

# First Report of *Stemonitis splendens* Rostaf Causing Bark Decay of Oak Logs Used for Shiitake Cultivation in Korea

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**Abstract** Severe bark decay disease was observed on oak logs at a shiitake cultivation farm in Geochang-gun, Gyeongnam province. The symptoms observed were fruiting bodies that had developed on the top and side surface of oak logs. As a result, the bark came off easily exposing the sapwood. Slime mold specimens collected from oak logs showed developing fruiting bodies comprising of stalks, hypothallus, capillitium, and columella, and the causal agent of bark decay disease was identified as *Stemonitis splendens* on the basis of morphological characteristics. To our knowledge, this is the first report of *Stemonitis splendens* causing bark decay of oak logs used for shiitake mushroom cultivation in Korea.

**Keywords** Bark decay, *Lentinula edodes*, Oak log, *Stemonitis splendens* Rostaf

The shiitake (*Lentinula edodes*) is an edible mushroom native to and cultivated in East Asian countries including Korea, China, Japan, Vietnam, and Thailand. The shiitake mushroom is well accepted as food due to its taste and aroma, fuelling demand and subsequent supply, both of which are on the rise [1]. Currently, the shiitake is cultivated on oak logs or sawdust in Korea. Shiitake cultivation on sawdust has the benefit that nutrients can be added to the basal substrate. Wheat straw, rice straw, wheat bran, and grain are also used as basal substrate for shiitake cultivation in areas such as Pakistan, Canada, Hawaii, and Turkey [2, 3]. Sawdust and rice bran mixture for shiitake cultivation has been tried in Korea; however, sawdust produces a lower yield than oak logs and contributes to approximately 5% of the domestic market. Therefore, oak logs are most

commonly used as substrate for domestic shiitake cultivation [4].

*Stemonitis splendens* Rostaf is a species of slime mold is generally found on old broad-leaves or leaves that have fallen. *S. splendens* produces profuse fruiting bodies under favorable conditions. Several harmful mushroom and fungi species are known to contaminate and colonize the logs used for shiitake cultivation, including *Bulgaria inquinans*, *Diatrype stigma*, *Hypoxylon* sp., *Inonotus xeranticus*, *Nitschkia confertula*, *Odontia* sp., *Penicillium* sp., *Schizophyllum commune*, and *Trichoderma* sp. [5]. However, there has been no record of bark decay of oak logs caused by *S. splendens* in Korea. In this study, we aim to confirm the bark decay of oak logs caused by *S. splendens* Rostaf during shiitake cultivation.

## ***Stemonitis splendens* Rostaf (GC08-5) sample collection, disease symptoms, and macroscopic characteristics.**

In 2013, specimens were collected from a shiitake cultivation farm, located beside high mountains in Geochang-gun, Gyeongnam province, Korea. Slime mold fruiting bodies developed on the top and side surfaces of the oak logs, a year after being cut. The oak logs were severely damaged by approximately 20%. The bark of infected oak logs came off easily, exposing the sapwood beneath (Fig. 1A, 1B, and 1C). Fruiting bodies formed close, profuse, large colonies and mature sporangia appeared brown, cylindrical, 10 to 15 mm tall with dark reddish-brown spore-masses (Fig. 1D). After removing the spores, the sporangium appeared bright brown (Fig. 1E).

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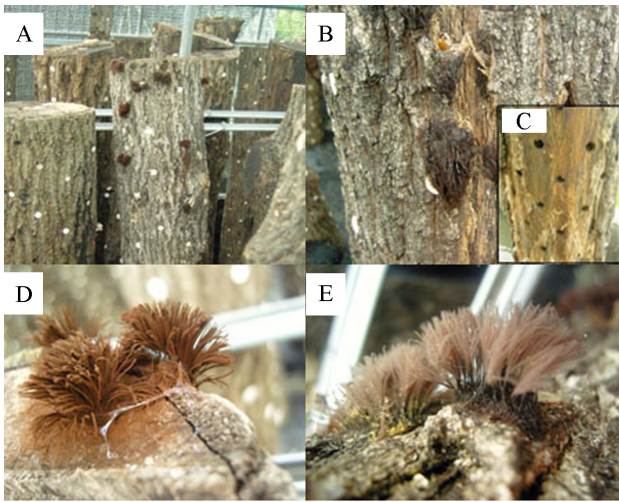
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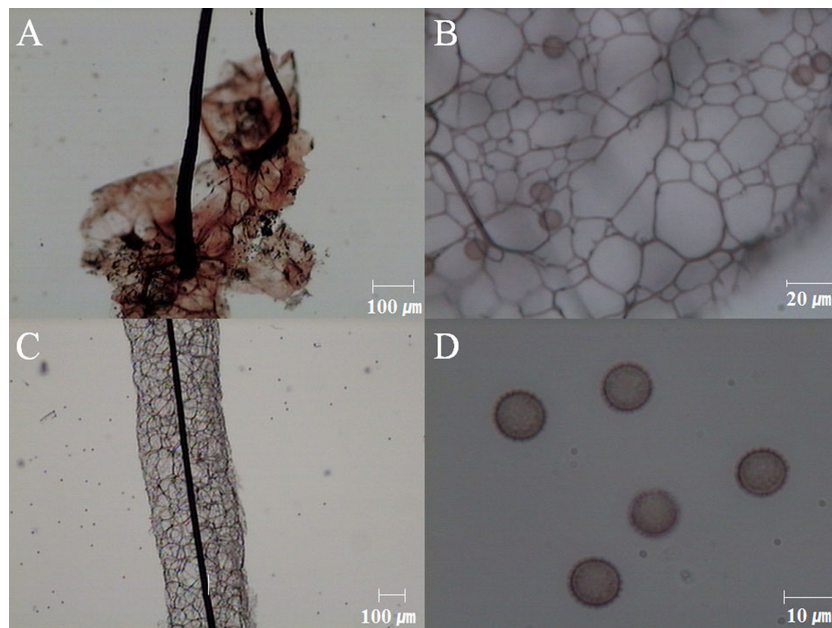
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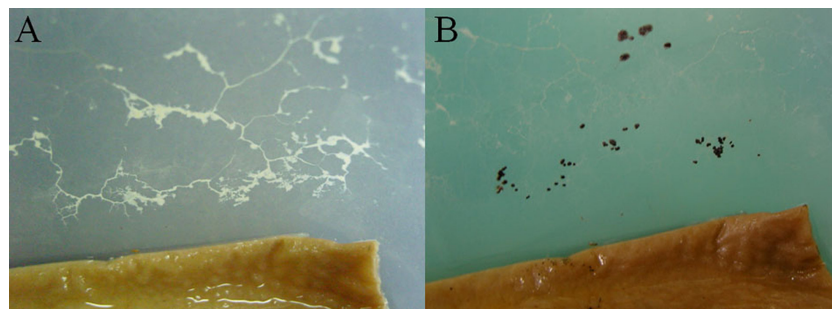
**Fig. 1.** Occurrence of *Stemonitis splendens* on oak logs used for shiitake cultivation. A and B, Fruiting bodies on the oak logs; C, Debarked surface of log; D and E, Mature fruiting body and spore mass.

**Microscopic characteristics and *in vitro* culture.**

Morphological characteristics of the slime mold were examined *via* light microscopy. The sporophore morphology, surface structures of sporangia, columella, capillitium, peridium, spores, stalk, and hypothallus of the slime mold samples were assessed through stereomicroscopy and light microscopy. The stalk appeared black, shiny, and slender, measuring 1.0~4.0 × 0.1 mm to 0.2 mm. The hypothallus was purple, silvery, and flared widely expanded (Fig. 2A). The capillitium appeared as purple-brown threads with a metallic tinge. Primary branches extended from junctions within the net and at distant intervals from the columella, simple at first, then suddenly branching vigorously to form a smooth surface net with rounded or angular mesh forms measuring 20~70 μm in width (Fig. 2B). The columella was black, reaching almost to the top of the sporotheca, tapered, rigid, and flexuous towards the tip (Fig. 2C). Spores were lilac-brown, 7~9 μm in diameter, almost smooth with fine, pale warts (Fig. 2D). For *in vitro* culture, moist chambers consisting of a sealed sterilized plastic box with



**Fig. 2.** Morphological characteristics of *Stemonitis splendens*. A, Stalk and cellophane-like base (hypothallus); B, Capillitium; C, Columella; D, Spore.



**Fig. 3.** *In vitro* cultivation of *Stemonitis splendens*. A, Plasmodium; B, Formation of fruiting bodies.

three sheets of Kim's towel at the bottom. Spore masses and fruiting bodies were transferred to the plastic box and incubated at room temperature (25~28°C). Plasmodium was initially white (Fig. 3A) and later turned pale reddish yellow (Fig. 3B). The spores germinated and produced swam cells (Fig. 3A), which further formed primordia and sporocarps (Fig. 3B). Based on morphological characteristics, the pathogenic slime mold causing decay of the oak bark was identified as *Stemonitis splendens* Rostaf, as reported by Nieves-Rivera and Stephenson [6].

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