Integrated Pest & Crop Management

Consider Herbicide Carryover Potential before Planting Wheat this Year

By Kevin Bradley

Although some areas of the state have received average or above average rainfall during the growing season, other areas like southwest Missouri have experienced severe drought conditions. Under especially dry conditions, the risk of carryover injury to wheat from corn or soybean herbicides is much higher.

The amount of rainfall received during the course of the growing season is one of the most important factors that influences the likelihood of herbicide carryover injury to wheat. Soil moisture is critically important for herbicide degradation, especially in the first few weeks after herbicide application. If adequate rainfall is not received during this time period, then the chemical and microbial processes responsible for herbicide degradation are reduced significantly and the herbicide molecules are more likely to become bound (adsorbed) to soil particles. All of this results in less herbicide degradation and increases the likelihood of herbicide carryover to wheat. Some herbicides are also degraded chemically in a process called hydrolysis. Hydrolysis is a reaction of the herbicide in question with soil water; therefore when soil water is limited, chemical hydrolysis of the herbicide is also reduced.

Another factor that influences the likelihood of herbicide carryover is the type of herbicide applied. As a general rule, corn or soybean herbicides with residual soil activity have the highest potential for causing carryover injury to wheat in Missouri. This is because residual herbicides are designed to remain in the soil profile for a specified period of time in order to prevent weed seedling germination, and also because most of the wheat planted in Missouri will follow either corn or soybeans.

In fields where corn was the previous crop, triazine herbicides are of the greatest concern in terms of herbicide carryover injury to wheat. These include atrazine or a variety of prepackaged mixtures that contain atrazine as one of the active ingredients (Bicep II Magnum, Degree Xtra, Guardsman Max, Harness Extra, Lexar, etc.). I have received several calls from southwest Missouri farmers and retailers who indicated they received little to no rainfall following applications of atrazine in corn this season. These are the areas that are most at risk for herbicide carryover injury to wheat this fall. However, it is important to note that these labels **do not** allow for rotation to wheat until the year following application.

In fields where soybeans were the previous crop, the likelihood of carryover injury to wheat is usually lower because there are fewer residual herbicides applied in soybean. However, as a result of our glyphosate-resistant waterhemp problem throughout the state, fomesafen (Flexstar, Rhythm, in Prefix, etc.) has now become a more common post-emergence herbicide of choice in soybean, and this has a 4-month wheat replant interval. Regardless of the herbicide used, a good habit to get into is to consult the herbicide label for rotation information **prior to application** so that subsequent crop rotations can be planned. In addition to the

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herbicide label, information on crop rotation restrictions for some common corn and soybean herbicides can also be found in the Missouri Pest Management Guide for Field Crops (MU Extension Publication #M171) at http://weedscience.missouri.edu/publications/m00171.pdf.

The rate of herbicide applied and the timing of the herbicide application are other factors that influence the likelihood of herbicide carryover injury to wheat. Simply put, the higher the rate of herbicide applied and the later the herbicide application was made, the greater the chance that some of the herbicide will remain to cause carryover injury to wheat. This is often an issue when corn was the previous crop and atrazine was applied later in the season and/or at rates higher than 2 lbs per acre. It is important to note that the label **does not allow** for rotation to any other crops except corn and grain sorghum until the following year if atrazine was applied after June 10.

What does all of this mean for growers who are trying to decide where to plant wheat this year? I think it means that wheat growers should be more aware of the higher potential for herbicide carryover injury that can occur in areas that have experienced extreme drought conditions. The best practice is to follow the label and consider the herbicide use history of each field in relation to each of the factors discussed above. If several of these factors indicate a high probability of herbicide carryover, then it is a good idea to abandon the field until next spring and rotate to another location where the probability of herbicide carryover is not as high.

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Corn Growers—Don't Let Aflatoxin Ruin Your 2011 Corn Harvest

By J. Allen Wrather

Corn harvest will soon begin in the upper Mississippi delta region, and I want to warn farmers to take precautions to minimize aflatoxin contamination of their grain. Some farmers in this region had problems with aflatoxin last year, but these problems were not nearly as severe as those in 1998. Unfortunately, problems with aflatoxin contaminated corn may develop this year because drought was as severe as last year, and damage to corn by drought can enhance the development of the mold on corn kernels that produces aflatoxin. All corn farmers, even those that irrigated their crop and sprayed for earworm or planted varieties with resistance to earworm, should take some precautions to avoid problems with aflatoxin.

Here is the situation. The problem occurs when a mold named *Aspergillus flavus* feeds on the starch inside corn kernels and produces aflatoxin. This mold gets to the starch through openings in the kernel hull due to drought caused stress cracks and injury due to ear worm feeding. I don't know the reason this mold produces aflatoxin as it feeds, but it does. Aflatoxin will be produced as long as the mold feeds and more will be produced when the mold grows rapidly.

Aflatoxin is a poison to humans and animals, and the U. S. Food and Drug Administration designed methods to protect us and animals from contaminated corn and corn products. One of the methods designed by FDA to protect us is to prevent grain merchants from buying corn containing 20 parts per billion or more aflatoxin. This is good because it minimizes availability of aflatoxin contaminated products that we eat such as corn meal.

This mold can grow on corn kernels in the field and on corn kernels stored in a truck or grain tank. The mold prefers to grow on 18-20% moisture corn kernels at around 85° F. It grows slowly on 15% moisture corn and will not grow or grows very slowly on 13% moisture corn. To reduce growth of this mold and aflatoxin production on stored corn, farmers should dry freshly harvested corn to 15% moisture within 24 hours of harvest. Farmers should dry corn to 13% for long term storage to stop growth of the mold and aflatoxin production.

What should farmers do this year? I suggest they first harvest some dryland corn and have the grain tested for aflatoxin. If it is not contaminated with aflatoxin, then

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the irrigated corn will probably not be contaminated. If the dryland corn is contaminated, farmers should then harvest some irrigated corn and test it for aflatoxin. If the irrigated corn has no aflatoxin, farmers should first harvest and sell the healthy corn or store it in separate bins and then harvest the contaminated corn and store it separate from the healthy corn. Don't blend contaminated and toxin free corn in a truck or grain bin because this may result in contamination of the entire truck load or bin of corn.

What should farmers do in the future to avoid aflatoxin problems? I suggest they only plant corn in fields that can be irrigated and treat growing corn for earworm if necessary. They may also consider planting corn varieties resistant to earworm, but the corn should still be irrigated aggressively.

Again, corn farmers should beware of this problem and always dry corn to 15% moisture within 24 hours of harvest. More information is available on the web at http://extension.missouri.edu/publications/DisplayPub.aspx?P=G4155.

Following these suggested procedures will give corn farmers a better chance of producing aflatoxin-free corn during 2011. For more information, you may call me at 573-379-5431 or visit the web at http://aes.missouri.edu/delta/croppest/aflacorn.stm.

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Multi-Colored Asian Lady Beetle Taint in Wine

By Andy Allen

Sometimes good ideas have downsides. It's called the Law of Unintended Consequences. Such is the case with Multi-colored Asian Lady Beetle. A species of lady beetle native to an area in Asia from southern Siberia to southern China, the Multi-colored Asian Lady Beetle (MALB) was introduced into the United States on several different occasions during the course of the Twentieth Century in an attempt to provide natural control of soft-bodied insect pests of crops, particularly aphids. The earliest known introduction was into California in 1916. But it was its introduction into areas of the eastern U.S. in the late 1970's and early 80's that led to established populations across most of the continental US. (Note: there is some speculation that it was not the intentional release of MALB, but accidental introductions through seaports that led to established populations in the U.S.) The MALB is a very successful predator and was introduced to provide biological control of pecan aphids in the southeastern U.S.; a job that it has performed very well. As it has become established and spread across the country it has also helped provide biological control of aphids and other soft-bodied pests in crops such as apples, citrus, alfalfa, sweet corn, cotton, tobacco, and winter wheat. In the Midwest, it is well known for its predation of soybean aphids. But with its success has come an unintended consequence: it has become a nuisance pest in some other crops, particularly winegrapes in the Eastern and Midwestern U.S. and Ontario.

In the latter part of the fall season, in areas where large populations of MALB and vineyards coexist, the beetles will move into the vineyards and take shelter within the grape clusters. This may be due to the declining populations of insect-prey in the late fall or the beetles may be seeking sugars and other carbohydrates from the berries themselves before hibernating. Despite some contradictory research results, the MALB does not appear to be a direct pest of winegrapes in that they do not attack or feed on undamaged berries. So, they do not cause yield loss. They do however, feed on already damaged fruit and this damaged fruit may in fact attract them. But, the real problem with MALB and winegrapes is that the MALB contain a substance in their hemolymph that causes "off" odors and flavors when incorporated into the wine made from grapes in which the MALB have been residing. This substance, 2-isopropyl-3-methoxypyrazine (IPMP), causes peanut, bell pepper, asparagus, and earthy/herbaceous aromas and flavors in wines and can mask or reduce the varietal fruit characteristics of the wine. The IPMP is released either through "reflex bleeding", a defensive mechanism when the beetles are stressed or when they are crushed at the winery along with the grape clusters. Making matters worse, it takes very few MALB to produce a noticeable fault in the wine, referred to Lady Bug Taint (LBT). While estimates vary, most sources agree that 1 MALB per pound of grapes produces a taint noticeable by even casual wine drinkers, while winemakers, wine connoisseurs, trained sensory panels, and those with well-developed senses of smell

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and taste can detect LBT at contamination levels of 1-2 MALB per harvest lug (approx. 30 pounds of grapes). The sensory level can be affected by the variety of grape, with neutral-aroma/flavor wines such as Chardonnay having a lower threshold of detection than a highly aromatic/flavored wine such as Riesling. Indeed, trained sensory panelists were able to detect LBT at a level of 0.318 ng/L of Chardonnay wine, or 0.3 parts per trillion. For Riesling, the level necessary for detection by the panel was 2.3 ng/L. Several winemaking practices have been tested to try to ameliorate LBT in wine, but most are ineffective or only reduce the taint but not remove it. And unfortunately, IPMP is a very stable compound, so it doesn't degrade in the wine over time. Research showed that wines made by adding MALB during the winemaking process and then bottled and aged 10 months had aroma and flavor profiles similar to newly-made LBT-contaminated wines.

MALB look like most native lady beetles. Their color can range from tan to yellow to orange to red. Their wing covers can have from 0 to 19 black spots on them. But MALB can be identified by a characteristic "M" (or "W", depending on which end you're looking from) on their pronotum, the region behind their heads. In Missouri, MALB can be found in small numbers in vineyards throughout most of the growing season preying on other insects, but do not appear in large numbers in the vineyard until late in the fall when most of the winegrape harvest is over. However, Norton winegrapes and blocks of certain varieties left to ripen to the point of shriveling that are used to make what are called "late-harvest" wines are at risk of LBT from Multi-colored Asian Lady Beetles. This still represents a very substantial percentage of the winegrape acreage in the state. Since the use of remedial actions in the winemaking process has little effect, this means that the best method to avoid LBT in wines is to avoid harvesting MALB along with the grapes. Recently, several insecticides have been labeled specifically for the control of MALB in winegrapes. These include Belay 2.13SC, Clutch 50WG, Venom 70SG and Scorpion 35S. Belay and Clutch have a 0-day preharvest interval (PHI) while Venom and Scorpion have a 1-day PHI. The best strategy is to apply insecticides in time to not only kill the MALB but for them to fall out of the clusters, as dead MALB may still have the capability to taint wine. In all cases, read the label of the material used for restrictions and recommendations on use.

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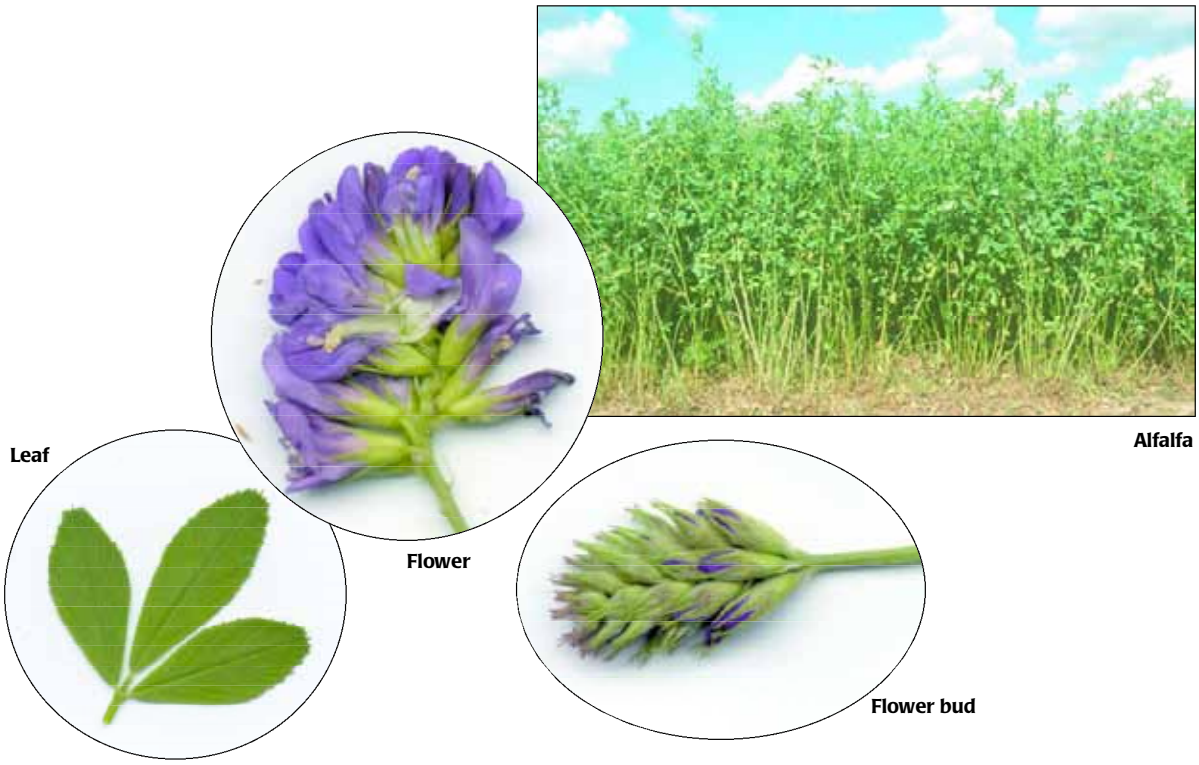
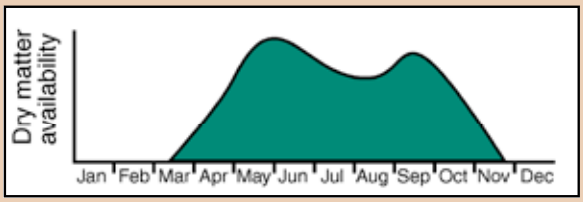
Forage of the Month: Alfalfa (*Medicago sativa* L.)

By Rob Kallenbach

Alfalfa is a perennial legume that is one of the most important forage crops in the United States. Generally used for hay or silage, it is increasingly used to provide high-quality pasture in rotational grazing systems. Its deep root system allows it to withstand drought better than most other legumes. Alfalfa grows well with other grasses in a mixture. However, alfalfa grown alone can cause bloat in grazing animals, and alfalfa itself is prone to a number of insect and disease problems. Alfalfa produces and persists poorly on shallow or poorly drained soils and should not be planted on such sites. Despite this, alfalfa is important statewide, and it is grown on more than 700,000 acres.



Origin: Asia Minor and the Middle East
Adaptation to Missouri: Statewide
Growth habit: Erect, perennial.
Leaf: Usually pinnately trifoliolate, stalk of middle leaflet longer than others, arranged alternately on stems. The upper third of the oblong leaflets toothed.
Stems: Flemish types hollow, other types solid; 5 to 30 stems per plant originating from crown.
Stipules: Stipules are slender and fused to the petiole, usually serrate.
Flowers: Arranged loosely in racemes, usually blue or purple, some yellow or white, 10 to 20 flowers in a cluster, borne in axils of upper leaves.
Fertilization: No N needed if nodulated. Maintain 40 lb P/acre and 300 lb K/acre. Magnesium, sulfur and boron to soil test recommendations.
Timing of production: 50 percent of annual production between April 1 and June 30.
When to begin grazing: In early- to midbud stage. Needs a 30-day rest period between grazings.
When to cut for hay: Late bud to early bloom
Lowest cutting or grazing height: 1 inch
Fall management: Do not cut or graze after Sept. 15.



Yield distribution of alfalfa in Missouri.

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Weather Data for the Week Ending August 14, 2011

By Pat Guinan

Station	County	Weekly Temperature (ºF)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	August 1-14	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	84	64	88	61	74	0	1.46	-0.34	2763	+389
St. Joseph	Buchanan	83	65	85	60	73	-2	1.97	+0.74	2668	+295
Brunswick	Carroll	83	64	87	60	73	-2	0.94	-0.84	2728	+319
Albany	Gentry	85	60	88	55	72	-3	0.63	-0.90	2623	+284
Auxvasse	Audrain	86	62	92	57	73	-3	0.76	-0.56	2741	+305
Vandalia	Audrain	87	61	91	56	73	-3	0.16	-1.35	2678	+283
Columbia-Bradford Research and Extension Center	Boone	86	63	90	59	73	-3	0.80	-0.69	2724	+219
Columbia-Capen Park	Boone	89	63	93	58	74	-3	0.87	-0.56	2754	+171
Columbia-Jefferson Farm and Gardens	Boone	86	64	90	61	74	-2	0.78	-0.71	2800	+291
Columbia-Sanborn Field	Boone	86	67	91	62	76	-1	1.07	-0.36	2946	+363
Columbia-South Farms	Boone	86	64	90	61	74	-2	0.82	-0.68	2787	+281
Williamsburg	Callaway	86	63	91	59	73	-2	1.10	-0.42	2744	+362
Novelty	Knox	84	60	88	55	72	-3	0.77	-0.67	2513	+157
Linneus	Linn	85	62	88	56	73	-1	0.19	-1.29	2578	+272
Monroe City	Monroe	85	60	89	56	72	-3	0.68	-0.75	2621	+220
Versailles	Morgan	87	66	93	61	75	-1	1.75	+0.44	2996	+438
Green Ridge	Pettis	85	65	90	60	74	0	1.92	+0.56	2848	+419
Lamar	Barton	86	66	92	63	74	-3	3.21	+1.98	3050	+393
Cook Station	Crawford	85	64	88	60	73	-3	3.29	+1.72	2807	+244
Round Spring	Shannon	85	64	91	60	72	-3	2.27	+0.85	2727	+270
Mountain Grove	Wright	84	64	88	60	72	-4	2.02	+0.89	2780	+364
Delta	Cape Girardeau	87	66	90	62	75	-3	1.86	+0.52	3050	+202
Cardwell	Dunklin	90	69	94	66	78	-1	1.21	+0.04	3353	+265
Clarkton	Dunklin	87	68	91	64	76	-3	2.08	+1.04	3270	+228
Glennonville	Dunklin	86	68	91	65	76	-2	2.22	+1.16	3273	+242
Charleston	Mississippi	86	67	90	64	76	-2	1.36	+0.25	3162	+301
Portageville-Delta Center	Pemiscot	87	70	91	68	78	-1	1.12	+0.10	3383	+321
Portageville-Lee Farm	Pemiscot	87	69	90	65	78	0	0.52	-0.53	3369	+325
Steele	Pemiscot	90	70	93	65	78	0	1.76	+0.60	3452	+381

‡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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