

Flower Pink Rot of *Allium* Plants Caused by *Fusarium proliferatum*

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Inflorescence of *Allium thunbergii* was found to be severely infected with *Fusarium* sp. The flower was covered with the fungus and eventually failed to form seeds. The causal fungus was identified as *F. proliferatum* (Matsushima) Nirenberg based on the cultural and morphological characteristics. Pathogenicity of the fungus was proved by artificial inoculation onto the healthy plants. This is the first record of this disease from Korea.

KEYWORDS: *Allium*, Flower pink rot, *Fusarium proliferatum*, Pathogenicity

Allium thunbergii G. Don has been used for a spice or fresh vegetable for a long time in Korea. Recently this plant is cultivated in several experimental fields for collecting germplasm from diverse localities of Korea and developing the cultivation method. In early September 1993, a flower rot disease of *A. thunbergii* was first observed occurring in an experimental plot of Crop Experiment Station at Suwon, Korea. All of 50 plants

growing in the plot showed the same symptoms.

The whole inflorescence was covered with salmon to pink mass of the fungus, resulting in sterility of the seed. These symptoms suggested the proposed pink rot designation. As infection spreads, the discolored lesion progressed down along the floral stem (Fig. 1A and B).

For taxonomic purposes, colonies were started from single conidium and grown on potato-dextrose agar (PDA)

Table 1. Comparative morphological characteristics of *Fusarium proliferatum*

	Mycological characteristics ^a		
	Present study	Burgess <i>et al.</i> ^b	Nelson <i>et al.</i> ^c
Conidia			
microconidia	: abundant, formed from mono and polyphialides	: formed abundantly in chains from polyphialides	: abundant, formed from mono and polyphialides and borne in chains
shape	: single-celled (occasionally 2 celled but generally rare), oval to club-shaped with a flattened base, pear-shaped microconidia may also occur but generally are rare	: clavate, usually 1 to 2 celled, and have a flattened base, a few pyriform microconidia are present	: usually single-celled or club-shaped with a flattened base, pear-shaped microconidia may also occur but generally are rare.
size	: (4.5-)7~10(-12) × 2.5~3.5 μm	: - ^d	: -
macroconidia	: abundant, produced from monophialides on branched conidiophores in the sporodochia (pale orange color) and rarely from monophialides on hyphae	: produced from monophialides on branched conidiophores in the sporodochia and rarely from monophialides on hyphae	: abundant
shape	: slightly sickle-shaped to almost straight with the dorsal and ventral surfaces parallel, foot-shaped basal cell	: long, slender, falcate to almost straight	: only slightly sickle-shaped to almost straight with the dorsal and ventral surfaces parallel, foot-shaped basal cell
septa	: mostly 3~5(-6)	: usually 3~5	: -
size	: (28-)43~65 × 3.5~5.0 μm	: -	: -
Chlamydospore	: absent	: absent	: absent

^aOn carnation leaf culture, but the present study on potato dextrose agar.

^bBurgess *et al.* (1994).

^cNelson *et al.* (1983).

^dNo data available.

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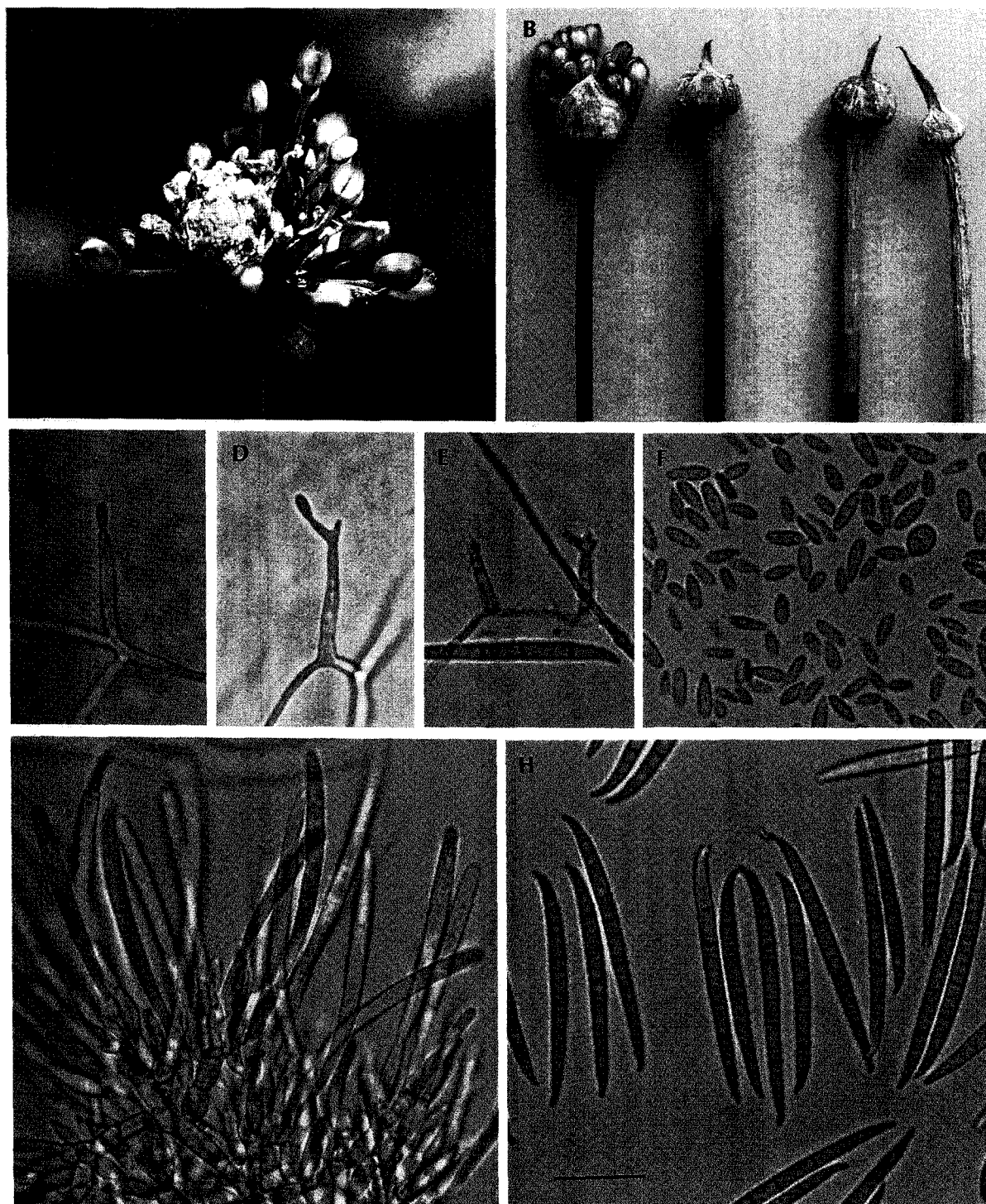


Fig. 1. Symptoms of flower pink rot of *Allium thunbergii* and mycological characteristics of *Fusarium proliferatum*. (A) symptom of inflorescence infected at later stage of flowering. (B) Symptoms of inflorescences at different stage of infection. Note the discolored lesion progressed down along the floral stem. (C) Monophalidic conidiogenesis. (D) Diphalidic conidiogenesis. (E) Triphalidic conidiogenesis. (F) Microconidia. (G) Macroconidia produced abundantly from monophialides on branched conidiophores in the sporodochia. (H) Macroconidia. (Scale bar represents 20 μm for C-H).

in plastic petri plates at 24~26°C under fluorescent lights providing 12-hr light periods. Pigmentation in the PDA was quite variable, range from white aerial mycelium or greyish orange to violet grey, dark violet. The undersur-

face varied from colorless to dark purple.

Microconidia were formed in chains on polyphialides, and formed abundantly from monophialides or polyphialides (Fig. 1C-E), aseptate or occasionally uniseptate, oval to

club-shaped with a flattened base, (4.5-)7-10(-12) × 2.5~3.5 μm. Occasionally pear-shaped microconidia (Fig. 1F) were also found. Macroconidia were produced abundantly from monophialides on branched conidiophores in the tan to orange discrete sporodochia (Fig. 1G) and rarely from monophialides on hyphae, slender, almost straight or slightly sickle-shaped with the dorsal and ventral surfaces parallel, basal cells foot-shaped, 3-5(-6)-septate, (28-)43-65 × 3.5~5 μm (Fig. 1H). Chlamydospores were absent. The causal fungus was identified as *F. proliferatum* (Matsushima) Nirenberg based on the cultural and morphological characteristics (Table 1) (Burgess *et al.*, 1994; Nelson *et al.*, 1983).

To prove the pathogenicity of the isolate, the inflorescences of two healthy plants grown from seeds were sprayed with conidial suspension (ca. 1×10^5 conidia/ml) and maintained in a humid chamber for 24 hr in room temperature. Two days after inoculation, white aerial mycelia were noticed around the inflorescence. Salmon to pink colored masses of the fungus were formed on the inflorescence, but no distinct change was found on leaves inoculated. Controls were treated in the same manner with sterilized water. From infected tissues of the inflorescence, the fungus was reisolated and was identical to the stock culture. All controls remained healthy in the tests.

After the first collection of this fungus in 1993, we have made additional findings of this disease on *Allium* spp. They are preserved in the mycological herbarium

SMK (Korea University, Seoul, Korea) as follows: on *A. sacculiferum* Max., SMK 14810 (19 Aug 1998, Chunchon); on *A. schoenoprasum* var. *orientale* Regel, SMK 15459 (9 Oct 1998, Chunchon); on *A. thunbergii* G. Don, SMK 12601 (3 Sep 1993, Suwon), 14926 (26 Aug 1998, Kyeongju), 15404 (8 Oct 1998, Suwon), 15458 (9 Oct 1998, Chunchon), 15512 (20 Oct 1998, Seoul).

F. proliferatum was previously known to be associated with several diseases of plants, viz. damping-off of onion, foot-rot of corn (Farr *et al.*, 1989), leaf spot of asparagus (Elmer *et al.*, 1999), and leaf spot of *Cymbidium* (Ichikawa and Aoki, 2000). There seems to be no previous report on flower infection of *Allium* spp.

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