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First record of the lupin pathogen *Phoma schneiderae* in Australia

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Abstract. There was a high incidence of root rot and leaf blight in a bitter white lupin crop grown at Minimay in the West Wimmera region of Victoria in 2004. *Phoma schneiderae* was consistently isolated from diseased plants and shown to be the causal agent according to Koch's postulates. This is the first record of *P. schneiderae* in Australia.

White lupin (*Lupinus albus*) is grown as both a forage and grain legume in the USSR, Poland, Germany, South Africa, and the Mediterranean, and as a cash crop in Australia, from where it is exported to the European and East Asian feed markets. At present, it is a minor field crop in Victoria, but has been very profitable because the grain is sold at a premium over that of the more common narrow-leafed lupin (*Lupinus angustifolius*). There appears to be considerable potential for expansion of the industry in eastern Australia, especially following the outbreak of lupin anthracnose in Western Australia.

In October 2004, an unidentified disease occurred in a commercial crop of bitter white lupin cv. 'Giant Bitter' being grown at Minimay in the Wimmera region of Victoria. The disease caused leaf scorch and root rot, which seriously retarded plant growth and sometimes partially defoliated plants. It was estimated to have affected ~25% of plants within the crop. Most infected plants were stunted with mild chlorosis and had elongated black lesions that often completely girdled and sometimes severed the taproot. On the leaves, there were small (3–5 mm wide), circular shaped light-brown lesions, sometimes with a small chlorotic area surrounding the lesion. Where the disease was severe, the leaf tips and edges turned completely yellow, and the affected leaflets withered and died before falling to the ground.

In order to determine the causal organism, 40 plants (20 diseased and 20 apparently healthy) were removed from the affected crop on 5 October 2004 (~16 weeks after emergence), when they were 15–20 cm tall and had developed 7–8 leaves. Individual plants were removed by digging to a depth of 20 cm, then washed to remove soil from the roots. Infected segments of the leaves, stem and taproot were removed from each plant, split longitudinally, then surface sterilised (1 min in 0.5% NaOCl) and plated onto V8 agar.

A species of *Phoma* was consistently isolated from all affected samples. Morphological and cultural characters on oatmeal agar and malt agar were obtained according to Boerema *et al*. (2004). The fungus was identified as *Phoma schneiderae* Boerema *et al*., based on colony colour, growth rate, aerial mycelium, conidium septation and chlamydospore production. In culture the first pycnidium also produced some conidia which were larger and two-septate. These resembled the conidia that are produced *in vivo* by the synanamorph (*Stagonosporiopsis lupini* Boerema *et al*.). This is the first record of *P. schneiderae* in Australia. Specimens have been deposited in the plant pathology herbarium of the Victorian Department of Primary Industries as accessions VPRI 32174 and VPRI 32175. The rDNA ITS regions of these isolates were sequenced and have been deposited in GenBank under accessions DQ660979 and DQ660980. These two sequences were identical, but differed by only three bases from *Phoma pinodella* (L.K. Jones) Morgan-Jones & K.B. Burch sequences from south-eastern Australia obtained by Bretag and Cunnington (2005). This similarity is somewhat surprising, as these two species are placed in different sections of *Phoma* (Boerema *et al*. 2004); however, both species are pathogens of legumes. There was also a low incidence of *Fusarium* and *Pythium* species on diseased roots, and *Alternaria* and *Stemphylium* species on diseased leaves and stems.

Glasshouse studies on white lupin were undertaken to prove Koch's postulates. For foliar inoculation, leaves and stems were inoculated with spore suspensions of *P. schneiderae*. In a separate experiment, soil-borne inoculum was prepared by growing the isolates on autoclaved barley

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grain, which was mixed with soil before planting. Detailed methods are given in Bretag and Cunnington (2005). Foliar and root rot symptoms were the same as those observed in the field. *Phoma schneiderae* was readily reisolated from infected tissues taken from the leaves, stems and roots, thus confirming Koch's postulates. Limited host range experiments were also conducted. The isolates were weak foliar pathogens of pea and fenugreek, and weakly pathogenic on roots of pea. The fungus was moderately aggressive on roots of fenugreek.

Phoma schneiderae is a seed-borne pathogen of lupins. It is commonly found on perennial lupins in North America, and it is known as a significant pathogen of *L. mutabilis* in South America (Boerema *et al*. 2004). It has been found occasionally in England on *L. arboreus*, and has more recently been found there causing disease on *L. albus* (Boerema *et al*. 1999). Despite being able to affect plants other than lupins in the glasshouse, *P. schneiderae* has never been recorded on hosts other than lupins in the field. The Victorian Plant Standards Branch undertook surveys for this fungus in Victoria in the 2005–06 season. It was not found, and was not isolated from self-sown white lupins at the original site in Minimay.

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