New Disease Reports

First report of the rust *Puccinia porri* on cultivated *Allium vineale* 'Hair'

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Allium vineale is native in the UK and temperate Europe and naturalised elsewhere. In North America, amongst other places, it is considered to be an exotic invasive weed. *A. vineale* is also cultivated as an ornamental plant, including the variety *A. vineale* 'Hair'. In June 2014, all stems of this variety (*ca*. 50 plants), established from commercial bulbs in a private garden in York in 2004, exhibited multiple eye-shaped lesions for the first time, with dark edges and golden-yellow centres, *ca*. 10mm long x 5mm wide (Fig. 1). Infected plant material was deposited in the Kew fungarium under accession number K(M)193813. The causal agent was suspected to be *Puccinia porri* (synonym *Puccinia allii*).

In August, stem samples (Fig. 2) were confirmed as being infected by *P. porri* based on morphological characteristics and molecular diagnostics. Teliospores measured 34-50 µm (mean 43 µm) x 18.75-28 µm (mean 21 µm) (Fig. 3); matching conventional descriptions (e.g. McNabb, 1966). As only resting spores (teliospores) were present on the sample at this stage, it was not possible to perform Koch's postulates. Molecular diagnosis used primers ITS1F and RUST1 for analysis of the ITS region, as described by Anikster *et al*. (2004). Sequences isolated from infected *A. vineale* 'Hair' samples (GenBank Accession Nos. KP205384 and KP205385) were 99% identical to *P. allii* isolates from cultivated chives (*Allium schoenoprasum*; AF511087) and garlic (*Allium sativum*; AF511075). In addition, the large ribosomal subunit (LSU) was amplified and sequenced using primers NL1 and NL4 (Maier *et al.*, 2003). Although the isolated LSU sequences (KP205382 and KP205383) matched *P. allii* sequences in GenBank (AF511087 and AF511075; 98% and 99% respectively), they additionally closely matched LSU sequences of *P. hordei* (AF511086; 98%) and *Uromyces scillarum* (AF511085; 99%). However, morphological characteristics of our isolates do not match these two species.

Phylogenetic analysis of the ITS region was undertaken using KP205384, KP205385 and the top 18 matching sequences retrieved through NCBI megablast (see Fig. 4). The rust on *A. vineale* 'Hair' falls within *P. porri* (as the synonym *P. allii*). Anikster *et al*. (2004) observed a geographical split, supported by morphological and molecular data, but stated more work was needed before splitting *P. porri.* This finding indicates a potential new group within *P. porri sensu lato*. If research separates *P. porri* into two species, the rust on *A. vineale* 'Hair' may also represent a new species.

P. allii has been reported on wild plants of *A. vineale* in Bulgaria, Portugal, Spain, Sweden, the UK and USA, but not on cultivated varieties (Farr & Rossmann, 2014). Kirk and Cooper (2009) list 32 records of *P. allii* and two of *P. porri* on *A. vineale* in Britain and Ireland. Only one of these (*P. allii*) was on an unnamed ornamental variety (growing in the National Botanic Garden of Wales, April 2009) and symptoms were reported on the leaves, not the stems. To our knowledge this is the first report of *P. porri sensu lato* on *A. vineale* 'Hair' in the world.

A field experiment conducted by Koike and Smith (2001) suggested that invasive *A. vineale* has the potential to act as a source of overwintering inoculum of *P. porri* (as *P. allii*) for commercial crops of garlic (*A. sativum*) and onion (*Allium cepa*). Although not investigated, cultivated ornamental varieties of *A. vineale* are not only at risk of infection themselves, but could also act as an inoculum source of *P. porri* for other commercial crops of *Allium* spp. in the UK.

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Figure 1

Figure 2

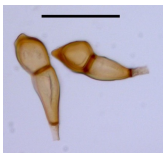

Figure 3

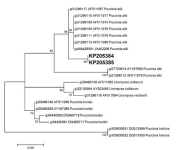

Figure 4

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