



First record of downy mildew, caused by *Peronospora belbahrii*, on *Solenostemon scutellarioides* in the UK

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Solenostemon scutellarioides (Lamiaceae), commonly known as coleus, is a popular ornamental houseplant and summer bedding plant in the UK. In 2014, several *S. scutellarioides* cv. 'Chocolate Mint' plants were received by the Royal Horticultural Society (RHS) advisory service with brown necrotic blotches visible on the leaves that became dry and crisp over a period of two to five days (Fig. 1).

Symptom-bearing leaves were clarified with an acetone/industrial methylated spirits solution (1:1 v/v) followed by staining with lacto-fuchsin and methyl blue (Koroch *et al.*, 2013). Mycelium and conidiophores, typical of a downy mildew, were observed on the abaxial surface arising directly out through stomata. Conidia were abundantly attached to the conidiophores when infected leaves were placed under humid conditions. The conidiophores were hyaline, with a size range 331–680 μm x 10–17 μm (mean 480 x 13 μm) with (sub)monopodial branching (Fig. 2). The conidiophores branched 3–5 times before terminating in slender branchlets, set obtusely, of uneven length, longest 11–25 μm (mean 15 μm), shortest 5–10 μm (mean 8 μm) (Fig. 2). Conidia were light brown, ellipsoid and non-papillate ranging 20–25 μm x 17–20 μm (mean 24 x 18 μm) (Fig. 2); measuring slightly smaller than those described by Thines *et al.* (2009) but fitting with the description by Daughtrey *et al.* (2006). Oospores were not observed. When infected plants were kept in dry, warm conditions no necrosis was observed although mycelium and conidiophores were present on the lower leaf surface (Fig. 3).

The ITS region was analysed using the semi-nested PCR as described by Cooke *et al.* (2000), using primers DC6/ITS4 followed by ITS6/ITS4 and deposited in GenBank (Accession No. KP164987). The sequence had 99–100% identity with *Peronospora belbahrii* from *Solenostemon* sp. (Accession Nos. FJ394333, FJ394334, FJ394337). The molecular and morphological results in this study fit with the description of *P. belbahrii* (Thines *et al.*, 2009), previously recorded as causing downy mildew of *S. scutellarioides*. To our knowledge this is the first record of *P. belbahrii* infection on *Solenostemon* spp. in the UK. *Peronospora belbahrii* is recorded infecting *Solenostemon* spp. in the USA and Germany (Farr & Rossman, 2014). In the UK, *P. belbahrii* has been confirmed on basil and *Agastache* sp. (Webb *et al.*, 2012), both of which are propagated by seed,

thereby limiting the risk of downy mildew spread and infection. *Solenostemon* spp. are predominantly propagated via cuttings and the detection of *P. belbahrii* surviving and producing conidiophores on asymptomatic tissue potentially increases the risk of rapid spread through the plant trade undetected.

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References

- Cooke DEL, Drenth A, Duncan JM, Wagels G, Brasier CM, 2000. A molecular phylogeny of *Phytophthora* and related Oomycetes. *Fungal Genetics and Biology* **30**, 17–32. <http://dx.doi.org/10.1006/fgbi.2000.1202>
- Daughtrey ML, Holcomb GE, Eshenaur B, Palm ME, Belbahri L, Lefort F, 2006. First report of downy mildew on greenhouse and landscape coleus caused by a *Peronospora* sp. in Louisiana and New York. *Plant Disease* **90**, 1111. <http://dx.doi.org/10.1094/PD-90-1111B>
- Farr DF, Rossman AY, 2014. Fungal Databases, Systematic Mycology and Microbiology Laboratory, ARS, USDA. Retrieved February 10, 2014, from <http://nt.ars-grin.gov/fungaldatabases/>.
- Koroch AR, Villani TS, Pyne RM, Simon JE, 2013. Rapid staining method to detect and identify downy mildew (*Peronospora belbahrii*) in basil. *Applications in Plant Sciences* **1**, 1300032. <http://dx.doi.org/10.3732/apps.1300032>
- Thines M, Telle S, Ploch S, Runge F, 2009. Identity of the downy mildew pathogens of basil, coleus, and sage with implications for quarantine measures. *Mycological Research* **113**, 532–540. <http://dx.doi.org/10.1016/j.mycres.2008.12.005>
- Webb K, Sansford C, MacLeod A, Matthews-Berry S, 2012. Rapid assessment of the need for a detailed Pest Risk Analysis for *Peronospora belbahrii*. UK Risk Register Details for *Peronospora belbahrii*. UK Plant Health Risk Register (DEFRA). <https://secure.fera.defra.gov.uk/phiw/riskRegister/viewPestRisks.cfm?csref=26813>



Figure 1



Figure 2

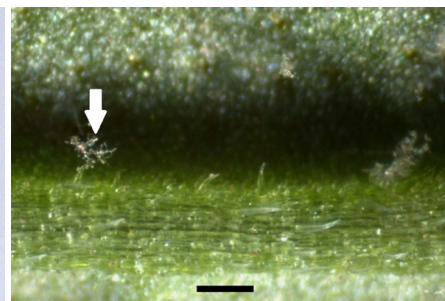


Figure 3

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