

## Effective fungicide rate and timing for rice disease control

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### Introduction

Rice diseases pose a major threat to rice production in the southern United States. The two most important fungal diseases, sheath blight (*Rhizoctonia solani* Kuhn) and blast (*Pyricularia oryzae* Sacc.), cause significant yield and quality reductions that cost farmers millions of dollars each year. Disease caused by the fungus *Cercospora* (Narrow Brown Leaf Spot) (*Cercospora janseana* (Racib.) Constant) has also become a major problem in recent years especially in the ratoon crop. Kernel smut (*Tilletia barclayana* (Bref.) Sacc. & Syd.) severity is increasing. Disease resistance is the best control option, but it is not always available. Cultural control can reduce disease development, but usually involves reducing inputs, especially nitrogen and seeding rates which can limit yield. As a result, rice farmers often rely on fungicides to control diseases. Fungicide use is common with most varieties treated with at least a single application if needed or not. Wide use of fungicides and utilization of low rates has led to the development of fungicide resistance in the sheath blight, kernel smut, and narrow brown pathogen populations.

### Materials and Methods

Experiments were conducted at the LSU Agricultural Center's H. Rouse Caffey Rice Research Station in Rayne, LA or at off-station trials with natural disease pressure. Plots were drill-seeded at the rate of 136 kg ha<sup>-1</sup> and were 1.2 by 4.9 m. Agronomic, weed, and insect management practices followed current standard recommendations. Plots on station were inoculated at the late tillering growth stage with a virulent isolate of *R. solani* (LR172). Inoculum was from natural sources for off-station trials and other diseases. Fungicides were applied at the panicle differentiation (PD panicle 2 mm), boot (5- to 10-cm panicle in the boot), heading (50 to 70 percent of panicles emerging from the boot), or 5, 10, and 15 days after heading. Treatments were applied at a delivery rate of 140 L ha<sup>-1</sup> with a CO<sub>2</sub>-pressurized backpack sprayer. Nonsprayed were included in all trials. Plots were evaluated for multiple disease development approximately 1 week before maturity and assigned severity ratings using a semi linear scale. The center four rows of each plot were harvested with a small-plot combine. Treatments were replicated four to five times in a randomized complete block design and repeated at multiple sites over multiple (2-3) years.

### Results and Discussion

Fungicide timing is critical for disease control (Figure 1). Sheath blight should be treated between early boot (5- to 10-cm panicle) and heading growth stage, but not beyond 50-70 percent of heads emerging (any part of the head exposed). If blast is present, delaying fungicide application to the 50-70 percent heading growth stage is best because blast can be more damaging than other diseases, and heading applications can be effective against sheath blight. Narrow brown leaf spot is best treated at boot growth stage, but fungicides must be applied earlier the later rice is planted. Kernel smut must be treated at mid-boot growth stage (4-6 inch panicle in the boot) for best activity. Yield and grain quality increase with disease control but quickly decrease if fungicides are applied after 50-70 percent heading. Effective fungicide use must be based on the presence of the most damaging disease in a field and when it starts to develop. This is determined by knowing the varietal susceptibility, field disease history, weather

conditions, and most importantly by scouting for disease in the field multiple times during the growing season. Moreover, fungicides must be applied at or before 50-70 percent of heads have emerged since yield increases decrease rapidly after this growth stage. Lower than labeled rates, single mode of action, and blanket (most fields treated every year) fungicide applications have been used regularly with the result of fungicide resistance developing.

### Conclusions

Rice disease control is becoming more difficult using a single fungicide application due to fungal resistance to fungicides, multiple diseases requiring different timings for effective control, and higher multiple applications being warranted. Rice producers are encouraged to use the full labeled rates, rotate modes of actions, and use multiple fungicide applications, when justified, to effectively and economically manage rice diseases. Fungicide timing must be based on the most damaging disease present in a field. If sheath blight or grain smuts are significant in a field, a boot application is normally best. If blast is present, a heading application of a fungicide would be best, even if other diseases are present. If *Cercospora* is present, an application any time between boot and heading would be effective.

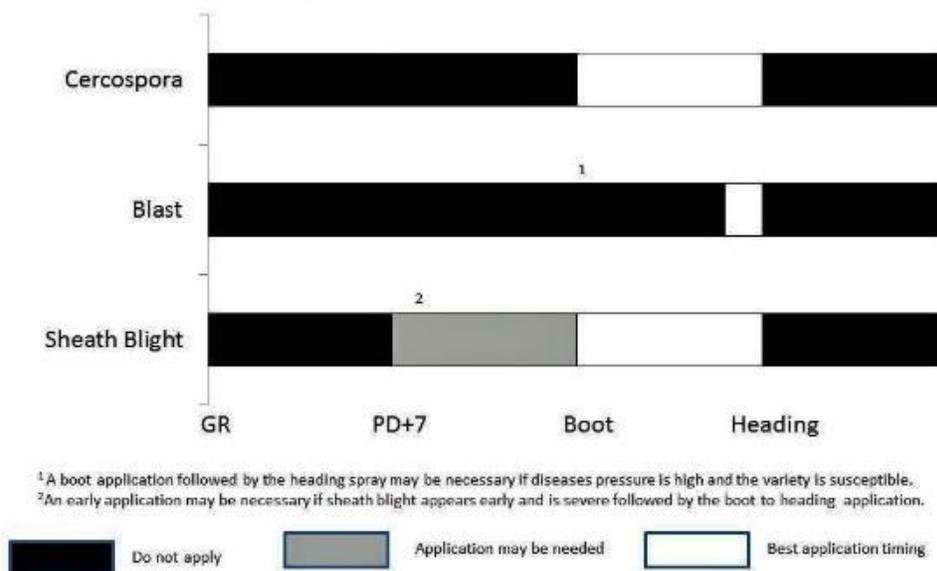


Figure 1. Rice fungicide timing.

### References

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