# Rice Sheath Blight

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Sheath blight, a major rice disease in Arkansas, is typically found in 50-66 percent of rice fields across the state. It can reach economically damaging levels, especially in highly susceptible semidwarf medium and long-grain inbred varieties planted in fields with a history of sheath blight. Because soybean is a host to the same pathogen, fields under rice-soybean or rice-rice rotation can sustain or increase the pathogen density. Before 1970, sheath blight was considered a minor issue in Arkansas. However, its prevalence surged in the 1970s and 1980s due to the adoption of shorter, more susceptible varieties, increased nitrogen fertilization, reduced tillage, and crop rotations with susceptible hosts. Today, sheath blight is the most widespread and economically important rice disease in the state.

## Causal Agent

Sheath blight in rice is caused by the soilborne fungus *Rhizoctonia solani* AG1-IA. The fungus can infect the aerial parts of rice at any growth stage, but it is most common after tillering. The AG stands for **A**nastomosis **G**roup, which is the ability of the fungus to anastomose (fuse its mycelia) with other genetically similar fungi (fungi in AG1 will fuse with other fungi in AG1). This is useful for identification. Other anastomosis groups, *R. solani* AG11 and AG4, can cause seedling blight (or damping-off) but will not cause sheath blight. Different isolates of *R. solani* AG1-IA can be found throughout rice production sites in Arkansas. These isolates

**Figure 1.** The hyphae of *Rhizoctonia solani* are septate and hyaline, with characteristic right-angle (90°) branching and a septation just above the branched hyphae. *Photo credit: Bruna Ronning.*

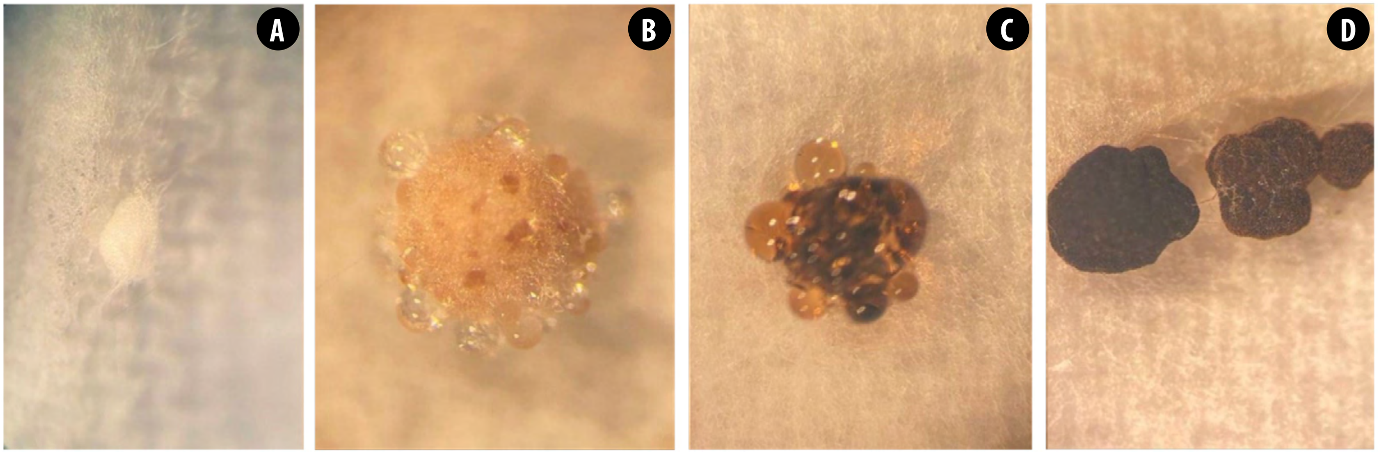


**Figure 2.** Stages of *Rhizoctonia solani* AG1-IA sclerotium formation in lab conditions. (A) White hyphae intertwining at the initial aggregation stage. (B) Early sclerotium differentiation, with a yellowish to light brown coloration. (C) Maturing sclerotium, brown in color, with visible droplets, possibly associated with fungal metabolic activity. (D) Fully mature sclerotium, black and dry in appearance. *Photo credit: Bruna Ronning.*

may exhibit variation in growth rate, virulence, and resistance to fungicides. This diversity presents a challenge to disease management strategies and underscores the need for localized research and tailored control measures.

Under the microscope, we can observe that the hyphae of *R. solani* AG1-IA form long, multinucleated cells with septa and branching at 90° angles to the main hyphae with constriction at the branching point (Fig. 1). The fungus produces sexual spores, which are rarely observed in Arkansas fields and thus not considered important for disease development.

In advanced stages of disease development, the fungus develops survival structures called sclerotia (Fig. 2). The sclerotia start out white, turning brown or black as they mature. They can be 6 mm or more in diameter and float when rice fields are flooded. The sclerotia are dense, hardened clusters of fungal mycelia that enable fungi to survive in the soil for extended periods (2+ years). These structures act as the primary inoculum for sheath blight infection in rice. When weather conditions are favorable, the sclerotia germinate, producing hyphae that infect the leaf sheaths of rice.

## Symptoms

Sheath blight primarily affects the leaf sheaths and sometimes the leaves and stems of rice plants. Symptoms typically appear during the tillering to booting stages of growth and progress rapidly under warm, humid conditions.

- **Initial Symptoms:** The disease often begins as small, water-soaked, oval pr irregularly shaped lesions on the lower leaf sheaths near the waterline. These lesions are typically pale green or grayish (Fig. 3A-B).
- **Lesion Development:** As the infection advances, the lesions enlarge and merge, forming large, irregular patches that can girdle the sheath. The center of older lesions may become tan or light brown, surrounded by a distinct dark green or brown margin (Fig. 3C).
- **Mycelial Growth:** Cottony white fungal mycelium can often be seen growing on the surface of affected sheaths, especially during humid weather.
- **Disease Spread:** The infection moves upward on the plant, affecting multiple leaf sheaths and sometimes spreading to the leaves and stems. In severe cases, the disease can cause lodging due to weakened stems (Fig. 3C).

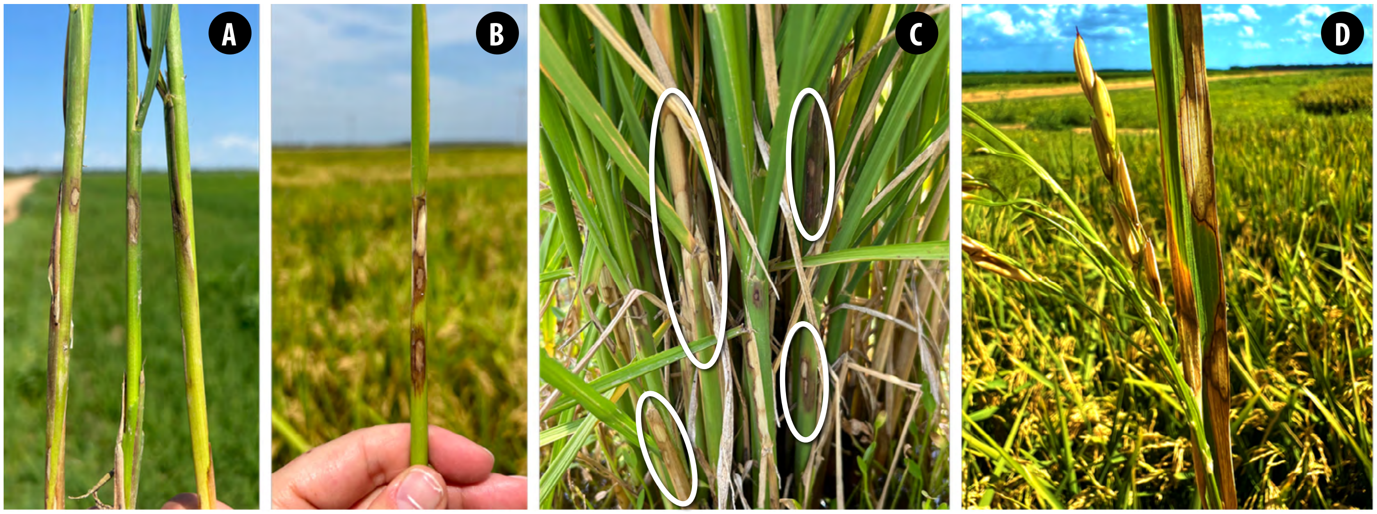


**Figure 3.** Symptoms of sheath blight caused by *Rhizoctonia solani* AG1-IA in rice. (A–B) Early symptoms appear as water-soaked, oval to irregularly shaped lesions on the lower leaf sheaths. (C) As the disease progresses, the infection moves upward, affecting multiple leaf sheaths and occasionally spreading to the leaves and stems. (D) In severe cases, infected plants show signs of leaf senescence and poor grain filling, contributing to yield loss. *Photo credit: Camila Nicolli & Bruna Ronning.*

- **Impact on Plant Health:** Severely diseased plants may exhibit premature leaf senescence, reduced tillering, and poor grain filling, leading to significant yield losses (Fig. 3D).

## Disease Cycle

The fungus can survive between the seasons in the crop residue or as sclerotia. Sheath blight is a classic soilborne disease, meaning the initial inoculum is already in the field before the crop is established. The introduction of inoculum from other fields is considered minimal and not relevant for disease incidence. However, some field-to-field movement on equipment or through drainage is possible. This may introduce strains that are more aggressive or less sensitive to fungicides, which, over time, may become the predominant biotype in the field. Therefore, it is important to avoid the movement of implements with soil residue or drainage from fields with a history of severe or difficult-to-manage sheath blight.

The disease develops in two phases: vertical and horizontal. The vertical phase begins with the initial inoculum (either sclerotia or crop residue) infecting the base of the tillers at water level, moving to the upper canopies. The second phase, horizontal spread, refers to the spread of the disease from plant to plant through the physical contact of mycelia with healthy tissue.

As the disease progresses under highly favorable conditions, it can compromise the integrity of the stem and cause premature lodging, which can complicate harvest or limit grain fill. At the end of the season, or once the rice tissue is completely depleted, the fungus produces the sclerotia.

Favorable conditions for disease development include temperatures between 73º and 95º F (optimum 86º and 90º F) and relative humidity above 95 percent. The disease is also favorable by high nitrogen fertilization and plant density (e.g.: Titan 79 lbs./acre). Rotation with a susceptible host, such as soybean, or successive seasons of rice can increase the inoculum in the soil and increase the risk of disease development the following season. Although no variety is completely resistant to sheath blight, the susceptibility can range widely, with inbred semidwarf varieties being especially susceptible. The plant's susceptibility increases after heading.

## Managing Sheath Blight

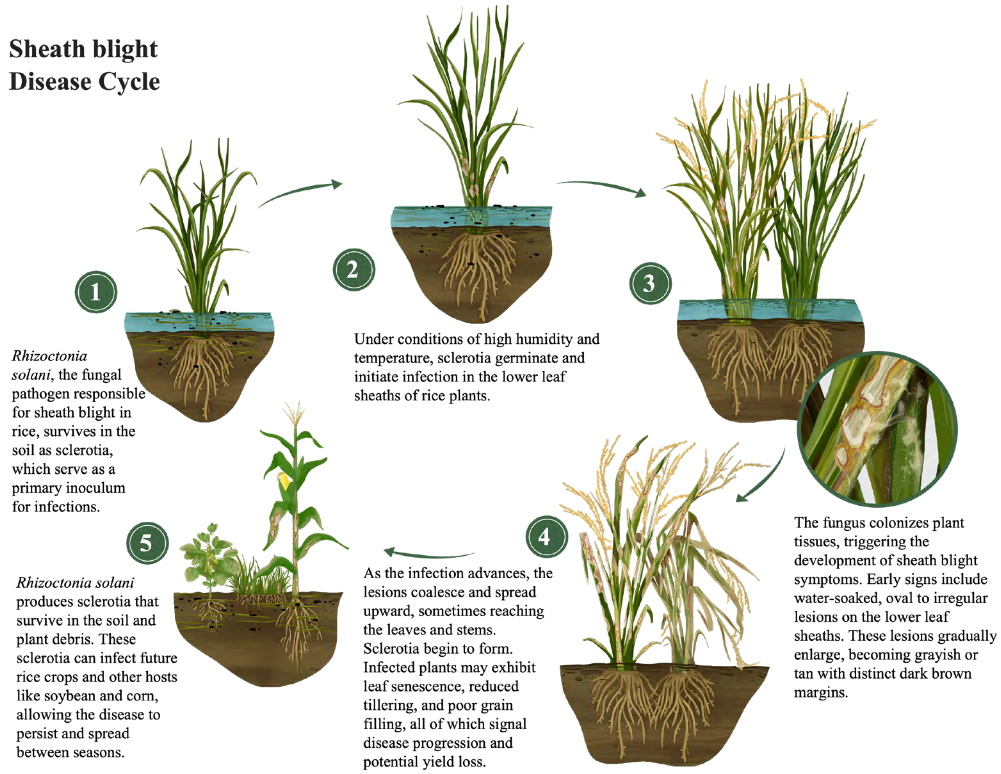


**Figure 4.** The illustration highlights the key stages of Rhizoctonia solani infection, colonization, and survival in rice. *Copyright: LSU AgCenter.*

An effective integrated pest management (IPM) strategy is essential to minimizing potential yield losses from sheath blight in rice. Cultural practices, such as high planting density and excessive nitrogen fertilization, can significantly increase disease risk during the season. While nitrogen is critical for maximizing yield in modern rice cultivars, applying rates above recommended levels — especially during tiller elongation — can lead to more severe sheath blight outbreaks.

Sheath blight often appears in patches, making it challenging to assess disease incidence and determine the need for treatment. In one part of a field, symptoms may be severe, while nearby areas remain unaffected. This uneven distribution complicates management decisions and underscores the importance of regular field scouting.

Tillage and residue management, including burning, also play a role in reducing disease pressure. *Rhizoctonia solani*, the pathogen responsible for sheath blight, often survives between seasons as sclerotia and mycelia in infected crop debris, particularly in rice stubble. Practices such as deep tillage and residue burning can help reduce overwintering inoculum and delay disease onset. However, these methods should be used judiciously, as they are not sufficient on their own and must be weighed against soil conservation and long-term sustainability goals. In terms of yield impact, sheath blight becomes economically damaging when lesions reach and destroy the upper two leaves of the canopy before grain filling is complete. If the disease remains confined to the lower canopy or develops only by mid-season, the effect on yield may be minimal.

Fungicide applications are most effective when timed according to rice growth stages and disease pressure. The critical window for application is between internode elongation and early heading (R2–R4 stages). Fungicides should be applied at the first signs of disease in the lower canopy, especially under favorable conditions like high humidity and dense stands. Targeting the late boot to early heading stages ensures protection of the flag leaf sheath and upper canopy, which are essential for grain fill and yield preservation.

Once the disease has advanced into the upper canopy or passed the heading stage, fungicide efficacy is greatly reduced and applications are generally too late to prevent yield loss. Therefore, timely scouting and proactive management decisions are critical for successful sheath blight control.

## Are There Any Varieties or Hybrids Resistant to Sheath Blight Disease?

The short answer is no — there are currently no rice varieties or hybrids with complete resistance to sheath blight. However, rice varieties or hybrids grown in the state vary in susceptibility to sheath blight (Table 1). Hybrids (RT) generally exhibit moderate to high susceptibility to sheath blight and require careful management in fields with a history of the disease. DynaGrow (DG) varieties show variable levels of susceptibility but are often similarly vulnerable as hybrids. In contrast, pure line varieties present the widest range of susceptibility, with some cultivars classified as moderately susceptible, making them more suitable for managing sheath blight in high-risk areas.

## What Fungicide Should be Applied to Control Sheath Blight?

The fungicides labelled for sheath blight are listed in Table 2.

**Table 1.** Arkansas Rice Cultivar Sheath Blight Disease Ratings

| Cultivar | Reaction | Cultivar | Reaction | Cultivar | Reaction |
|---|---|---|---|---|---|
| **ARoma 22** | MS | **Diamond** | S | **RT 7331 MA** | S |
| **CLHA03*** | S | **Ozark** | S | **RT 7401** | MS |
| **CLL16** | S | **ProGold 1** | S | **RT 7421 FP** | MS |
| **CLL18** | MS | **ProGold L4*** | -- | **RT 7521 FP** | S |
| **CLL19** | VS | **ProGold M3** | S | **RT XP753** | MS |
| **CLM04** | MS | **PVL03** | VS | **RTv7231 MA** | S |
| **CLM05** | S | **PVL04** | VS | **RTv7303*** | -- |
| **DG263L** | S | **RT 3202** | S | **Taurus** | MS |
| **DG353M** | S | **RT 7302** | MS | **Titan** | S |
| **DG563PVL*** | -- | **RT 7321 FP** | MS | | |

* Ratings based on limited data.
Reaction: R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible; VS = Very Susceptible. Cells with no values indicate no definitive Arkansas disease rating information is available currently. Reactions were determined based on historical and recent observations from test plots and grower fields across Arkansas and other southern rice states. In general, these ratings represent expected cultivar reactions to disease under conditions that most favor severe disease development.

## How to Decide If and When to Apply a Fungicide

The main factor in determining fungicide application is the incidence and severity of the disease. Therefore, it is recommended to use the zigzag evaluation system (Fig. 5) in the central area of the field, since the edges must be evaluated separately. The positive stop method is recommended because it is simple and effective in obtaining reliable data for decision-making.

A "positive stop" is defined as any infected tiller found within a 3-foot-long section of

**Table 2.** Recommended fungicides for controlling Rice Sheath Blight in Arkansas.

| Fungicide[1] | Active Ingredient | FRAC Code | Rate/Acre |
|---|---|---|---|
| Quadris® 2.08 SC | Azoxystrobin | 11 | 8.5 - 12.5 fl oz |
| GEM® 500 4.05 SC | Trifloxystrobin | 11 | 3.8 – 4.7 fl oz |
| Elegia® 3.8 SC | Flutolanil | 7 | 32 fl oz |
| Quilt Xcel® 2.2 EC[2] | Azoxystrobin + Propiconazole | 11 + 3 | 14 – 27 fl oz |
| Amistar Top® 2.82 SC[2] | Azoxystrobin + Difenoconazole | 11 + 3 | 10 – 15 fl oz |

[1]Recommendations are based on the 2024 Arkansas Plant Disease Control Products Guide MP154.
[2]**Important Note:** Propiconazole and difenoconazole alone are not effective for controlling sheath blight. Fungicides like Quilt Xcel and Amistar Top, which contain a combination that includes azoxystrobin, are recommended for effective management of sheath blight.

**Figure 5.** Scouting zigzag pattern for sheath blight in a rice field. *Photo credit: Rice Farming, Dr. Ronnie Levy, LSU AgCenter.*

rice. To carry out the assessment, a "tee-stick" (Figure 6), a 3-foot horizontal PVC pipe and a 4-foot cable, is used. This allows the scout to open the canopy and inspect for sheath blight. If symptoms of sheath blight are identified, this stop is considered positive. The process should be repeated at least 40 times in a 40-acre rice field. To calculate the result, the number of positive stops is divided by the total number of stops, thus obtaining the percentage of positive stops in the field. This type of assessment requires time, labor, and adequate training to determine the need for a fungicide application.

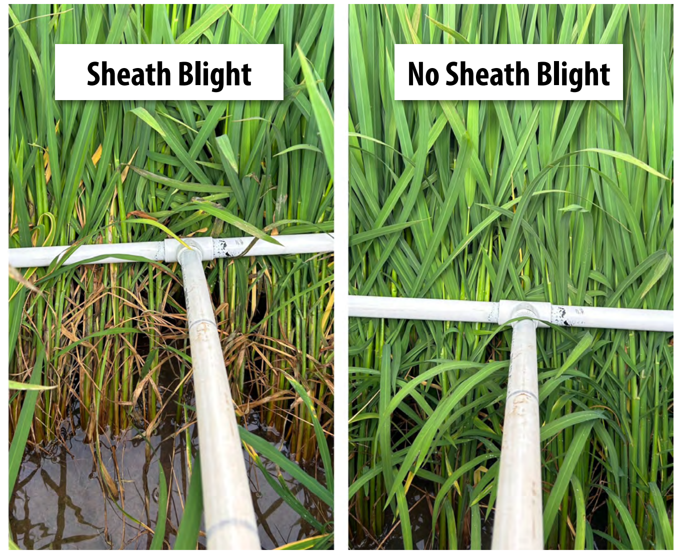


**Figure 6.** A "tee-stick" used for scouting sheath blight, consisting of a 3-foot horizontal PVC pipe attached to a 4-foot cable.

For varieties rated as susceptible (S) or very susceptible (VS), the recommended threshold is 35 percent positive stops. For moderately susceptible (MS) cultivars, the threshold is 50 percent positive stops. The best way to avoid serious crop damage is to carry out regular monitoring to track disease development. Rigorous scouting for sheath blight should occur between panicle differentiation and early heading.

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