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Management of Blister Beetles in Alfalfa

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Adult blister beetles (*Epicauta* spp.) tend to be gregarious, and several may be observed feeding on the same flowering plant such as alfalfa or sometimes soybeans, goldenrod or occasionally musk thistle. They feed primarily on leaves and flowers but do little damage to crops.

Adult blister beetles vary in size and color but can be recognized by elongated, narrow, cylindrical and soft bodies. When viewed from above, they have a constriction behind the head where it attaches to the narrowed anterior end of the thorax. In Nebraska, the three-striped, gray and black blister beetles are the most common species. The three-striped is long, slender, brown and yellowish-gray with yellowish stripes. The gray is a larger beetle that is 9/16 inch to 11/16 inch long. The gray coloring is due to a thick covering of hair. The black blister beetle is the largest of the three species. It is more robust and is 5/8 inch to 7/8 inch long.

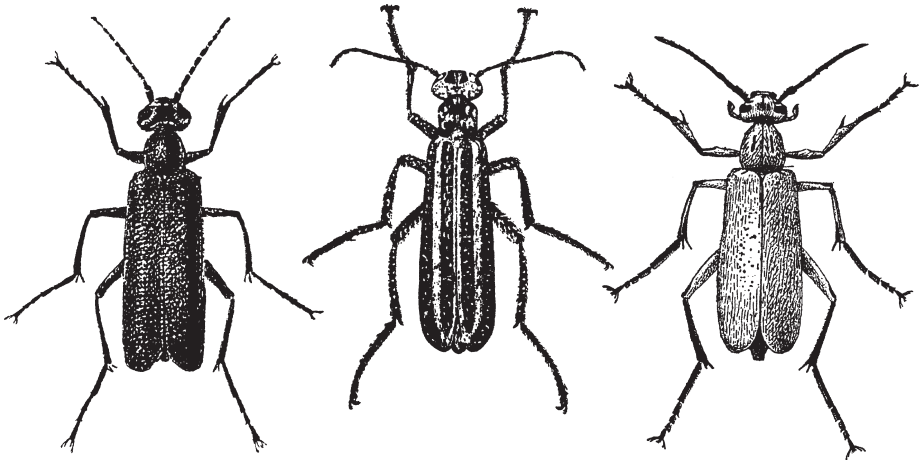
Life Cycle

Most blister beetle larvae feed on grasshopper eggs, so often their numbers may be higher where there are high numbers of grasshoppers. Consequently, there probably will be more blister beetles in the year following large grasshopper numbers. The life cycle of the blister beetle is complex and includes several immature forms. Females deposit clusters of eggs in depressions in the ground. Newly hatched larvae move through the soil, feeding on grasshopper egg pods. This larval stage is termed "triungulin". Within a month, the larvae pass through three more growth stages with each becoming more sedentary. Finally, they change to a pseudopupae, which is the overwintering stage. As temperature and moisture increase in the spring, they enter the final immature pupal stage from which adults emerge. There is one generation per year. Adult blister beetles can generally be found in alfalfa through the second and third cuttings and some years into the fourth cutting. Some species are also predaceous in the larval cells of ground-dwelling bees.

Damage

The interest in blister beetles is not due to potential plant damage, but rather the potential injury to horses or less commonly to cattle and sheep if they ingest blister beetles with harvested forage (Ray et al. 1989), (Gayle et al. 1981). The bodies of blister beetles contain a lipid soluble blistering agent called cantharidin. Cantharidin causes blisters on skin tissue upon contact.

Horses are particularly susceptible to blister beetle poisoning. Part or all of a horse's digestive tract can be severely irritated, leading to secondary infections and bleeding (Bauernfeind and Breeden 1984). Cantharidin is absorbed and



Black Blister Beetle Three-striped Blister Beetle Gray Blister Beetle

excreted through the kidneys, thus irritation of the kidneys, ureter, urinary bladder and urethra could be followed by secondary infections and bleeding. The substance also lowers serum calcium levels and causes damage to heart muscle tissue.

Capinera et al. (1985) conducted a cantharidin analysis on several species of blister beetles commonly found in Colorado. They found differences in amounts found among species and sexes. Males produce cantharidin and pass it to females at mating. The minimum lethal dose of cantharidin is about 1 mg/Kg body weight of a horse. The lethal dose for cattle may be as low as 0.5 mg/Kg body weight (Gayle, 1981). Consequently, a few beetles with a high cantharidin level would kill a small horse, but quite a few with a low level would be required to kill a larger horse. These researchers estimate that it would require 1700 black blister beetles to kill an 825-pound horse, but only 120 three-striped blister beetles. However, only 40 three-striped blister beetles would kill a 275-pound colt. As little as 4-6 grams of dried beetles can be fatal to a horse.

Signs and symptoms of cantharidin poisoning in a horse may include blisters and ulcers in the mouth, gastritis, esophagitis, edema of the submucosa of the intestine, colic, diarrhea and blood and mucous in the stool. Other signs include frequent attempts to urinate but voiding of little urine and blood in the urine. The lowered blood serum calcium levels may cause body tremors and a breathing pattern characterized by a periodic jerking contraction of the diaphragm (synchronous diaphragmatic flutter) associated with the heartbeat. Poisoned horses may place the muzzle in water without drinking, have an increased temperature, increased pulse and breathing rate, be dehydrated, depressed and in shock. Oral and gastrointestinal ulcerations may be observed in cattle and sheep. If cantharidin poisoning is suspected, consult a veterinarian.

To diagnose blister beetle toxicosis, there need to be appropriate clinical signs and presence of the beetle. Some veterinary diagnostic laboratories can analyze hay, urine, serum or gastric content for cantharidin concentration.

Treatment

There is no specific antidote for cantharidin. Treatment is directed toward supportive care. The gastrointestinal tract needs to be decontaminated by activated charcoal and mineral oil. Fluid therapy and bicarbonate need to be used to alleviate shock and acidosis. Calcium also may be needed.

Prevention or Avoidance

Toxicosis by blister beetles is related to simultaneous cutting and crimping of hay when beetles are present. If hay is cut with a sickle bar or rotary mower and not crimped, the beetle can leave the hay after it is cut. If the beetles are not allowed to escape, the trapped beetles die and are incorporated into the hay. In Nebraska, first cutting of alfalfa usually occurs before blister beetle adults are present so horse owners could be fairly safe in buying first cutting alfalfa. Use hay harvested before mid-May or after early September when blister beetles are less apt to be present. Scout fields, particularly in border areas for the presence of blister beetles and if found, treat with a short residual insecticide before cutting. Insecticides approved for use on alfalfa can be found on the UNL Department of Entomology web site at *http://entomology.unl.edu*. When selecting a pesticide, read the label to determine harvest restriction intervals. Kansas State University doesn't recommend blister beetle treatment because the dead beetles, which are still toxic, remain in the field. Other recommendations include not using crimpers on hay intended for horses and cutting alfalfa in the bud stage because blooms attract blister beetles.

It is difficult to eliminate the possibility of blister beetles in alfalfa. Examining hay bales prior to purchase is difficult because the beetles tend to congregate, so most bales may be free of beetles, but a few may contain enough beetles to cause toxicity in horses. Careful examination when feeding alfalfa may allow detection of beetles if present.

Resources

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