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Blackpatch of Forage Legumes

Cause of Slaframine Toxicosis or "Slobbers" in Animals

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Blackpatch is an important fungal disease of forage legumes in Kentucky. A metabolite produced by the fungus can result in slaframine toxicosis, or "slobbers," in many animals (Figure 1). The fungal disease was first reported in Kentucky in 1933 on red clover. Most Extension literature associates blackpatch and slaframine with red clover, which is very susceptible to the disease. However, many forage legumes, including alfalfa, can be infected by the causal fungus. Slaframine toxicosis can occur when contaminated hay is fed to livestock or horses. This publication describes the symptoms and signs of blackpatch in forage legumes; conditions that favor development of the fungal disease and production of slaframine; clinical signs associated with slaframine toxicosis; and management methods for both the fungal disease and slaframine toxicosis.

Figure 1. Excessive salivation or "slobbers" resulting from slaframine toxicosis. *Bob Coleman*

Symptoms and Signs of Blackpatch

Blackpatch symptoms and signs are often overlooked or difficult to detect in pastures or hayfields, and the first indication of a problem is usually when animals develop "slobbers." Plants affected by blackpatch are often scattered in a field. Early signs of the disease are dark strands of fungal growth (mycelium) on lower stems (Figure 2). As the disease progresses, lesions may be visible on leaves and stems (Figure 3). Lesion characteristics vary based on the host plant, but most are gray to tan or brown in color. Lesions on alfalfa can be tan with dark edges, while lesions on clover species often have concentric rings and both small and large lesions present on a leaf. As disease spreads in a field, patches of dead or wilted plants covered with dark fungal growth may be observed, leading to the name "blackpatch." In severe cases, clover flowers may be covered with fungal growth, and seed in infected flower heads may be infected and contribute to disease spread.

Cause and Disease Development

Blackpatch is caused by the fungus *Slafractonia leguminicola* (formerly *Rhizoctonia leguminicola*). The fungus overwinters in soil and infected plant tissue and can survive in seed. *Slafractonia leguminicola* has a wide host range and has been reported to infect many forage legumes, soybean, kudzu, and some weed species. Disease spreads within a field primarily plant to plant through fungal growth, by animals feeding on infected plants and then moving through the pasture, and by harvest equipment spreading infected plants through a pasture. The disease can spread to new areas through equipment, infested hay, and infested seed. High humidity, high temperatures, and consistent moisture favor disease development. Symptoms and signs of disease are more prevalent in wet summers and falls, and hay cut during periods of high humidity and temperatures has been associated with oubreaks of slobbers.

Figure 2. Fungal growth of *Slafractonia leguminicola*, causal fungus of blackpatch, on alfalfa stems. *Brenda Kennedy*

Slaframine Toxicosis

The clinical signs that occur when animals graze infected plants or are fed hay infected by *S. leguminicola* are due to the fungal production of slaframine. Slaframine is a mycotoxin, a non-living compound produced as a byproduct of fungal infection. Slaframine stimulates excessive secretion by exocrine glands, primarily salivary glands and digestive glands in the pancreas. Animals that ingest pasture or hay contaminated with slaframine often develop excessive saliva production, or "slobbering." Clinical signs can appear as soon as one hour after eating affected forage and can include frequent urination, diarrhea, tear shedding, and feed refusal. Cattle may bloat. Animals may be more severely affected during hot, humid weather.

Swainsonine Toxicosis

Slafractonia leguminicola can also produce swainsonine, a different mycotoxin. Swainsonine-contaminated hay does not result in excessive salivation, but can cause a chronic neurologic disease. Clinical signs of swainsonine include depression, weight loss, infertility, and aggressive or violent behavior in animals. It is unknown how prevalent swainsonine contamination in Kentucky pastures and hay affected by blackpatch. Management of swainsonine toxicosis is not well understood.

Diagnosis of Blackpatch and Slaframine Toxicosis

Forage samples or hay from fields suspected to have blackpatch should be provided to local county Extension agents for submission to the Plant and Pest Diagnostic Laboratory. These samples will be checked for symptoms of blackpatch and the diagnostic features of the causal fungus. Confirming the species of fungus, the causal disease, observing symptoms of slobbers in affected animals, and full recovery after the suspect forage is removed is often enough to determine the presence of blackpatch and slaframine toxicosis. However, samples can be sent to an independent laboratory to test for the presence of slaframine and swainsonine if needed.

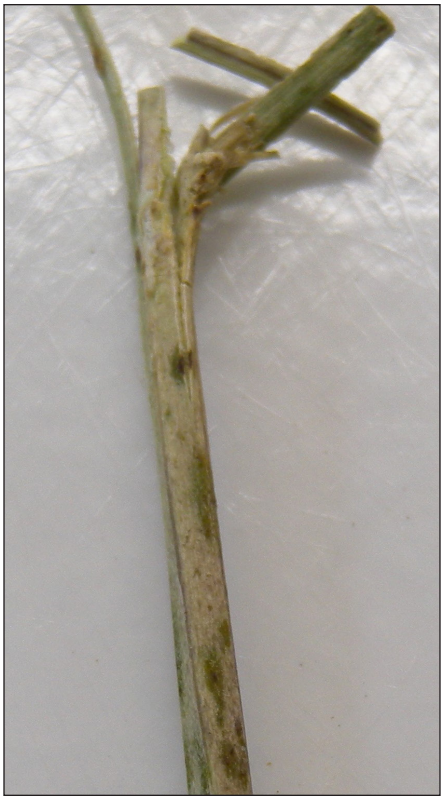

Figure 3. Blackpatch lesions on alfalfa stems. *Brenda Kennedy*

Managing Slaframine Toxicosis

- Animal owners should consult with their veterinarian to determine the best course of action for treating animals affected by slaframine toxicosis. Rabies is always a possibility for any animal with excessive salivation, so caution must be exercised before placing one's hands in an animal's mouth.
- Early removal from the contaminated hay or moving animals from affected pastures is critical. Most animals fully recover within a day or two after the symptoms begin if the source is removed early.
- Provide plenty of water to affected animals, and monitor health over time. Especially in hot, humid weather, animals can become dehydrated quickly due to the amounts of fluid lost.

Managing Blackpatch

- It is difficult to manage blackpatch once it is established in a pasture or hayfield. Fields with a history of blackpatch should be carefully managed and monitored to prevent re-establishment and/or disease spread to new areas.
- In severe cases, eliminating forage legumes and weeds in a field and rotating to a non-host crop for at least two years can reduce the amount of *S. leguminicola* available to infect plants.
  - Control weeds and forage escapes carefully during this time to prevent the fungus from establishing and surviving in small pockets in the field.
- Plant certified seed. Avoid saving seed or using low-quality seed to establish fields.
- Traditional forage disease management methods such as using disease-resistant cultivars is difficult with blackpatch because there is very limited information on cultivar susceptibility of different host species. There is no current information on the efficacy of new foliar or seed-applied fungicides for blackpatch management.
- In fields with a history of the disease, do not delay harvest. Delayed harvest can allow the fungus to continue to spread and produce slaframine. Harvest clover by 10 percent bloom. Ensure that red clover does not go to seed in infested fields.
- Prevent movement of the fungus from infested fields to new areas.
  - Do not frequently move grazing animals from an infested area to an non-infested pasture unless they are showing symptoms of slaframine toxicosis.
  - Clean mechanical harvesting equipment to prevent moving infected plants and plant parts between fields.
  - Do not store baled hay from fields with blackpatch, especially hay that is primarily red clover, in or beside fields where the disease has not been reported.

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References

Berkenkamp, B. Blackpatch of forage legumes. Canadian Plant Disease Survey 57:65–67.

Croom, W.J., Jr., W.M. Hagler Jr., M.A. Froetschel, et al. The involvement of slaframine and swainsonine in slobbers syndrome: A review. J Anim Sci 73:1499–1508.

Kagan, I. Blackpatch of clover, cause of slobbers syndrome: A review of the disease and the pathogen *Rhizoctonia leguminicola*. Frontiers in Veterinary Science 3:1–9.

Meerdink, G.L. 2004. Slaframine. Pp. 262–264. In: K.H. Plumlee, ed. *Clinical Veterinary Toxicology*. Mosby, St. Louis, MO. Published online: doi: 10.1016/B0-32-301125-X/50026-1.

Rhodes, L.H., and D.K. Gerken. 2015. Blackpatch. IN: D.A. Samac, L.H. Rhosed, and W.O. Lamp, eds. *Compendium of Alfalfa Diseases and Pests*, 3rd edition. American Phytopathological Society Press, St. Paul, MN.

Wijnberg, I.D., P.J. van der Ven, J.F. Gehrmann. Outbreak of salivary syndrome on several horse farms in the Netherlands. *Vet Rec*;164:595–596.

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