New Disease Reports

First report of *Golovinomyces sordidus* causing powdery mildew on plantain in Vietnam

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Plantago major (plantain) is one of the most abundant and widely distributed medicinal crops in the world. Since 2013, typical symptoms of powdery mildew were observed in plantain growing wild in fields as well as cultivated for medicine production, the latter with a large area in Hanoi, Vietnam. Disease incidence was observed at around 80% and the disease severity almost 100% with almost all aerial parts of the plant (i.e. flowers, leaves and stem), covered by white fungal colonies (Fig. 1). As a result, yield at harvest was dramatically decreased. A representative diseased specimen was deposited in the PPRI Herbarium (Accession No. PPRI-PM050).

Conidiophores were composed of one to three cells, and measured (82.4-)112.2-147.1(-172.1) µm long. Footcells of conidiophores were cylindrical, straight, or curved at the base and 50-62.5 x 10-12.5 µm long (Fig. 2). Conidia, produced in chains, were variable in shape, oval to cylindrical, oval or doliform, 30-35 x 17.5-20 µm with a length/width ratio of 1.6 to 2.0. No chasmothecia were found. The morphological characteristics were consistent with descriptions of the genus *Golovinomyces* (Braun & Cook, 2012). To confirm the identity of the causal fungus to the species level, the complete ITS region of rDNA from diseased plant accession PPRI-PM050 was amplified with our universal primer pairs HF1 (5'-GGATCCTCGTAACAAGGTTTCCGTAG-3')/ HR4 (5'-CTGCAGCTCCGCTTATTGATATGCTT-3') (Tam *et al*., 2015) and directly sequenced. The resulting sequence (636 bp) was deposited in GenBank (Accession No. KM260734). A BLAST search using the present data revealed that the ITS sequence shares 99% identity with those of *Erysiphe sordida* and *Golovinomyces sordidus* (AF011309, AB077658 respectively) in which *E. sordida* and *G. sordidus* are synonyms (Saenz & Taylor, 1999; Matsuda & Takamatsu, 2003).

Pathogenicity was confirmed through inoculation by gently pressing diseased leaves of plantain onto young leaves of ten potted three-week-old seedlings of *P. major*. Ten non-inoculated seedlings were used as controls. Plants were maintained in a greenhouse in PPRI at 26-28°C. Inoculated leaves developed symptoms after nine days, whereas the control plants remained symptomless. The fungus present on the inoculated leaves was morphologically identical to that observed on the original diseased leaves, with the same sequence following PCR as above, fulfilling Koch's postulates. *G. sordidus* is also known to infect several host plants in the Plantaginaceae and is widely distributed in North America, Europe, Central Asia, China, Japan, Korea and New Zealand (Braun & Cook, 2012). To our knowledge, this is the first report of *G. sordidus* infecting *P. major* in Vietnam. The disease seems to be an important threat to the production of pharmaceuticals from plantain in Vietnam.

References

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Figure 1

Figure 2

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