Leaf Diseases of Grasses in the South

Howard W. Johnson

The more important perennial grasses that provide summer grazing in the Southern States are Bermudagrass (Cynodon dactylon), carpetgrass (Axonopus affinis), and Dallisgrass (Paspalum dilatatum).

Bermudagrass is attacked by two species of Helminthosporium. H. giganteum causes a zonate eyespot with tan center and brown margin. H. cynodontis causes a bleaching and withering, particularly of the leaf tips.

The leaves of carpetgrass are sometimes spotted by a species of Helminthosporium, and one species of Curvularia has also been reported from leaf spots on this grass.

Dallisgrass is attacked in some areas by anthracnose (Colletotrichum graminicola). In spring the leaves sometimes are spotted by Stagonospora paspali. Neither has been severe enough to warrant intensive work by plant pathogens.

Johnsongrass (Sorghum halepense) is another perennial warm-season grass that is grazed and cut for hay in some parts of the South. It is quite susceptible to the numerous leaf diseases that attack Sudangrass and frequently suffers severe leaf injury.

Tall fescue (Festuca arundinacea) is utilized commonly for cool-season grazing in the South. Three leaf diseases of some importance attack it. Leaf scald, caused by Rhizoctonia solani, has caused the most serious losses. It causes large, bleached, tan-colored areas on the leaves, especially noticeable in summer. A dark-brown, diffuse, netlike leaf discoloration (net blotch), caused by Helminthosporium dictyooides, sometimes becomes rather abundant on leaves of tall fescue during the cool months of fall, winter, and spring.

The leaf spot caused by Cercospora festucae has a gray center and a purplish border, which differentiate it from net blotch. Cercospora leaf spot is first evident in spring and becomes more severe as summer progresses. It was first observed on tall fescue in Kentucky in 1944. It became severe on tall fescue at College Station and Temple, Tex., in 1949, and appeared to be responsible for the death of both seedling and mature plants.

Temporary winter grazing in the South is furnished largely by the early growth of winter cereals (oats, rye, barley, and wheat). The foliar diseases of these grasses are discussed in another section (page 344). Annual ryegrass (Lolium multiflorum) is also utilized throughout the South for winter grazing. Its chief foliar disease is crown rust, caused by Puccinia coronata. It is discussed on page 279.

Sudangrass (Sorghum vulgare var. sudanense) and pearlmillet (Pennisetum glaucum) are the grasses most widely grown for temporary summer grazing in the South.

Sudangrass is attacked by a number of bacterial and fungus diseases, which limit its usefulness. Pearl millet is less widely grown and so far has been attacked by fewer parasites.

Bacterial stripe (Pseudomonas andropogonis) is probably the most common and destructive bacterial disease of Sudangrass. It occurs also on Johnsongrass and sorghums. It shows as stripes with blunt or jagged ends. The stripes are about one-fourth inch long when young and a foot or more when mature. The color, continuous throughout the lesion, ranges from purplish red to brown or tan, depending on the variety. Abundant bacterial exudate
forms over the lesions and dries to form crusts or scales, especially on the lower leaf surface. The scales of exudate are the same color as the stripes.

Bacterial streak (Xanthomonas hollcicola) is another widely distributed disease of Sudangrass, Johnsongrass, and sorghums. The young lesions are narrow, water-soaked streaks 1 to 6 inches long. They bear beadlike, light-yellow drops of exudate. Red or brown margins later develop, and irregular blotches of color appear in the streaks, breaking their continuity. The streaks may join to form irregular areas that cover much of the leaf blade. At that stage the exudate has dried to thin, white or cream-colored scales, which distinguish this disease from bacterial stripe, which has a darker exudate.

Bacterial spot (Pseudomonas syringae) is somewhat less common than the other two bacterial diseases, but some years it occurs abundantly on the leaves of Sudangrass, Johnsongrass, pearl millet, foxtail millet, sorghums, and corn. The spots, circular to elliptical, vary from tiny dots to almost one-half inch circles in later stages. They appear water-soaked at first. Soon they become dry and light-colored in the center and develop a red or brown border. The spots may unite to form large diseased areas, but they do not elongate to form stripes or streaks. Exudate does not form on the lesions.

Leaf blight, caused by the fungus Helminthosporium turcicum, is probably the most destructive disease of Sudan grass in the Southern States. The disease occurs also on Johnsongrass, sorghums, and corn. The causal fungus is seed-borne and lives also on dead plant material on or in the soil. It may cause seed rot and seedling blight, which make it difficult to obtain a satisfactory stand. When the leaves of older plants are attacked, the fungus causes long, elliptical lesions one-eighth to one-half inch wide and several inches long. The lesions may coalesce and kill large areas of the leaves, so that severely affected plants appear as though they had been blighted by an early frost.

The center of the individual lesions is usually gray to straw-colored. The border of the lesions varies from reddish purple to tan. In warm, humid weather, the lesions are covered with a dark, moldlike growth of fungus spores. Wind and rain scatter the spores and spread the disease.

Two other species of Helminthosporium attack Sudangrass, but the foliar diseases they cause are less damaging than leaf blight. Target spot, caused by the fungus Helminthosporium sorghi-cola, the more serious, occurs on Johnsongrass and sorghums, as well as Sudangrass. It forms small, round or oval lesions. They consist of alternate light-tan and brown bands of tissues. The tissues have a zonate or "target spot" appearance on varieties such as Tift Sudan, which contain a tan pigment. On common Sudan, which contains a darker pigment, the lesions are purplish black and are less zonate. The disease may become more serious in the South as the acreage planted to Tift Sudan increases, because while it resists leaf blight it appears to be quite susceptible to target spot.

The second species, Helminthosporium rostratum, is primarily a parasite of corn and pearl millet but can attack Sudangrass, Johnsongrass, and sorghums. The leaf spots it causes are small and light brown in color when young. Older lesions have straw-colored centers and may coalesce to form larger necrotic areas. On sorghums and Sudangrasses having dark pigment there is some purpling around the lesions.

Anthracnose, caused by the fungus Colletotrichum graminicola, occurs commonly on the leaves of Sudangrass, Johnsongrass, and sorghums in the South. When young, the spots are about one-sixteenth inch in diameter, circular to elliptical, and reddish purple. Later the spots enlarge and
the centers fade to tan or straw color. The border of the mature spots is reddish or brown. Dark-colored fungus bodies (acervuli) develop on the older spots. The spores produced in those structures are spread by wind and rain. Anthracnose lesions develop on the midrib of the leaf quite commonly and cause a rather striking discoloration. The fungus is seed-borne and overwinters also in dead plant refuse on, or in, the soil. Lesions appear on the leaves of seedling plants, but it is usually midsummer before the disease is abundant. It develops rapidly from that time until the plants are mature.

Zonate leaf spot (*Gloeocercospora sorghi*) is a conspicuous disease of Sudangrass, Johnsongrass, and sorghums. It has been reported also on sugarcane, corn, and pearlmillet. The mature spots are large and composed of alternating bands of reddish-purple and tan or straw-colored tissue, forming a zonate pattern. Spots near the leaf margin are semicircular. Those nearer the center of the leaf are nearly circular with irregular, wavy margins. Black sclerotia of the fungus develop within the tissues of the older leaf lesions and the fungus spores are borne in salmon-colored gelatinous masses (sporodochia) in and around the necrotic areas. In some seasons the disease is rather common in the lower Mississippi Valley.

Rough spot (*Ascochyta sorghina*) attacks Sudangrass, Johnsongrass, and sorghums. It has round or oval spots, which are yellowish brown or reddish purple and are covered with small black fruiting bodies. The bodies usually are so abundant that the affected areas feel rough when rubbed between the fingertips.

Gray leaf spot, caused by the fungus *Cercospora sorghi*, is found commonly on Sudangrass, Johnsongrass, and sorghums in the Gulf States. When small, the reddish-purple to tan spots are indistinguishable from other leaf spots, but as they elongate they become covered with a grayish-white fuzz, composed of fungus conidiophores and conidia. The conidia, spread by wind and rain, cause new infections.

Sooty stripe, caused by *Ramulispora sorghi*, occurs in the Southern States on Sudangrass, Johnsongrass, and sorghums. Mature lesions are elongate-elliptical, have a straw-colored center surrounded by a purple border, and usually are covered by numerous black sclerotia. In moist weather, fungus spores are produced in light-pink, gelatinous masses (sporodochia) on the lesions. The sclerotia function primarily in overwintering the fungus and the conidia produced by them are the chief source of infection in the spring.

Rust, caused by *Puccinia purpurea*, frequently attacks Sudangrass, Johnsongrass, and sorghums in the humid Gulf States. It causes the leaves to dry and break off, thus reducing the forage value. Rust pustules occur on both the upper and lower surfaces of the leaf. They are covered at first by a brownish coating. This soon breaks open and allows the chestnut-brown rust spores to escape. Purplish-red or tan areas develop around the rust pustules and the functional efficiency of large areas of leaf tissue is eventually destroyed.

Nonparasitic leaf discolorations caused by environmental conditions or hereditary factors also occur commonly on Sudangrass, Johnsongrass, and sorghums in the South. These lesions lack bacterial exudate and show no evidence of fungus fruiting structures, which serves to differentiate them from the parasitic disorders I have discussed.

**SEED TREATMENT** and crop rotation help check the diseases of Sudangrass, but the most feasible control measure is the development of disease-resistant varieties.

Tift Sudan, a variety resistant to leaf blight, anthracnose, bacterial stripe, and bacterial streak, was developed through cooperative work by the Department of Agriculture and the Georgia Coastal Plain Experiment Station.
The origin and early testing of this improved variety is described by Glenn W. Burton in Georgia Circular 11, published in April 1943.

Tift Sudan has become popular in the South because of its disease resistance. Plant breeders use it in attempts to improve Sudangrass still more.

Pearlmillet is susceptible to three of the diseases that attack Sudangrass—bacterial spot, zonate leaf spot, and the leaf spot caused by *Helminthosporium rostratum*. Eyespot, caused by *Helminthosporium sacchari*, also occurs on pearlmillet. The fungus infects and blackens the seed and causes a conspicuous leaf spot. Species of *Curvularia* have also been reported from leaf spots and seed of pearlmillet.

A more common leaf disease than any of those is caused by a species of *Cercospora*, which had not been named in 1953. That fungus causes a small, circular to elliptical spot with gray center and reddish-brown border. Both the improved variety Starr and commercial pearlmillet are susceptible to it. The disease usually develops rather late in the summer, however, and so the damage is not great during the pasturing season.

**Howard W. Johnson** is a graduate of Ohio State University. He has a doctorate in plant pathology from the University of Minnesota. He has been engaged in work on diseases of forage crops since 1930. He is employed jointly by the division of forage crops and diseases and the Mississippi Agricultural Experiment Station with headquarters at the Delta Branch Experiment Station, Stoneville, Miss.

For further reference (see also page 257):

The Northern Forage Grasses

Kermit W. Kreitlow

Many of the organisms that attack western and southern grasses occur on northern grasses. I mention them briefly and discuss in more detail the other serious diseases on northern grasses.

Redtop (*Agrostis alba*) is a perennial species that occurs most commonly in poorly drained areas but grows well on poor, acid soils. The most widespread and important disease of redtop, brown stripe, is discussed in the section on needlegrasses, page 258.

Redtop also is attacked by rust and smut. In the humid northeastern and north central sections, redtop is damaged by several species of *Helminthosporium*. The most common, *H. erythrospilum*, is termed red leaf spot. It also attacks other species of *Agrostis*.

Small spots, with round, water-soaked areas, develop on leaves. They turn straw-colored, with a reddish or brownish-red border. As the spots lengthen and merge, they form streaks and cause the leaves to wither and turn brown. Sometimes the leaves wither immediately without developing leaf spots. The injury then resembles the effect of drought.

Infection occurs from spores spread by wind and rain. Heavy infection follows periods of warm, wet weather. The fungus overwinters on old, dead leaves. Resistant plants exist within the species, and it should be possible to develop resistant varieties.

Tall oatgrass (*Arrhenatherum elatius*),