

## Stem Rot of Tawny Daylily (*Hemerocallis fulva*) Caused by *Sclerotium rolfsii* in Korea

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In July 2002, a destructive stem rot of tawny daylily (*Hemerocallis fulva*) was occurred sporadically in exhibition farm of Gyeongsangnam-do Agricultural Research and Extension Services located in Hamyang-gun, Korea. The fungus also caused collar and crown rot, and systemic wilt or blight of whole plant. White mycelium spread over stems and petioles of infected plants and sclerotia were formed on the old lesions and near the soil surface. The optimum temperature for mycelial growth and sclerotial formations was 30°C on PDA. The mycelial width ranged 4.2~10.4 µm and the color was white, usually many narrow mycelial strand grew in the aerial mycelium and formed clamp connection. The shape of sclerotia was spherical and 1.0~3.2 mm in diameter. The fungus was isolated repeatedly from the infected tissues and confirmed its pathogenicity to *Hemerocallis fulva* and identified as *Sclerotium rolfsii*. This is the first report on the stem rot of *H. fulva* caused by *S. rolfsii* in Korea.

**KEYWORDS:** *Hemerocallis fulva*, *Sclerotium rolfsii*, Stem rot, Tawny daylily

Recently, tawny daylily (*Hemerocallis fulva*) is sporadically cultivated in the flower beds along the roadsides in southern part of Korea. During the growing season in summer of 2002, a severe stem rot on the tawny daylily caused by a *Sclerotium rolfsii* was observed in the flower beds along the roadsides in Hamyang-gun, Gyeongnam Province.

Sclerotial diseases caused by the genus *Sclerotium* occur primarily in warm and humid climate. The pathogens of sclerotial diseases induces damping-off of seedlings, stem canker, crown blight and rot of root, crown, bulb, tuber and fruit. Sclerotial diseases frequently cause severe losses of fleshy fruits and vegetables during transport and storage (Agrios, 1997). This kind of disease is often called sclerotia rot in general. Several papers have been described that sclerotia rot disease on *Hemerocallis fulva* was caused by *S. rolfsii* (Farr *et al.*, 1995; Kobayashi *et al.*, 1992; Mordue, 1972). Mordue (1972) suggested that *S. rolfsii* was synonym of sclerotial state of *Corticium rolfsii*. However, no scientific report on the sclerotial stem rot of *H. fulva* has been reported in Korea (The Korean Society of Plant Pathology, 1998).

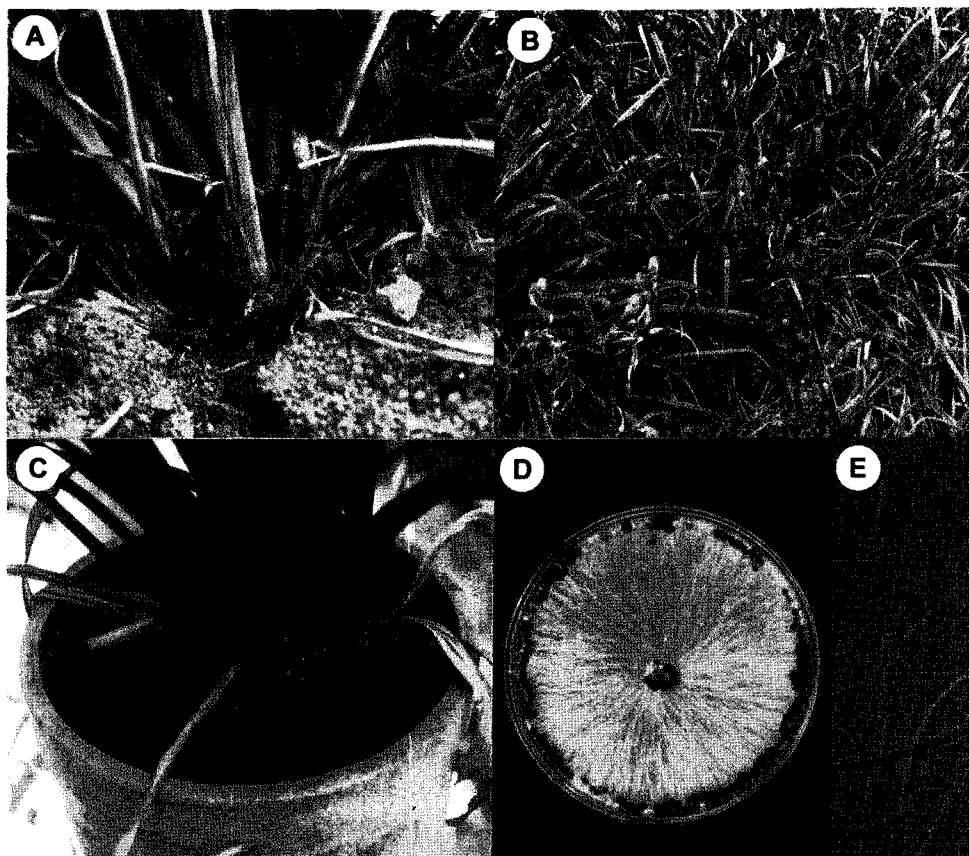
**Disease occurrence.** A destructive stem rot was occurred on *H. fulva* and the disease was sporadically found in exhibition farm of Gyeongsangnam-do Agricultural Research and Extension Services in Hanyang-gun, Korea. In July 2002, when the plants become densely covered, sclerotia stem rot was started to occur. The high

temperature and frequent rain predisposed to infection of the sclerotium stem rot disease. The maximum infection rate reached to 16.3 percent. Fungal hyphae grew upward on surface of stems, covered the lesion with a cottony, white mass of mycelium in infected plant (Fig. 1A). The white mycelia in the infected stems and on the soil surface around infected plants are considered the major source of further infection. The fungus grew into the cortex of stem and slowly or quickly girdles the plants, and then eventually killed the plant (Fig. 1B).

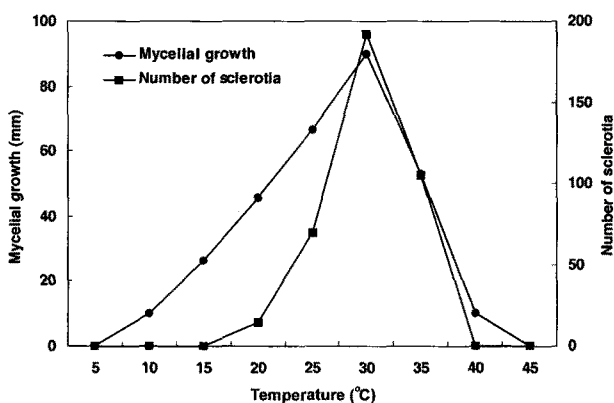
**Mycological characteristics.** Small and spherical sclerotia were produced on the surface of lesions. They were white at first but became dark brown after matured and their size were generally uniform. The causal fungus was readily isolated on water agar (WA) and rapidly grew on potato dextrose agar (PDA). The temperature for mycelial growth of the fungus on PDA ranged 10~40°C, and the optimum temperature was 30°C (Fig. 2). The white mycelium usually formed many narrow mycelial strands in the aerial mycelium and they were measured 4.2~10.4 µm in width. This mycelium showed characteristic clamp connection structure (Fig. 1E). The sclerotia were produced on PDA plate the colonies grown at 30°C. The sclerotia were not formed when the temperature was below 15°C or over 40°C (Fig. 2). The size of sclerotia was 1.0~3.2 mm in diameter and the shape was globose (Table 1, Fig. 1D).

**Pathogenicity test.** For the pathogenicity test, *Hemerocallis fulva* was planted in a Wagner pot (1/5000<sup>th</sup>) filled

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**Fig. 1.** The symptom of stem rot of *Hemerocallis fulva* and morphological characteristics of the pathogenic fungus *Sclerotium rolfsii*. A: Typical symptoms on stem, B: Plants infected by *S. rolfsii* in the field, C: Typical brown sclerotia were formed on the stem and soil surface, D: The white mycelia and sclerotia of *S. rolfsii* grown on PDA, E: Typical clamp connection of the hypha.



**Fig. 2.** Effect of temperature on mycelial growth and sclerotia formation of *Sclerotium rolfsii* the causal organism of stem rot of *Hemerocallis fulva*. Diameter of mycelial growth were measured after 58 hours incubation of the fungus on PDA. The data are mean of three replications. The number of sclerotia were counted after 15 days of incubation and the experiments were replicated 3 times.

with autoclaved soil and cultivated in the greenhouse for one year. Inoculum was prepared from mycelial mats

**Table 1.** Comparison of mycological characteristics of the fungus isolated from stem rot of *Hemerocallis fulva* and *Sclerotium rolfsii* described by Mordue

| Characteristics |                  | Present isolate | <i>S. rolfsii</i> <sup>a</sup> |
|-----------------|------------------|-----------------|--------------------------------|
| Colony          | color            | white           | white                          |
| Hyphae          | diameter         | 4.2~10.4 μm     | 4.5~9.0 μm                     |
|                 | clamp connection | present         | present                        |
| Sclerotium      | shape            | sphere          | sphere                         |
|                 | size             | 1.0~3.2 mm      | 1~2 mm                         |
|                 | color            | brown           | brown                          |

<sup>a</sup>Described by Mordue (1972).

grown for 7 days on PDA. The inoculated plants were placed in 30°C and high humid greenhouse. The fungal isolates obtained from naturally infected tawny daylily showed strong pathogenicity. The inoculation tests were replicated three times and the first symptom was appeared at 12 days after infection and infected plants were eventually wilt, blight and died (Fig. 1C).

The pattern of mycelial growth on infected plant, areal mycelium, and clamp connection structure are considered as the decisive characteristics for differentiating *S. rolfsii*

from other species in the genus *Sclerotium*. The characteristics of the present isolates was almost identical to *S. rolfsii* described by the previous workers (Farr *et al.*, 1989; Kobayashi *et al.*, 1992; Mordue, 1972), Consequently, the pathogenic fungus of stem rot disease of *Hemerocallis fulva* was identified as *Sclerotium rolfsii*.

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