



SPECIES OF PYTHIUM ASSOCIATED WITH  
BARLEY IN SOUTH AUSTRALIA

by

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Thesis submitted to The University of Adelaide  
in fulfilment of requirements for the  
degree of Doctor of Philosophy

July, 1985

Awarded 25/11/85

## TABLE OF CONTENTS

	Page
DECLARATION	v
SUMMARY	vi
ACKNOWLEDGEMENTS	ix
CHAPTER 1 : GENERAL INTRODUCTION	1
CHAPTER 2 : FIELD SURVEY FOR <u>PYTHIUM</u> IN BARLEY CROPS IN SOUTH AUSTRALIA	8
A. Introduction	8
B. Characteristics of the field survey	9
C. Materials and Methods	13
C.1 Soil samples	13
C.2 Assessment of <u>Pythium</u> populations	13
C.2.1 Soil plate method	13
C.2.2 Dilution plate method	14
C.2.3 Results	15
C.2.4 Discussion	15
C.3 Isolation of <u>Pythium</u> species from the roots of infected barley seedlings	18
C.3.1 Selection of a root surface treatment	19
C.4 Isolation of <u>Pythium</u> from the root systems of barley seedlings taken from the field	24
C.5 Sporulation and identification of <u>Pythium</u> isolates	25
C.6 pH	26
C.7 Soil texture	26
D. Results and Discussion	27
D.1 Soil pH and Soil texture	27
D.2.1 Seasonal variation of <u>Pythium</u> populations	27
D.2.2 Conclusions	30
D.2.3 Discussion	31
D.3.1 Occurrence of <u>Pythium</u> species in barley soils and diseased barley roots	32
D.3.2 Discussion	34
CHAPTER 3 : TAXONOMY OF THE GENUS <u>PYTHIUM</u> . DESCRIPTION AND IDENTIFICATION OF <u>PYTHIUM</u> SPECIES ISOLATED FROM BARLEY SOILS AND INFECTED BARLEY ROOTS IN SOUTH AUSTRALIA	37
CHAPTER 4 : THE INFLUENCE OF ENVIRONMENT FACTORS INFLUENCING <u>PYTHIUM</u> SPECIES ON BARLEY	52
A. Introduction	52

	Page
B. The relationship between soil water and nine species of <u>Pythium</u> on the growth of barley	53
B.1 Materials and Methods	53
B.2 Results	55
B.3 Discussion	58
C. The relationship between soil water and inoculum density of <u>P. irregulare</u> on the growth of barley	59
C.1 Materials and Methods	59
C.2 Results	59
D. The relationship between pH of the medium and growth rate of <u>Pythium</u>	61
D.1 Linear growth of <u>P. irregulare</u> on pH substrates	61
D.1.a Materials and Methods	61
D.1.b Results	62
D.2 The growth of <u>P. irregulare</u> on different pH liquid cultures as determined by weight of mycelium	62
D.2.a Materials and Methods	62
D.2.b Results	64
E. Production of oogonia and sporangia of <u>P. irregulare</u> at different pH levels of media	66
E.1 Materials and Methods	66
E.2 Results	66
F. Influence of temperature on mycelial growth of <u>Pythium</u> species and on disease severity	69
F.1 Materials and Methods	69
F.2 Results	70
F.3 Discussion	72
CHAPTER 5 : <u>THE EFFECT OF PYTHIUM IRREGULARE AND PRATYLENCHUS THORNEI ON THE GROWTH OF BARLEY AND WHEAT</u>	75
A. Introduction	75
B. Materials and Methods	76
C. Results	77
CHAPTER 6 : <u>STUDIES ON PYTHIUM VOLUTUM</u>	87
A. Introduction	87
B. Occurrence of <u>Pythium volutum</u> in different soils of South Australia	87
B.1 Materials and Methods	87
B.2 Results	88

	Page
C. Relationship between pH of the medium and growth rate of <u>P. volutum</u>	91
C.1 Linear growth of <u>P. volutum</u>	91
C.2 The growth reaction of <u>P. volutum</u> in different pH liquid cultures as determined by weight of mycelium	93
D. The influence of temperature on mycelial growth of <u>P. volutum</u>	93
D.1 Materials and Methods	93
D.2 Results	95
E. Varietal resistance and susceptibility of barley to <u>P. volutum</u>	95
E.1 Materials and Methods	95
E.2 Results	97
E.3 Discussion	99
 CHAPTER 7 : STUDIES ON THE CONTROL OF <u>PYTHIUM</u> SPP.	 101
A. Introduction	101
B. Efficacy of metalaxyl (Ridomil 25 WP - CGA 48988) to control <u>Pythium</u> spp.	104
B.1 Introduction	104
B.2 Bio-assay and soil test	105
B.2.1 Materials and Methods	105
B.2.2 Results	108
B.3 Assessment of metalaxyl (Ridomil 25 WP - CGA 48988) effects on <u>Pythium</u> spp. under growth chamber conditions	108
B.3.1 Materials and Methods	108
B.3.2 Results	109
B.4 Field experiment	112
B.4.1 Materials and Methods	112
B.4.2 Results	114
B.4.3 Discussion	117
C. Biological control of <u>Pythium</u> spp. pathogenic to barley seedlings by using the mycoparasite <u>P. oligandrum</u>	118
C.1 Introduction	118
C.2 Parasitic relationships between <u>P. oligandrum</u> and some other species of <u>Pythium</u> in vitro	120
C.2.1 Materials and Methods	120
C.2.2 Discussion	127
C.3 Biological control of <u>Pythium</u> spp. that induced root disease in barley seedlings by treating the seeds with the mycoparasite <u>P. oligandrum</u>	128
C.3.1 Materials and Methods	129
C.3.2 Discussion	134

CHAPTER 8 : GENERAL DISCUSSION	137
BIBLIOGRAPHY	140
APPENDIX	

## SUMMARY

A field survey of barley soils conducted at three sites in South Australia : Roseworthy and Virginia, north of Adelaide, and Strathalbyn, south of Adelaide, revealed that Pythium species are common inhabitants of barley soils in South Australia. Population levels are higher in the 0-10 cm layer of the soil than in the 10-20 cm layer. A seasonal variation was found in the Pythium population of barley soils over 12 months. Monthly assays suggested that activity of Pythium in soil was directly influenced by temperature in two sites, whereas rainfall affected the Pythium population in only one site.

Eleven species of Pythium, isolated from soils and from infected barley seedlings, were identified and characterized. P. irregulare was found to be the predominant species. P. volutum was recorded for the first time in Australia.

The influence of environmental factors influencing Pythium species on barley was studied. There was a high positive correlation between soil moisture and the incidence of disease on barley seedlings caused by P. irregulare, P. graminicolum and P. volutum. The relationship between soil water and inoculum density of P. irregulare on the growth of barley revealed that, for this fungus, inhibition in growth of barley seedlings is associated with high population levels in soils with a high level of moisture.

The relationship between pH of the medium and growth rate of P. irregulare showed that the fungus can grow linearly and in weight at relatively high and low extremes with an optimum growth at neutral pH.

Experiments carried out to evaluate the influence of temperature on mycelial growth of Pythium irregulare and on disease severity indicated that the optimum temperature for mycelial growth was between 25--30°C, whereas the pathogenicity test showed that root length of barley seedlings was significantly reduced by the fungus at 13°C.

The influence of Pythium irregulare and the nematode Pratylenchus thornei was assessed to test the hypothesis that a statistical interaction occurred between the two organisms in their effect on host plants (barley and wheat). P. thornei seems to be equally pathogenic in wheat and barley, unlike Pythium irregulare which is more damaging in barley than in wheat. Nematode and fungus appear to act independently in terms of plant response to infection; Pythium irregulare more so in barley than in wheat.

Pythium volutum, was recorded for the first time in Australia. It was consistently isolated from infected barley roots and from soil in the survey of barley soils. Furthermore, P. volutum occurred in another 10 barley and wheat fields, with pH values and clay contents quite different from each other. Some aspects of fungus biology were studied in vitro such as the influence of temperature, pH and soil water on growth. Three barley cultivars commonly grown in South Australia were sown in artificially infested soil to assess varietal resistance and susceptibility to P. volutum. There were no differences between cultivars in terms of response to infection. All cultivars tested were susceptible to infection by P. volutum.

Studies on possible control measures for Pythium species were conducted. Metalaxyl (Ridomil 25 W P) was tested in vitro, in pots and

in the field. Metalaxyl, a fungicide specific against Pythium spp. and other oomycetes, produced a marked increase in growth when applied as a seed treatment.

Pythium oligandrum was tested in vitro and in pots to control other species of Pythium which were found to be pathogenic to barley seedlings. Clear evidence of control was achieved.