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# Occurrence of Anthracnose on Cabbage Caused by *Colletotrichum dematium*

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**Anthracnose symptoms on young cabbages were found in cabbage nursery fields in Jangheung area of Korea in 1998. The symptoms developed on seedlings, leaves, and stems of young cabbages (*Brassica oleracea* var. *capitata* L.). The casual fungus was identified as *Colletotrichum dematium* (Fr.) Grove based on morphological and cultural characteristics. Similar symptoms were observed on the cabbage when artificially inoculated on the plant leaves. The fungus was reisolated from the symptoms of the inoculated plant.**

**KEYWORDS: Anthracnose, Cabbage, *Colletotrichum dematium***

Cabbage (*Brassica oleracea* var. *capitata* L.) has been worldwidely cultivated as a vegetable crop. During disease survey on August 1998, severe outbreak of anthracnose on cabbage was observed in cabbage nursery fields. *Colletotrichum dematium* was frequently isolated from the symptoms of the young cabbages. Anthracnose symptom caused by *C. dematium* has been reported on 118 different host genera, not including cabbage (Simmonds, 1965; Sutton, 1980). On cabbage, leaf spots caused by *C. higginsianum* and anthracnose symptoms caused by *C. gloeosporioides* have been reported (Grand, 1987). In this study, we report that *C. dematium* is the causal agent of seedling damping-off as well as anthracnose on cabbage.

Anthracnose occurred on cabbage seedlings in Jangheung area of Korea in the late August, 1998. The disease symptoms developed on leaves and stems of young cabbage. The initial symptoms on leaves and stems of cabbage showed irregular round spots, and turned to grayish-brown lesions. The lesions on the stems of the diseased seedlings rapidly enlarged, and finally caused damping-off (Fig. 1-1, 1-2). Salmon-pink conidial mass and acervuli were frequently observed on the well-developed lesions of diseased stems. Morphological and cultural characteristics of the fungus were examined on potato dextrose agar (PDA) 7 days after inoculation. Fungal growth of three isolates were compared with three media such as PDA, V-8 agar, and Czapec-Dox agar. Isolates grew well on PDA with the growth rate of 9.8 mm/day at 25°C (Table 2). Color of the fungal colonies was grayish-brown when PDA was incubated in the dark (Fig. 1-4). Optimum temperature for hyphal growth was 28°C. Conidia formed on acervuli were aseptate, hyaline, apices acute, falcate, and 22.5~30.0 × 2.5~3.0 mm in size (Table 1 and Fig. 2-5). Setae were dark-brown color with 1-3 setae (Fig. 1-3). Appressoria were abundant, medium brown in color, clavate to circular in shape, 8.0~12.0 × 5.5~8.0 mm in size (Table 1). Based on the keys described by Arx (1970 and 1981) and Sutton (1980), the fungal pathogen of cabbage anthracnose was identified as *C. dematium* (Fr.) Grove.

For pathogenicity test of *C. dematium*, two varieties of cabbages and three kinds of other hosts (cucumber, chinese cabbage, and red-pepper) were used. The 15-day-old seedlings of cabbages and other hosts were inoculated with a conidial suspension adjusted to $1 \times 10^5$ conidia/m*l* using a plastic sprayer. Seedlings as a control were applied with sterile distilled water. Then, all seedlings

**Table 1.** Mycological characteristics of *Colletotrichum dematium* isolated from anthracnose symptoms on cabbage

| Item (or characteristics) | This study | Sutton (1980) |
|---|---|---|
| Colony[a] | dark brown | dark brown |
| Sclerotia formation | abundant, black | abundant, black |
| Setae | abundant, black | abundant, black |
| Conidia | | |
| Shape | falcate, hyaline | falcate, abundant |
| Size (μm) | 22.5~30.0 × 2.5~3.0 | 19.5~24 × 2~2.5 (-3.5) |
| Appressoria | | |
| Shape | clavate to circular | clavate to circuar |
| Size (μm) | 8.0~12.0 × 5.5~8.0 | 8~11.5 × 6.5~8.0 |
| Growth rate (mm/day) | 9.8 (on PDA at 25°C) | not discribed |

[a]After 7 days on PDA at 25°C.

**Table 2.** Effect of different media on hyphal growth of *Colletotrichum dematium* causing anthracnose on cabbage

| Isolate | Medium | Hyphal growth (mm) | | |
|---|---|---|---|---|
| | | 3 days | 5 days | 7 days |
| SB-1 | PDA | 31.9±1.7[a] | 54.0±1.7 | 78.1±1.4 |
| | V-8 agar | 20.2±0.8 | 50.0±0.8 | 72.3±1.0 |
| | Czapek-Dox agar | 26.3±0.8 | 43.5±1.3 | 65.8±1.0 |
| SB-2 | PDA | 30.2±1.9 | 52.2±1.9 | 76.7±1.5 |
| | V-8 agar | 29.2±1.3 | 49.2±1.3 | 70.9±0.9 |
| | Czapek-Dox agar | 26.1±1.5 | 43.0±2.2 | 65.5±2.2 |

[a]Values are means of 10 replicates with standard deviation.

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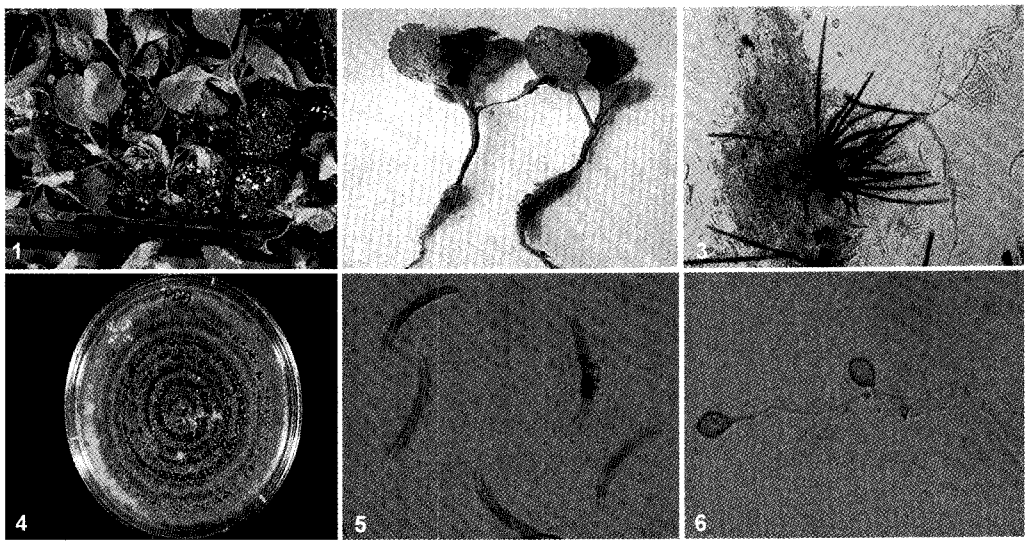


**Fig. 1.** Anthracnose symptoms on cabbage caused by *Colletotrichum dematium* and its mycological characteristics. 1 and 2, lesions on seedlings; 3, setae produced on PDA (scale bar = 30 $\mu$m); 4, 7-day-old colony on PDA at 28°C; 5, conidia (scale bar = 10 $\mu$m); 6, appressoria (scale bar = 10 $\mu$m).

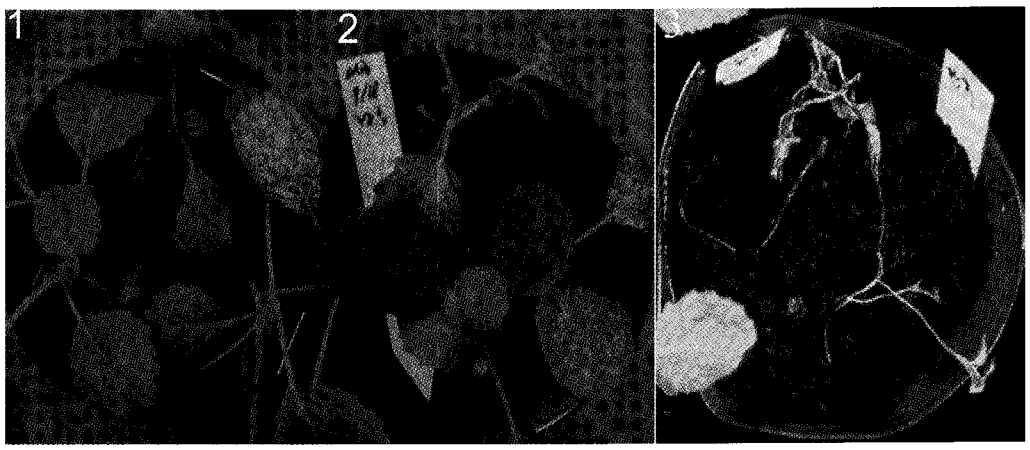


**Fig. 2.** Anthracnose symptoms on cabbage caused by *Colletotrichum dematium* in a pot experiment. 1, water control; 2, lesion spot on variety Dekong of cabbage; 3, damping-off on variety Manchu of cabbage.

**Table 3.** Pathogenicity of *Colletotrichum dematium* on cabbage and other hosts

| Host | Seedlings diseased (%) |
|---|---|
| Cabbage (Dekong) | 89.0 |
| Cabbage (Manchu) | 100.0 |
| Chinese cabbage (Jangmi) | 40.3 |
| Cucumber (Eunsung) | 0.0 |
| Red-pepper (Hanbyul) | 0.0 |
| Red-pepper(Daewang) | 0.0 |

were placed in a dew chamber with 100% relative humidity at 28°C for a day, and transferred to a greenhouse at 28°C. Anthracnose symptoms including damping-off appeared only on cabbage and chinese cabbage (Table 3). The variety of cabbage, Manchu showed more susceptible to the fungus than Dekong (Table 3). The lesions on the cabbage were similar to those on naturally infected leaves of cabbage. The pathogen was reisolated from the symptoms on the inoculated plants. This is the first report that *C. dematium* causes damping-off as well as anthracnose on cabbage in Korea or in the World.

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