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Disease Reports

Downy Mildew of *Impatiens balsamina* and *I. walleriana* in Korea

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Two commercial impatiens, *Impatiens balsamina* and *I. walleriana* are popular ornamental plants grown worldwide. In Korea, *I. balsamina* has long been grown in private gardens and public parks, while *I. walleriana* has been introduced for commercial purposes and afterwards widely cultivated. In July 2007, the two plants showing typical symptoms of downy mildew disease were first collected at flower gardens in Kangnung, Korea. As the disease progressed, the leaves became wilted and deformed, and premature leaf fall was commonly observed (Fig. 1-A & C). Infected leaves turned pale green or yellow with a whitish fungal-like downy growth developing on the abaxial surface (Fig. 1-B & D).

Detailed microscopic examinations of representative samples from *I. balsamina* (KUS-F22731) and *I. walleriana* (KUS-F22732) were performed using an Olympus BX51 microscope (Olympus, Tokyo, Japan) and a Zeiss AX10 microscope (Carl Zeiss, Göttingen, Germany). Sporangiophores were hyaline, tree-like, straight, 150-400×7-12 μm, and 3-6 times monopodially branched (Fig. 2-A & B). Ultimate branchlets were straight, 9-14 μm long, 1.5-2.5 μm wide, and had truncate or cup-like tips (Fig. 2-C & D). Sporangia were hyaline, broadly oblong, 15-20×11-16 μm, length/width ratio=1.06-1.32 (Fig. 2-E & F). Although three downy mildews, *Plasmopara obducens*, *P. constantinescui*, and *Pseudoperonospora cubensis* have previously been recorded from impatiens (Voglmayr et al., 2009), the present morphological characteristics are well concordant with those given for *P. obducens* J. Schröt. (Shin and Choi, 2006).

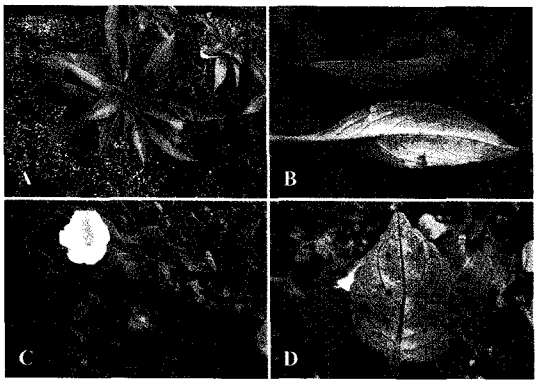

Fig. 1. Downy mildew symptoms on *Impatiens balsamina* (A & B) and *I. walleriana* (C & D) infected with *Plasmopara obducens*.

Fig. 2. *Plasmopara obducens* on *Impatiens balsamina* and *I. walleriana*. A & B. Sporangiophores (Bar=100 μm); C & D. Ultimate branchlets (Bar=20 μm); E & F. Sporangia (Bar=20 μm).

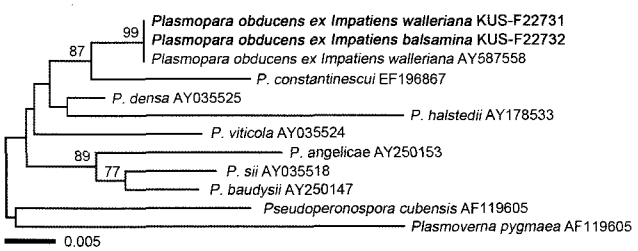

Fig. 3. Phylogenetic relationship between *Plasmopara obducens* on *Impatiens balsamina* and *I. walleriana* and other *Plasmopara* species, inferred by neighbor-joining method using the D1-D3 region of the 28S rDNA. Numbers above the branches represent the bootstrap values of over 50% obtained from 1,000 bootstrap replicates. Bar=Number of nucleotide substitutions per site.

To confirm the identification, the amplification and sequencing of D1-D3 region of the 28S rDNA was performed, and the resulting sequence of about 800 bp was deposited in GenBank (Acc. No. FJ638469, FJ638470). Molecular phylogenetic reconstructions were done using MEGA4, version 4.0 for neighbor-joining (using Tajima-Nei distances). The Korean isolates shared 100% similarity with a sequence (AY587558) of *P. obducens* from *I. walleriana*, distant from *P. constantinescui* and *Pseudoperonospora cubensis* (Fig. 3). The present phylogenetic analysis along with the morphological results indicated that the causal agent is *P. obducens*.

From *I. balsamina*, the disease has been recorded in China and the UK, while from *I. walleriana* it has been restricted to the USA but just recently occurred in Australia and the UK (Farr and Rossman, 2009). To our knowledge, this is the first report of downy mildew disease on *I. walleriana* in Asia and *I. balsamina* in Korea. Since the commercial impatiens are popular in outdoor gardens and indoor flowerpots in other Asian countries, this disease has the potential to cause significant economic losses in nurseries and landscape businesses, like the recent outbreaks occurred in Australia and the UK (Cunnington et al., 2008).

References

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