Integrated Pest & Crop Management

For Grain Sorghum Health and Yield the First 40 Days are Critical

By Allen Wrather

Grain sorghum was the sixth most valuable field crop grown in Missouri during 2009 following soybeans, corn, wheat, rice, and cotton. The value of this crop was about $30 million, but the value would have been greater if not for reduced yields caused by seedling diseases. Grain sorghum seedling diseases can be caused by several microorganisms that normally live in the soil on organic matter but can attack grain sorghum seedling roots especially when the soil is cold and wet and the soil pH is low. Seedling diseases cause dark red to black rotten areas to develop on grain sorghum roots. The leaves of diseased seedlings may wither or appear pale-green, and diseased plants will be smaller than healthy plants. Plants that survive this are often weak and yield less than healthy plants. Severely damaged plants may die, and this results in thin stands and skips in rows, and farmers must occasionally replant entire fields due to death of most or all seedlings.

Farmers can help protect grain sorghum seedlings from this problem by following a few simple guidelines.

1. Plant only when the soil temperature 4 inches deep has warmed up to about 65°F by 8:00 a.m. and plant only when at least 7 days of warm and dry weather are predicted immediately after planting.
2. Plant only high-quality seed that has a high germination rate.
3. Plant in fertile soils that have a pH of 6.0 to 6.5. Grain sorghum seedlings growing in soil with a pH less than 5.5 are more likely to be diseased.
4. Plant in well drained fields. Make sure field surface drainage is adequate to quickly eliminate excess water and enhance internal soil drainage by breaking hardpans with a ripper.
5. Have the seed treated with extra fungicides when grain sorghum is planted early in the season, in poorly drained fields, in clay soils, and certainly when planting in fields where seedling diseases have been a problem in previous years.
6. When planting no-till, equip your planter to move trash away from the row, so the sun can warm the soil around the seed faster.

Following these suggested procedures will give Missouri grain sorghum farmers a better chance of producing high yield and profit during 2010. More information is available at your University of Missouri Extension county office and is posted on the University of Missouri Delta Center web page (www.aes.missouri.edu/delta).

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Considering Your Weed Management Program in Corn

By Kevin Bradley

Regardless of whether you intend to plant Roundup Ready©, Liberty Link©, or conventional corn varieties this year, it's always important to plan ahead and think about what type of weed management program you will utilize. Over the past six years, I've had the opportunity to evaluate a lot of different herbicides and herbicide programs as part of our general herbicide evaluation research at the University of Missouri. Recently, I've compiled much of this data in order to better understand which herbicide programs are most likely to provide highest corn yields. Understand that the objective of this "data mining" exercise was not to compare any one specific herbicide treatment to another, but rather to compare the different type of herbicide program approaches one might utilize in a corn production system.

After examining the data, I found that I was able to make a fair comparison of three different program approaches that have been evaluated in 55 trials in Missouri over the past six years. I have to admit that I really wasn't all that surprised by what I found. The results showed that in 67% of the trials examined, highest corn yields were obtained with a two-pass program consisting of a preemergence herbicide application at or near planting followed by an in-crop postemergence herbicide application. A one-pass postemergence program that also contained a residual herbicide provided highest corn yields in 29% of the trials, while a one-pass preemergence herbicide program at or near planting provided the highest corn yields in only 4% of the trials.

Collectively, what all of this indicates to me is that depending on the year, environment, soil type, and weed spectrum, either of these program approaches ***might*** work for you, but year-in and year-out, the two-pass preemergence followed by postemergence herbicide program should provide the highest levels of weed control and corn yield in either conventional, Roundup Ready©, or Liberty Link© corn. I want to emphasize that the response to these different programs is likely to vary from one location to another, and will be highly dependent on the weed spectrum that you have in your fields. So, if you have been using a one-pass preemergence herbicide program for years and have no complaints, chances are you probably have a pretty low weed density in your fields and/or you do not have very many weed species that germinate later in the season. In these situations, I agree that there's certainly no reason for you to switch herbicide programs at this time. However, with the typical spectrum of weeds that we have in Missouri like cocklebur, waterhemp, common and giant ragweed, sunflower, foxtail, fall panicum, and others, our data show that a postemergence application is usually required for weeds that have escaped or germinated since the initial preemergence herbicide application.

Just to reiterate and so you don't misunderstand my next statement, I certainly do believe that for the typical Missouri corn grower, the two-pass preemergence followed by postemergence herbicide program is the option that offers the least risk and best chance at obtaining optimum weed control and corn yield. However, what these percentages do not reveal is the changes that have occurred in these program approaches in recent years.

Without question, the one-pass postemergence plus residual herbicide program has been "gaining a lot of ground" over the past several years. No doubt this is due to Roundup Ready© corn adoption and the ability to get good control of small emerged weeds with a glyphosate product, and then get residual control of later season weed flushes with a residual herbicide. Some companies have recognized this and prepackaged their own products like Halex GT from Syngenta which contains glyphosate, Dual II Magnum, and Callisto all in one jug. I think we will probably see more of these kinds of product concepts in the future.

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Alfalfa Weevil Larvae

By Wayne Bailey

Economic infestations of alfalfa weevil have been found in some southwest Missouri alfalfa fields. Although numbers of larvae vary depending on the field, most fields support weevil infestations which have either reached or are increasing toward economic levels. Alfalfa weevil grow through 4 worm (larval or instars) stages on their journey from egg to adult weevil. Adult weevils generally lay eggs inside alfalfa stems during warm days during fall, winter, and spring. Eggs hatch from early to late spring with 1st stage larvae crawling to the top of alfalfa plant stems to feed inside plant terminals. Larvae continue to feed inside plant terminals through development of the 2nd instar. Third and 4th instars feed on foliage outside of plant terminals often causing substantial decreases in forage yield and quality. Heavy defoliation also reduces alfalfa competition with weeds and may result in increased weed populations.

Producers in southwest and central Missouri are encouraged to scout alfalfa fields at this time 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 5 random locations in a field for a total of 50 stems per field. At each of the 5 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% or more of the alfalfa stems show feeding damage, then control is justified. Most weevils found by this scouting method will be in their 3rd or 4th larval stages of growth. Note: eggs laid on south facing slopes often hatch first in the spring due to receiving more heat units due to their location.

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 about 98% with mechanical harvest and about 90% 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

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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 is does so this year Missouri is yet to be determined.

Table 1. Recommended Insecticides for Control of Alfalfa Weevil Larvae in Alfalfa - 2010

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
Cholopyrifos	*Lorsban Advanced	1 to 2 pts/acre	0.5 to 1 lb a.i./acre
Chlorpyrifos 4E	*Lorsban 4E	1 to 2 pts/acre	0.5 to 1 lb a.i./acre
	*numerous products	see specific labels	see specific labels
Chlorpyrifos 4E plus			
Gamma-cyhalothrin	*Cobalt	19.0 to 38.0 fl oz/acre	
Cyfluthrin	*Tombstone	1.6 to 2.8 fl. oz/acre	0.025 to 0.044 lb a.i./acre
Gamma-cyhalothrin	*Proaxis	2.56 to 3.84 fl. oz/acre	0.02 to 0.03 lb a.i./acre
Lambda-cyhalothrin	*Warrior	2.56 to 3.84 fl oz/acre	0.02 to 0.03 lb a.i./acre
	*numerous products	see specific labels	see specific labels
Methyl Parathion	*Chemnova Methyl 4EC	1 pt/acre	0.5 lb a.i./acre
Phosmet	Imidan	see specific label	see specific label
Zeta-cypermethrin	*Mustang Max EC	2.24 to 4.0 fl oz/acre	0.014 to 0.025 lb a.i./acre

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

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Late Planted Corn Susceptible to Black Cutworm

By Wayne Bailey

One insect which benefits from late planting of corn is the black cutworm. Moths began migrating into Missouri about two weeks ago. Upon arrival, female moths will lay eggs on a variety of vegetative materials and soil surfaces although winter annuals such as henbit and chickweed are favored egg laying sites. Black cutworm grow through several larval stages as they develop from eggs to an adult moth. Smaller instars will often leaf feed causing minor defoliation of corn seedlings, but damage increases significantly as the larvae grow to 4th instar or larger stages and begin cutting plants. A predictive model is used to predict the different developmental stages for BCW. The model is based on intensive captures of moths during early spring and uses both a 30-year average of meteorological data along with real time data collected from several weather stations located throughout Missouri. The predicted date of first cutting may change by location as current 2010 meteorological data are entered into the model.

Scouting activities should occur from first emergence of corn plants and continue through the 5th leaf stage of plant development. If this is not possible, then scouting of fields should begin a minimum of one week prior to the predicted date of cutting. Early damage by black cutworm larvae smaller than 4th instars may be visible as leaf feeding on corn plants. Recent high

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moth captures in the Columbia and Centralia areas suggest that black cutworm may be an important pest of corn this season.

For more information on the black cutworm predictive model and the counties currently monitoring for black cutworm, please visit our Website at: http://ppp.missouri.edu/pestmonitoring/index.htm. Information at this site will include the number of moths captured, the date of an intensive moth capture (begins the model), and the predicted date of first black cutworm cutting of corn. At present, the predicted cutting for Columbia and Centralia areas is May 2, 2010. This is the predicted date larvae will reach the 4th instar stage and begin cutting plants. This date may change depending on actual meteorological data collected over the next couple of weeks.

Black cutworm infestations may occur in scattered areas within a field or be found throughout the entire field. When scouting be sure to check all areas of the field, but focus some effort on those areas of the field where black cutworm infestations have been found in the past. Although the economic threshold for black cutworm varies from state to state, under normal conditions in Missouri treatment is recommended when cutting of corn seedlings reach or exceed 3-4% cutting above ground and 2-3% cutting below ground. These thresholds are based on the location of the plant growing point at the time of cutting by black cutworm and the potential for yield loss. Cut plants may be left on the soil surface or partially pulled into the soil by the larvae. If the economic threshold is reached, then treatment with a recommended insecticide is justified. It is possible for a field of corn to be infested more than once by black cutworm due to migratory patterns of arriving moths. Corn fields most at risk from this pest are those late planted and have a history of winter annual weeds in the field. Scouting for this pest on seedling corn should begin with emergence and continue through the 5th leaf stage of plant development. Rescue applications of labeled insecticides generally provide control of this pest. Seed treatments will provide partial control of this pest, but heavy populations of larvae may cause significant damage in seed treated fields. The Herculex event along with several transgenic events currently undergoing labeling have been shown to provide good control of black cutworm in Missouri field trials.

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IPM Publications, Information You Can Use! IPM1006: Introduction to Scouting

By Steven Kirk

Crop scouting provides field-specific information on pest pressure and crop injury, as well as information essential to the appropriate selection and application of pest management procedures. Because crop losses from insects, diseases and weeds can be costly for Missouri's farmers, scouting can be an essential part of an Integrated Pest Management (IPM) program that can help reduce these losses.

IPM1006: '*Introduction to Scouting*' is a publication designed to explain the field-sampling procedures used by field scouts as well as introduce the concepts of the 'economic injury level' and 'economic threshold' to Missouri's producers. IPM1006 discusses the importance of the scouting report as a record of the field sampling survey. Topics covered in this manual include an introduction to scouting, weed identification and management, plant diseases, and insects of field and horticultural crops. This information is designed to help farmers and pest managers improve their decision-making process in order to protect crop yield and quality while minimizing the risks associated with pesticide use.

Introduction to Scouting is an essential tool to aid in providing farmers and field-scouts with important information in how to establish a sound scouting program for pests most commonly occurring in Missouri. This publication will also help to provide management strategies to cope with a variety of pest pressures as well as information describing the concepts of the economic injury level (EIL) and economic threshold (ET). It will outline how to develop a sampling plan, including recommended field-sampling procedures as well as a scouting report. IPM1006 also includes an appendix on the identification of crop growth stages for corn, soybeans, wheat, grain sorghum, cotton and rice.

The MU Plant Protection Program produces IPM manuals and publications 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 publications offer something for everyone involved in pest management. All 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.

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Weather Data for the Week Ending April 12, 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.	April 1-April 12	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	73	44	86	30	59	+10	0.36	-0.84	120	+119
St. Joseph	Buchanan	71	46	82	36	60	+10	.50	-0.89	125	+122
Brunswick	Carroll	73	45	82	35	60	+10	1.45	+0.26	126	+122
Albany	Gentry	72	43	85	30	58	+9	0.49	-0.83	109	+108
Auxvasse	Audrain	74	48	81	38	61	+11	1.88	+0.44	147	+142
Vandalia	Audrain	74	47	82	37	61	+11	2.50	+1.01	139	+136
Columbia-Bradford	Boone	73	46	81	36	60	+9	1.63	+0.10	137	+123
Columbia-Jefferson Farm	Boone	73	48	81	37	61	+10	1.58	+0.05	152	+138
Columbia-South Farms	Boone	73	48	80	37	61	+10	1.75	+0.22	151	+137
Williamsburg	Callaway	75	48	83	37	62	+11	1.93	+0.47	157	+149
Novelty	Knox	71	44	80	33	58	+8	1.28	-0.01	116	+114
Linneus	Linn	71	44	81	31	59	+10	1.24	+0.12	113	+112
Monroe City	Monroe	72	46	80	35	60	+10	1.96	+0.47	131	+128
Versailles	Morgan	75	48	83	38	62	+10	1.00	-0.86	162	+135
Green Ridge	Pettis	72	47	80	36	60	+9	1.06	-0.51	141	+134
Lamar	Barton	73	47	81	37	60	+7	0.71	-0.89	145	+115
Cook Station	Crawford	74	43	82	30	60	+7	1.32	-0.07	155	+119
Round Spring	Shannon	76	42	82	29	60	+7	1.20	-0.29	145	+118
Mountain Grove	Wright	71	46	78	36	60	+8	1.48	-0.10	138	+121
Delta	Cape Girardeau	73	48	80	39	61	+6	1.38	-0.02	145	+95
Cardwell	Dunklin	74	50	82	43	63	+6	1.43	-0.28	164	+88
Clarkton	Dunklin	73	49	81	41	62	+6	1.95	+0.48	159	+92
Glennonville	Dunklin	74	50	81	39	62	+6	1.30	-0.13	164	+94
Charleston	Mississippi	73	51	80	41	62	+8	1.55	-0.13	165	+110
Portageville-Delta Center	Pemiscot	74	52	82	43	63	+6	1.92	+0.27	176	+101
Portageville-Lee Farm	Pemiscot	75	52	83	43	64	+7	1.62	-0.02	183	+110
Steele	Pemiscot	75	52	83	43	64	+8	1.41	-0.33	176	+105

* 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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