Diseases of Rice

Sheath Blight (fungus – *Rhizoctonia solani*)

Sheath blight is the most important disease of rice in Texas. Initial symptoms usually develop as lesions on sheaths of lower leaves near the water line when plants are in the late tillering or early internode elongation stage of growth (approximately 10-15 days after flooding). These lesions usually develop just below the leaf collar as oval-to-elliptical, green-gray, water-soaked spots about 1/4 inch wide and 1/2 to 1 1/4 inch long.

With age, the lesions expand and the center of the lesions may become bleached with an irregular tan-to-brown border. When humidity exceeds 95 percent and temperatures are in the range of 85-90 degrees F, infection spreads rapidly by means of runner hyphae to upper plant parts, including leaf blades, causing extensive, tan, irregularly shaped lesions with brown borders. Disease development progresses very rapidly in the early heading and grain filling growth stages during periods of frequent rainfall and overcast skies. Plants heavily infected at these stages produce poorly filled grain, particularly in the lower portion of the panicle. Additional losses result from increased lodging or reduced ratoon production due to infection of the culm and reduced carbohydrate reserves. As plants senesce from maturity, lesions will dry and become grayish-white to tan with brownish borders. Sclerotia, initially white but turning dark brown at maturity, are produced superficially on or near the lesions. Sclerotia are loosely attached and easily dislodge from the plant. Sclerotia are the primary means for fungus survival between crop years. They survive long periods in the soil and will float to the surface of flooded rice fields in the subsequent rice crop, infect rice plants at the waterline and continue the disease cycle. Sclerotia can survive from one to several years in the soil. They can also attack several weed hosts and cause infection.

New varieties and changing cultural practices often combine many of the factors that favor disease development. In recent years, the wide acceptance of susceptible varieties, because of their high yielding potential, has contributed greatly to the rapid increase in sheath blight. In addition, high levels of nitrogen fertilizer are applied in order to achieve high yield potential. Excessive vegetative growth predisposes susceptible plants to attack by the sheath blight organism. Rotation with susceptible alternative crops, such as soybeans can also increase the severity of sheath blight in succeeding rice crops.
Blast (fungus – *Pyricularia grisea*)

This disease can cause serious losses to susceptible varieties during periods of weather conditions favorable to growth of blast. Depending on the part of the plant affected, the disease is often called leaf blast, rotten neck, or panicle blast. The fungus produces spots or lesions on leaves, nodes, panicles, and collar of the flag leaves. Leaf lesions range from somewhat diamond-shaped to elongated with tapered, pointed ends. The center of the spot is usually gray and the margin brown or reddish-brown. Both the shape and color of the spots may vary and resemble those of the brown leaf spot disease. Blast differs from brown leaf spot in that it causes longer lesions and develops more rapidly. The blast fungus frequently attacks the node at the base of the panicle and the branches of the panicle. If the panicle is attacked early in its development, the grain on the lower portion of the panicle may abort giving the head a bleached whitish color, giving the term "blasted" head or rice "blast". If the node at the base of the panicle is infected, the panicle breaks causing the "rotten neck" condition. If neck rot occurs early, the entire panicle may die prematurely, leaving it white and completely blank. Later infections may cause incomplete grain filling and poor milling quality. Other parts of the panicle including panicle branches and glumes may also be infected. Panicle lesions are usually brown, but may also be black. In addition, the fungus may also attack the nodes or joints of the stem. When a node is infected, the sheath tissue rots and the part of the stem above the point of infection often is killed. In some cases, the node is weakened to the extent that the stem will break causing extensive lodging.

Blast generally occurs scattered throughout a field rather than in a localized area of the field. Late planting, frequent showers, overcast skies, and warm weather favor development of blast. Spores of the fungus are produced in great abundance on blast lesions and can become airborne, disseminating the fungus a considerable distance. High nitrogen fertilization should be avoided in areas that have a history of blast. Control measures include early planting, avoiding excessive or high levels of nitrogen, proper flood management, resistant varieties, and fungicides. Varietal resistance is the most effective method of controlling rice blast. Some foliar fungicides can reduce the incidence of blast, but severe losses can occur on susceptible varieties even when fungicides are applied.
Brown Leaf Spot (fungus – *Bipolaris oryzae*)

This disease, previously called *Helminthosporium* leaf spot, is common in Texas. Most conspicuous symptoms of the disease occur on leaves and glumes of maturing plants. Symptoms also appear on young seedlings and the panicle branches in older plants. Brown leaf spot is a seed-borne disease. Leaf spots may be evident shortly after seedling emergence and continue to develop until maturity. Leaf spots vary in size, are typically 1/8 inch in diameter, and are circular to oval in shape. The smaller spots are dark brown to reddish brown, and the larger spots have a dark-brown margin and reddish brown to gray centers. Damage from brown spot is particularly noticeable when the crop is produced in nutritionally deficient or otherwise unfavorable soil conditions. Significant development of brown spot is often indicative of a soil fertility problem. Brown spot may be reduced by balanced fertilization, crop rotation, and the use of high quality planting seed. Foliar fungicides are not economical for controlling brown leaf spot on most commercial long grain varieties. Rice seed with infected glumes can result in diseased seedlings. Seed treatment fungicides reduce the incidence and severity of seedling blight caused by this fungus.

Narrow Brown Leaf Spot (fungus – *Cercospora janseana*)

The disease varies in severity from year to year and usually becomes most severe as rice approaches maturity, causing premature ripening and yield reduction. Leaf spots are long (1/10 to 1/2 inch), narrow (1/32 inch), and cinnamon-brown. Premature leaf death will occur in severe cases. Late in the growing season, the fungus often attacks the sheath of the flag leaf causing the "brown blotch" or "net blotch" phase of the disease in which a large (1 1/2 to 3 inch long) cinnamon brown lesion is formed and typically encircles the uppermost internode about an inch below the base of the panicle. Early maturing varieties tend to escape the major impact of the disease. There are differences in susceptibility among some rice varieties, however, due to buildup of certain races of the fungus, resistance does not remain reliable. Some foliar fungicides effectively suppress this disease and may be economical if other diseases are also controlled along with the narrow brown leaf spot.
Kernel Smut (fungus – *Tilletia barclayana*)

Kernel smut is a serious disease caused by the fungus *Tilletia barclayana* (Neovossia horrida). The fungus infects and replaces the endosperm of the rice grain completely or partially with a mass of black smut spores. Usually only a few grains per panicle are infected. Although yield losses are insignificant, monetary losses can be very high if the rice cannot be sold or the price is reduced at the mill. Infested lots of grain often have a dull, grayish cast caused by the smut spores. Rice lots exceeding 3% kernel smut infection presently will not qualify for government loan.

The disease is not systemic. The smut spores fall to the soil surface, where they remain dormant until the following rice crop, or they can be introduced into a field on the surface of infested rice seed. The smut spores float to the surface of the irrigation water where they germinate and produce air-borne spores that infect individual rice florets. Disease development is favored by frequent light showers and high relative humidity.

Kernel smut is difficult to control. Field tests indicate that a late boot application of Tilt® or Propimax® at 4 to 6 fluid ounces per acre reduces the number of smutted kernels. Some varieties are less susceptible to the disease than Cocodrie or Cypress. Heavy nitrogen fertilization favors the disease. A 3-year crop rotation should help reduce the number of smut spores present. Do not plant seed contaminated with smut spores.