grazing is initiated when weevil numbers reach or are approaching the economic threshold and the alfalfa plants are more than 6-8 inches in height. Grazing is generally accomplished using a management intensive grazing method in which a large number of cattle are placed on a small amount of acres and quickly remove the alfalfa growth. As the alfalfa is grazed to normal harvest level, eggs and larvae that are present are destroyed. Data from Missouri indicate that alfalfa weevil larval numbers are reduced by

Recommended insecticides for larval alfalfa weevil management - 2008

Insect Pest				
Alfalfa weevil Larvae:	*Chemical name*	*Common name*	*Rate of Formulated Material*	*Rate of Active Ingredient (a.i.)*
	Beta-cyfluthrin	*Baythroid XL	1.6 to 2.8 fl oz/acre	0.0125 to 0.022 lb a.i./acre
	Carbofuran	*Furadan 4F	1/2 to 2 pts/acre	0.25 to 1 lb/acre
	Chlorpyrifos 4E	*Lorsban 4E *numerous products	1 to 2 pts/acre see specific labels	0.5 to 1 lb/acre see specific labels
	Chlorpyrifos 4E plus Gamma-cyhalothrin	*Cobalt	19.0 to 38.0 fl oz/acre	
	Methyl Parathion	*Chemnova Methyl 4EC	1 pt/acre	0.5 lb a.i./acre
	Gamma-cyhalothrin	*Proaxis	2.56 to 3.84 fl oz/acre	0.02 to 0.03 lb a.i./acre
	Phosmet	Imidan	see specific label	see specific label
	Zeta-cypermethrin	*Mustang Max	4.0 fl oz/acre	0.014 to 0.025 lb a.i./acre
	Carbaryl	Sevin 4F	1.5 qts/acre	1.5 lb a.i./acre
	Carbaryl	Sevin XLR Plus	1.5 qts/acre	1.5 lb a.i./acre
	Lambda-cyhalothrin	*Warrior *Numerous products	2.56 to 3.84 fl oz/acre see specfic labels	0.02 to 0.03 lb a.i./acre see specific labels

Read and follow all label direction, precautions, and restrictions.
** Designated a restricted use product.*

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Scouting for Soybean Rust In Missouri

By Allen Wrather and Simeon Wright

University of Missouri will reactivate its statewide early-warning network of soybean rust sentinel plots during 2008. Each sentinel plot will be monitored weekly from June to October. University of Missouri Extension regional agronomists in 20 locations will scout soybean fields and collect 100-leaf samples to be shipped overnight express to the pathology laboratory at the MU Delta Center for examination. The objective is to detect soybean rust when it first starts to develop in Missouri soybean fields so farmers can be warned to take action. Once the disease is detected, an all-out alert will be issued using radio and other media. This year, a toll-free hotline will be established through the Missouri Soybean Association so anyone can call to get up-to-date information regarding soybean rust movement. The hotline will have a pre-recorded message by Dr. Allen Wrather that will be updated daily once rust begins to spread toward Missouri. Contact Allen Wrather, wratherj@missouri.edu, for more information about this. Those interested in more information about rust can go to www.sbrusa.net to view a map of the US showing areas scouted for rust and areas were rust has developed.

Missouri farmers and crop consultants may have soybean leaves examined for rust by the University of Missouri Plant Diagnostic Clinic. Soybean leaves and a moist paper towel should be sealed in a plastic bag, and these should be sent immediately by express mail to the clinic along with a completed information form. The information form and more instructions about collecting and mailing samples to the clinic are posted at http://soilplantlab.missouri.edu/plant/index.htm. You may also call, 573-882-0623, or e-mail, plantclinic@missouri.edu, the clinic about this and other services they provide. The clinic can also provide diagnosis and management information for other soybean problems including diseases, insects, and weeds. There is a $15 fee for examination of samples submitted to the diagnostic clinic.

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White Grub Larvae Numerous in Many Crop Fields

By Wayne Bailey

Elevated numbers of white grub larvae are present in many crop fields, pastures, and lawns. In Missouri we use an economic threshold of 1-2 or more grubs per linear foot of row for most crops. This equates to 1 cubic foot of soil when you sample 6 inches to each side of the row and 12 inches deep. Two general groups of white grubs are typically found causing economic damage in crop and forage fields. They include several species of annual and perennial white grubs.

Annual white grub species have a 1-year life cycle in which they remain in the grub or larval stage for most of their lives. Eggs are typically laid in August and hatch in a few days to a few weeks. Depending on the species, small larvae (grubs) will feed and grow through several instars or stages before overwintering in cells they form in the soil. The next spring they become active, feed on available plant roots, usually grow through 2-3 additional instars and then pupate and emerge as adult beetles in late May, June and July. The adult beetles of some species (*Cyclocephala* spp) such as the Northern and Southern Masked chafers will congregate on willows, cottonwoods, sycamores to feed, mate, and then move into fields to lay eggs in the soil for the next generation. Other species such as the Japanese beetle (*Popillia japonica*) will often congregate on host plants such as corn or soybean to feed, mate, and then move to the soil to lay eggs.

Perennial white grub or True white grub (*Phyllophaga* spp.), includes up to 100 different species commonly referred to as May and June beetles. Most true white grubs have a three year life cycle with grubs slowly growing over a three year period. They pupate the last summer and typically emerge as adults during late April, May and June the following spring.

Grubs from both groups can cause severe damage when they feed on roots of most field and forage crops. They prefer grasses such as corn and wheat, but can also severely damage soybean plants. Damage is often observed in the spring on seedling crops, but may occur throughout the growing season depending on grub species. In surveys this past year, problems in corn and soybean were often caused by both annual and perennial grubs with

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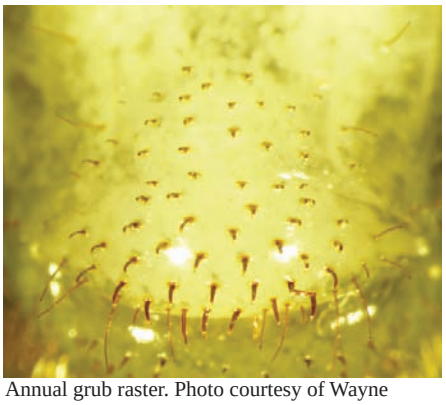
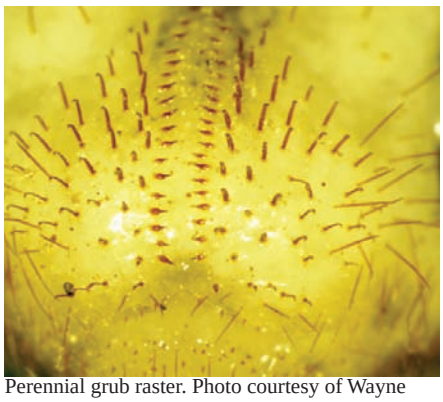


Annual grub raster. Photo courtesy of Wayne Bailey.



Perennial grub raster. Photo courtesy of Wayne Bailey.

Pest Update

Common Ragweed

Ambrosia artemisiifolia L.

By Kristin Payne and Kevin Bradley

Common ragweed, also known as Roman wormwood or hogweed, is a summer annual weed native to North America that has become very common throughout the United States over the past 200 years. Common ragweed is perhaps best known for its abundant pollen production which is the number one cause of hay fever in North America. Common ragweed can be found in disturbed sites, cultivated fields, pastures, and roadsides.

Common ragweed seedlings have cotyledons that are round to oblong in outline, often purple beneath, and the first true leaves are arranged oppositely along the stem (Figure 1). Subsequent leaves become alternately arranged with age. Mature plants have stems that are green with purple spots and leaves that are uniquely divided (Figure 2). Leaves are covered with hairs along the upper leaf surface and margins. Common ragweed has small (2 to 4 mm wide), inconspicuous flower heads that occur in the upper portions of the plant. Common ragweed is monoecious, meaning that male and female flowers are produced in separate locations on the same plant. The male flowers usually occur at the top of the plant and are drooping, in order to deposit pollen to the female flowers, which occur below in the upper leaf axils.

Figure 1. Common ragweed seedling.

Common ragweed seed germinate at soil temperatures of 55 to 60 degrees Fahrenheit, so this is one of the first species to emerge in agricultural fields and grass pastures in Missouri. Research conducted by Myers et al. (2004, 2005) has revealed that common ragweed is one of the first weed species to emerge in the spring and also that this species has a relatively short duration of emergence. In these studies, common ragweed emergence was 50 percent complete after 140 soil growing degree days were reached, and 95 percent complete by 420 soil growing degree days (about five weeks). Research has also shown that tillage will shift the emergence pattern of common ragweed by approximately two weeks when compared to no-till fields. Spring tillage also tends to reduce the total number of emerged common ragweed seedlings when compared to no-till fields.

Common ragweed commonly invades overgrazed pastures, reducing productivity. We have recently initiated a series of experiments to investigate the impacts of common ragweed on grass pastures and hay fields. Although this research is still ongoing, one of the things we have been able to document thus far at one research location is that the elimination of a common ragweed infestation from a grass pasture can increase total forage yields by 480 lbs/acre in a single growing season. Surprisingly however, even very high densities of common ragweed in the spring do not appear to deleteriously impact forage quality. We have found that 8- to 10-inch tall common ragweed that might typically occur at the time of the first spring hay harvest has a crude protein content of about 16% and is lower in acid detergent fiber (ADF) and neutral detergent fiber (NDF) than tall fescue harvested at the same time. Other research we have conducted also shows that common ragweed is highly digestible for cattle that may be forced to graze this weed during this time period.

Figure 2. Mature common ragweed plant in soybeans.

For more information on common ragweed and other species, visit the MU Weed ID Guide Web site at http://weedid.missouri.edu.

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Fusarium Head Blight or Scab of Wheat

By Laura Sweets

Fusarium head blight or scab of wheat develops on plants in the flowering to early grain fill stages of growth. Although winter wheat in south Missouri began flowering in the last week, the winter wheat in much of the rest of the state ranges from flag leafs emerging to just beginning to head. So the time for possible infection by the Fusarium head blight fungus is at hand. Infection is very dependent on environmental conditions while wheat is in susceptible stages of growth, i.e., flowering. Moderate temperatures in the range of 77-86 degrees Fahrenheit, frequent rain, overcast days, high humidity and prolonged dews favor infection and development of scab. Weather conditions over the next several weeks will determine the extent and severity of scab in this year's wheat crop. Fusarium head blight or scab problems will be more severe if rains coincide with flowering of wheat fields. Many parts of the state have been unusually wet and the forecast for the week of May 5-9 with moderate chances for rain almost every day could be quite conducive to scab problems in areas of the state in which the wheat crop is flowering.

The characteristic symptom of scab on wheat is a premature bleaching of a portion of the head or the entire head. Superficial mold growth, usually pink or orange in color, may be evident at the base of the diseased spikelets. Bleached spikelets are usually sterile or contain shriveled and or discolored seed.

Scab is caused by the fungus *Fusarium graminearum*. This fungus overwinters on host residues such as wheat stubble, corn stalks and grass residues. Spores are carried by wind currents from the residues on which they have survived to wheat heads. If environmental conditions are favorable, i.e., warm and moist, the spores germinate and invade flower parts, glumes and other portions of the spike. Scab infection occurs when favorable environmental conditions occur as the wheat crop is in the flowering to early grain fill stages.

Unfortunately, the detrimental effects of scab are not limited to its adverse effects on yield. The fungi which cause scab may also produce mycotoxins. Vomitoxin (deoxynivalenol or DON) and zearalenone may occur in wheat grain infected by scab fungi. This is a primary concern where grain is fed to non-ruminant animals. Ruminants are fairly tolerant of these two mycotoxins. Also, the fungi which cause scab may survive on the seed and can cause seedling blight and root rot problems when scabby grain is used for seed.

Crop rotation, variety selection and residue management are preventative measures for amanging scab in wheat. At this point in the season the only remaining management option would the application of a fungicide to try to reduce scab levels. The fungicide table in the last issue of the Integrated Pest & Crop Management Newsletter listed Proline as good to very good against scab, with PropiMax, Tilt, and Bumper as fair against scab. Also, Caramba was just recently labeled for use on wheat including for management of scab. Growers should be scouting fields to get a feel for incidence and severity of scab in this year's wheat crop. Because of possible mycotoxin concerns and seed quality concerns, grain from fields with scab may require special handling. Wheat planted on corn, sorghum or wheat residue (even wheat double cropped with soybeans) has a greater risk for scab.

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White Grub Larvae Numerous in Many Crop Fields *continued from page 49*

populations of both grub groups being present in some fields. If only perennial grubs were present, we often observed several overlapping generations present and feeding on plant tissues. Conditions generally favorable to both groups of grubs include soils with high organic matter content, fields where cattle and other livestock have grazed, and fields with borders of certain tree species, especially willow trees. Grub larvae can generally be divided into annual and perennial categories by looking at the raster pattern (hair or spine patterns) found on the lower side of the tail end of the grub. If the hairs of the raster pattern are arranged randomly, then the grub is in the annual group. If the hairs of the raster are found to be in a distinct zipper pattern, then the grubs are from the perennial or *Phyllophaga* group.

Damage from grubs has increased substantially during the past few years. Several agronomic factors thought to favor grub survival in current agricultural systems include (1) reduced application of pesticides, (2) use of low dose seed treatment which provide partial control, (3) use of transgenic seed which does not target grubs, (4) changes in weed management which allow for more winter annuals and other weeds to remain in the field longer in the spring, (5) adoption of tillage systems which help build organic matter content in the soils, and (6) possibly other factors not yet known.

Management of white grub populations in established crops is difficult at best. In fields with known population levels of white grub, viable management options which will help reduce grub numbers include the use of high dose seed treatments (1250 rate) or 250 rate with additional insecticide, the application and incorporation of pre-plant insecticide applications such as Lorsban 4E, and the use of planting-time liquid Capture LFR1.5 or Regent 4SC, and use of planting-time granular products such as Counter 20CR or Force 3G. See specific labels for rates and placement.

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Would You Like to be a Volunteer Precipitation Observer for Missouri?

By Pat Guinan

Because of Missouri's size and topography, there is significant climatic variation within the state. For perspective, the distance from the northwestern tip of the Show-Me state to the Bootheel is over 400 miles, or the same distance as going from the bootheel to the Florida panhandle! Annual average temperatures range from 50 degrees Fahrenheit in the northern tier counties to nearly 60 degrees at the bootheel tip. Annual precipitation ranges from less than 34 inches in extreme northwestern Missouri to 50 inches in the bootheel.

The climatic variation of Missouri also translates to temperature and precipitation differences on a much shorter time scale. For example, precipitation can be highly variable over short distances, especially during the summer when thunderstorm activity has a tendency to be localized. The hit and miss nature of rainfall during the growing season make it all that more important for an extensive monitoring network that will capture as much information on precipitation patterns in the state as possible. A large network of rain gauges across the state provides valuable information in regard to drought assessment and flood monitoring and prediction. Additionally, precipitation information is used by the National Weather Service, emergency managers, city utilities, engineers, farmers, hydrologists, teachers, students, and outdoor enthusiasts.

Missourians have recently been offered an opportunity to expand precipitation monitoring in the state via a program that began in Colorado called the Community Collaborative Rain Hail and Snow network, or CoCoRaHS. CoCoRaHS was established in 1998 and is a grass roots volunteer network of observers who measure and log precipitation for their local communities. The program has been well received in Colorado and has expanded to 30 additional states including Missouri. As stated in their mission statement, the only requirements to join are an enthusiasm for watching and reporting weather conditions and a desire to learn more about how weather can affect and impact our lives. Additionally, in order to provide consistent and accurate precipitation data, all observers are required to use a particular rain gauge model that retailers sell for twenty to thirty dollars each.

Once enrolled, the weather observer is assigned a station ID and uses an interactive Web site to submit their observation. The Web site allows the observer to see their observation mapped in real-time and provide valuable information for all data users. More than 200 Missourians currently report on a regular basis but we would like to double or triple the number.

If you would like to be a CoCoRaHS volunteer weather observer in Missouri, please go to www.cocorahs.org for more information or contact your state coordinators:

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Agriculture and Carbon Credits *continued from page 47*

carboncredit.ndfu.org/). Aggregators offer five year contracts to sequester carbon in soil at a price determined on the Chicago Climate Exchange. They retain about 10 percent for their service. In addition, they may retain some of the price until the contract is completely satisfied at the end of the five years.

When a farmer enters into a carbon sequestration contract, he is agreeing to certain land practices for the duration of the contract. For example, land under a carbon contract cannot be tilled even if compaction is a problem.

Currently, carbon contracts are selling for about $6/ton. Last year at this time the price was less than $4/ton. At $6/ton and receiving .6 tons/acre credit for no-tillage production, the price a farmer could receive is $3.60/acre/year, minus the fees charged by the aggregator. The farmer would need to weigh the value of the credit against the limitations on production practices.

Should GHG emissions become regulated in the US, the price of a carbon credit is likely to rise. In Europe, where GHG emissions are limited, carbon sells for over $30/ton. But Europe does not allow farmers to sell carbon credits.

And there is the big question for US farmers. Should they hope for carbon regulations so that the price will rise and they can make money for doing something they may already be doing? Or should they realize that the EPA considers both crop and livestock production to emit GHG that can be regulated—with or without payments for reductions? I recently heard a person whose business depended on the government to say "Those who live by the sword, die by the sword."

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Update on Wheat Diseases and Fungicides

By Laura Sweets

Thus far this season, wheat viruses have been the most prevalent diseases occurring on wheat in Missouri. Wheat spindle streak mosaic, wheat soilborne mosaic, barley yellow dwarf and even wheat streak mosaic have all been reported and confirmed from locations throughout the state. At this point in the season little can be done to manage virus diseases. Foliar fungicides will not control these virus diseases. See the article on wheat virus diseases in the May 2, 2008 issue of *Integrated Pest & Crop Management Newsletter f*or more detailed information on wheat virus diseases.

There have been a few reports of powdery mildew and Septoria leaf blotch but so far neither disease appears to be widespread or severe. Leaf rust is being reported in states to the south and west of Missouri but is just beginning to show up in very low levels in Missouri. According to the Missouri Agricultural Statistics Service, the wheat crop is 11 days behind last year and 10 days behind normal with only three percent of the crop headed. The forecast for this coming week shows moderate temperatures and chances of rain almost daily. These conditions could favor the development of Fusarium head blight or scab in wheat that is flowering during these periods of frequent precipitation. See accompanying article on Fusarium head blight.

Also, since the April 18, 2008 issue of the *Integrated Pest & Crop Management Newsletter* there have been some changes in fungicides labeled for use on wheat. Caramba and Multiva both BASF products have received Federal Section 3 labels (full federal registration) for use on wheat and other small grains. These products have also been registered in Missouri so are now legal for use in Missouri. According to BASF, there will be a small amount of Caramba (metconazole) for sale this season but Multiva, a combination of Headline (pyraclostrobin) and Caramba (metconazole), may be available for demonstrations but will not be sold during the 2008 season. Folicur (tebuconazole) a Bayer product has also received a Federal Section 3 label, but is not yet registered in Missouri. Until the state registration comes through, Folicur can not legally be used on wheat in Missouri.

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High Numbers of Alfalfa Weevil Larvae *continued from page 48*

about 98 percent with mechanical harvest and about 90 percent by cattle grazing in a management intensive grazing system. These reductions in larval numbers can effectively eliminate the risk from alfalfa weevil as long as most spring laid eggs have hatched. *This method of alfalfa weevil control is not without risks. Fields should not be grazed when wet and susceptible to damage from cattle hooves. Bloat also must be a concern as producers must take precautions to prevent bloat from occurring to cattle*. Your local extension office can provide additional information concerning grazing precautions. Producers should continue to scout alfalfa after grazing to determine whether larval or adult alfalfa weevil numbers again reach economic levels and require further control.

Biological Control is a long-term control strategy that can help keep alfalfa weevil numbers below damaging levels. Five species of biotic agents are now commonly found associated with the alfalfa weevil in this state: four parasites and a fungal disease. The parasites are all introduced species from Europe as is their host the alfalfa weevil. *Bathyplectes curculionis*, a larval parasite, moved into the state with the alfalfa weevil in the 1960s. Similarly, the fungal disease, *Zoophthora phytonomi*, was first detected in Missouri in the early 1970s. Both of these biotic agents occur throughout the state and cause some mortality of alfalfa weevil larvae. The three other parasites have a limited range in the state, but are increasing in distribution. The two larval parasite, *Bathyplectes anurus* and *Oomyzus incertus*, and an adult parasite, *Microctonus aethiopoides*, have been established in Missouri as a result of parasite release programs conducted during the 1970s and 1980s. These parasites have a limited distribution, but should increase in importance as they move to other Missouri counties.

Producers can help conserve and increase the number of parasites on their farms by using pesticides only when needed and leaving a small area of alfalfa standing when the first cutting is removed. The alfalfa that has not been treated with an insecticide and is not harvested during first cutting will serve as a reservoir for many parasites and predators that attack alfalfa weevil. This alfalfa can be harvested at second and later cuttings because most of these parasites will mature shortly after removal of first alfalfa harvest. The fungal pathogen (*Zoophthora phytonomi*) is most effective at causing larval mortality in wet years. However, the wet conditions experienced this spring seem to have little effect on weevil numbers to this point in the season. Infected alfalfa weevil larvae slow their feeding activities, turn from light green to pale yellow in color, and die within a few days of becoming infected by the fungal pathogen. If this pathogen develops early in the season it can decimate larval alfalfa weevil populations. Whether it does so this year Missouri is yet to be determined.

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Weather Data for the Week Ending May 5, 2008

By Pat Guinan

Station	County	Weekly Temperature (Degrees Fahrenheit)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	Apr 1-30-Apr	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	72	44	87	36	58	1	3.3	0.15	157	30
St. Joseph	Buchanan	70	45	81	33	57	-1	5.06	1.47	145	-11
Brunswick	Chariton	71	45	81	32	58	0	4.69	1.33	181	20
Albany	Gentry	70	43	81	31	57	-1	5.85	2.26	133	2
Auxvasse	Audrain	70	45	80	31	59	1	3.79	0.01	201	37
Columbia	Boone	70	45	80	31	59	0	4.09	-0.17	206	9
Sanborn Field	Boone	71	46	81	32	60	0	4.35	0.09	227	17
Williamsburg	Callaway	70	45	79	31	59	1	3.45	-1.13	209	47
Novelty	Knox	68	44	76	30	57	-1	4.58	1.15	164	14
Linneus	Linn	70	43	79	28	57	-1	5.25	1.86	162	23
Monroe City	Monroe	69	44	77	29	57	-1	4.76	1.36	184	18
Versailles	Morgan	72	46	80	33	60	0	4.74	0.4	223	-12
Green Ridge	Pettis	70	46	80	34	59	1	6.28	2.12	188	38
Lamar	Barton	71	46	79	35	59	-1	7.38	2.88	201	-37
Cook Station	Crawford	73	43	81	28	59	-2	4.93	0.64	225	-23
Alley Spring	Shannon	74	39	83	27	58	-1	5.94	1.69	208	-11
Round Spring	Shannon	74	40	84	28	58	-1	5.97	1.7	211	-8
Mountain Grove	Wright	70	43	80	29	58	-1	6.5	1.81	185	-11
Delta	Cape Girardeau	70	46	77	33	59	-3	6.96	2.89	248	-50
Cardwell	Dunklin	72	50	79	38	62	-2	5.74	1.06	311	-54
Clarkton	Dunklin	71	48	79	34	61	-3	5.23	0.91	279	-75
Glennonville	Dunklin	72	49	78	36	61	-3	4.14	-0.04	293	-65
Charleston	Mississippi	70	48	77	36	60	-3	5.9	1.43	273	-22
Portageville-Delta Center	Pemiscot	72	51	80	37	62	-2	5.63	1.05	313	-44
Portageville-Lee Farm	Pemiscot	72	51	79	37	62	-2	6.12	1.52	313	-37
Steele	Pemiscot	73	51	80	37	63	-1	6.19	1.4	328	-28

* 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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