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STUDIES OF  
MARSSONINA AND DREPANOPEZIZA  
SPECIES PATHOGENIC TO POPLARS

A thesis presented in partial fulfilment of  
the requirements for the degree of Doctor  
of Philosophy at Massey University

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Seedling of *Populus trichocarpa* (2 years old) ex California attacked by *Marssonina brunnea*. Note that as typically observed with this disease defoliation of the lower foliage has occurred.







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## ABSTRACT

A taxonomic study was conducted of *Marssonina* species pathogenic to poplars. From descriptions of conidial morphology in the literature and examination of type material 3 species were recognised viz: *M. populi*, *M. castagnei* and *M. brunnea*. Study of worldwide collections of 280 herbarium specimens confirmed the existence of the three species and further established the validity of type specimens as species representatives. The stability of selected differential taxonomic criteria was evaluated both in the laboratory and field under varying environmental conditions. Subsequent comparative morphological studies under defined laboratory conditions established that features of conidium morphology (shape, mean dimensions and septum location) were valid differential taxonomic criteria. Further, the existence of 'large-conidium variants' was demonstrated. Microconidia were of no value in species delimitation. Host range and pathogenicity tests revealed two host specific forms of *M. brunnea*:

- (i) *M. brunnea* f. sp. *trepidiae* pathogenic to *P. tremula* and *P. tremuloides*,
- (ii) *M. brunnea* f. sp. *brunnea* pathogenic to *P. deltoides* and *P. x euramericana*.

Conidium and microconidium ontogeny of the three *Marssonina* species was annellidic and not phialidic as previously reported.

A taxonomic study of *Drepanopeziza* species pathogenic to poplars established the synonymy of *D. tremulae* and *D. punctiformis* and the close morphological similarity of *D. tremulae*, *D. populorum* and *D. populi-albae*. Production of apothecia of *D. tremulae* was induced in the laboratory and the rate of maturation shown to be temperature dependent. Incubation temperature had no significant effect on dimensions of asci and ascospores.

Seed transmission studies established that *M. brunnea* was transmitted on imported poplar seedlines as a contaminant. Seed-borne contamination was effectively controlled by dusting seed with a number of fungicides, the benzimidazole derived compounds being particularly effective.

Studies on the pathogenesis of *Marssonina* species to poplars showed that germ tubes penetrated poplar leaves directed by enzymatic activity, the infection peg being naked. Within host tissue hyphae ramified indiscriminately.

inately and completely disrupted cellular contents. The resistance of leaves to infection increased significantly with maturity, this being attributed to the ultrastructure of the mature cell wall.

In depth host range studies of New Zealand and overseas isolates of *M. brunnea* established the wide host range and strong pathogenicity of this species. In many instances gross differences in pathogenicity were revealed between isolates. The solution to this disease as seen in the breeding of resistant material is discussed.