



IDENTIFICATION OF CANDIDATE DEFENCE RESPONSE GENES ASSOCIATED WITH THE BARLEY-*PYRENOPHORA TERES* INCOMPATIBLE INTERACTION

by

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TABLE OF CONTENTS

DECLARATION BY CANDIDATE	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
ABSTRACT	viii
CONFERENCE PROCEEDINGS	ix
<u>CHAPTER I:</u> Plant-pathogen interactions: a review	1
1.1 INTRODUCTION	1
1.2 PLANT DEFENCE MECHANISMS AGAINST FUNGAL PATHOGENS	2
1.2.1 Fungal infection of plants	2
1.2.2 General plant defence mechanisms	2
1.3 RECOGNITION AND INDUCED PLANT DEFENCE RESPONSES	4
1.3.1 The “gene-for-gene” <i>versus</i> the “guard” hypothesis	4
1.3.2 Features of R and Avr proteins	6
1.3.3 The hypersensitive response (HR)	7
1.3.4 The HR against biotrophic <i>versus</i> necrotrophic pathogens	8
1.3.5 Signalling molecules involved in coordinating plant defence responses	9
1.3.6 R gene signal transduction components	10
1.3.7 Differential gene expression in compatible <i>versus</i> incompatible interactions	12
1.3.8 Non-host resistance	13
1.4 ENGINEERING DISEASE RESISTANCE IN PLANTS	14
1.4.1 Manipulation of genes encoding antimicrobial proteins	14
1.4.2 Manipulation of genes encoding key regulators of the defence response	15
1.5 NET BLOTCH DISEASE OF BARLEY	16
1.5.1 The causal agent and forms of net blotch	16
1.5.2 Fungal penetration and colonisation	16
1.5.3 The genetics of net blotch disease resistance	18
1.5.4 Molecular aspects of the barley defence response	19
1.6 PROJECT AIMS AND SIGNIFICANCE	20
<u>CHAPTER II:</u> Identification of net blotch resistant and susceptible barley genotypes for differential screening	22
2.1 INTRODUCTION	22

2.2 MATERIALS AND METHODS	23
2.2.1 Plant material and pathogen inoculation	23
2.2.1.1 Plant and fungal material used	23
2.2.1.2 Inoculum preparation	23
2.2.1.3 Inoculation and sampling	24
2.2.2 Molecular analysis	25
2.2.2.1 Fungal DNA extraction	25
2.2.2.2 Isolate-specific PCR	25
2.2.2.3 Expression analysis of a defence-associated gene	26
2.3 RESULTS	26
2.3.1 Phenotypic analysis	26
2.3.2 Molecular analysis of re-isolated <i>P. teres</i> isolates	27
2.3.3 <i>PR-5</i> defence gene induction	27
2.4 DISCUSSION	30
<u>CHAPTER III: Differential accumulation of plant defence response genes in the barley- <i>P. teres</i> incompatible interaction</u>	32
3.1 INTRODUCTION	32
3.1.1 Suppression subtractive hybridisation (SSH) overview	33
3.2 MATERIALS AND METHODS	35
3.2.1 RNA extraction	35
3.2.2 Suppression subtractive hybridisation	35
3.2.2.1 Tester and driver double-stranded cDNA preparation	35
3.2.2.2 Subtractive hybridisation	36
3.2.2.3 Suppression PCR amplification	36
3.2.3 Subtracted cDNA library synthesis	36
3.2.4 Differential screening of the cDNA libraries using macroarrays	37
3.2.4.1 Preparation of cDNA macroarrays	37
3.2.4.2 Hybridisation and autoradiography	37
3.2.5 Differential screening of selected clones using Northern blots	38
3.2.6 cDNA sequencing and analysis	38
3.2.6.1 Template preparation and sequencing	38
3.2.6.2 cDNA sequence analysis	38
3.3 RESULTS	39
3.3.1 cDNA library construction	39
3.3.2 Macroarray analysis	39
3.3.3 Northern blot analysis	41
3.3.4 Sequence analysis of the SSH clones	45
3.3.5 Categorisation of the SSH clones into functional classes	45

3.4 DISCUSSION	51
3.4.1 Differential screening of SSH clones using macroarrays and Northern blots reveals limitations in detecting clones of low abundance	51
3.4.2 Candidate genes involved in the barley- <i>P. teres</i> incompatible interaction	54
3.4.2.1 Genes with unknown function or non-significant homology	54
3.4.2.2 Genes involved in metabolism	54
3.4.2.3 Genes with similarities to defence- and stress-related genes	55
3.4.2.4 Genes involved in gene expression, signal transduction, and protein degradation	58
3.4.2.5 Genes involved in transport and protein synthesis	61
3.4.3 Selection of clones for detailed expression analysis	63
CHAPTER IV: Expression profiling of SSH transcripts reveals novel insights into the early induction of genes associated with the barley-<i>P. teres</i> incompatible interaction	68
4.1 INTRODUCTION	68
4.1.1 Gene expression profiling by quantitative real-time PCR (Q-PCR)	68
4.1.2 Q-PCR normalisation	69
4.2 MATERIALS AND METHODS	70
4.2.1 Expression profiling by Q-PCR	70
4.2.1.1 Preparation of cDNA template	70
4.2.1.2 Experimental design	70
4.2.1.3 Data analysis	71
4.3 RESULTS	71
4.3.1 Primer specificity	71
4.3.2 Normalisation	72
4.3.3 SSH efficiency	75
4.3.4 Transcript profiling of selected SSH clones	75
4.4 DISCUSSION	87
4.4.1 Normalisation	87
4.4.2 Cluster analysis	88
4.4.3 SSH efficiency	89
4.4.4 Putative functions of the analysed genes	89
4.4.4.1 Profile 1 gene cluster	90
4.4.4.2 Profile 2 gene cluster	93
4.4.4.3 Profile 3 gene cluster	97
4.4.4.4 Profile 4 gene cluster	103
4.4.4.5 Profile 5 gene cluster	105
4.4.4.6 Profile 6 gene cluster	109
4.4.4.7 Profile 7 gene cluster	111
4.4.4.8 Profile 8 gene cluster	113

CHAPTER V: General discussion	114
5.1 Resistance to the barley net blotch pathogens may be governed by a common set of defence related genes and signal transduction pathways	115
5.2 The barley-<i>P. teres</i> incompatible interaction: Is it controlled by a non-host signal transduction pathway whose components are “amplified” following the recognition of avirulence effectors by the plant?	116
5.3 Quantitative differences in pathogen-induced gene expression distinguish the barley-<i>P. teres</i> incompatible interaction from a compatible one	121
5.4 Future work	122
5.4.1 Detailed cytological analysis of the barley- <i>P. teres</i> interaction within 24 hai	122
5.4.2 Functional characterisation of differentially expressed genes	122
5.4.3 Mapping of differentially expressed genes	123
5.4.4 Identification of novel variants of candidate defence response genes by mutational screening	124
5.4.5 Biochemical analysis of the barley- <i>P. teres</i> interaction	125
5.5 Conclusion and perspectives	125
 APPENDICES	
Appendix A Northern blot summary	126
Appendix B List of SSH clones and their sequence homologies	127
Appendix C Individual gene specific primers and acquisition temperatures for Q-PCR	145
Appendix D Melt profiles of individual SSH clones	147
Appendix E Normalisation factors	151
 REFERENCES	 152

ABSTRACT

Barley net- and spot-form of net blotch, caused by two *formae* of the hemibiotrophic fungus *Pyrenophora teres*, are two of the major diseases affecting barley crops worldwide. In this study, the method of suppression subtractive hybridisation was used to isolate barley epidermal genes that were differentially expressed in the early stages of both net blotch incompatible compared to compatible interactions. As a result, two subtracted libraries of cDNA clones comprising mainly of gene transcripts of low abundance were generated. Quantitative real-time PCR was employed to verify and profile the differential expression of forty-five subtracted transcripts during the first 48 hours of infection, resulting in the identification of twenty-eight clones that were pathogen-induced and differentially expressed. These clones were grouped into one of eight clusters depending on the kinetics of their expression, and they included groups of genes that were up-regulated early (within 3 hai) and later (24 hai) in both barley-*P. teres* incompatible interactions. Among the differentially expressed clones were those with sequence homology to genes that encode proteins involved in calcium signal perception (e.g. a calcineurin B-like protein), detoxification (e.g. multidrug transporters), carbohydrate metabolism (e.g. an invertase), and signal transduction (e.g. protein kinases). Furthermore, the expression profiles generated for each individual gene cluster were similar for both net- and spot-form interactions, indicating that the resistance-associated defence response against both pathogens may be mediated by the same molecular mechanism. The differentially expressed genes are discussed with respect to their potential functional role in contributing to net blotch disease resistance. In addition, a model detailing early events that may take place in the barley-*P. teres* incompatible interaction is presented.