

WATER, FUNGICIDES AND HOST RESISTANCE AFFECT DEVELOPMENT OF *ERYSIPHE PISI* ON PEA LEAVES; AN ELECTRON MICROSCOPE STUDY

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INTRODUCTION

Powdery mildew of peas (*Pisum sativum* L., caused by the fungus *Erysiphe pisi* DC. ex St-Am., occurs worldwide, and has prevented or limited pea production in many countries (Dixon, 1978). Severe epidemics of the disease have recently occurred in New Zealand, possibly due to dry, warm weather conditions (Falloon *et al.*, 1989a). The disease in green pea crops disrupts harvesting and reduces crop yield and quality, while effective fungicide control is costly (Falloon *et al.*, 1989a). Cryo-fixation techniques and the scanning electron microscope have been used to study morphology of *E. pisi* on pea leaves, and effects of water, fungicides and host resistance on development of the fungus.

METHODS

On a susceptible host (cv. 'Pania'), germinated conidia of *E. pisi* possessed single primary appressoria, and later developed hyphae radiating outwards across the host epidermis. Hyphae grew uni-directionally across leaves. Six days after inoculation, many hyphae were seen on leaf surfaces, and conidiophore development had begun. By 14 days, leaf surfaces were covered with powdery mildew colonies, consisting of surface hyphae, conidiophores and conidia. Morphology of *E. pisi* has been described in detail elsewhere (Falloon *et al.*, 1989).

Spraying distilled water onto leaves caused collapse of many hyphae while others appeared normal, and impact of water droplets caused severe disruption of colonies. Four days after water application, many abnormal outgrowths were observed on hyphae. Spraying leaves with triazole fungicides caused disruption of colonies and general

collapse of conidia and hyphae. On a resistant host (cv. 'Bounty'), conidium germination and early growth of hyphae were similar to that on 'Pania', but by 14 days after inoculation, conidia and hyphae had collapsed and no normal *E. pisi* tissue was seen.

RESULTS

Observed effects of water on *E. pisi* may explain reductions in severity of powdery mildews on several hosts recorded after rain or irrigation (Yarwood, 1978). Triazole fungicides, effective pea powdery mildew control agents (Kerse *et al.*, 1989; Follas & Welsh, 1989), caused rapid collapse of fungal tissue on leaf surfaces. Early growth of the fungus on both resistant and susceptible plants was similar, but on resistant leaves, development later ceased, suggesting that resistance in the host may be a response to penetration of leaves by the pathogen.

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