STUDIES OF CAMELLIA FLOWER BLIGHT (*CIBORINIA CAMELLIAE* KOHN)

A thesis presented in partial fulfilment of
the requirements for the degree of
Doctor of Philosophy in Plant Science
(Plant Pathology)
at
Massey University
Palmerston North
New Zealand

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March 2004

ABSTRACT

Camellias are popular ornamental plants and the most serious pathogen of this plant is camellia flower blight, caused by the fungal pathogen *Ciborinia camelliae* Kohn. Ascospores of this fungus attack the flowers, turning them brown, rendering infected flowers unattractive. Little is known about the pathogen and control measures are not particularly effective.

In this thesis, various aspects of the pathogen's basic and molecular biology and interaction with host species were studied.

Surveys of the distribution and spread of *C. camelliae* within New Zealand determined that the pathogen was present in most regions of the North Island, and north and east coasts of the South Island. Over the distances and time involved, it appeared that the disease was spreading mainly by windborne ascospores rather than human transfer.

Sclerotia were germinated out of season to increase the period during which ascospores were available for infection work. Greatest germination was achieved at low temperatures (5°C-10°C) in 24 h darkness.

Isolate-specific primers were designed to the ribosomal DNA Internal Transcribed Spacer region to detect the pathogen *in planta* and distinguish between New Zealand isolates of *C. camelliae* and other fungal pathogens. Phylogenetic analysis of the ITS region with other *Ciborinia*, *Sclerotinia* and *Botrytis* species showed that *C. camelliae* was more closely related to *S. sclerotiorum* than other *Ciborinia* species.

Two inoculation techniques for infecting *Camellia* petals with ascospores of *C. camelliae* were developed and tested. Inoculation using airborne ascospores in a settling chamber was a simple and quick method for testing large numbers of species for resistance. Inoculation of ascospores in suspension produced qualitative data, but was more time consuming.

Of the four mechanisms of resistance tested, levels of aluminium hyperaccumulation and the presence of phenolic compounds did not correlate with resistance in *Camellia* species. The large uptake of aluminium, however, did indicate that *Camellia* species would be good plants for phytoremediation of acid soils. Some resistant species were found to have cell wall modifications and/or lignification of cell walls in response to *C. camelliae* infection and chitinase activity was found in most resistant *Camellia* species tested. Further research into these latter two mechanisms is recommended and indicates that the development of resistant *Camellia* cultivars is possible.

ACKNOWLEDGEMENTS

Many thanks are due to my supervisors, Dr Peter Long and Dr Rosie Bradshaw, without whom this thesis would not exist. They have never failed to be patient and be readily available for questions or discussions about this work. Aside from their excellent academic input, I thank them for their delight when I announced the first pregnancy and their fortitude when I announced the second.

Thanks are also due to Hugh Neilson, Lorraine Davies and Pam Howell, who have always been ready to help with practical work, advice or administration details, statistician Duncan Hedderley for explaining and re-explaining, statistics, and Dr Brett Robinson for his guidance with the aluminium study.

Members of the New Zealand Camellia Society, particularly Vonnie Cave, Vince Neall, and Neville Haydon (who donated more than 100 plants and did all grafting experiments) were invaluable. In addition were the members of the Manawatu Branch, who lent their time and gardens for my research, and whose constant enthusiasm and interest kept me sustained through the boring bits.

In Los Angeles, Tim Thibault & Co. (Descanso Gardens) and Ann Richardson & Co. (The Huntington) befriended me and ensured my time there was successful, both research-wise and culture-wise.

Financially, thanks are due to the Massey University Doctoral Scholarship which kept me housed and fed; the Camellia Memorial Trust, who funded all my research costs; Descanso Gardens and The Huntington, who funded my two trips to Los Angeles; and my husband Brett, when all the funding ran out ...

A thank you to all the friends I made during my time at Massey, particularly Jennifer, Pyone, Cait and Georgie.

And finally, thanks are due to my family, my parents, particularly my mother, who provided valuable Bryn-sitting time so that this thesis could be completed. Thanks to my husband Brett for enduring the storm, and sons Bryn (born 22.12.02) and Tor (born 9.4.04), who actively hindered completion of this thesis, but in the nicest way possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

a.i.	active ingrediant
ANOVA	ANalysis Of VAriance
cc	cubic centimetre(s)
d	day(s)
df/DF	Degrees of Freedom
GA	Gibberellic Acid
GLB	Gel Loading Buffer
h	hour(s)
Hg	mercury
hpi	hours post inoculation
HR	Hypersensitive Response
IPTG	isopropylthio-β-D-thiogalactopyranoside
kPa	kilo Pascals
LB	Luria-Bertani broth or agar
L/D	Light/Dark
LS	Least Squares
min	minute(s)
mm	millimetre(s)
MS	Mean Square
nm	nanometres
PAL	Phenylalanine Ammonia Lyase
PCR	Polymerase Chain Reaction
PDA	Potato Dextrose Agar
ppm	parts per million
PR	Pathogenesis Related
p.s.i	pounds per square inch
RAPD	Randomly Amplified Polymorphic DNA
RH	Relative Humidity
RO	Reverse Osmosis
SS	Sums of Squares
μF	micro Farad
$\mu g\ g^{-1}$	micrograms per gram

V	volt
wk	week(s)
w/v	weight/volume
X-gal	5-bromo 4-chloro 2-indolyl-β-D-galactoside