THE BIOLOGY OF PYTHIUM ULTIMUM TROW IN AN IRRIGATED PEA FIELD

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SUMMARY

Pythium ultimum Trow was found to be the predominant *Pythium* species isolated from pea roots and from soil from an irrigated pea field in the Murray-river district of eastern South Australia. Other species obtained were *P.debaryanum*, *P.echinulatum*(?) and a 'sporangial type', the latter failing to produce oospores on laboratory media. As only four isolates of *P.echinulatum*(?) were obtained from pea roots this species may have been present as a root surface contaminant.

Although *P.ultimum* was frequently isolated from roots of mature pea plants from the field, the fungus by itself was considered to have only a slight effect on plant growth. Only rarely was the presence of *P.ultimum* associated with the development of lesions on roots. Also, in a glasshouse experiment in which plants were grown in uncultivated soil inoculated with field soil, the fungus grew extensively on and within pea roots, apparently without causing disease.

Analysis of numbers of propagules of *P.ultimum* in small volumes of field soil, when estimated by the soil plate method, showed that a grouped distribution of the fungus existed in the field. When measured by

the dilution plate method on the other hand the distribution of propagules appeared to be following a Poisson series.

No difference in numbers of P. ultimum at 0-3 and 9-12 cm deep in the pea field was found at the end of the growing season but by the end of the following summer numbers were much greater in the 0-3 cm layer, a large decrease in numbers having occurred in the 9-12 cm layer. Both sporangia and oospores persisted over the summer. While a greater proportion of oospores than of sporangia were still viable at the end of the summer in which the investigation was carried out, the higher numbers of sporangia produced in the soil initially meant that sporangia remained predominant. However, from laboratory studies on loss of viability of sporangia with drying, it was considered that persistence of P.ultimum during a long summer of low rainfall may depend to a large extent on survival of oospores.

During oospore germination and prior to the extrusion of the germ tube, the spore contents became reorganized. The characteristic resting structures of reserve globule, refringent body and thick wall disappeared, the wall being reduced to less than 1µ in thickness. Oospores in this condition were indistinguishable from sporangia.

The relative proportions of oospores and sporangia produced by the fungus in sterilized soil were found to be markedly influenced by the water content of the soil. Oospores were produced in wet and sporangia in dry soil. However, in unsterilized, wet soil an unidentified factor greatly restricted oospore production by the fungus.