New Disease Reports

First finding of *Phytophthora foliorum* in the United Kingdom

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In January 2016, Science and Advice for Scottish Agriculture received shoots of *Rhododendron ponticum* submitted by a Forestry Commission Scotland Tree Health Officer. The samples had been collected during a survey for *P. ramorum* from an extensive area of wild rhododendron growing along a road in the northwest of Scotland (Fig. 1).

Affected shoots were wilted with red-purple discoloration of the leaves as well as dieback of the branch tips. Segments of leaves and stems bordering the discolorations and dieback were plated onto V8 agar containing antibiotics selective for *Phytophthora* spp. (PARPNH; Jung *et al*., 1996). The agar plates were incubated at 18°C and after five days a *Phytophthora* sp. had grown from some of the segments. The resulting culture was homothallic with an abundance of plerotic, thick-walled oogonia and predominantly paragynous antheridia (Fig. 2). No sporangia were observed. The growth rate on V8 agar was 51-56 mm after seven days at 20°C with little aerial mycelium (Fig. 3).

Sequencing the ITS region of the ribosomal RNA gene (GenBank Accession No. KX364273) after amplification with primers ITS4 and ITS6 (White *et al*., 1990; Cooke & Duncan, 1997) revealed a 100% match with four isolates of *P. foliorum* (e.g. KJ755120 and EF120469). A subsequent sample from the same plant was sent to the Tree Health Diagnostic and Advisory Service of Forest Research, Alice Holt where the finding was confirmed.

To complete Koch's postulates the abaxial sides of detached *R. ponticum* 'Variegatum' leaves (n=12) were inoculated with agar plugs (4 mm diameter) from a two-week-old *P. foliorum* culture in a 50 µl droplet of sterile distilled water that was replenished every two-three days. One half of the leaves was wounded by a pin prick before inoculation the other half was left non-wounded. Leaves were incubated at 20°C under natural light. After seven days, lesions (1-1.5 cm diameter) developed around the wounds from which the pathogen was readily re-isolated; without wounding, no lesions formed. For comparison, the same host was inoculated with other *Phytophthora* spp. at the same time. *P. foliorum* appeared to be less aggressive than *P. kernoviae* and *P. ramorum*, but more aggressive than *P. gonapodyides* and *P. syringae* (Fig. 4).

Phytophthora foliorum was first described by Donahoo *et al*. (2006) attacking the foliage of evergreen hybrid azaleas (*Rhododendron* sp.) in nurseries in California and Tennessee, USA. No other hosts have been reported to date. The only other report of this pathogen is from two-year-old azalea plants in two container stands from an ornamental nursery in Spain (Jung *et al*., 2016). The finding in Scotland is the first detection in the UK and the first finding in the wider environment in the world. A follow-up survey in the surrounding area found a second wild *R. ponticum* with *P. foliorum* which was also infected by *P. ramorum*. Other *Phytophthora* species present on *R. ponticum* in the surrounding area were *P. gonapodyides* and *P. syringae*. All infected plants have now been removed as part of a rhododendron clearance programme.

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Figure 1

Figure 2

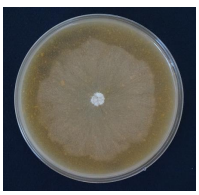

Figure 3

Figure 4

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