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Notes

First Report of an Unrecorded Nematode-Trapping Fungus Species *Monacrosporium phymatopagum* in Korea

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A fungus that can capture nematodes by means of sessile adhesive knobs was isolated from rotten wood in Uiseong, Korea. It was found to produce single, spindle-shaped, 3-4 septate (commonly 4-septate) conidia, 44.8 μm (range, 41.6-50.1 μm) long and 13.3 μm (range, 10.7-15.4 μm) wide. Conidiophores were found to be hyaline, erect, straight, and 202.7-245.7 μm high. On the basis of these morphological features, the fungus was identified as *Monacrosporium phymatopagum*. This is the first report of *M. phymatopagum* in Korea which can be a potential biological control resource of plant parasitic nematode.

Keywords: *Monacrosporium phymatopagum*, nematode-trapping, sessile knob, unrecorded species

During a survey of bio-control fungi of plant parasitic nematode in Korea in 2009, rotten wood was sampled, crushed, and screened through a 1-mm-diameter testing sieve. A modified sprinkling-baiting technique was used to isolate nematode-trapping fungi (Barron, 1977). Rotten wood powder (approximately 0.5 g) was sprinkled onto a plate containing both 1.7% corn meal agar (CMA; Difco) and 2% water agar (WA), and approximately 200 nematodes (*Rhabditis* spp.) were added to the surface of a petri dish (diameter, 10 cm) as bait for the nematode-trapping fungi. Two CMA plates and 2 WA plates were used for each sample. The plates were incubated for 2-4 weeks at 25°C and were examined every other day under a dissecting microscope (Olympus SZ×12) to detect the appearance of nematode-trapping fungi. When nematode-trapping fungus was detected, it was photographed using an attached digital camera (Nikon DXM1200F) and was transferred to a CMA plate for pure culture. A nematode-trapping fungus that was identified as *Monacrosporium phymatopagum* was isolated; this species has not been reported in Korea to date. A description of the species is presented in this paper. The taxonomic changes of the species are as follows:

Monacrosporium phymatopagum (Drechsler) Subram., J. Indian Bot. Soc. 42: 293. 1963.

= *Dactylella phymatopaga* Drechsler, Mycologia 46: 775. 1954

= *Golovinia phymatopaga* (Drechsler) Mekht., Khishchnye nematofogovye Griby-Gifomitsety: 165. 1979

= *Gamsylella phymatopaga* (Drechsler) M. Scholler, Sydowia 51: 109. 1999.

This species was originally described by Charles Drechsler (1954) after isolation from decaying vegetable material collected in southern Louisiana on Dec. 20, in 1952 and cultured on a corn meal agar (CMA) plate. The mycelial growth in this species is often scanty, and the mycelia consist of colorless, branched vegetative hyphae that are septate at moderate intervals, often (especially in the presence of nematodes) bearing adhesive protuberances at intervals of 5-125 μm (mostly at intervals of 10-50 μm). The adhesive protuberances are sessile, obovoid or prolate ellipsoid, and are 6.0-9.5 μm long, 2-3 μm wide at the base, and 3.8-5.5 μm at the greatest width, and are usually filled with homogeneous contents at the base and granular protoplasm the distal region. The conidiophores are colorless, erect, 250-325 μm in height, 3.5-4.5 μm wide at the base, and gradually taper upward to about 2 μm at the tip where a single conidium is borne. The conidia are colorless, typically spindle-shaped, truncate, quite narrow at the base, rounded at the distal end, mostly 40-60 μm (average, 49.2 μm) in length, and 11-18 μm (average, 14.4 μm) wide. The conidia are commonly divided by 4 cross-walls into 5 cells, of which the middle cell usually exceeds the others in length and width.

We isolated *M. phymatopagum* for the first time in Korea. The fungus produces spindle-shaped, 2-4 septate conidia (2-septate, 2%, 3-septate, 12%, and 4-septate 86% in 50 conidia counts) on CMA, 44.8 μm (range, 41.6-50.1 μm) long, and 13.3 μm (range, 10.7-15.4) μm wide (Fig. 1A, B). Adhesive sessile knobs, instead of stalked knobs, to capture nematodes are a distinct feature of *M. phymatopagum* (Fig. 1E). The sessile knobs are produced either in the presence of nematodes or on CMA medium (Fig. 1C, D). In aged 30-

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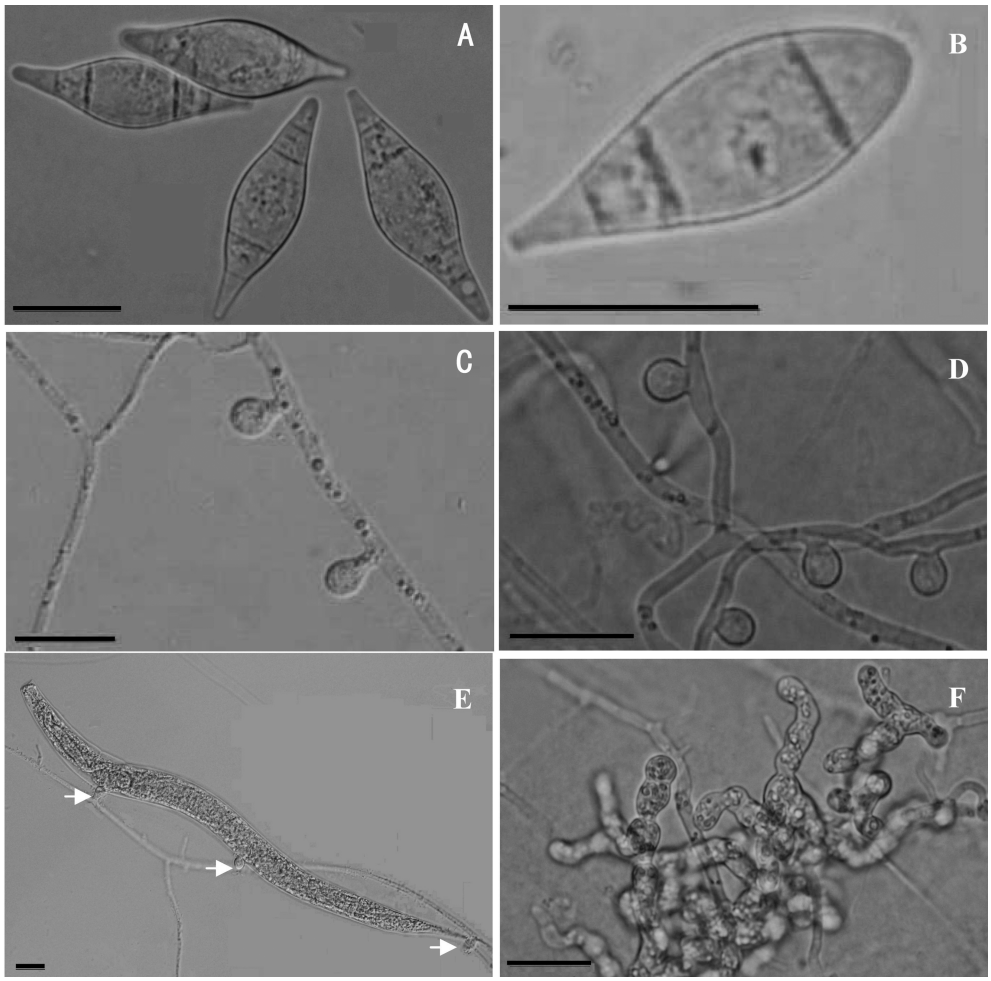

Fig. 1. *Monacrosporium phymatopagum*. A, B. Conidia, C. Adhesive sessile knob produced from nematodes-infested water agar medium, D. Adhesive sessile knob produced from pure CMA, E. Nematode fast held by adhesive knob (the knobs indicated by arrows), F. Distended storage hyphae filled with protoplasm produced on CMA. Bars = 200 μm.

Table 1. Comparison of the *Monacrosporium phymatopagum* isolates from Korea with the original description and other closely related species (Drechsler, 1954, 1961; McCulloch, 1977)

Character		Korea isolate	Original description	*M. parvicollis*	*M. robustum*
Conidiophores	Length (μm)	210.7-283.2	Commonly 250-325	130-290	150-450
Conidia	Length (μm)	41.6-50.1	40.0-60.0	35.0-45.0	68.0-85.0
	Width (μm)	12.5-15.4	11.0-18.0	8.0-14.0	20.0-30.0
	Septa	Commonly 4	Commonly 4	2-4, Mostly 4	3-5
Adhesive knob	Length (μm)	5.5-9.6[a] 5.7-7.3[b]	6.0-9.5	6.5-11.0	16.0-24.0
	Width (μm)	4.7-6.1[a] 4.8-6.2[b]	3.8-5.5	5.5-9.0	9.0-10.0
	Stalk (μm)	No	No	No or short stalk	No
	Shape	Globose, obovoid or prolate ellipsoid	Obovoid or prolate ellipsoid	Globose, obovoid or prolate ellipsoid	Prolate ellipsoid

[a] WA + nematode; [b] CMA.

day-old cultures, some distended storage hyphae filled with protoplasm appeared (Fig. 1F) – also one of the characteristics of *M. phymatopagum* (Drechsler, 1954). The *M. phymatopagum* isolates were consistent with the original description by Drechsler (Table 1), except for a few differences: the conidiophores were shorter and the knobs larger. The *M. phymatopagum* isolate was deposited at the Institute for Natural Products Research, Gyeongbuk Agricultural Technology Administration.

M. phymatopagum can be distinguished from several other nematode-trapping fungi, which have stalked adhesive knobs, by its sessile adhesive knobs. Another nematode-trapping fungus, *Monacrosporium robustum*, also has sessile knobs for capturing nematodes; however, this species has large conidia, (68.0-85.0 μm long and 20-30 μm wide), which are clearly distinct from those of *M. phymatopagum*. Another closely related fungus *Monacrosporium parvicollis* produces adhesive knobs on relatively short, yet clearly recognizable stalks (Table 1). These short stalks have never been observed in the adhesive knobs of *M. phymatopagum*. Recently, Li et al. (2005) reviewed species of *Monacrosporium* and proposed transferring *M. phymatopagum* to *Dactylellina phymatopaga* on the basis of phylogenetic interpretation.

In Korea, the nematode-trapping fungi *Arthrobotrys* (8 species: *Arthrobotrys amerospora*, *A. arthrobotryoides*, *A. brochopaga*, *A. conoides*, *A. dactyloides*, *A. musiformis*, *A. oligospora*, *A. vermicola*), *Monacrosporium* (5 species: *Monacrosporium cionopagum*, *M. ellipsosporum*, *M. gephyropagum*, *M. thaumasium*, *M. ullum*), and *Dactylella* (2 species: *Dactylella lobata*, *D. pseudoclavata*) have been reported. This is the first report of the isolation of the unrecorded nematode-trapping fungus species *M. phymatopagum* in Korea.

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