Plant Pathol. J. 28(3) : 332 (2012)
http://dx.doi.org/10.5423/PPJ.DR.05.2011.0096
pISSN 1598-2254 eISSN 2093-9280

The Plant Pathology Journal

Disease Report | Open Access

Rust Disease of *Aster pilosus* Caused by *Coleosporium asterum* in Korea

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(Received on May 22, 2011; Revised on November 5, 2011; Accepted on November 9, 2011)

Aster pilosus Willd. [syn. *Symphyotrichum pilosum* (Willd.) G.L. Nesom var. *pilosum*], commonly known as frost aster or white heath aster, is a perennial plant belonging to the Asteraceae. This plant is native to North America and was introduced into Korea during the Korean War in the 1950s (Park, 1995). It is now widely naturalized and officially designated as one of 11 'harmful non-indigenous plants' by the Korean Ministry of Environment. Since 2004, from June to November, severe occurrence of rust infections has been consistently observed on plants growing wild in Korea. Examination of a typical plant revealed yellow-orange rust pustules were produced on the stem and lower leaf surface with corresponding small yellowish to chlorotic lesions on the upper surface (Figs. 1A & 1C). No symptoms were observed on flowers. Both the cauline and radical leaves were equally susceptible to the pathogen. Severe infections often resulted in leaf distortion, withering and premature senescence (Fig. 1B). More than 20 voucher specimens have been deposited in the herbarium of Korea University (KUS).

Uredinia were mostly hypophyllous, yellow-orange, erumpent, and 90–150 μm in diameter (Fig. 1D). Urediniospores were subglobose to ellipsoid, but somewhat irregular and variable in shape, yellow-orange, verrucose, 22.5–32.5 × 17.5–20 μm, including 2 μm in wall thickness (Figs. 1E–1H). No telial stage was found. This species is supposed to overwinter in the uredinial state in Korea.

Fig. 1. (A–C) Symptoms of rust disease caused by *Coleosporium asterum* on stem and leaves of *Aster pilosus*, showing yellow-orange uredinia. (D) Uredinium. Bar = 100 μm. Urediniospores in median view (E) and surface view (F) by light microscopy. Bar = 20 μm. (G) Urediniospores observed with SEM. Bar = 10 μm. (H) Close-up view (SEM) of wall ornamentations in a urediniospore. Bar = 2 μm.

Based on the morphological characteristics, the rust pathogen was identified as *Coleosporium asterum* (Dietel) Syd. & P. Syd., as described by Hiratsuka et al. (1992).

Genomic DNA was extracted from urediniospores of the dried herbarium specimens (KUS-F23395, 24985, 25002). The D1/D2 region of 28S rDNA was amplified using the primers LROR and LR6, and directly sequenced. The resulting sequences of the three specimens were identical to each other, and have been deposited in GenBank with accession numbers (JF273968–JF273970). A NCBI BLAST search showed that the present sequences had 99% similarity to those of *Coleosporium asterum* on *Aster* sp. and *Solidago* sp. In the phylogenetic tree (Fig. 2), inferred using neighbour-joining method in MEGA4, the Korean isolates and *C. asterum* formed a monophyletic clade with moderate bootstrap value.

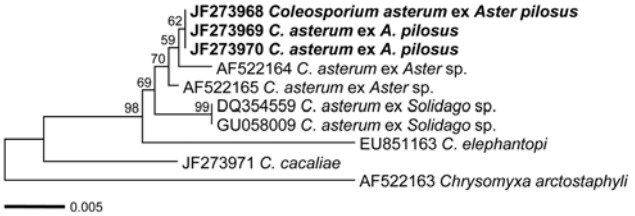

Fig. 2. Phylogenetic relationship between *Coleosporium asterum* on *Aster pilosus* and other *Coleosporium* species, inferred by neighbor-joining method using the 28S rDNA region. Numbers above the branches represent the bootstrap values. Bar = Number of nucleotide substitutions per site.

C. asterum on *A. pilosus* has been reported from Canada and the United States (Farr and Rossman, 2011). This is the first record outside of North America, as well as in Korea, for a rust infection on *A. pilosus* caused by *C. asterum*. This rust fungus has been reported to produce spermogonial and aecial stages on *Pinus densiflora* (Hiratsuka et al., 1992). However, its occurrence has not been confirmed in Korea. Our observations suggest that the rust infections markedly suppress the growth of this noxious weed and ecologically retard the spread and expansion to the natural environment. This rust fungus may thus have the potential to be successfully exploited as a biocontrol agent for the weed.

References

Farr, D. F. and Rossman, A. Y. 2011. Fungal Databases, Systematic Mycology & Microbiology Laboratory, ARS, USDA. Retrieved March 1, 2011, from http://nt.ars-grin.gov/fungaldatabases/.

Hiratsuka, N., Sato, S., Kakishima, M., Kaneko, S., Sato, T., Hiratsuka, T., Katsuya, K., Hiratsuka, Y., Ono, Y., Harada, Y. and Nakayama, K. 1992. *The Rust Flora of Japan.* Tsukuba Shuppankai, Ibaraki, Japan. 1205 pp. + 159 pp. (Index)

Park, S. H. 1995. *Colored Illustrations of Naturalized Plants of Korea*, Ilchokak, Korea.

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