

Rice Diseases

of Louisiana

Bacterial Panicle Blight

Bacterial panicle blight, caused by the bacteria *Burkholderia glumae* and *gladioli*, is one of the most important diseases of rice in the South. The disease is associated with hot, dry weather. Losses include reduced yields and poor milling with loss estimates ranging from a trace to 70 percent. The bacteria are seed-borne and have caused seedling blights in other countries. The bacteria appear to survive on the plant as an epiphytic population on the

leaf and leaf sheath and follow the canopy up. This population infects the grain at flowering and causes grain abortion and rotting during grain filling. The disease is first detected as a light to medium brown discoloration of the lower third to half of hulls shortly after emergence. The stem below the infected grain remains green. Pollination occurs, but the grain aborts sometime after grain filling begins. Over time, diseased grains become gray to black or pink be-

cause of growth of secondary fungi. The disease tends to develop in circular patterns with the most severely affected panicles in the center remaining upright because of grain not filling. Currently, no chemical control measures are recommended. Some varieties have more resistance than others (See LCES Publication 2270, "Rice Varieties and Management Tips"). Rice planted later in the season and fertilized with high N rates tends to have more disease.



Initial Infection



Severe Panicle Damage



Grain Discoloration

Blast

Blast disease is caused by the fungus, *Pyricularia grisea*. Blast can be found from the seedling stage to near maturity. The leaf blast phase occurs between the seedling and late tillering stages. Leaf spots start as small white, gray or blue-tinged. They enlarge quickly under moist conditions to either oval diamond-shaped spots or linear lesions with pointed ends with gray or white centers and narrow brown borders. Leaves and whole plants are often killed under severe conditions.

Rotten neck symptoms appear at the base of the panicle, starting at the node. The tissue turns brown to chocolate brown and shrivels, causing the stem to snap and lodge. If the panicle does not fall off, it may turn white to gray, or the florets that do not fill will turn gray. Panicle branches and stems of florets also have gray-brown lesions.

Scouting for blast should begin early in the season during the vegetative phase and continue through to heading. Leaf blast will usually appear in high areas of the field where the flood has been lost or is shallow. As part of management, the flood must be maintained. Areas of heavy nitrogen fertilization and edges of the fields are also potential sites. If leaf blast is in the field or has been reported in the same general area, and, if the variety is susceptible, fungicidal applications are advisable to reduce

rotten neck blast. Fungicide timing is critical. When 50 to 70 percent of the heads have begun to emerge application should be made. Application before or after this growth stage will not provide good control of this disease.



Leaf Blast



Pathogen Spores



Rotten Neck Blast

Grain Smuts

The false smut fungus, *Ustilaginoidea virens*, infects rice at flowering. The disease is characterized by large orange to olive-green spore balls that replace one or more grains on a head. In the middle of the spore masses are sclerotia that act as the survival structure. These sclerotia can be spread with the seed and infect the next crop. Removal of the sclerotia in seed-cleaning reduces spread. Seed treatment with a fungicide also reduces inoculum potential.

False smut spores cause discoloration of milled rice, but no

significant yield loss is associated with the disease. Presence of the smut sclerotia in grain for export has caused problems. Some foliar fungicides applied at boot can reduce disease incidence.



Galls on Panicle



Gall Replacing Grain



Fungal Sclerotium

Kernel smut symptoms appear just before maturity. A black mass of smut spores replaces all or some of the endosperm of the seed. Often, the spores ooze out of the grain, leaving a black mass along the seam of the hulls. The fungus infects immature, developing grain. The fungus, *Tilletia barclayana*, overwinters as spores in soil of affected fields and in seed. Significant quality and yield reductions are possible. Disease development is favored by high nitrogen amounts. Some varieties are more resistant than others. It has been reported, from other states, that boot applications of propiconazole containing fungicides reduce damage significantly.



Spores Oozing



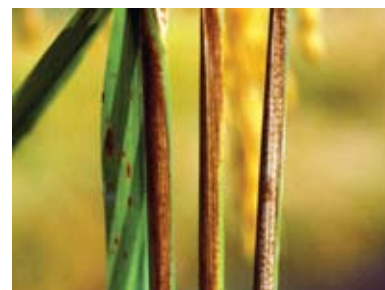
Diseased & Healthy Grain

Narrow Brown Leaf Spot and the *Cercospora* Complex

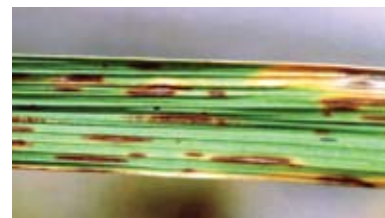
The fungus *Cercospora janseana* causes narrow brown leaf spot. Spots are linear and reddish-brown. On susceptible cultivars, the lesions are wider, more numerous and lighter brown with gray necrotic centers. They tend to be narrower, shorter and darker on resistant cultivars. Spots usually appear near heading and are slow to develop, taking up to 30 days from infection. Both young and old leaves are susceptible. Sheaths and glumes can be infected, causing significant discoloration and necrosis. On sheaths, the disease is referred to as "sheath net blotch" because of the brown cell walls and the tan-to-yellow intracellular areas that form a netlike pattern. Branches of the seed heads can become infected, causing premature ripening and unfilled grains. Symptoms can

be confused with rotten neck and panicle blast lesions. Narrow brown disease lesion symptoms usually are darker brown and develop in the internodal area of the neck. Grain infection appears as a diffuse brown discoloration. The disease is often severe on the second crop.

Resistance to narrow brown leaf spot is available, but new races of the pathogen develop rapidly. Low nitrogen appears to favor disease development. Fungicides that are used to reduce other diseases may reduce narrow brown leaf spot. A limited number of fungicide trials have been conducted to determine the best timing against all stages of this disease, but disease control and yield increases appear best when fungicides are applied between the boot and heading growth stages.



Cercospora Sheath Rot



Narrow Brown Leaf Spot



Severe Leaf Damage

Sheath Blight

Sheath blight is one of the most important diseases in rice in Louisiana. It is characterized by large oval spots on the leaf sheaths and irregular spots on leaf blades. Infections usually begin during the late tillering-joint elongation stages of growth. The fungus, *Thanatephorus cucumeris* (*Rhizoctonia solani*) survives between crops as structures called sclerotia or as hyphae in plant debris. Sclerotia or plant debris floating on the surface or irrigation water serve as sources of inoculum that attack and infect lower sheaths of rice plants at the waterline. Fungal mycelium grows up the leaf sheath, forms infection structures, infects and causes new lesions. The infection

can spread to leaf blades. After the panicle emerges from the boot, the disease progresses rapidly to the flag leaf on susceptible varieties. With very susceptible varieties, the fungus will spread into the culm from early sheath infections. Infected culms are weakened and the tillers may lodge or collapse.

The lesions have grayish-white or light green centers with a brown or reddish-brown margin. As lesions coalesce on the sheath, the blades turn yellow-orange and eventually die. As areas in the field with dead tillers and plants enlarge, they may coalesce with other affected areas to cause large areas of lodged, dead and dying plants. Damage

is usually most common where wind-blown, floating debris accumulates in the corners of cuts when seedbeds are prepared in the water.

Disease severity can be reduced by integrating several management practices. Dense stands and excessive use of fertilizer both tend to increase the damage caused by this disease. Broadcast seeding tends to increase stand and canopy density. Rotation with soybeans or continuous rice increases the amount of inoculum in field soils. Fungicides are available for reducing sheath blight. Avoid late application beyond 50 percent to 70 percent heading.



Initial Lesions



Early Leaf Lesion



Sclerotia on Leaf



Sheath Blight "Birds-Nest"

Sheath Rot

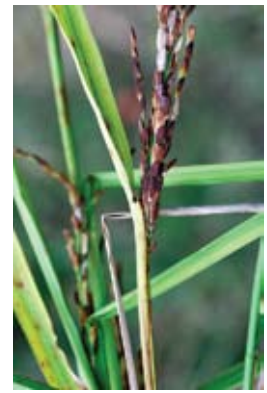
Sheath rot is caused by the fungus *Sarocladium oryzae*. Symptoms are most severe on the uppermost leaf sheaths that enclose the young panicle during the boot stage. Lesions are oblong or irregularly oval spots with gray or light brown centers and a dark reddish-brown diffuse margin. Early or severe infections may affect the panicle so that it only partially emerges. The unemerged portion of the panicle rots, with florets turning reddish-brown to dark brown. A powdery white growth consisting of spores and hyphae of the pathogen is usually observed on the inside of affected leaves. Insect or mite damage to the boot or leaf sheaths increases the damage from this disease. Emerged panicles may be damaged, with florets

discolored reddish-brown to dark brown and grain not filling.

Some varietal resistance is available. The disease is usually minor, affecting scattered tillers in a field and plants along the levee. Occasionally, large areas of a field may have significant damage. No control measures are currently recommended. Fungicidal sprays used in a general disease control program may reduce damage.



Sheath Symptoms



Grain Damage



Panicle and Sheath Lesions

Stem Rot

The fungus *Sclerotium oryzae* causes stem rot. Losses are not usually detected until late in the season when control practices are ineffective. Damage appears as severe lodging, which makes harvesting difficult. Seed sterility also has been reported. No high level of resistance to stem rot is available. High nitrogen and low potassium levels favor the disease. Stem rot is more serious in fields that have been in continuous rice for several years.

The pathogen overwinters as sclerotia in the top 2 to 4 inches of soil and in plant debris. During early floods, sclerotia float to the surface, come in contact with the plant, germinate and infect the tissues near the water surface. The first symptom is a black an-

gular lesion on leaf sheaths near the water line at tillering or later growth stages. As lesions develop, the outer sheath may die, and the fungus penetrates into the inner sheaths and then finally the culm. These become discolored and have black or dark brown lesions. At maturity the softened culm breaks, plants lodge, and numerous small, round black sclerotia develop in the dead tissues. The fungus can continue to develop in the stubble after harvest, and numerous sclerotia are produced.

Control measures include burning or cultivating stubble after harvest to destroy sclerotia, using crop rotation when possible, applying potassium fertilizer, and avoiding excessive nitrogen

rates. Fungicidal sprays used in a general disease control program against other fungal diseases may reduce damage due to stem rot.



Stem Damage with Sclerotia



Initial Lesions

Water-Mold and Seed-Rot

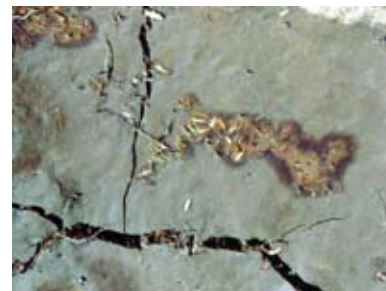
When using the water-seeding method of planting rice, it is difficult to obtain uniform stands of sufficient density to obtain maximum yields. The most important biological factor contributing to this situation is the water-mold or seed-rot disease complex caused primarily by fungi-like *Achlya spp.* and *Pythium spp.* Recently, certain *Fusarium spp.* also have been found associated with molded seeds. The disease is caused by a complex of these fungi-infecting seeds. The severity of this disease is more pronounced when water temperatures are low or unusually high. Low water temperatures slow the germination and growth of rice seedlings, but do not affect growth of these pathogens. In the 1970s and 1980s, an average of 45 percent of water-planted seeds were lost to water-mold. In addition to the direct cost of the lost seeds and the cost of replanting, water-mold also cause indirect losses through the reduced competitiveness of rice with weeds in sparse or irregular stands.

Water-mold can be observed through clear water as a ball of fungal strands surrounding seeds on the soil surface. After the seeding flood is removed, seeds on the soil surface are typically

surrounded by a mass of fungal strands radiating out over the soil surface from the affected seeds. The result is a circular copper-brown or dark green spot about the size of a dime with a rotted seed in the center. The color is caused by bacteria and green algae that are mixed with the fungal hyphae.

Achlya spp. normally attack the endosperm of germinating seeds, destroying the food source for the growing embryo and eventually attacking the embryo. *Pythium spp.* usually attack the developing embryo directly. When the seed is affected by the disease, the endosperm becomes liquefied and oozes out as a white, thick liquid when the seed is mashed. If affected seeds germinate, the seedling shoot and root are attacked and the seedling is stunted. When infection by *Pythium spp.* takes place after the seedling is established, the plant is stunted, turns yellow and grows poorly. If the weather is favorable for plant growth, seedlings often outgrow the disease and are not severely damaged. The disease is less severe in water-seeded rice when weather conditions favor seedling growth. Temperatures averaging above 65 degrees favor seedling growth, and water-mold is less severe. Seeds should be

vigorous and have a high germination percentage. Seed with poor vigor will be damaged by water-mold fungi when water-seeded. Treat seed with a recommended fungicide at the proper rate to reduce water-molds and seed diseases.



Water Mold



Mycelium on Grain

For the latest information on pesticide recommendations for all these rice diseases, contact your local LSU AgCenter Extension Service agent.



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