

Department of Life Sciences

Phylogenetics of Plant Pathogenic Fungi



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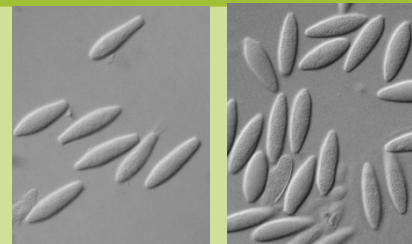
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Objectives

Fungal plant pathogens have enormous impact worldwide causing up to 16% loss in production. Diagnosis of plant diseases is hampered by the difficulties in species identifications. Species were traditionally identified based on their morphology, but in practice this is difficult to apply and underestimates the number of species. It also does not clearly discriminate pathogenic from saprophytic species (e.g., *Neofusicoccum luteum* and *N. parvum*, Fig 1 a, b).

Therefore, the objective of this research is to study the phylogenetic relationships of fungi associated with plants to differentiate pathogenic from non-pathogenic species (Fig. 2).



1a. *N. luteum*
(non-pathogen)

1a. *N. parvum*
(pathogenic)

Methodology

Large collections of isolates from various disease symptoms on different hosts are sampled. The fungal isolates are purified, DNA isolated, purified and ITS and EF1-alpha loci are sequenced by established methods. Sequences are aligned and phylogenetic trees constructed by the usual methods and species boundaries established.

This methodology has already been applied by us to fungi in the Botryosphaeriaceae, Plectosphaerellaceae and various genera in the Capnodiales. Hosts include *Quercus suber*, *Vitis vinifera*, various vegetable crops with root and collar rots and several ornamentals.

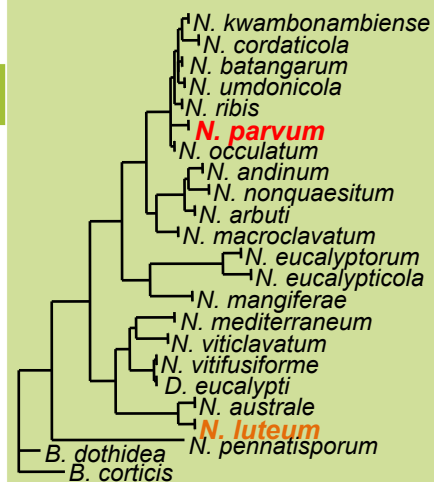


Fig. 2. In a combined phylogeny, *N. luteum* (non-pathogenic) is clearly distinguished from *N. parvum* (virulent pathogen).

Expected Results

Thus far we have resolved species complexes of *Diplodia* on cork and other oaks, *Diplodia* species on Rosaceae, *Neofusicoccum* species on *Vitis vinifera*, *Plectosporium* species associated with root and collar rots. This has resulted in clarification of the species limits, identified the pathogenic species and resulted in descriptions of many new species (Fig. 3). This information is being used in plant disease diagnostics.

We are continuing this line of research and applying the same approach to other hosts of economic importance, such as *Eucalyptus* in Portugal, Mango in Brazil and Iran, grapevines in Algeria.

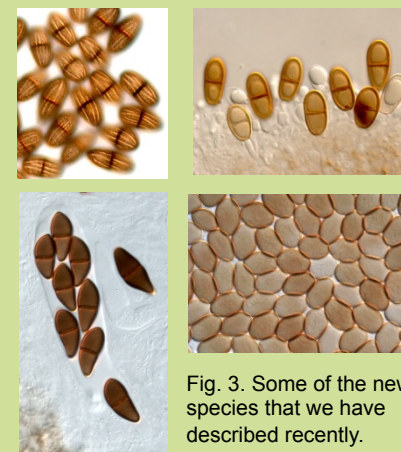


Fig. 3. Some of the new species that we have described recently.

Funding:

PTDC/AGR-FOR/3807/2012 Potential impact of climate changes on Botryosphaeriaceae-related diseases of *Eucalyptus* spp. in Portugal. PI A.Alves, U. Aveiro; partner A. Phillips, FCT.
Pest-OE/BIA/U10457/2011.