



# Isolation and Cultural, Morphological Characterization of *Sclerotium rolfsii* Causing Seedling Blight in Rice

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

In Telangana state, India, around June 2021, the seedling blight of rice was seen in nursery beds 10 days after sowing (DAS). *Sclerotium rolfsii* was the disease's causative agent. Infected plant samples were gathered in farmer's paddy nurseries in the Telangana state of India during *kharif* 2021 as part of the Rice Production Oriented Survey (POS) in farmer fields in Katkur (Village), Akkannapeta (Mandal), Siddipet (District). The farmer uses a seed called PAN 152 from a private company. The affected rice seedlings showed the typical signs of soft rot, yellowing and white cottony mould growth. Spherical-shaped dark brown sclerotial bodies were also seen in the basal stem region of the infected seedlings. Cultural and morphological identification was done for identifying the microbe.

Keywords: Sclerotial bodies; *Sclerotium rolfsii*; seedling blight; rice.

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## 1. INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most significant and commonly grown crops, accounting for around 27.08% of all cultivated land and producing 23.9 % of all agricultural output in India (www.usda.gov.in). In Telangana, during the *kharif* and *rabi* seasons of 2021–2022, rice is mostly grown along canals, tanks, and bore wells across an area of about 129.78 lakh acres. The rice crop is afflicted by a variety of diseases brought on by fungi, bacteria, viruses, nematodes, and other parasites, and fungal diseases are one of the main causes of the significant yield losses (40%) in the rice crop [1]. *Sclerotium rolfsii* Sacc. is a emerging and harmful soil-borne plant pathogen that affects a wide range of hosts and is frequently seen in tropical and warm climates. It causes root rot, stem rot, wilt and foot rot in a variety of crops [2]. Thus, the objective of this study was to identify the cultural, morphological characteristics and pathogenicity studies on susceptible rice cultivar (TN1). *S. rolfsii* is unique in that it produces persistent sclerotia and abundant mycelial growth, which aid in the survival of the organism and the progression of plant disease [3].

## 2. MATERIALS AND METHODS

The samples of infected plants were taken during the *kharif* of 2021 from a farmer's paddy nursery in the Indian state of Telangana's Katkur (Village), Akkannapeta (Mandal), and Siddipet (District). With the use of a sterile scalpel, the infected seedling tissue and some healthy tissue were cut into pieces and surface sterilised with 1% sodium hypochlorite solution for one minute. They were then rinsed three times in sterile

distilled water and dried with sterilised filter paper. The sample was surface sterilised and then put on Potato Dextrose Agar (PDA) medium before being put in a BOD incubator at  $28\pm 2^{\circ}\text{C}$  [4]. After five days, the inoculated pieces' fungal growth was checked and single colonies were aseptically transplanted into PDA slants. According to Lilly and Barnett [5], the pathogen was purified using the hyphal tip method. The fungus linked to seedling blight have been provisionally identified as *Sclerotium* spp. based on their mycelium growth pattern, colour, shape and size of sclerotia.

## 3. RESULTS AND DISCUSSION

### 3.1 Pathogenicity

Rice cultivar (cv.TN1) and sorghum grains were sterilised in 500 ml conical flasks in an autoclave at  $121^{\circ}\text{C}$  and 15lb pressure after being soaked in water overnight, air dried for two hours, and then tested for pathogenicity. A sterilised sorghum grain was inoculated with mycelial discs (5 mm) containing the seedling blight pathogen, which were then incubated for 10–12 days at  $28^{\circ}\text{C}$  [6,7]. The fungal culture was introduced to sterilised soil at a rate of 2g per kg of soil in pots. Rice cultivar TN1 seeds were sown in inoculated pots seven days after inoculation, with sterilised soil devoid of fungal culture serving as the control. The pots were set up in a greenhouse at  $28^{\circ}\text{C}$  and 51% relative humidity. After 20–25 days from sowing, all of the seedlings in the inoculated pots exhibited signs that were the same as those seen in the field. The control seedlings did not contract any diseases. Based on morphological traits, the pathogen's identity was confirmed after it was re-isolated from the affected seedlings.



Fig.1(a). Infected nursery bed



Fig. 1 (b). Rotting symptoms



Fig. 1 (c). White mycelial growth on basal portion of the seedlings



Fig. 1 (d). Dark brown color sclerotial bodies



Fig. 2. Pure culture of *Sclerotium rolfsii*

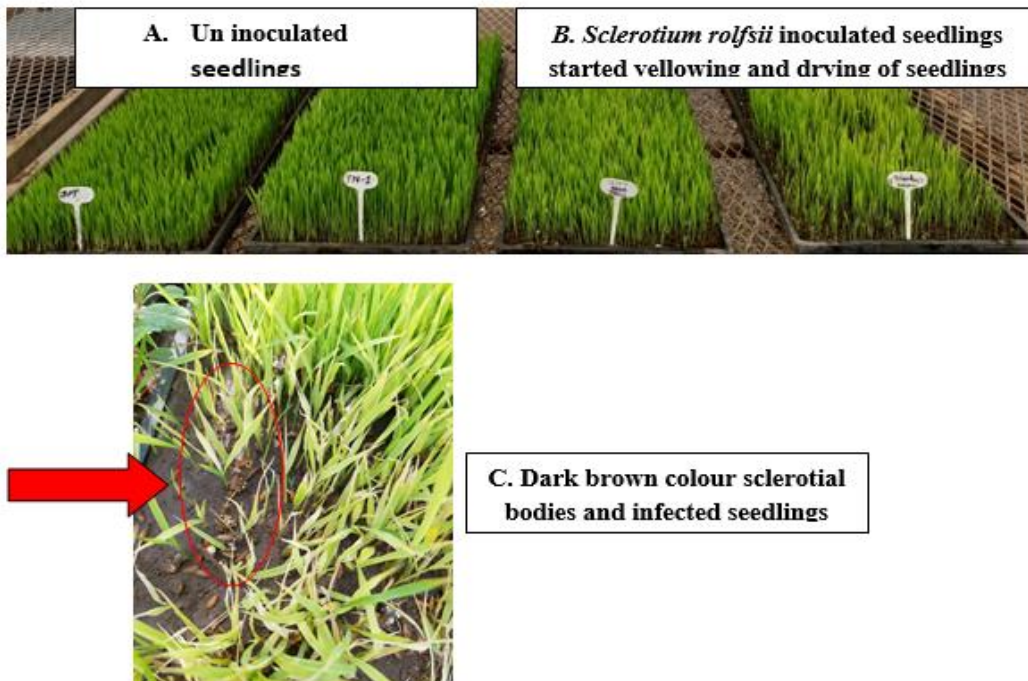


Fig. 3. Comparison between inoculated and un inoculated seedlings (Pathogenicity)



### 3.2 Cultural and Morphological Identification of *Sclerotium rolfsii* REFERENCES

The pathogen's mycelial development on PDA medium is wave-like and whitish in colour. After 11 days, thin mycelium and sclerotia form near the edge of the cultured plate, and little whitish sclerotial bodies transform into dark brown pigment. The pathogen's pure culture was sent to the Indian Type Culture Collection (ITCC), IARI, New Delhi, for diagnosis. *Sclerotium rolfsii*, with reference number pp/22-23/892 of ITCC, New Delhi, has been identified as *Sclerotium rolfsii* incite seedling blight in rice.

#### 4. CONCLUSION

In Telangana state, rice seedling blight caused by *Sclerotium rolfsii* Sacc. is a emerging and harmful soil-borne plant pathogen that affects a wide range of hosts and Spherical-shaped dark brown sclerotial bodies were also seen in the basal stem region of the infected seedlings. Cultural and morphological identification was done for identifying the microbe.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

1. Kindo D, Bhagat RK, Tiwari P. Efficacy of fungicides for the management of sheath rot disease in rice under *In vitro* and *In vivo* conditions. *Oryza*. 2015;52(3):227-230.
2. Farr DF, Bills GF, Chamuris GP, Ross Man AY. Fungi on plants and plant products in the United States. *Mycological Research*. 1989;94.
3. Kokub D, Azam F, Hassan A, Ansar M, Asad MJ, Khanum A. Comparative growth, morphological and molecular characterization of indigenous *Sclerotium rolfsii* strains isolated from different locations of Pakistan. *Pakistan Journal of Botany*. 2007;39:1849–1866.
4. Booth C. Introduction to general methods. In: *Methods in Microbiology*, Volume 4, page 3-5, Edited by C. Booth, Academic Press, London and New York; 1971.
5. Lilly VG, Barnett HL. *Physiology of the fungi*. 1951;251.
6. Adhikari SM, Shrestha HK. Manandhar and S. Marahatta1. Morphology and cross infectivity of *sclerotium rolfsii* sacc. isolated from different host plants in Nepal. *The Journal of Agriculture and Environment*. 2022;23(7):177-187.
7. Department of Agriculture; 2020. Available:<http://www.agri.telangana.gov.in>.

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