



**Fig. 1.** Severe dieback and mortality of a forest stand of *Eucalyptus gomphocephala* (a); crown symptoms of a declining *E. gomphocephala* (b); sporangia of *Phytophthora multivora* on V8 agar (c); oogonia of *P. multivora* with paragynous antheridia andplerotic oospores, scale bar = 50 µm (d). Photo credits: Thomas Jung, Centre for Phytophthora Science and Management.

**Disease:** *Phytophthora multivora* dieback

**Classification:** D: Eukaryota, K: Stramenopila, C: Oomycota, O: Peronosporales, F: Pythiaceae.

*Phytophthora multivora* is pathogenic to *Eucalyptus gomphocephala* and *E. marginata* and is believed to be involved in the decline syndrome of both eucalypt species within the tuart woodland in south-west Western Australia. Further research is required to determine the role of *P. multivora* in ecosystems throughout the known distribution.

**The Pathogen:** *P. multivora* was previously identified as *P. citricola* in WA based on morphological characters and similar growth rates at 25 °C. Phylogenetic analyses of the ITS and *cox1* gene regions show that *P. multivora* is unique and comprises a discrete cluster within the major ITS clade 2 of Cooke *et al.* (2000) with its present closest relative being *P. citricola*.

**Morphology:** *P. multivora* isolates are similar to *P. citricola* including homothallic mating, paragynous antheridia, semipapillate persistent sporangia, oogonia dimensions and the absence of catenulate hyphal swellings. *P. multivora* produces smaller oogonia and oospores, and thicker oospore walls than *P. citricola*. The oospore wall index (Dick 1990), the ratio between the volume of the oospore wall and the volume of the entire oospore, was almost 50% higher than that of the *P. citricola*.

**Distribution:** *P. multivora* is wide spread in south-west Western Australia. It has been found in Hungary, Canada, Switzerland, Korea, Japan and Spain.

**Host Range:** In south-west WA, *P. multivora* has

been isolated from 16 species including *Eucalyptus gomphocephala*, *E. marginata* and multiple *Banksia* species.

**Impact:** *P. multivora* is the first record of a *Phytophthora* species associated with *E. gomphocephala* decline and has been shown to proliferate on calcareous soils, believed to be suppressive to other *Phytophthora* species including *P. cinnamomi*. It is also found in a range of other soil types. It is believed to be a significant driving factor contributing to the complex decline of *E. gomphocephala* and *E. marginata* within the Yalgorup National Park, WA. Initial results indicate that *P. multivora* attacks the fine roots of *E. gomphocephala* and may not colonize the stem collar under normal conditions. The high oospore wall index indicates that *P. multivora* may be adapted to tolerate periods of prolonged drought.

**Detection and control:** Isolation by soil baiting may be cryptic and variable on different soils and may require a range of soil preparation treatments and baits to break dormancy. Nursery hygiene and the quarantine of infected areas is required to control the spread. Initial results indicate that infected *E. gomphocephala* respond well to phosphite application.

**Further Reading:** Scott *et al.* (2009) *Persoonia* 22: 1-13; Burgess *et al.* (2009) *Plant Disease* 93: 215-223; Shearer *et al.* (1988) *Plant Disease* 72: 121-126.

**Key Contacts:** Peter Scott, Murdoch University, e-mail: p.scott@murdoch.edu.au; Prof. Giles Hardy, Murdoch University, e-mail: g.hardy@murdoch.edu.au, Ph: (08) 9360 6272