

Occurrence of Eggplant Scab Caused by *Cladosporium cucumerinum* in Korea

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A scab disease on eggplant (*Solanum melongena* L. cv. Chukyang) in plastic film houses around Kimhae area in Korea during the winter season of 1998-1999. The disease started on leaves with small dark brown spots which were gradually expanded to 1 to 3 mm diameter lesions. Later, the central parts of the lesions became collapsed and detached to make holes. Dark brown mold was grown out of the lesions on the lower side of leaf. Numerous conidia were produced on the diseased leaves and appeared to be readily dispersed in the air. A fungus was isolated from the diseased leaves, and tested for Koch's postulates to prove the causal agent of the disease. The isolated fungus grew on potato dextrose agar, forming greenish black to pale brown colonies. Conidia were ellipsoidal, fusiform or subspherical, mostly one-celled but occasionally septated, and formed in long branched chains on the erected conidiophores which were pale olivaceous brown and variable in length between 12.4 and 393.4 μm . The fungus was identified as *Cladosporium cucumerinum* Ellis Arthur based on the above morphological characteristics examined. The optimum temperature for mycelial growth and conidial formation was about 20 to 25°C. In addition to cucumber, the fungus was also pathogenic to watermelon, pumpkin and oriental melon. This is the first report on the scab disease of eggplant in Korea.

Keywords : *Cladosporium cucumerinum*, eggplant, scab.

Cladosporium cucumerinum Ellis Arthur has been known as an important pathogen of cucumber which causes a scab disease all over the world. The scab caused by the same fungus was reported in cucumber in 1997 (Lee et al., 1997), but not in eggplant in Korea (The Korean Society of Plant Pathology, 1998). In the winter season of 1998-1999, a disease suspected eggplant scab was found in greenhouses around Kimhae area. The infection rate of the disease in some greenhouses reached up to 8.4% and the damage was quite severe in certain spots. In this study, we identified the causal organism and characterized the scab disease of egg-

plant.

Diseased leaves were collected from eggplants growing in the greenhouses at Hanlim-myon, Kimhae City, Kyongsangnam-do, Korea in the winter season of 1998-1999. From the surface disinfected leaf or mycelial tip of the diseased leaf, greenish black fungal colonies were isolated and cultured on potato dextrose agar. This fungus was incubated in the dark at 25°C until used. Mycelium and conidiophores were observed and conidia and ramoconidia were carefully examined under the light microscope (Nikon Fluophot, Japan). The mycelial growth of the fungus and the germination of conidia at various temperatures were examined.

The symptoms incited by the pathogenic fungus were limited only to the leaves of eggplant. The typical symptom of the disease was greenish to black or brown spots on leaves (Fig. 1A, B). These spots were usually surrounded by yellowish haloes and the infected tissue were collapsed later. The number of lesions on a leaf was varied from a few to over fifty. Besides the typical lesions, numerous small necrotic spots were also presented. The small lesions usually remained less than 2 mm in diameter. In inoculated plants, the lesions were mostly developed on the young plants with sunken and dark green spots, followed by small lesion formation. Early symptoms appeared 2 or 3 days after inoculation. When the environmental conditions were humid and cool favorable for the disease development, gummy substances were exuded. But no symptoms appeared on eggplants if the weather conditions become dry and hot. The lesions formed previously were not developed further and remained small brownish spot. When seedlings of watermelon, cucumber, oriental melon and pumpkin were inoculated artificially, upper parts of the seedlings were softened, broken down, dried and eventually dead. In the later season, greenish black mycelia were appeared on the lesions, and the plants stopped growing and stunted.

The mycological characteristics of the isolates collected from diseased eggplants were not greatly different from those reported previously (Table 1). The conidiophore was pale olivaceous brown, smooth, tall, dark, upright, branched variously near the apex, clustered or single, and variable in size of about 12.4×393.4 μm (Fig. 1D). The conidia were

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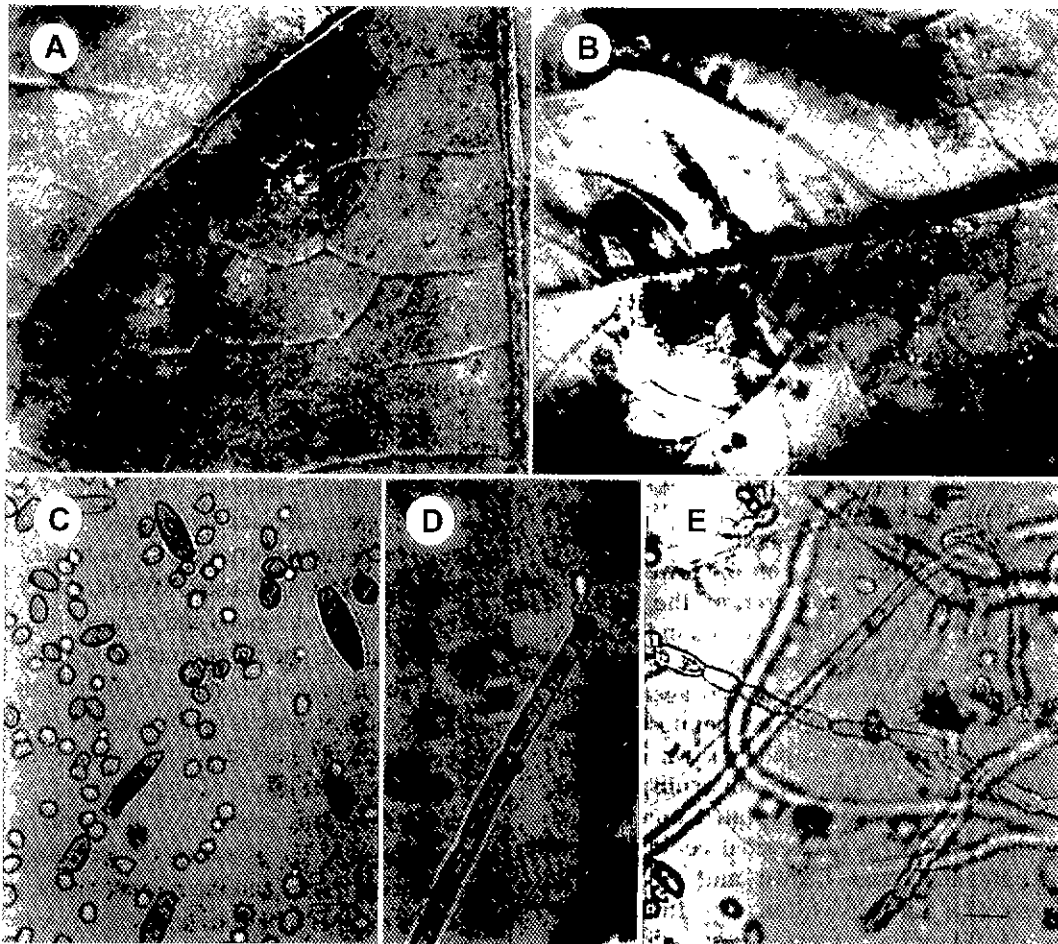


Fig. 1. Symptoms and morphological characteristics of eggplant scab by *Cladosporium cucumerinum*. Dark brown spots surrounded by yellowish haloes on the upper (A) and lower (B) leaf surfaces; Conidia (C); Conidiophores (D). Ramoconidia (E); Bars indicate 10 μm .

Table 1. Comparison of morphological characteristics between pathogenic fungus of scab disease of eggplants and *Cladosporium cucumerinum* described by Ellis

Morphological feature	Present study	<i>C. cucumerinum</i> ^a
Colony color	greenish black, velvety	greenish black, velvety
Conidium		
color	pale olivaceous brown	pale olivaceous brown
size	4.7-24.3×2.5-5.5 μm	4-25×2-6 μm
septa	0-1	0-1
shape	ellipsoidal, fusiform	ellipsoidal, fusiform
Ramoconidium		
color	pale olivaceous brown	pale olivaceous brown
size	5.5-28.1×3.0-6.8 μm	30×3-5 μm
septa	0-2	0-2
Conidiophore		
color	pale olivaceous brown	pale olivaceous brown
length	12.4-393.4 μm	8-400 μm
width	3.0-5.7 μm	3-5 μm

^aDescribed by Ellis (1972)

formed in long branched chains, and conidium was variable in shape and size, ovoid to cylindrical and irregular, some typically lemon shaped, ellipsoidal, fusiform or subspherical single-celled, mostly aseptate but occasionally 1-septate (Fig. 1C). The length of the conidium was 4.7-24.3×2.5-5.5 μm . Colonies on PDA were densely packed with greenish black color. The ramoconidium was mostly single-celled, showing 5.5-28.1×3.0-6.8 μm in size with 0-2 septa (Fig. 1E). The morphological characteristics of the isolate were almost identical to *C. cucumerinum* (Ellis and Holliday, 1972). Accordingly, we identified the casual agent as *C. cucumerinum* Ellis & Arthur.

The maximum temperature for mycelial growth was 35°C. The minimum growth temperature was 5°C for most isolates. Optimum growth temperature was 20-25°C. The germination of conidia was highest at 25°C and the germination rate was sharply decreased lower than 15°C or higher than 30°C.

Pathogenicity of the scab fungus to Cucurbitaceae vegetable crops was tested. Four-week-old seedlings of eggplant,

watermelon, pumpkin and oriental melon raised in 1/5000a Wagner pots were used. The fungus was incubated on PDA at 20–25°C for 30 days and the conidia formed on the PDA were collected with brush and washed with sterilized water by centrifugation. The conidial suspension at concentration of 10^5 conidia/ml was sprayed to the test plants until run-off. The plants were transferred to a dew chamber at 20°C, maintained for 24 hrs. and then placed in the greenhouse. After four days of incubation, when the plants were showing spots or blight symptoms due to the infection of the pathogen, the infection rate was scored. The severities of the disease were divided in to four levels as –, no symptom; +, weak; ++, moderate; and +++, severe symptoms.

All of the isolates successfully induced the typical scab symptoms on eggplant, watermelon, cucumber, pumpkin and oriental melon. Characteristic spots were appeared on the leaves 4 days after inoculation with conidial suspension. The spots were almost identical to those of naturally infected leaves. The infected leaves appeared black spots first. The isolated of *C. cucumerinum* incited moderate or severe symptoms on watermelon, cucumber, pumpkin and oriental melon and rather weak symptom on eggplant. However, no isolate caused the disease on red pepper. Morphological characteristics of the conidia and mycelia of the fungi that were reisolated from inoculated plants were same as those of naturally infected leaves.

Cucumber scab has been known as an important disease in Cucurbits such as watermelon, cucumber, pumpkin and oriental melon in the temperate region. The scab diseases in cucumber, watermelon, pumpkin and oriental melon have been already reported in Korea (Cho et al., 1997; Gobayashi et al., 1992; Kwon et al., 1996; Lee et al., 1997). But there have been no records of diseases on eggplant in Korea (The Korean Society of Plant Pathology, 1998). This may partially because the environmental conditions of eggplant-

growing fields are not favorable for growth of the scab fungus. Generally, eggplant is cultivating in open fields during the summer in Korea, in which the weather is usually hot and dry. However, when the eggplants are cultivating in greenhouses or vinyl houses all year around, the occurrence of the scab disease of eggplants was expected. Therefore, environmental conditions for the plant growth are humid and cool for extended period of time. *C. cucumerinum* grow abundantly and cause epidemics in such an environmental condition (Lee et al., 1997).

This is the first report of a leaf scab on eggplant caused by *C. cucumerinum* in Korea.

References

- Barnett, H. L. and Hunter, B. B. 1986. Illustrated Genera Imperfect Fungi, 4th ed. Macmillan Publishing Company. 106pp.
- Cho, W. D., Kim, W. G., Jee, H. J., Choi, H. S., Lee, S. D. and Choi, Y. C. 1997. Compendium of Vegetable Diseases with Color Plates. National Institute Agricultural Science and Technology: 447pp (in Korean).
- Ellis, M. B and Holliday, P. 1972. *Cladosporium cucumerinum*. CMI Descriptions of Pathogenic Fungi and Bacteria. No. 348.
- Gobayashi, T., Katamoto, K., Abiko, K., Abe, Y. and Kakishima, M. 1992. Illustrated Genera of Plant Pathogenic Fungi in Japan. The Whole Farming Educational Association. 534pp.
- Kwon, M. K., Hong, J. R., Cho, B. H., Ki, U. K. and Kim K. C. 1999. A scab disease caused by *Cladosporium cucumerinum* on watermelon seedlings. *Plant Pathol. J.* 15(1):72-75.
- Lee, K. Y., Young, K. H., Kang, K. J., Ahn, K. S., Min, K. B. and Cha, B. H. 1997. Cucumber scab caused by *Cladosporium cucumerinum* in Korea. *Korean J. Plant Pathol.* 13:288-294 (in Korean).
- The Korean Society of Plant Pathology. 1998. *List of Plant Diseases in Korea*, 3rd ed. pp. 101-103 (in Korean).