

## Occurrence of German Iris Leaf Spot Caused by *Cladosporium iridis* in Korea

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**A fungus associated with the leaf spot of German iris (*Iris germanica*) was identified as *Cladosporium iridis* based on the morphological characteristics of the conidiophores and conidia. A conidial suspension of the fungus was artificially inoculated onto a healthy unwounded plant, proving its pathogenicity. This is the first record of this disease from Korea.**

**Keywords :** *Cladosporium iridis*, iris, *Iris germanica*.

German iris (*Iris germanica* L.) is cultivated for ornamental purposes and also used as a medicinal resource. Bacterial leaf blotch caused by *Pseudomonas syringae* is the only disease recorded thus far on this plant in Korea (The Korean Society of Plant Pathology, 1998). In May 1997, a severe disease was noticed on leaves of German iris in the experimental field of National Crop Experiment Station, Suwon, Korea. Symptoms of the disease were characterized by creamy white to light grey colored spots on the leaves (Fig. 1A). Each spot was often surrounded by a chlorotic halo at the early stage of disease development and later by a dark brown margin (Fig. 1B). Initial color of the spot was creamy white and turned into grey to greyish brown due to heavy fructification of the fungus (Fig. 1C). Leaf spots could coalesce and develop into large patches, especially on the distal portion of leaves. The disease was most serious after rain in May and June.

A species of *Cladosporium* was consistently associated with leaf lesions of the plant. The fungus was characterized as follows: Conidiophores arising in a fascicle of 2-10 or singly through stomata or from stomata in the substratum, mildly flexuous to substraight, sometimes geniculate, not branched, thick-walled throughout, but thin-walled at the apical portion, smooth-walled, 0-4 (-6) septate, olivaceous to mid brown, paler upwards, (92-) 142-220 × 9.6-12.8 μm; conidiogenous scars apical or on shoulders caused by geniculation, slightly protuberant, thickened (Fig. 1D).

Conidia solitary, straight to slightly curved, oblong to cylindrical, obtuse at both ends, distinctly and densely verruculose, (1-) 2-3 (-5) septate, straight or slightly constricted at the septa, light to olivaceous brown, usually paler than conidiophores in colour, 45-72 (-80) × 15-23 μm; hilum not prominent, usually visible as a thickened plate below the wall layer, 3-5 μm diameter; usually on the basal end, sometimes on both ends (Fig. 1E). A teleomorph state of the fungus was not found although many overwintered leaves were examined.

Based on these morphological characteristics of the anamorph, this fungus was identified as *Cladosporium iridis* (Fautrey & Roum.) G. A. de Vries, which is a well-known leaf spot fungus on *Iris* spp. (David, 1997; de Vries, 1952; Ellis and Waller, 1974; McKemy and Morgan-Jones, 1990;). This species has been recorded from nearly all over the world where the plant is cultivated, but not from Korea (David, 1997; The Korean Society of Plant Pathology, 1998).

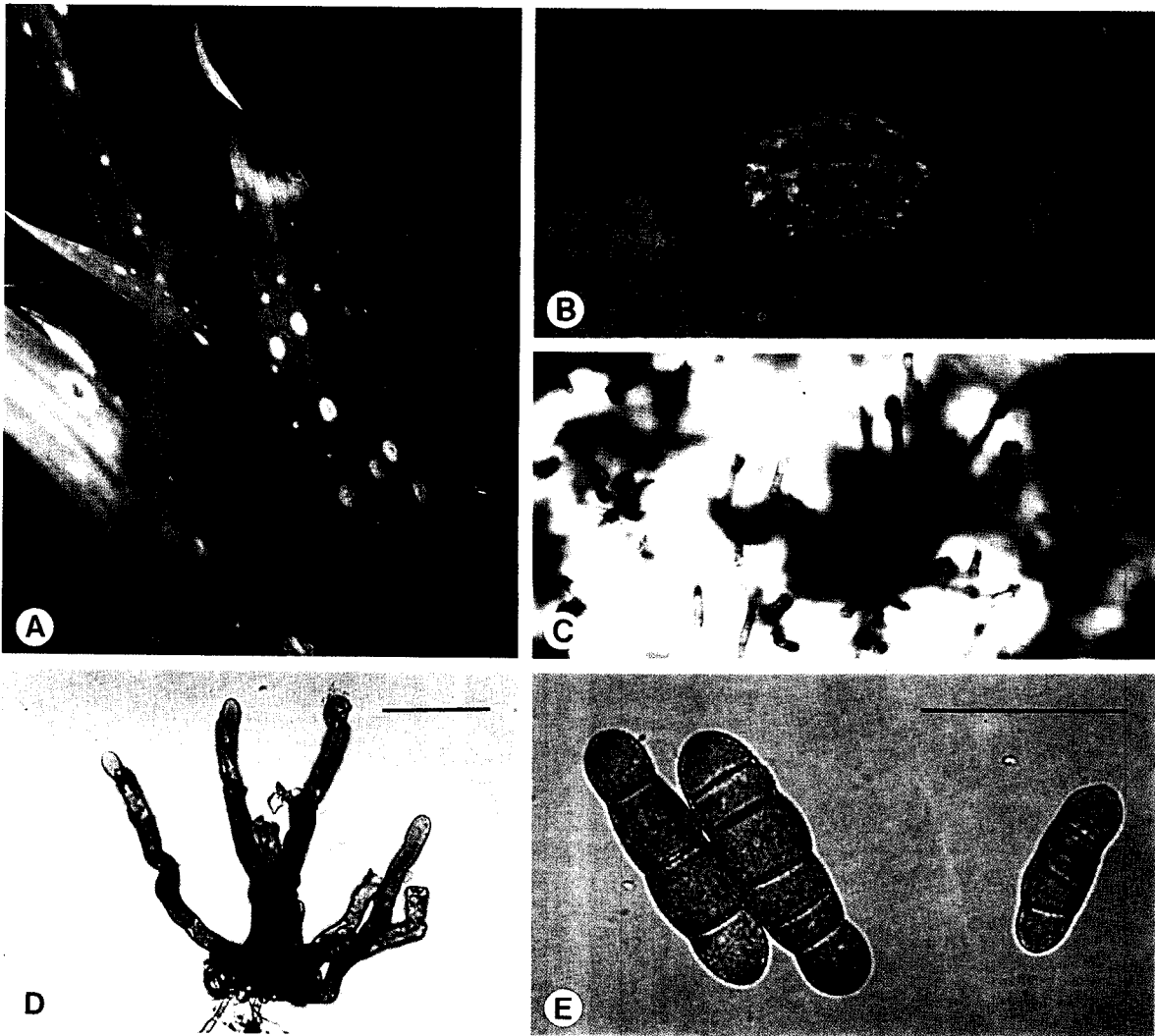
To isolate the fungus, the infected tissue was surface-sterilized with a diluted sodium hypochlorite solution, and small pieces of the tissue were placed on potato dextrose agar (PDA) plates. White colored mycelial mats were growing from the edges of the tissue. Mycelia were hyphal-tipped, and transferred to fresh PDA plates. After two weeks of incubation under near-UV light with a 12 hr diurnal cycle of light and darkness at 22°C, the colony was covered with plentiful conidia. A stock culture was prepared from the colony by transferring a single conidium with a sharp needle under a dissecting microscope to a PDA slant for further study.

To prove the pathogenicity of the fungus, inoculum was produced by transferring mycelial plugs from a stock culture to fresh PDA in plastic Petri dishes. The fungus was growing very slowly and colonies reached about 4 cm in diameter after 3 weeks of incubation. No further growth was recognizable, and the colony became senescent and darker in color. Cultures were incubated on a 12 hr diurnal light period at 22°C. Distilled water containing a drop of Tween 20 was added to each Petri dish, and conidia were dislodged by gentle rubbing with a painter's brush. Conidial

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**Fig. 1.** (A) Symptoms of the leaf spot on *Iris germanica* caused by *Cladosporium iridis*. Note the creamy white lesions at the early stage of disease development and greyish brown lesions on the leaf in the upper right corner. (B) Close-up of the affected tissue showing tufted center due to heavy fructification. Margin of the lesion became dark brown and was surrounded by a greenish yellow halo. (C)-(E) *C. iridis* associated with the leaf spot of *I. germanica*. Note the heavy fructification of the fungus (C), conidiophores in a fascicle (D), and conidia (E). Scale bars represent 50  $\mu$ m.

suspensions were concentrated in a beaker, and adjusted to about  $1 \times 10^4$  conidia/ml.

The conidial suspension was sprayed onto a healthy plant without wounding. The plant was maintained in a humid plastic chamber for 36 hr and then moved onto the laboratory bench (18-25°C). A comparable plant was treated with sterilized water and maintained under the same conditions. The characteristic small white spots were observed 5 days after inoculation on the leaves sprayed with the conidial suspension. No visible symptoms were, however, observed on the plant treated with sterilized water. From the lesions induced by artificial inoculation, the first sign of fructification was noticed 10 days after inoculation. Microscopic examination of the lesion revealed that visible

change of the lesion from creamy white to greyish brown is as a result of conidial formation. The conidia and conidiophores observed from these lesions were in accordance with those of the fungus that appeared on the naturally infected plants. No other fungi or bacteria were found on these lesions.

This is the first record of the fungus and the disease in Korea. The disease is commonly referred to 'Himmuni-byeong' in Korean as it is shown as a leaf spot with creamy white lesions. A total of three specimens were collected, and are preserved in the mycological herbarium (SMK) of Korea University as follows: SMK 13766 (11 V 1997, Suwon), SMK 13927 (4 VI 1997, Suwon), and SMK 14538 (23 V 1998, Seoul).

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