

## Black Dot Root Rot of Tomato Caused by *Colletotrichum coccodes*

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### *Colletotrichum coccodes*에 의한 토마토 검은점뿌리썩음병(흑점근부병)

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**ABSTRACT :** Black dot root rot occurred severely in greenhouse tomatoes in Jangseong area of Korea in April, 1996. The causal fungus of the disease was identified as *Colletotrichum coccodes* based on the morphological and cultural characteristics. Pathogenicity tests revealed that isolates of the fungus were responsible for the disease, and two cultivars of cherry tomato were less susceptible to the disease than other cultivars of tomato and cherry tomato tested.

**Key words :** black dot root rot, *Colletotrichum coccodes*, tomato.

Greenhouses of tomatoes were surveyed for disease occurrence in Jangseong area of Korea in April, 1996. Black dot root rot occurred up to 80% in 2 of 12 greenhouses of tomatoes during the survey. The symptom was characterized by a wilt and root rot of infected plants (Figs. 1 and 2). Numerous dotlike black sclerotia developed in the cortex of infected roots. The infected roots showed brown to dark brown discoloration at the early stages of the disease and were partially decomposed later. Diseased plants grew normally during the early growing stages but wilted gradually and blighted at the late growing stages.

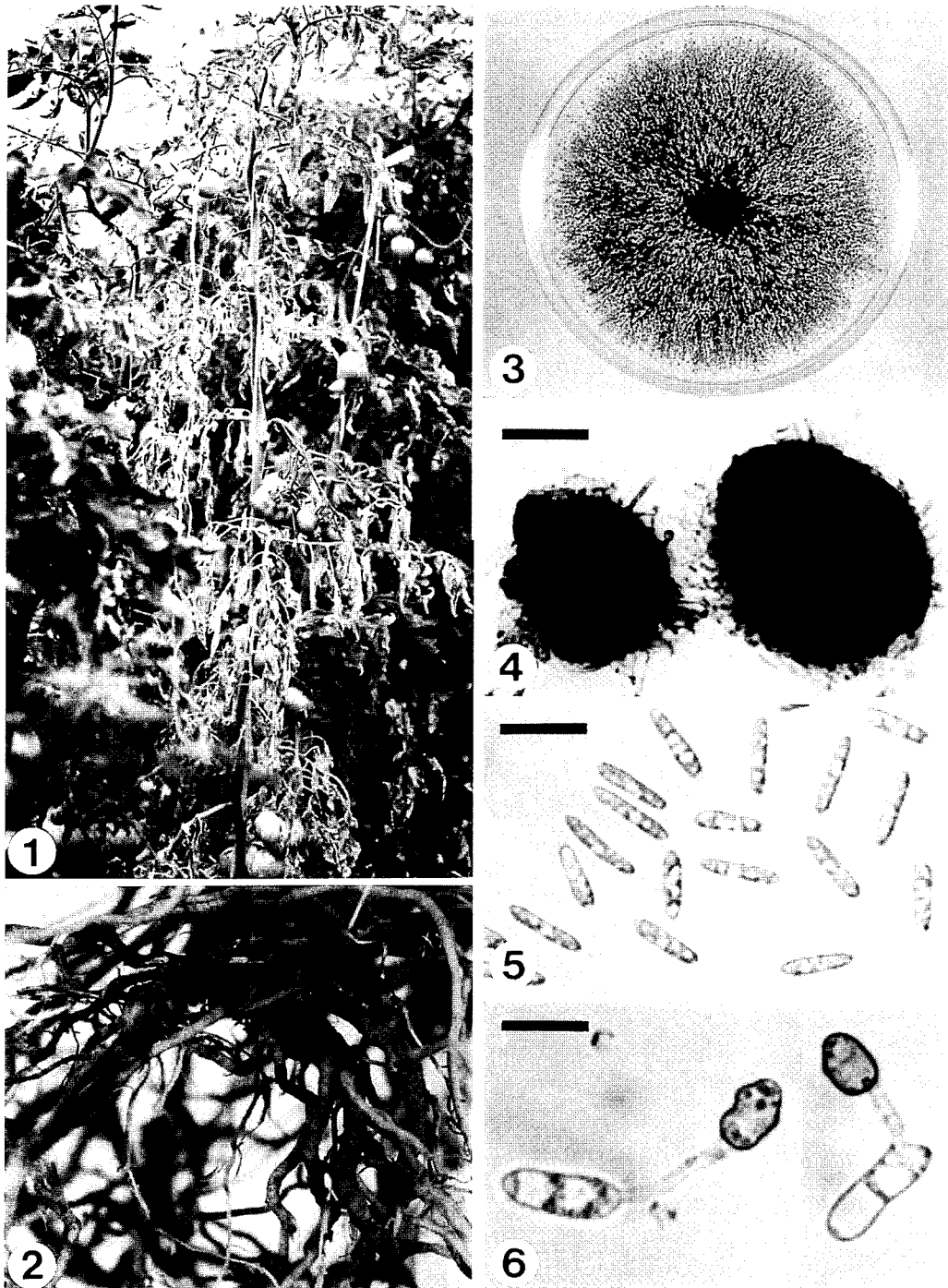
*Colletotrichum* sp. was consistently isolated from the root rot lesions of tomato. All the isolates of the fungus were identified as *Colletotrichum coccodes* (Wallr.) Hughes according to the classification of previous workers (1, 5, 10). Colonies on potato dextrose agar (PDA) consist of abundant black sclerotia and sparse aerial mycelium (Fig. 3). Setae develop on conidiomata and occasionally on sclerotia, which are 2~9 septate and measure 25~170×3~5 μm (average 116×4 μm). Sclerotia produced on the roots are black, globose to irregular and measure 70~450×50~280 μm, and those in PDA culture are black, globose (Fig. 4) and measure 160~680 μm in diameter. Conidia are straight, elongated fusiform (Fig. 5) and measure 14~24×3~5 μm (average 20×4 μm). Appressoria are ovate to elliptical or irregular,

pale yellow to grayish brown (Fig. 6) and measure 8~12×5~8 μm (average 9.6×7.0 μm). Temperature range for mycelial growth of 5 isolates of the fungus was examined. The optimum temperature for mycelial growth of the isolates was 24~26°C, and minimum and maximum temperatures for that were 2°C and 34°C, respectively.

Two isolates of *C. coccodes* from diseased tomato roots were used for pathogenicity tests. For preparation of inoculum, each isolate was cultured in sand tomato root (STR) medium (20 g sand, 8 g dry tomato roots and 30 ml distilled water) in 250-ml-flasks at 24~26°C for 30 days. Three cultivars each of tomato (*Lycopersicon esculentum* Mill.) and cherry tomato [*Lycopersicon esculentum* Mill. var. *cerasiforme* (Dunal) A. Gray] were cultivated in plastic circular pots (29 cm in height and 28 cm in diameter) with sterile soil for 30 days in a greenhouse at 18~30°C for inoculation experiments. For inoculation to roots of the tomatoes, surface soil around the plant was dug by a depth of 2~3 cm, and 20 g of each inoculum was placed on the roots. The inoculated plant parts were covered with the original soil. The same quantity of STR medium was used for the control. The inoculated and control plants were cultivated in the greenhouse. Pathogenicity test was performed in three replicates. Symptoms were observed during cultivation of the inoculated plants, and disease rating was made 96 days after inoculation.

Black dot root rot occurred on the cultivars of to-

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**Figs. 1-6.** Symptoms of black dot root rot of tomato observed in the field and morphology of the causal fungus, *Colletotrichum coccodes*. 1, wilt of a diseased plant; 2, note dotlike black sclerotia on infected roots; 3, colonies of *C. coccodes* cultured on PDA in darkness at 25°C for 20 days; 4, sclerotia produced in PDA culture (scale bar=100 µm); 5, conidia (scale bar=20 µm); 6, appressoria from germinated conidia (scale bar=10 µm).

mato and cherry tomato inoculated but did not on the control plants (Table 1). Symptoms induced by artificial inoculation were identical to those observed in the field, and *C. coccodes* was reisolated from all the infected

roots. Two cultivars of cherry tomato were less susceptible to the disease than three cultivars of tomato and one cultivar of cherry tomato, suggesting that there is some difference in resistance to the disease among

**Table 1.** Pathogenicity of *Colletotrichum coccodes* to 6 cultivars of tomato and cherry tomato by artificial inoculation

Kind of tomatoes	Cultivar tested	Virulence of isolates	
		JS-1	JS-2
Tomato	Gwangmyeong	++ <sup>a</sup>	++
	Momotaro	++	++
	Seogwang	++	++
Cherry tomato	Mini carol	++	++
	Ppeppe	+	+
	Ppoppo	+	+
Control		-	-

<sup>a</sup> ++, severe symptoms; +, weak symptoms; -, no symptom.

the cultivars of tomatoes. Further screening is required for selection of resistant cultivars of tomatoes to the disease.

*C. coccodes* has a wide host range, being particularly destructive on Solanaceae (3). The fungus causes black dot root rot and anthracnose on tomatoes (2, 8, 9, 12). Black dot root rot occurs in greenhouse (8), open field (9) or hydroponically grown tomatoes (11). It was reported that black dot root rot occurred on eggplants in Korea (7). The present study first reveals that *C. coccodes* causes black dot root rot of tomato in Korea. It has been reported that infection of the fungus also occurs on fruits, stems and leaves of tomatoes (2, 12). However, the authors could not find lesions caused by the fungus on the aboveground parts of tomatoes during the survey of fields. Inoculation tests of previous workers (4, 6) showed that *C. coccodes* could infect only ripe fruits and leaves of tomatoes under favorable conditions, and the susceptibility to infection on fruits increased with the age of the fruits. Accordingly it is probable that anthracnose caused by the fungus occurs on fruits, stems and leaves of tomatoes in other fields in Korea.

## 요 약

1996년 4월, 국내 장성지역의 온실재배 토마토에서 검은점뿌리썩음병이 심하게 발생하였다. 이 병의 병원 진균은 형태적 및 배양적 특성에 의해 *Colletotrichum coc-*

*codes*로 동정되었다. 이 균의 균주들을 사용하여 토마토에 대한 병원성검정을 실시한 결과, 병원성이 확인되었으며, 2종의 방울토마토 품종은 검정한 다른 토마토 및 방울토마토 품종보다 이 병에 대해 덜 감수성인 것으로 나타났다.

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