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

A thesis presented in partial fulfilment of  
the requirements for the degree of  
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## 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.

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**LIST OF ABBREVIATIONS**

a.i.	active ingredient
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- $\beta$ -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
$\mu$ F	micro Farad
$\mu$ g g <sup>-1</sup>	micrograms per gram

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