

Gray Mold of Day Lily (*Hemerocallis fulva* L.) Caused by *Botrytis elliptica* in Korea

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(Received on August 24, 2001)

In March 2000, gray mold was found on day lily (*Hemerocallis fulva* L.) in Korea. Among the symptoms observed was blight or early rot with chlorotic halo of the leaves. All the isolates obtained from the lesions of the diseased plant parts were identified as *Botrytis elliptica*, based on the morphological characteristics of conidia. Conidia that formed on conidiogenous cells were not in chains, hyaline to pale brown, unicellular, ellipsoidal to obovate with a single hilum at the base, entirely verruculose, and $21\text{-}31 \times 12\text{-}23 \mu\text{m}$ in size. Pathogenicity of the fungus was established by artificial inoculation on day lily plants. This is the first record of gray mold on day lily caused by *B. elliptica* in Korea.

Keywords : *Botrytis elliptica*, *Hemerocallis fulva*, gray mold.

Day lily (*Hemerocallis fulva* L.), a flowering plant, belongs to the family Liliaceae. In Korea, young leaves of the seedlings are consumed as edible vegetable, while the roots are used as oriental medicine. During a disease survey in the spring of 2000, gray mold symptoms were first found on leaves of day lily. A fungus isolated repeatedly from the gray mold symptoms was identified as *Botrytis* sp. However, leaf blight caused by *Botrytis* sp. on day lily has not yet been reported in Korea.

Pathogenic fungi causing gray mold on *Lilium* spp. were found to be *B. cinerea*, *B. elliptica*, and *B. tulipae* in America, and *B. tulipae* in Japan (Farr et al., 1989; The Japan Society of Plant Pathology, 1995). In many lilies including *Lilium candidum*, *B. elliptica* causes brown spot on the leaves, and later attacks the flowering shoots (Ellis, 1971). On family Liliaceae, *B. cinerea* and *B. elliptica* have been reported to cause gray mold diseases on lily and dahlia in Korea (Anonymous, 1998). Some important diseases reported to have caused severe damage to day lily include bacterial leaf blight and rust caused by *Erwinia* sp. and *Puccinia hemerocallidis*, respectively (Anonymous, 1998).

Gray mold caused by *Botrytis* sp. may be a potential threat to day lily under environmental conditions favorable for the disease. In this study, the causal organism of gray mold of day lily was identified, and its pathogenicity to the day lily plants was examined.

In March 2000, a severe fungal disease causing gray mold was observed on the leaves of day lily in a greenhouse in Yonchon, Korea. Symptoms of gray mold on the day lily plants usually developed at the leaf margins (Fig. 1A, B). Water-soaked and irregularly shaped lesions initially appeared on infected leaves, which gradually enlarged and coalesced. The lesions turned brown and dried outward from the center, resulting in blight or early rot of the leaves. Each spot was occasionally surrounded by a chlorotic halo. Plants with numerous lesions rapidly withered and died. Gray to grayish brown, and velvety molds with numerous dry conidia often appeared on the lesions under moist conditions (Fig. 1B). A noticeable feature was gray-mold fruiting layer on the affected tissues, which is characteristic of *Botrytis* diseases (Agrios, 1997; Hausbeck and Moorman, 1996). The conidia are released readily in humid weather and carried by air currents (Javis, 1960; Javis, 1962).

Color of colonies on PDA medium was gray or grayish brown. Sclerotia were black in color. Production, size and shape of sclerotia on natural substrate and in culture were extremely variable. Conidia which formed on conidiogenous cells were not in chains, hyaline to pale brown, unicellular, ellipsoidal to obovate with a single hilum at the bases, entirely verruculose, and measured $21\text{-}31 \times 12\text{-}23 \mu\text{m}$ in size (Table 1 and Fig. 1C). *B. elliptica* is distinguished from other *Botrytis* spp. by the conidial size (Ellis, 1971). Conidia of *B. elliptica* are larger than those of other *Botrytis* species. The morphological characteristics of the day lily isolates were very similar to those of *B. elliptica* reported in previous studies (Ellis, 1971).

To test the pathogenicity of the fungus, single conidia were transferred from the leaf tissue sample to the PDA medium. Two weeks later, conidia were harvested by adding about 2 ml of sterile distilled water to the plate and then scraping the culture with a rubber spatula. The conidia per milliliter were counted with a hemacytometer and adjusted

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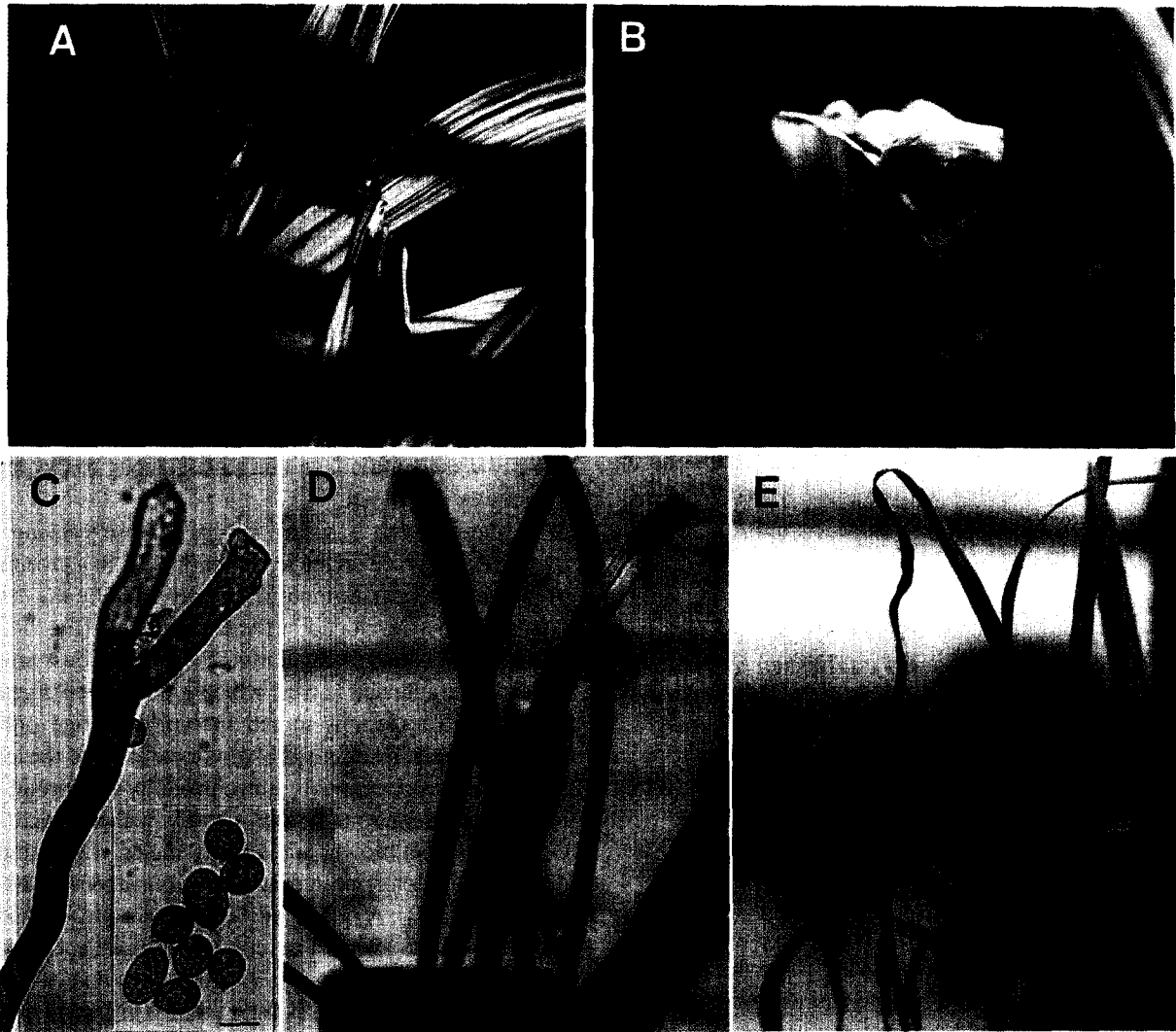


Fig. 1. Gray mold symptoms on leaves (A) and seedling (B) naturally infected by *Botrytis elliptica* in the field; (C) Conidiophores and conidia of *B. elliptica* produced on potato-dextrose agar (D, E) Symptoms induced by artificial inoculation with *B. elliptica*. The bar represents 20 μ m.

Table 1. Comparison of conidial size of the causal organism of gray mold of day lily and *Botrytis* spp. described previously

Isolate	Conidial size (μ m)
Present isolate	21-31 \times 12-23
<i>Botrytis cinerea</i> ^a	6-18 \times 4-11 (mostly 8-14 \times 6-9)
<i>B. elliptica</i> ^a	16-35 \times 10-24 (mostly 20-30 \times 13-18)
<i>B. squamosa</i> ^a	16-26 \times 10-18 (mostly 15-21 \times 13-16)
<i>B. tulipae</i> ^a	12-22 \times 8-15 (mostly 16-20 \times 10-13)

^aEllis (1971).

to 10^5 conidia/ml. The conidial suspension was sprayed on the healthy plant non-wounded or wounded. Inoculated plants were maintained in a moist chamber at 100% relative humidity and $25 \pm 1^\circ\text{C}$ for 24 h in the dark. These were then transferred to a growth chamber. A comparable plant was

Table 2. Pathogenicity of isolates of *Botrytis elliptica* to day lily

Isolate	Disease severity ^a	
	Non-wounded	Wounded
Be-20048	+	+
Be-20054	+	++
Be-20056	+	++

^aLengths of the lesions were measured 7 days after inoculation with 10^5 conidia/ml. +++ = more than 11 mm in length; ++ = 6-10 mm in length; + = 1-5 mm in length; - = no lesion.

treated with sterilized water and maintained under the same conditions. All of the three tested isolates of *B. elliptica* caused typical symptoms on wounded plants. Characteristic lesions were observed on the wounded leaves 5 days after inoculation with the conidial suspension (Fig. 1D). The

plant organ having lesions began to rot or blight when the lesions enlarged and coalesced 5-10 days after inoculation. Some of the leaves with lesions entirely died 2 weeks after inoculation (Fig. 1E). However, the pathogenicity of *B. elliptica* on non-wounded leaves was very weak. Gray mold symptoms, which were induced on the plants after inoculation with the isolates, were similar to those observed in the field. The fungus was re-isolated from lesions on the plants inoculated. There was no significant difference in pathogenicity among the isolates. This is the first report that *B. elliptica* causes gray mold on day lily in Korea.

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