



## Outbreak of downy mildew caused by *Peronospora belbahrii* on *Ocimum basilicum* var. *polosum* in China

B. Hu<sup>1</sup>, Z. Li<sup>2</sup>, M. Hu<sup>2</sup>, H. Sun<sup>1</sup>, J. Zheng<sup>1</sup> and Y. Diao<sup>3\*</sup>

<sup>1</sup> Beijing Plant Protection Station, Beijing, 100029, China; <sup>2</sup> Shenzhen Agricultural Science and Technology Promotion Center, Shenzhen, 518055, China; <sup>3</sup> State Key Laboratory of Mycology, Institute of Microbiology, Chinese Academy of Sciences, Beijing, 100101, China

\*E-mail: diaoyongz@163.com

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Downy mildew caused by *Peronospora* spp. is a prevalent disease in basil-producing regions in many countries (Thines *et al.*, 2009; Nagy & Horváth, 2011; Kanetis & Vasiliou, 2014). Basil is an important aromatic herb in China used in cooking and medicine and Beijing is one of the largest production areas in China. In July 2016, downy mildew symptoms (grey and furry growth on the undersurface of infected leaves) were observed in sweet basil (*Ocimum basilicum* var. *polosum*) in the Shunyi and Daxing districts of Beijing, China (Figs. 1-2). In less than ten days, disease incidence increased from 30% to 100%. Microscopic observations revealed that conidiophores were hyaline, straight to slightly sinuous, branching two to five times, with a length of 193 to 463 µm (average 317 µm). Branches were distinctly curved and sinuous. Ultimate branchlets were in pairs, curved, 5-14.5 µm long, 2-6 µm wide at the base (n = 50). Sporangia were globose, broadly ellipsoidal or ellipsoidal, olive to dark brown, 28.5-36 × 22.5-32 µm (average 32 × 28 µm). The length/width ratio was 1.14 (1.07 to 1.32) (Fig. 3).

Molecular investigation of two isolates was performed. DNA of the pathogen was extracted and the nuclear ribosomal internal transcribed spacer (ITS) region was amplified using ITS1 and ITS4 primers and sequenced. The sequences (Genbank Accession Nos. MG383397 and MG383398) showed 100% identity with a sequence of *P. belbahrii* (KF419289) isolated from basil. Based upon these morphological characteristics and the molecular data, the causal agent was identified as *P. belbahrii*.

To test the isolates for pathogenicity, leaves of healthy basil plants were inoculated with a suspension of sporangia ( $1 \times 10^5$  sporangia per ml, approximately 15 ml per plant). The control plants were treated with 15 ml of sterilised water. Five replicate plants were inoculated with each of the two isolates and incubated in a moist chamber at 22°C, 80% relative humidity, and a 12/12 h light/dark cycle. Five plants were used as the negative control treatment. After seven days, typical symptoms of downy

mildew had developed on the leaves of the inoculated plants but the control plants remained disease-free. *P. belbahrii* was confirmed from the inoculated leaves by morphological features and based on the ITS sequences.

*Peronospora belbahrii* was reported causing disease on basil (*Ocimum basilicum*) on the island of Hainan, China (Kong *et al.*, 2015). To our knowledge, this is the first report of *P. belbahrii* causing downy mildew on sweet basil in mainland China.

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Figure 1



Figure 2



Figure 3

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