

## Brown Spot in Florida Rice<sup>1</sup>

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Brown spot is one of the most important rice diseases in Florida. The disease can adversely affect the yield and milling quality of the grain. Under environmental conditions conducive to disease, yield loss estimates range from 16 to 40 percent in Florida.

### SYMPTOMS

Brown spot symptoms initially appear as small circular to oval spots on the first seedling leaves. Leaf spots are observed throughout the growing season and may vary in size, shape and color depending on the environmental conditions, age of the spots, and the degree of susceptibility of the rice variety. Small spots are dark brown to reddish brown while large spots have a light, reddish-brown or gray center surrounded by a dark to reddish-brown margin (Plate 1). Older spots may have a bright yellow halo surrounding the lesion. Spots on the leaf sheath and hulls are similar to those on the leaves.

Early brown spot lesions are difficult to distinguish from blast disease lesions, but mature blast lesions are usually spindle or diamond shaped (Figure 1). Severely infected leaves may die before



Plate 1.

maturity and these plants will produce lightweight or chalky kernels. Infection occurring directly on the kernels will significantly reduce grain yield and quality. Infected glumes and panicle branches have a black discoloration.

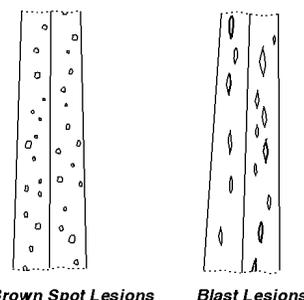


Figure 2.

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## CAUSAL AGENT

Brown spot is caused by the fungus *Bipolaris oryzae* (formerly known as *Helminthosporium oryzae*). It can infect all plant parts. The morphology and life cycle of the fungus is complex and beyond the scope of this paper. Plant pathologists, however, can usually identify the causal agent by looking at the conidia (spores) microscopically. Briefly, conidia of *Bipolaris oryzae* are very small, club shaped to cylindrical, generally curved, light brown to golden brown, with 6 to 14 transverse cell walls (Plate 2).



Plate 2.

## SPREAD OF THE DISEASE

*Bipolaris oryzae* is seedborne. It can also survive on infected rice straw and stubble. It spreads from plant to plant in the field by airborne spores. Species of some 23 grass genera have been reported to be susceptible to infection by *Bipolaris oryzae*. It is not known how many of these species may act as alternative hosts in the spread of the disease to rice.

Disease development is favored by high relative humidities (86-100%) and temperatures between 68° to 78° F. Leaves must be continuously wet for 8 to 24 hours for infection to occur.

## PREVENTION AND CONTROL

Severe leaf spotting is often associated with weak plants growing under stressful conditions such as dense plant stands, water stress, inadequate fertilization or herbicide toxicity. Plants that grow in soils with nutritional deficiencies or in soils where nutrient uptake is hindered are more susceptible to infection.

The severity of brown spot can be intense on Histosol(organic)-grown rice in Florida. Although

there are varietal differences in susceptibility to brown spot, the best management strategy is balanced nutrition. Soils known to be low in plant-available silicon should be amended with calcium silicate slag before planting. Improved silicon nutrition not only enhances plant resistance to brown spot, but will increase rice yields. The usual slag application rate is two tons per acre, although higher rates have been shown to be even more effective in reducing brown spot incidence and increasing yields.

Small plot experiments conducted by the University of Florida have shown that using calcium silicate slag and fungicides may limit yield reductions in infected fields. In one recent experiment, nontreated plots exhibited yield reductions of 16%, 39.3% and 43.8% when compared to plots treated with a fungicide (Tilt®) alone, slag alone, or a combination of fungicide and slag, respectively. Note that although fungicide treatment alone exhibited an increased yield over non-treated plots, the effects due to slag treatment alone were much greater, and the addition of fungicide with the slag treatment did not improve yields significantly. Therefore, slag treatment alone may be the best method for managing this disease on Florida's Histosols. Fungicidal seed treatment, however, has proven very effective in reducing seedling brown spot disease.