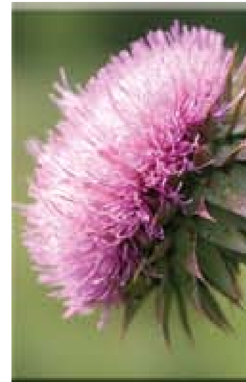
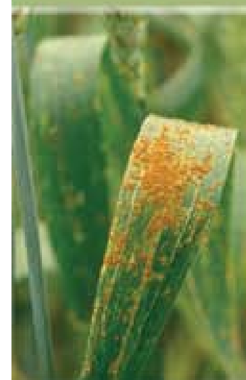
Integrated Pest & Crop Management





Problems Controlling Alfalfa Weevil Larvae

By Wayne Bailey

Several alfalfa producers from southwest Missouri and southeastern Kansas are reporting problems attaining good control of alfalfa weevil larval infestations. Some fields have required up to three insecticide applications in order to reduce numbers of this pest to below economic threshold levels. Missouri producers reporting problems this spring initially applied one of several available pyrethroid insecticides. After finding substantial numbers of larvae remaining in fields, they again applied a second or third application of insecticides. Pyrethroid class insects provided some reduction in larval numbers, but often larval numbers were still above the economic injury level of an average of one or more larvae per stem of alfalfa. Several producers then selected an organophosphate class of insecticide which substantial reduced larval numbers within a few hours.

Why was there a perceived failure of the pyrethroid class of insecticide? Most of these insecticides have slower knockdown of the pest as compared to the organphosphate class of insecticides which traditional provide good efficacy with mortality occurring within a few hours. However, the pyrethroid insecticides often provide a longer residual control period once they begin killing the alfalfa weevil larvae as compared to organophosphate insecticides. In most Missouri fields where insect numbers remained high after spraying, a wide range of larval instars or worm sizes were observed. This suggests that some larvae were still emerging from eggs while other ranged in size from 1st instars (worm growth stages) to almost mature 4th instars. This indicates that eggs were laid in fall, winter, and spring months and allowed for an extended period of hatch to occur. At the same time, the number of larvae was well over the economic threshold of one or more larvae per stem of alfalfa. When very high numbers of larvae are present, even the best insecticides may kill approximately 90% of the larvae under ideal conditions. This leaves from 5 to 10% or more of larvae to continue feeding and damaging plant foliage after an insecticide application. Under very heavy infestations of larvae, these survivors may still exceed the economic threshold.

The amount of water used in the formulated spray mixture may be a factor in 2010. For ground application, most insecticides should be applied with a minimum of 10 gallons of water per acre with 20 gallons being recommended for optimal coverage of heavy alfalfa foliage. If applied by air, then 3 gallons or more is desired for optimal coverage. In most years when larval numbers are moderate to low, the 5-10% surviving larvae usually resulting in numbers of larvae being below the economic threshold level even though optimal coverage of the alfalfa foliage was not achieved with reduced rates of water. In years with high larval numbers the efficacy of the pesticides may remain the same, but due to the excessive number of larvae present, optimal coverage of the foliage with spray may be required to reduce the large larval population to below economic threshold levels. Other possibilities include improper rate of application (very unlikely as these are experienced applicators and the problem is present regionally), the insecticides being used are defective (not likely as the

Continued on page 55

Table of Contents

Weed of the Month: Cressleaf Groundsel or Butterweed

By Kevin Bradley

Butterweed or Cressleaf Groundsel (*Packera glabella* formerly *Senecio glabellus*) is one weed that I have seen more of in no-till cropping systems in Missouri over the past two seasons. I'm not going to say it's a new weed to Missouri but it is one I think we are starting to encounter more frequently. There is some information that indicates that cressleaf groundsel thrives in moist, saturated soils so this would explain its increased occurrence over the past several years. Cressleaf groundsel is a winter annual. It germinates in the fall, grows throughout the winter months, and is flowering right now in many areas of the state (Figure 1).

Figure 1. A mature cressleaf groundsel plant.

Cressleaf groundsel initially forms a basal rosette of leaves in the fall and winter months. Rosette leaves are highly variable in shape and deeply lobed or notched. Lobes are not initially apparent on seedlings but become more apparent as the plants take on a rosette growth habit. Cressleaf groundsel rosettes might be confused with those of yellow rocket, but the lobes of cressleaf groundsel leaves are arranged oppositely from one another while those of yellow rocket are arranged alternately. As the plants begin to mature in the early spring, flowering stems are produced. Stems are capable of reaching as much as 3 feet in height and are light green in color with conspicuous red veins running the length of the stem (Figure 2). Stems are also hollow, thick, and succulent. Leaves are arranged alternately along the flowering stem and become progressively smaller towards the upper portions of the plant. Like the rosette leaves, the mature stem leaves are deeply lobed and these lobes each have serrated, or toothed, margins (Figure 3). The leaves and stems of cressleaf groundsel are without hairs and are also poisonous to grazing animals.

Figure 2. A typical stem of cressleaf groundsel. Notice the thick, hollow stems with distinct red veins that run the entire length of the stem.

Many bright yellow "golden" flowers are produced on the ends of the central stems. Individual flowers consist of inner

Continued on page 51

continued from page 50

Figure 3. Leaves are arranged alternately along the flowering stem and are deeply lobed, with each lobe being serrated, or toothed, and arranged oppositely from one another.

(disk) and outer (ray) petals, although the outer ray petals are the most conspicuous (Figure 4). Cressleaf groundsel will generally have anywhere from 5 to 15 outer ray petals that are bright yellow in color and these petals surround the inner disk florets which are more golden yellow in color. The number of ray petals in cressleaf groundsel helps to distinguish it from any of the mustard species which only have 4 yellow petals per flower. Individual flowers are approximately ½ to 1 inch in diameter and are grouped together in clusters. Plants eventually produce many "puffball", dandelion-like seedheads. The seed within these puffballs are small and reddish-brown in color, with each seed having a white feathery pappus that facilitates wind dispersal.

Recent research conducted at the University of Illinois by Dr. Aaron Hager has shown that many of our common residual fall herbicide programs like Canopy EX, Valor, or Princep will provide good control of cressleaf groundsel. Additionally, their research has shown that either fall or spring applications of glyphosate or glyphosate plus 2, 4-D will provide good control of this weed. However, like most winter annuals, control of cressleaf groundsel is best achieved prior to flowering so timely spring applications of these herbicides will be vital to the level of control achieved.

Figure 4. Cressleaf groundsel flowers.

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Wheat Foliage Diseases and Their Management

By Laura Sweets

The 2010 growing season is already presenting challenges for Missouri producers. A wet fall and delayed harvest in many parts of the state lead to a significant decrease in the number of acres of winter wheat planted in Missouri. For wheat that was planted, planting dates ranged from near normal to much later than normal depending on weather conditions last fall. As a result there is a wide range in stage of growth of the wheat crop now. Some fields are finally beginning to green up and take off. Some fields in southeast Missouri are already in the boot stage. So far reports of foliage diseases on wheat in Missouri have been minimal. However, as the wheat begins to move towards boot and flowering stages of growth, it is important to scout fields for foliage diseases.

There are definitely foliage diseases that can cause losses on winter wheat in Missouri. Leaf rust, stripe rust and Septoria leaf blight are the three most likely to cause losses on soft red winter wheat grown in Missouri. Powdery mildew can be a problem on hard red winter wheat and, under the correct environmental conditions, may also cause losses on soft red winter wheat. The incidence and severity of these foliage diseases will depend on the weather conditions during the growing season, the susceptibility of the variety to each of these diseases and the amount of inoculum in the field or area.

There have been reports of leaf rust developing on wheat in southern states recently. However, there have not yet been any reports of leaf rust or stripe rust on winter wheat in Missouri. The development of foliage diseases on wheat and their severity this season will depend to a large degree on the weather conditions the rest of the season. Most wheat foliage diseases are favored by warm, wet conditions. Frequent light rains, heavy dews, high relative humidity and warm temperatures would be ideal for the buildup of the foliage diseases. The buildup of foliage diseases prior to flowering can lead to yield losses, especially if weather conditions remain favorable for disease development during and after flowering. It is important to scout wheat fields for foliage diseases, especially if there are scattered periods of precipitation as the temperatures warm up. There are a number of foliar fungicides labeled for use on winter wheat. This year in particular, it will be important to evaluate fields for stand and yield potential as well as for incidence and severity of foliage diseases before making a decision on foliar fungicide application.

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

Stagonospora glume blotch (formerly called Septoria glume blotch) may also begin as light yellow flecks or streaks on leaves. The lesions also turn yellow to reddish-brown but usually have a more oval to lens shaped appearance than those of Septoria leaf blotch. Again, the dark brown specks or fungal fruiting bodies of the causal fungus *Stagonospora nodorum* may be evident within the lesions. Symptoms of Stagonospora glume blotch are more common on heads than foliage of wheat. Infected heads will have dark blotches on the glumes.

The initial symptoms of **tan spot** are small tan to brown flecks on the leaves. These expand into tan to light brown, elliptical lesions which often have yellow borders. The centers of mature tan spot lesions may have a dark brown region caused by outgrowth of the fungus. But the fungus which causes tan spot, *Pyrenophora tritici-repentis*, does not produce pycnidia or fruiting bodies as the Septoria fungus does. So mature tan spot lesions do not have the distinct dark brown specks scattered throughout the centers of the lesions as do Septoria leaf blotch lesions. Although tan spot can occur in Missouri, it is not usually a problem in the state.

Leaf rust lesions appear primarily on the upper leaf surfaces and leaf sheaths. Initially, lesions are small, yellow to light-green flecks. Eventually, leaf rust appears as small, circular to oval shaped, orange-red pustules. These pustules break open to release masses of orange-red spores of *Puccinia recondita*. The edges of the open pustules tend to be smooth without the tattered appearance of stem rust pustules. Heavily rusted leaves may yellow and die prematurely.

Stripe rust, caused by the fungus *Puccinia striiformis*, has become more prevalent in Missouri over the last few years. Stripe rust may develop earlier in the season than leaf rust or stem rust. The pustules of stripe rust are yellow or yellowish-red and occur in obvious stripes or streaks running lengthwise on the wheat leaves. This disease is more commonly associated with cooler temperatures, especially cooler night temperatures.

Stem rust, caused by the fungus *Puccinia graminis* f. sp. *tritici*, is most common on stems and leaf sheaths of wheat plants but may develop on any of the above ground portions of the plant including both upper and lower leaf surfaces and glumes and awns. Stem rust pustules are small, oval, and reddish-brown. The ruptured pustules tend to have more ragged edges than leaf rust pustules. Frequently both leaf rust and stem rust occur on the same plant and both types of pustules may develop on an individual leaf.

Powdery mildew infections begin as light-green to yellow flecks on the leaf surface. As powdery mildew develops the leaf surfaces become covered with patches of cottony white

Continued on page 53

Wheat Foliage Diseases and Their Management

continued from page 52

mold growth of *Erysiphe graminis* f. sp. *tritici*, the causal fungus. These patches eventually turn a grayish-white to grayish-brown in color and small black fungal fruiting bodies may be visible within the patches of mildew growth.

The fungi which cause most of these wheat foliage diseases survive in infested wheat residues left on the soil surface. The next growing season spores are produced during moist periods and are carried by wind currents to susceptible wheat leaves where infection may begin. Disease problems tend to be more severe when wheat is planted in fields with infested wheat residue left on the soil surface. Eventually spores that are produced in the initial lesions on plants are wind blown to other leaves or other plants causing secondary infection.

Leaf rust, stem rust and stripe rust are exceptions to this simplified explanation of disease development. The rust fungi do not survive in infested residue left in a field. Rather, the rust fungi are reintroduced into this area each season when spores are carried up on air currents from the southern United States.

Most of the foliage diseases of wheat are favored by warm, wet or humid weather. Frequently infection begins on the lower portion of the plant. If weather conditions are favorable for disease development, the disease may move up through the plant. Severely infected leaves may yellow and die prematurely. Yield losses tend to be highest when the flag leaves are heavily infected.

There are several fungicides that are labeled for use on wheat to control fungal foliage diseases. It is important to scout wheat fields and determine which leaf diseases are occurring as well as the level of their severity before making a decision to apply a foliar fungicide. In particular be on the lookout for Septoria leaf blotch, Stagonospora glume blotch, leaf rust and stripe rust. When scouting fields, try to identify the disease or diseases which are present, determine the average percent of infection on a leaf and the number of leaves showing infection and determine the stage of growth of the crop. Generally, the profitable use of foliar fungicides on wheat depends on a number of factors including varietal resistance, disease severity, effectiveness of the specific fungicides and timing of fungicide application. The greatest increases in yield are usually obtained when fungicides are applied to disease susceptible varieties with high yield potential at the early boot to head emergence growth stage when the flag leaf is in danger of severe infection. Fungicide applications are seldom beneficial if applied after flowering or after the flag leaf is already severely infected. It is also important to read the fungicide label for specific information on rates, recommended timing of application, frequency of applications, preharvest intervals and grazing restrictions.

A management program for foliage diseases of wheat should include the following steps.

- Plant disease free seed of varieties with resistance to diseases likely to occur in your area.
- Rotate with non-host crops for one or more years.
- Manage residues- if tillage system is a conservation tillage system, particular care should be given to rotation and variety selection.
- Maintain good plant vigor with adequate fertility.
- Control volunteer wheat.
- Use foliar fungicides if warranted (see accompanying tables for additional information on wheat fungicides).

The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) developed a table containing information on fungicide efficacy for control of certain foliar diseases of wheat. These efficacy ratings were determined by field testing the materials over multiple years and locations by members of the committee. This table is included in this issue of the IPCM newsletter.

Continued on page 54

continued from page 53

Management of Small Grain Diseases: Fungicide Efficacy for Control of Wheat Diseases (Revised 4-05-10)

The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) has developed the following information on fungicide efficacy for control of certain foliar diseases of wheat for use by the grain production industry in the U.S. Efficacy ratings for each fungicide listed in the table were determined by field testing the materials over multiple years and locations by the members of the committee. Efficacy is based on proper application timing to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table. Table includes most widely marketed products, and is not intended to be a list of all labeled products.

Table 1. Efficacy of Fungicides for Wheat Disease COntrol Based on Appropriate Application Timing

Fungicide				Powdery mildew	Stagonospora leaf/glume blotch	Septoria leaf blotch	Tan spot	Stripe rust	Leaf rust	Stem rust[5]	Head scab	Harvest Restriction
Class	Active Ingredient	Product	Rate/A (fl. oz)									
Strobilurin	Azoxystrobin 22.9%	Quadris 2.08 SC	6.2 - 10.8	F(G)[1]	VG	VG	E	E[2]	E	VG	NR	45 days
	Pyraclostrobin 3.6%	Headline 2.09 EC	6.0 - 9.0	G	VG	VG	E	E[2]	E	G	NR	Feekes 10.5
Triazole	Metconazole 8.6%	Caramba 0.75 SL	10.0 - 17.0	VG	VG	--[3]	VG	E	E	E	G	30 days
	Propiconazole 41.8%	Tilt 3.6 EC PropiMax 3.6 EC Bumper 41.8 EC	4.0	VG	VG	VG	VG	VG	VG	VG	P	Feekes 10.5
	Prothioconazole 41%	Proline 480 SC	5.0 - 5.7	--[3]	VG	VG	VG	--[3]	VG	VG	G	30 days
	Tebuconazole 38.7%	Folicur 3.6 F4	4.0	G	VG	VG	VG	E	E	E	F	30 days
	Prothioconazole 19% Tebuconazole 19%	Prosaro 421 SC	6.5 - 8.5	G	VG	VG	VG	E	E	E	G	30 days
Mixed mode of action	Metconazole 7.4% Pyraclostrobin 12%	TwinLine 1.75 EC	7.0 – 9.0	G	VG	VG	E	E	E	VG	NR	Feekes 10.5
	Propiconazole 11.7% Azoxystrobin 7.0%	Quilt 200 SC	14.0	VG	VG	VG	VG	E	E	VG	NR	Feekes 10.5
	Propiconazole 11.7% Azoxystrobin 13.5%	Quilt Xcel 2.2 SE	14.0	--[3]	VG	--[3]	--[3]	--[3]	VG	--[3]	NR	Feekes 10.5
	Propiconazole 11.4% Trifloxystrobin 11.4%	Stratego 250 EC	10.0	G	VG	VG	VG	VG	VG	VG	NR	35 days

[1] Efficacy categories: NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent.
Efficacy designation with a second rating in parenthesis indicates greater efficacy at higher application rates.
[2] Efficacy may be significantly reduced if solo strobilurin products are applied after stripe rust infection has occurred
[3] Insufficient data to make statement about efficacy of this product
[4] Multiple generic products containing tebuconazole may also be labeled in some states. These products include: Muscle 3.6 F, Orius 3.6 F, Tebucon 3.6 F, Tebustar 3.6 F, Tebuzol 3.6 F, Tegrol , & Toledo
[5] Estimates of fungicide efficacy against stem rust are based on a small number of observations, and may be less reliable than the ratings for other diseases.

This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. No endorsement is intended for products listed, nor is criticism meant for products not listed. Members or participants in the NCERA-184 committee assume no liability resulting from the use of these products.

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Problems Controlling Alfalfa Weevil Larvae

continued from page 49

problem is occurring with several different pyrethroid class insecticides), or that the insects have develop a resistance to the pyrethroid insecticide class which no longer kill a high percent of the target pest (not likely as the insecticides worked well in past years and a gradual decreasing in efficacy is most likely to occur if resistance is a factor in this problem).

Although pyrethroid class insecticides can effectively control alfalfa weevil larvae in most years, the heavy larval populations and weather conditions experiences this spring may require the use of an organophosphate insecticide to obtain optimal knockdown of the larval population.

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

Chemical Name	***Common Name***	***Insecticide Class***	***Rate of Formulated Material***	***Rate of Active Ingredient (a.i.)***
Beta-cyfluthrin	*Baythroid XL	pyrethroid	1.6 to 2.8 fl oz/acre	0.0125 to 0.022 lb a.i./acre
Cholopyrifos	*Lorsban Advanced	organophosphate	1 to 2 pts/acre	0.5 to 1 lb a.i./acre
Chlorpyrifos 4E	*Lorsban 4E	organophosphate	1 to 2 pts/acre	0.5 to 1 lb a.i./acre
	*numerous products		see specific labels	see specific labels
Chlorpyrifos 4E plus	*Cobalt	organophosphate	19.0 to 38.0 fl oz/acre	
Gamma-cyhalothrin		pyrethroid		
Cyfluthrin	*Topmbstone	pyrethroid	1.6 to 2.8 fl oz/acre	0.025 to 0.044 lb a.i./acre
Gamma-cyhalothrin	*Proaxis	Gamma-cyhalothrin	2.56 to 3.84 fl oz/acre	0.02 to 0.03 lb a.i./acre
Lambda-cyhalothrin	*Warrior	pyrethroid	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	organophosphate	1 pt/acre	0.5 lb a.i./acre
Phosmet	Imidan 70-W	organophosphate	1 to 1-1/3 lb/acre	
Zeta-cypermethrin	*Mustang Max EC	pyrethroid	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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Weather Data for the Week Ending April 18, 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 18	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	75	51	83	37	63	11	1.12	-0.63	190	+171
St. Joseph	Buchanan	72	52	80	40	62	+8	1.17	-0.88	192	+162
Brunswick	Carroll	76	48	83	36	63	+9	1.45	-0.34	201	+171
Albany	Gentry	74	48	83	36	62	+0	1.32	-0.66	173	+155
Auxvasse	Audrain	75	50	83	40	63	+9	1.91	-0.28	223	+192
Vandalia	Audrain	75	47	83	35	63	+10	2.52	+0.29	210	+187
Columbia-Bradford	Boone	*	*	*	*	*	*	*	*	*	*
Columbia-Jefferson Farm	Boone	74	49	82	39	63	+8	1.59	-0.78	228	+182
Columbia-South Farms	Boone	74	49	81	39	63	+8	1.76	-0.61	227	+181
Williamsburg	Callaway	76	48	83	39	64	+10	1.96	-0.32	235	+204
Novelty	Knox	74	47	81	36	62	+9	1.28	-0.69	182	+157
Linneus	Linn	74	47	81	36	62	+9	1.28	-0.64	181	+159
Monroe City	Monroe	75	47	81	35	62	+8	1.96	-0.08	200	+167
Versailles	Morgan	77	49	84	37	64	+8	1.04	-1.68	242	+172
Green Ridge	Pettis	74	50	82	37	63	+9	1.07	-1.07	214	+180
Lamar	Barton	75	50	82	42	63	+7	0.71	-1.69	217	+148
Cook Station	Crawford	78	42	84	30	60	+4	1.33	-0.92	213	+137
Round Spring	Shannon	80	40	85	32	60	+5	1.36	-0.99	203	+142
Mountain Grove	Wright	75	50	79	38	63	+9	1.50	-0.93	212	+167
Delta	Cape Girardeau	79	48	85	40	63	+5	1.38	-0.80	226	+129
Cardwell	Dunklin	81	51	85	43	67	+8	1.43	-1.16	264	+133
Clarkton	Dunklin	79	50	85	38	66	+7	1.95	-0.20	252	+128
Glennonville	Dunklin	80	51	85	42	66	+7	1.30	-0.76	264	+136
Charleston	Mississippi	79	51	85	41	66	+9	1.57	-0.87	259	+163
Portageville-Delta Center	Pemiscot	80	54	86	44	68	+9	1.92	-0.66	282	+154
Portageville-Lee Farm	Pemiscot	81	53	86	42	68	+9	1.62	-0.96	289	+163
Steele	Pemiscot	82	54	87	43	69	+10	1.41	-1.23	287	+161

* 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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