



**Fig 1.** (a) Symptoms of Dothistroma needle blight (DNB) on *Pinus radiata* needles, (b) close-up of characteristic red DNB band on needle showing black fruiting bodies, (c) cross section of needle showing extensive mesophyll colonisation by *Dothistroma septosporum* (labelled with green fluorescent protein), (d) culture of *D. septosporum* secreting dothistromin, (e) fruiting bodies with copious spores erupting through the epidermis of a pine needle. Photo credits: Kabir and Bradshaw.

**Common Name:** *Dothistroma septosporum* (Dorog.) M. Morelet  
**Disease:** Dothistroma needle blight (DNB)  
**Classification:** K: Fungi, P: Ascomycota, C: Dothideomycetes, O: Capnodiales, F: Mycosphaerellaceae

*Dothistroma septosporum* is the main causal agent of Dothistroma needle blight (DNB), an important foliar disease of pine species that can kill heavily infected trees. The pathogen has a global distribution and recent epidemics in some regions have been associated with climate trends of increased rainfall.

**Biology of the pathogen:** *Dothistroma septosporum* is a hemibiotrophic fungal pathogen. It grows epiphytically across the needle surface before entering the plant through stomata, then eventually causing necrosis of host tissue. The red-coloured toxin dothistromin is a virulence factor required for expansion of the necrotic lesions. Reproduction is usually asexual, with spores distributed by rain-splash between hosts, but sexual reproduction has been observed in some Northern Hemisphere forests. *D. septosporum* is morphologically very similar to the less common species *D. pini* that also causes DNB; these species are only distinguishable by a DNA test.

**Distribution:** *D. septosporum* is distributed worldwide and has been found on all continents except Antarctica. On the other hand, distribution of *D. pini* seems to be limited to north-central USA and Europe. DNB occurs in both natural and plantation forest ecosystems. Although DNB occurs in a wide range of climatic conditions, the pathogen thrives best in areas with high rainfall. Most of New Zealand has a climate suitable for DNB due to high rainfall. Recent research reports suggest the incidence of DNB is increasing in many regions, particularly in Europe. A global DNB monitoring map is available at <http://arcgis.mendelu.cz/monitoring/>.

**Symptoms:** DNB symptoms usually first appear on lower needles of pines as yellow spots, these later encircle the needle and widen to a necrotic band. Diseased needles often also show dead tips and a green base. Characteristic red bands are then seen on needles, due to accumulation of dothistromin. In later stages, black fruiting bodies appear in the necrotic bands, arranged in rows parallel to the long axis of the needle. The disease cycle is highly variable, and can take up to 12 weeks, even in controlled glass house conditions.

**Host Range:** Over 80 pine species are hosts of *D. septosporum*. In addition to *Pinus* species, other conifers such as *Pseudotsuga menziesii* (Douglas fir), *Larix decidua* and some species of *Picea* (such as Norway spruce) have been reported with DNB.

**Impact:** In New Zealand lost revenue from *P. radiata* timber growth and control costs are estimated at \$20M per annum. In the Northern hemisphere heavy mortality has occurred in natural stands of pines in Canada and Europe in the past 20 years.

**Management options:** In New Zealand, DNB is mainly controlled by spraying copper fungicide. Because susceptibility varies between species, DNB can also be controlled by planting less susceptible hosts or by reducing inoculum through pruning and thinning.

**Further Reading:**

Kabir, M. S. et al (2015). *Plant Pathology* **64**(1): 225-234; Kabir, M. S. et al. (2015). *Forest Pathology* **45**(3): 190-202.  
 Watt, M. S. et al (2011). *Forest Ecology and Management*. **261**(11):1792-1798.  
 Watt, M. S. et al (2011) *NZ Journal of Forestry*. **56**(1): 20-22; Woods, A.J. et al (2016) *Forest Pathology* doi:10.1111/efp.12248  
 A special issue of *Forest Pathology* on Dothistroma needle blight is scheduled for publication later in 2016.

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