

Blister Beetle Management in Alfalfa

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Introduction

Blister beetles are easily recognized by their elongated, slender, cylindrical, soft-bodies that range in length from ½ to 1¼ inches. Color and markings of the adult vary from black, brown or gray to striped or spotted forms with a combination of colors. Antennae are conspicuous, and the head appears larger than the thorax. When viewed from above, blister beetles have a constriction between the back of the head and the anterior end of the thorax exhibiting a neck-like appearance.

Adults feed on alfalfa flowers (preferred) and foliage and attack other crops like soybeans, clover, peanuts or peas. Weeds such as pigweed, goldenrod, goathead and puncturevine also serve as host plants. The immature stages of the blister beetle are predaceous on grasshopper egg clusters and can be considered beneficial. All blister beetles contain the blistering agent cantharidin in their blood.

Life Cycle

In Arkansas, the most common blister beetle species complete a single generation per year. Adults emerge from the soil during late spring to early summer. After mating, females



Figure 1. Three-striped blister beetle
(Photo courtesy of Clemson University, USDA Cooperative Extension slide series, Bugwood.org)

lay egg masses during the summer. These egg masses, containing 50 to 300 eggs, are laid in shallow ground cavities and hatch within two weeks.

The larval stages are grub-like and are found in the soil. Blister beetle larvae actively search for and feed on grasshopper eggs. Larvae overwinter as pseudopupae. When favorable moisture and temperature conditions return in the spring, the final immature stage (pupa) develops. The next generation of adults then emerges after about two weeks.

Crop Injury

Blister beetles are especially attracted to alfalfa during bloom, and the gregarious nature of adults often results in congregation of large swarms within individual fields.

If alfalfa hay is suspected to contain blister beetles, it has no value as horse feed.

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Table 1. Estimated number of ingested blister beetles needed to provide a lethal dose to horses (assuming a minimum lethal dose of 1 mg/kg body weight).

cantharidin content per beetle (mg)	Horse Weight		
	555	835	1,200
	Number of Blister Beetles		
1.0	250	375	545
2.0	125	188	273
3.0	83	124	182
4.0	63	94	136
5.0	50	75	109

Their feeding can cause damage to blooms and foliage in localized areas within a field. However, this damage is usually not severe enough to cause economic damage and, thus, control measures are usually not warranted for this reason alone.

Hazard to Livestock

Blister beetle contamination of hay is a serious concern for producers and livestock owners. Blister beetle poisoning (cantharidiasis) results from livestock consuming hay contaminated with cantharidin. Cantharidin is an irritant capable of blistering internal and external body tissues. Cattle, sheep and poultry are susceptible, but horses are the most susceptible with the most deaths from cantharidiasis being reported in horses. Symptoms include tongue and mouth blistering, colic, diarrhea, blood or intestinal lining discharge in stools and problems with urination or bloody urine. A veterinarian should be contacted immediately if a case of blister beetle poisoning is suspected.

Kansas State University entomologists determined that *Epicauta vittata* (three-striped blister beetle) and *E. occidentalis* (striped blister beetle) were the two species that contributed most to the risk of livestock poisoning. They attributed the poisoning risk to the fact that these striped species tend to congregate in dense swarms. In Oklahoma, all fatalities caused by

blister beetle toxicity in horses examined by Oklahoma State University veterinarians were caused by the striped blister beetle.

Blister beetles (Figure 1) occur commonly in Arkansas. Toxicity of blister beetles to horses varies with horse age, weight, breed and general health. The estimated minimum lethal dose is 1 mg of cantharidin per kilogram of body weight (Table 1). Based on results adapted from Capinera et al. (1985), with 5 mg of cantharidin per beetle, it would take at least 50 blister beetles to kill a 555-pound horse and could take as many as 545 beetles with 1 mg of cantharidin per beetle to kill a 1,200-pound horse.

Blister beetle-contaminated hay is usually the result of beetles being crushed prior to baling. Beetles not killed in harvesting will leave the field as the hay dries. Crushed beetles occur where the swather, equipped with a crimper, cuts alfalfa infested with a swarm of beetles. The remains of beetles may be concentrated in small portions of bales and, when fed to livestock, poisoning can occur. If cut alfalfa is driven on before blister beetle adults have had time to escape, beetles can be crushed by the vehicle's wheels, and contamination can occur in this fashion as well. Once contaminated, the hay probably does not lose its toxicity since cantharidin is a stable compound, withstanding degradation by heating and drying.

Blister Beetle Management and Risk Minimization

Sampling

Fields should be thoroughly scouted to detect the presence of blister beetles just before and during harvest, especially if hay will be used to feed horses. Both direct observation and use of a sweep net should be used to detect beetles. Enough sweep net samples should be taken to ensure that low numbers of beetles would be detected. Additional sampling should be directed within 15 feet of the field edge. Past field history, heavy grasshopper populations the previous year, age of the stand and time of year are all factors determining the likelihood of blister beetle infestation.

Table 2. Insecticides registered for blister beetle control on alfalfa.

Insect	Insecticide	Examples
Blister Beetle	carbaryl	Carbaryl 4L, Sevin 80S, Sevin 80WSP, Sevin XLR PLUS
	gamma-cyhalothrin	Proaxis, Tenkoz Proaxis
	lambda-cyhalothrin	Silencer, Taiga Z, Warrior with Zeon
	pyrethrins	Pyganic EC
	pyrethrins + PBO	Evergreen EC

Totally eliminating concerns of consumers with respect to blister beetles in alfalfa hay is virtually impossible; however, certain harvesting practices can allow a high degree of confidence that hay is free of blister beetles.

Suggested Harvesting Practices

- Cut hay without using crimpers (may be impractical due to increased hay drying time).
- Use a sickle bar mower without conditioner (generally slower, allowing beetles time to get out of the way, and does not crimp).
- Avoid wheel traffic on standing or cut hay to prevent crushing blister beetles into hay.
- Cut hay prior to 10 percent bloom (cutting hay in the early bloom stage minimizes flower attractants for adult beetles).
- Use small square bales for horse hay (allows for easy inspection of flakes of hay for beetles and beetle parts as it is being fed to horses).
- Match cuttings and markets (early May and late September cuttings are before and after the major blister beetle season and are the best cuttings to target for horse buyers).

Insecticide Treatment

Treat hay intended for horse consumption with an approved short-residual insecticide. Make sure the insecticide has a minimal pre-harvest interval (7 days or less). When making the decision to treat, consider the value of the hay with respect to its end use. Ensure that any premiums from the buyer justify application costs.

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All chemical information is given with the understanding that no endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned. Before purchasing or using any pesticide, always read and carefully follow the directions on the container label.

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