

The Aphid-attacking Fungus *Pandora neoaphidis*; the First Observation and its Host Range in Korea

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국내 미기록 진딧물병원성 곰팡이, *Pandora neoaphidis*에 관한 보고

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ABSTRACT: The aphid-attacking fungus *Pandora neoaphidis* was collected during May and June, 1998 at various localities: two localities at Kyunggi, three at Kangwon, one at Kyungbuk and one at Chungnam Provinces. Occurrence of this fungus has never been recorded in Korea. The potential host aphids are *Acyrtosiphon kondoi*, *Myzus persicae*, *Lipaphis erysimi*, *Sitobion avenae*, *Aphis rumicis*, *Dactynotus* species and unknown species. Microscopic characters of the fungus are described and illustrated. *Pandora neoaphidis* studied in this study has an extremely broad range in conidial size and shape even within a single specimen. Such variable size and shape are typical characters of the fungus. During microscopic examination of specimens, the resting-spore phase was not observed.

KEYWORDS: The aphid-attacking fungus, *Pandora neoaphidis*, aphid hosts

The aphid-attacking fungus *Pandora neoaphidis* (Remaudière & Hennebert) Humber (Zygomycetes: Entomophthoraceae) is one of the most pathogenic species against various species of aphids occurring widely (Hall *et al.*, 1979). Various research programs aimed at the integrated control of the aphids have been established to investigate the potential of *P. neoaphidis* as a biological control agent in many countries (Milner *et al.*, 1980). Simultaneously much attempts are being made to isolate and select the most pathogenic indigenous isolate of the fungus. Despite of its potential use as a microbial insecticide, occurrence of this fungus in Korea has never been investigated.

During May and June, 1998, surveys were made of mycoses at various localities: 2

localities at Kyunggi, 3 at Kangwon, 1 at Kyungbuk and 1 at Chungnam Provinces. Epizootics were observed decimating various species of aphids: *Acyrtosiphon kondoi*, *Myzus persicae*, *Lipaphis erysimi*, *Sitobion avenae*, *Aphis rumicis*, *Dactynotus* species and unknown species. Numerous cadavers of the aphids were collected, and prepared for microscopic examination on glass slides in a drop of lactophenol or aceto-orcein by heating them gently. The pathogen was identified on the basis of the modern classification systems (Remaudière and Hennebert, 1980; Humber, 1989).

Our microscopic observations identified the fungus as *P. neoaphidis* which has never been recorded in Korea. The shape and dimensions of the different organs or structures appearing in our specimens were in agreement with descriptions of those described by Remaudière

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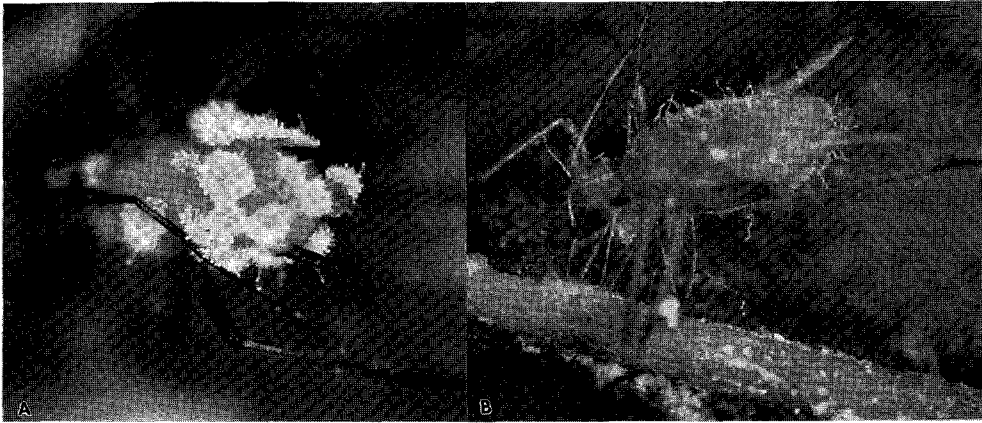


Fig. 1. (A) Vegetative stages and sporulating structures on *Aphis rumicis* killed by *Pandora neoaphidis*. Bar=200 μ m. (B) *Dactynotus* species stuck to the plant with 10~20 rhizoids. Bar=10 μ m.

and Hennebert (1980), and Humber (1989). In particular, range of primary conidial size was perfectly matched with that of *P. neoaphidis*. Herein, we have attempted to describe and illustrate the species on the basis of the collected specimens.

In vivo-infected specimens with *P. neoaphidis* were pale to dark brown or pale reddish in color, depending on the host aphid

(Figs. 1A & B). They were stuck to the plant with 10~20 rhizoids (Fig. 1B). Rhizoids are monohyphal, thicker than conidiophore or as thick as them, terminating in a broad scutellar or irregular branch (Fig. 2A). Cystidia are not numerous, slightly tapered extending above level of conidiophores, at base 2~3 times thicker than conidiophores (Fig. 2B). Conidiophores are digitately branched at

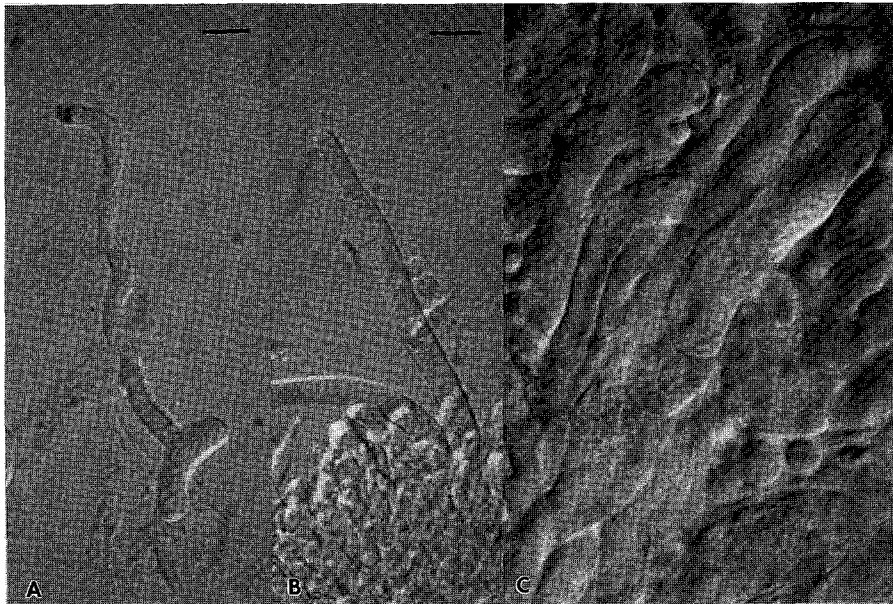


Fig. 2. (A) Irregularly branched monohyphal rhizoid. (B) Slightly tapered cystidium extending above level of conidiophores. (C) Digitately branched conidiophores. Bars in all figures=10 μ m.

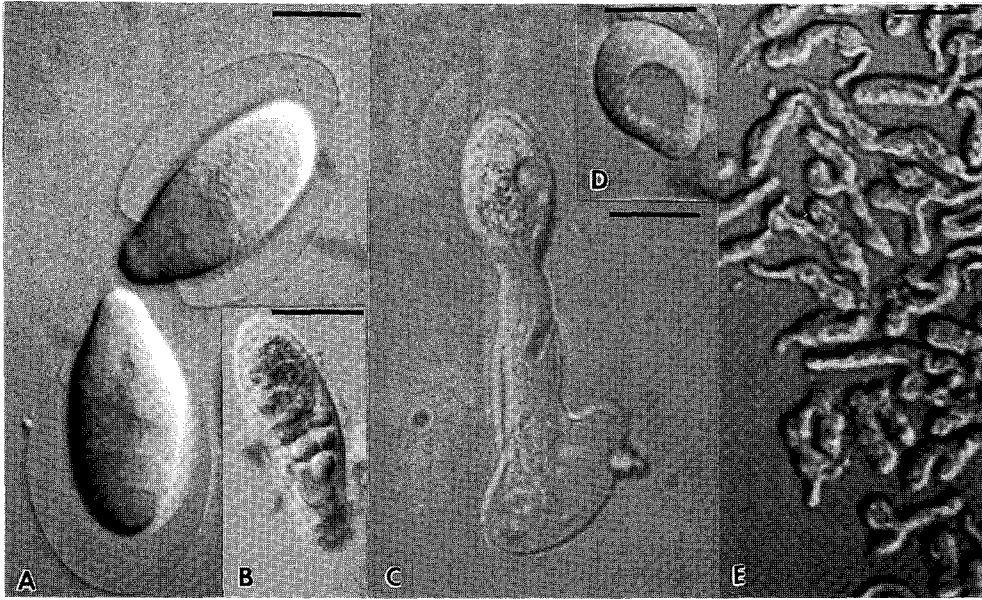


Fig. 3. (A) Bitunicate primary conidia with weakly bilateral symmetry. Bar=10 μm . (B) Aceto-orcein-stained primary conidium. Bar=10 μm . (C) Secondary conidium formed on a short lateral germ tube. Bar=10 μm . (D) Secondary conidium similar to primary conidia. Bar=10 μm . (E) Short and squat hyphal bodies with undulating edges. Bar=20 μm .

apices, intertwined in dense hymenia (Fig. 2C). Primary conidia are ovoid to cylindrical, obpyriform to obclavate or fusoid, often with weakly bilateral symmetry (basal papilla displaced laterally from spore axis) (Fig. 3A); uninucleate and easily staining with aceto-orcein (Fig. 3B); bitunicate (Fig. 3A); forcibly discharged by eversion of the papillar against the conidiophore. Secondary conidia are formed on a short lateral germ tube, and more or less similar to primary conidia (Figs. 3C & D); forcibly discharged by papillar eversion. The hyphal bodies are often short and squat with undulating edges, occasionally somewhat branched (Fig. 3E). Resting spores are not seen.

As described above, *P. neoaphidis* studied in this study has an extremely broad range in conidial size and shape even within a single specimen. Such variable size and shape are typical characters of the fungus, corresponding with the species concept of *P. neoaphidis* emended by Remaudière and

Hennebert (1980), and Humber (1989). During microscopic examination of specimens, the resting-spore phase was not observed. Absence of resting spore in this fungus has been noticed in other studies (MacLeod 1955; Wilding 1973), suggesting that *P. neoaphidis epizootics* are completed without the formation of resting spores by the pathogen.

Pandora neoaphidis is one of the most pathogenic fungi to the aphids, compared to other entomophthoraceous fungal species. We observed epizootics of this fungus from seven different aphid species during this study, indicating that it has a broad host range. Due to its potential as a microbial insecticide against the aphids, it deserves further screening and selection of indigenous isolate, and development of suitable culture medium for mass production.

적 요

국내 미기록 진딧물병원성 곰팡이, *Pandora*

*neoaphidis*를 1998년 5~6월 동안 7지역에서 발견 및 채집하였다: 경기도 2지역, 강원도 3지역, 경북 1지역, 충남 1지역. 이 균의 기주 진딧물은 토끼풀 수염진딧물(*Acyrtosiphon kondoi*), 복숭아혹진딧물(*Myzus persicae*), 무테두리진딧물(*Lipaphis erysimi*), 보리수염진딧물(*Sitobion avenae*), 소루쟁이진딧물(*Aphis rumicis*), 망초진딧물(*Dactynotus species*) 그리고 미동정 진딧물이었다. 이에 국내에서 처음으로 *P. neoaphidis*를 보고하며, 형태적 특징을 기재한다. 이 균은 다양한 모양과 크기를 지닌 단핵 1차포자를 생성하는 것이 큰 특징이다.

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