



BACTERIAL BLIGHTS OF FORAGE GRASSES

Bacterial blights occur widely in Illinois on forage grasses and cereal grains during warm, wet weather. The damage fluctuates considerably from year to year. The forage yield and its quality suffer during a local or general epidemic (epiphytotic). Affected leaves may wither and drop prematurely. Plants may be stunted. When infection is severe, the heads (spikes and panicles) are blighted and are killed as though injured by frost.

The bacteria attacking forage grasses are of two taxonomic groups, *Pseudomonas syringae* and *Xanthomonas campestris*. Members of these groups also attack small grains (see Report on Plant Diseases No. 106, Bacterial Blights of Oats), sorghum, and corn. Since disease cycles, temperature relationships, and control measures for these bacteria blights are similar, identification of specific pathogen types is based on their host ranges and symptomatology.

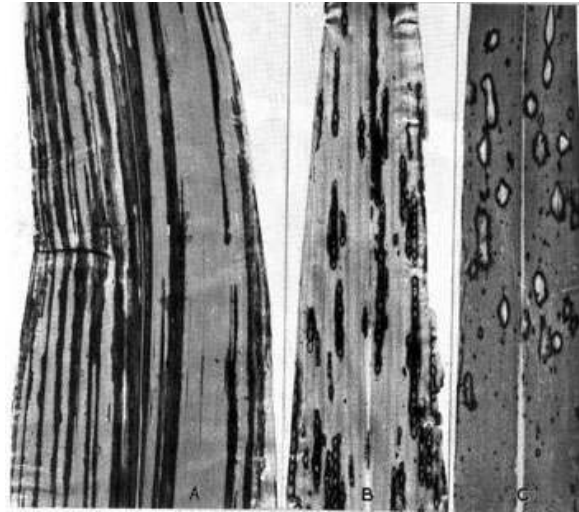


Figure 1. Bacterial blights of sorghum and sudangrass. A) bacterial leaf stripe; B) bacterial leaf streak; C) bacterial leaf spot (courtesy University of Wisconsin).

SYMPTOMS

The symptoms vary according to the forage grass or cereal crop involved, the bacterium, and the weather conditions. The spots (lesions) are often small, round-to-oval or elliptical, and are initially water-soaked. Continuing rainy or damp weather for several days causes lesions to enlarge, turn brown, and merge to form “eyespots” (Figure 1C), irregular, purplish brown to chocolate brown blotches (Figure 2A), or long streaks in the leaf blade and sheath (Figure 1A, 1B; Figure 2B). Affected leaves may wither and drop prematurely. Glossy white-to-cream droplets of bacterial ooze dry to form resinous granules or “beads” of varnish-like material and may cover affected areas on certain grasses and cereals.

Symptoms on Sorghums, Sundangrass, and Johnsongrass

1. **Bacterial Leaf Stripe** (*Pseudomonas syringae* subsp. *andropogonis*) is widely distributed and destructive on many types of sorghums (grain, forage, and sweet or sorgo), sudangrass, and broomcorn as well as on several other related grasses. Long, narrow stripes (1/4 inch by 9 inches or more) form on the leaves. These stripes are initially water-soaked, irregular, and bounded by veins. These areas soon dry and turn brick red, dark purplish red, reddish brown, or tan-to-dark brown depending on the sorghum variety. The color is continuous throughout the lesion (Figure

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1A). Later, the stripes elongate and fuse to form irregular blotches that cover a large part of the leaf surface and extend into the leaf sheath. Stalks and floral structures may show similar but more restricted lesions.

Bacterial exudate, the same color as the stripe, forms in droplets and dries down to reddish crusts or scales over the lesions, especially on the lower leaf surface. Severely infected leaves dry and wither. Infection occurs primarily through wounds produced by wind or insects and to a lesser extent through stomates. The bacterium is seedborne and survives in plant residue. Leaf stripe first appears about midsummer and continues until plant maturity. Disease development is favored by periods of warm, moist weather with an optimum of 71° to 82°F (22° to 28°C). The maximum is about 100°F (38°C) and the minimum, about 42°F (6°C).

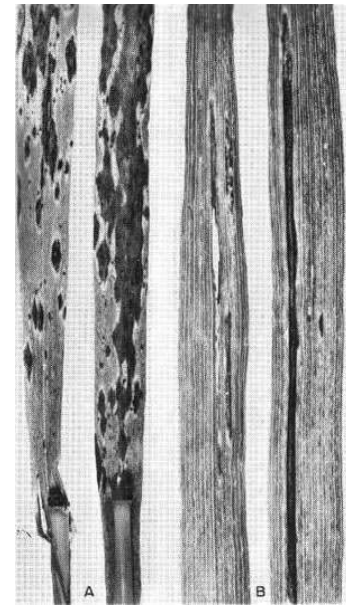


Figure 2. Bacterial blights on smooth bromegrass. A) chocolate spot or leaf blotch; B) leaf streak (courtesy University of Wisconsin).

2. **Bacterial Leaf Streak** (*Xanthomonas campestris* subsp *holcicola*) is widely distributed on sorghums—including sudangrass and Johnsongrass. Other plants that may become infected include corn, pearl millet, and foxtail millet. Narrow, water-soaked and translucent (1/8 by 1 to 6 inch long streaks), with red or brown borders and irregular blotches of color interrupting the streaks, form on the leaves. Irregular, oval blotches develop later as lesions enlarge and merge (Figure 1B) covering much of the leaf blade. The blotches have tan centers and red or brown margins. When infection is severe, leaves may wither and drop early.

Abundant yellow-to-cream droplets of bacterial exudate form on the lesions. This exudate dries to a thin, white-to-cream scale that is lighter than the bacterial leaf stripe exudate. Damp or rainy weather with a temperature of 83°F (28°C) is optimum for disease development (maximum, about 98°F [37°C]; minimum, 39°F or 4°C).

3. **Bacterial Eyespot or Leaf Spot** (*Pseudomonas syringae* subsp *syringae*) occurs more commonly than bacterial leaf streak, but is not as widespread. Besides sorghums, sudangrass, and Johnsongrass, hosts include broomcorn, pearl millet, foxtail millet, field or dent corn, sweet corn, and popcorn. Round to elliptical water-soaked spots form on lower leaves. The lesions soon dry, becoming papery, and light tan with red or brown borders (Figure 1C). Diseased areas may exudate and merge forming large, irregular blotches that kill the whole leaf. Bacterial eyespot can be distinguished from both bacterial stripe and bacterial streak by the absence of streaking and bacterial exudate. Eyespot appears soon after seedlings emerge in the spring and progresses with plant development throughout the entire growing season, gradually spreading upward from the lower leaves on the plant. Bacterial eyespot is favored by moist weather and cool temperatures of 55°F (13°C).

Symptoms of Bacterial Blights on Other Grasses

1. **Bacterial blight or Chocolate Spot** (*Pseudomonas syringae* subsp *coronafaciens*) is widely distributed in Illinois and is a serious disease of smooth bromegrass. Other grass hosts include quackgrass, wild ryegrasses, wheat grasses, prairie Junegrass, and perennial ryegrass. The lesions on the leaves and sheaths are circular to elliptical and are initially water-soaked. Lesions enlarge

and merge to form chocolate-to-purplish brown blotches (Figure 2A), usually with a light-colored “halo.” The blighted areas may involve the entire leaf blade and sheath. As infected leaves wither and die, the lesions fade to a rusty-brown. Bacterial exudate is not normally present. Lesions on the pedicels and heads (panicles) are smaller and more restricted than those on the blade and sheath. When the disease is severe, the upper nodes may be killed. And in such plants, the panicles wither and die as though injured by frost.

2. **Bacterial Stripe Blight or Leaf Streak** (*Xanthomonas campestris* subsp *translucens*) is widely distributed on a number of grass and cereal hosts, including timothy, various brome-grasses (including smooth brome, mountain brome, rescuegrass, rattlesnake chess, Japanese chess, soft chess, and ripgutgrass), quackgrass, barley, wild barleys, wheat, rye, and oats. Leaf lesions are usually long, narrow stripes, interrupted fine lines, or blotches that at first are watersoaked. Later, the lesions may elongate, dry, and turn yellow to dark brown with isolated, translucent areas. Finally, they may become brownish black with small, golden areas (Figure 2B). Water-soaked to black stripes develop on the stems. Frequently, the top leaves and inflorescence are blighted. Infections on the floral bracts (glumes) are dark brown, fine stripes to elongated spots. When attacked, the kernels are shriveled and brown.

Bacterial exudate is sometimes conspicuous on diseased leaf, leaf sheath, and inflorescence tissues. When dry, the droplets form yellowish, resinous “beads” or dry flakes. Numerous lesions usually result in a slow yellowing and death of the leaf, starting at the tip. Where severe, stripe blight may reduce the yields of forage and of grain. Disease development is optimum in rainy or damp weather when the temperature is about 79°F (26°C) with a maximum of about 100°F (38°C).

DISEASE CYCLES

The disease cycles of the various blight-producing bacteria discussed are very similar. They overwinter in or on seed, in crop residues, and in the soil. The bacteria are spread from plant to plant by the wind, splashing rain, and dew and by sucking as well as chewing insects. Mowing and grazing when the foliage is wet also spreads the bacteria. Young grass tissues are infected through stomata (natural openings) and wounds.

New leaves become infected during wet periods when the temperature is favorable. Primary infections usually occur during the seedling stage. Secondary infections occur on younger tissues throughout the growing period.

The bacteria embedded in the exudate on infected tissues remain dormant during dry periods and resume active development when the weather again becomes favorable. The bacteria remain viable for 2 years or more within dried crop residues and seed.

CONTROL

1. **Sow only certified, disease-free seed of improved, well-adapted cereal and grass cultivars**, as recommended by University of Illinois Agronomists and your nearest Extension office. Plant certified seed whenever available.
2. **Grow cultivars that are resistant to bacterial blight when they are available and are recommended.** Resistant cultivars of wheat, barley, sorghum, sudangrass, and smooth brome-grass

are available. See Illinois Agricultural Pest Management Guide Handbook for suggested cultivars to plant. Sorghos as a class are more susceptible to bacterial stripe than are the grain sorghums and sudangrass. The Kafirs and broomcorn varieties are resistant to bacterial leaf streak.

3. **Treat cereal and grass seed, where feasible, with a suggested fungicide.** Read Report on Plant Disease No. 101 “Seed Treatments for Field Crops” for details. Seed treatment helps prevent the introduction of bacteria, which are carried on the seed, to new fields.
4. **Avoid disease buildups by rotating grasses with nongrass crops, such as soybeans and forage legumes, for at least 2 years. Cut early** and remove from the field any hay crop that becomes heavily infected. This practice reduces losses in hay quality and removes inoculum that may threaten future cuttings. Avoid leaving a heavy mat of hay on the grass during warm, moist weather. Leaf-blighting diseases are seldom destructive in frequently cut or closely grazed pastures.
5. **When erosion is not a hazard, plow under cleanly all cover crops, severely infected stands, volunteer cereals or grasses, and plant residues. Where practical, seed a mixture of forage species.**
6. **Keep down weed grasses by cultural or chemical means.**
7. **Use a careful, controlled burning of dead grass in early spring, which may be warranted if pastures are severely affected.** This ancient practice destroys organic matter and kills leaf-blighting bacteria and fungi in overwintering leaves and crop residues. Check local EPA regulations about open burning.
8. **Practice balanced fertility, based on a soil test.** Maintain a high level of potash (K_2O) and avoid excessive rates of fertilizers high in nitrogen.