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PLANT PATHOGENIC SPECIES OF
STEMPHYLIUM WALLR. IN NEW ZEALAND

A thesis presented in partial fulfilment
of the requirements for the degree of
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by

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ABSTRACT

A taxonomic study was conducted of 48 isolates of plant pathogenic Stemphylium Wallroth species, all of which produced a Pleospora Rabenhorst perfect state in culture. Specific identification was attempted using gross colony characters and morphological features of the imperfect and perfect states. Only conidial and ascospore features proved to be of taxonomic value. The diagnostic conidial features were shape, dimensions, length/width ratio, number of longitudinal and lateral septa, number of lateral septal constrictions, ornamentations and pigmentation. Ascospore features of taxonomic significance were dimensions, and shape of both juvenile and mature spores.

On the basis of these criteria it was concluded that three Stemphylium species were present, namely Stemphylium botryosum Wallroth, Stemphylium globuliferum (Vestergren) Simmons, and Stemphylium vesicarium (Wallroth) Simmons, each with a corresponding Pleospora state. This cross-pairing had value since identification of form-species allowed reliable prediction of the Pleospora species, and vice-versa.

The cultural conditions providing the best expression of conidial features (and thus facilitating separation of Stemphylium species) were 5% V-8 agar, pH 7.5, 20C and an 8h photoperiod. Synchronous production of conidia was induced with an injury technique and ascostromata were matured most rapidly at either 12C or a diurnal temperature regime of 8h at 16C/16h at 8C.

A taxonomic survey of 166 Stemphylium isolates from 12 host species revealed the three previously mentioned species and a further undescribed species. The latter was isolated from annual phlox and was characterized by exceptionally large ascospores. S. vesicarium was by far the most common species, occurring on asparagus, chrysanthemum, blue lupin, Russell lupin, tree lupin, onion, pepper and tomato. The legumes were hosts of more than one species; lucerne for instance was a host for S. botryosum, S. globuliferum and S. vesicarium, while Russell lupin and tree lupin were only infected by S. botryosum and S. vesicarium. By contrast, lettuce and carnation were only infected by S. botryosum.

Cross-pathogenicity tests indicated that host specialization was relatively uncommon. S. botryosum from lettuce and the Stemphylium sp. from annual phlox were the only isolates exhibiting host specificity.

The results of ultrastructural studies of conidiogenesis, the

phenomenon of vegetative reversion of conidiophores and juvenile conidia, and the mechanism of ascospore release in Pleospora are discussed.

A previously undescribed, saprophytic, chain-forming species of Stemphylium is also described.