

Biosecurity and *Phytophthora* Monitoring at the Royal Botanic Garden Edinburgh

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Ex situ conservation—that is, propagating plants outside their native environment to preserve germplasm and reduce pressure on threatened species—is a crucial part of the plant conservation toolbox (Mounce et al. 2017). However, translocating plants for the sake of conservation presents a special challenge: it is impossible to move plants without also moving some number of their microbial associates, some of which may be damaging parasites on new hosts and/or in new environments. *Ex situ* conservation programs have high scientific and conservation value, but require acknowledgement and management of pest/pathogen introduction risks.

These introduction risks have been highlighted recently with the documentation of *Phytophthora* spp. movement in California conservation programs (Rooney-Latham et al. 2018) and in ornamental nurseries in Oregon (Parke et al. 2014), compounded by the heavy ecological toll worldwide of such diseases as ramorum blight and *Phytophthora austrocedri* dieback of junipers.

In response to these challenges, The Royal Botanic Garden Edinburgh (RBGE) has evaluated and revised its biosecurity practice and undertaken a monitoring program to assess its Living Collection and propagation systems for *Phytophthora* spp. as a bellwether for cryptic pathogens.

Here, we discuss RBGE's tiered risk-based approach to biosecurity monitoring and findings from pre-translocation screenings and repeated systematic sampling of planted garden environments and the separate nursery facility. We report the incidence, diversity, and spatial distribution of *Phytophthora* spp. in nursery and long-term planted environments, and discuss their importance for biosecurity practice and allocating monitoring effort.

References

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