

Supplementary Table 1 Primer sequences of pathogen-related (PR) protein genes of *Puccinia striiformis* f. sp. *tritici* used for qRT-PCR analysis of expression in wheat *Yr* gene lines inoculated with *Puccinia striiformis* f. sp. *tritici*

PR protein gene			Primer sequences (5' – 3')		Reference
Gene	Enzyme	Accession	Forward primer	Reverse primer	
<i>PR1</i>	PR protein 1	AJ007348	CTGGAGCACGAAGCTGCAG	CGAGTGCTGGAGCTTGCAGT	Desmond et al. 2006
<i>PR1.2</i>	Unknown	Not available	CGGTGTGTCCCTCTTATATT	CATCACCACACACAAATCAG	Molina et al. 1999
<i>PR2</i>	β -1,3-glucanase	Y18212	CTCGACATCGGTAACGACCAG	GCGGCGATGTACTTGATGTTC	Desmond et al. 2006
<i>PR3</i>	Endochitinase	AB0299934	AGAGATAAGCAAGGCCACGTC	GGTTGCTCACCAGGTCCTTC	Desmond et al. 2006
<i>PR4</i>	Endochitinase	Not available	AAGTGCCTCCAGGTGACGAA	TGCACTGGTCGACGATCCT	Casossola et al. 2015
<i>PR5</i>	Thaumatococin-like protein	AF44442967	ACAGCTACGCCAAGGACGAC	CGCGTCCTAATCTAAGGGCAG	Desmond et al. 2006
<i>PR9</i>	Peroxidase	Not available	CAAGGTGAACTCGTGATGGA	TTGAGGATTCAACCGTCGTT	Casossola et al. 2015
<i>PR10</i>	RNase	CA684431	TTAAACCAGCACGAGAAACATCAG	ATCCTCCCTCGATTATTCTCACG	Desmond et al. 2006
<i>β-actin</i>	Actin	Not available	TGTCGGGTGGAACGACCATGTATT	AGCCAAGATAGAACCACCGATCCA	Yin et al. 2009

Supplementary Table 2 Expression levels of pathogen-related (PR) protein genes in wheat near-isogenic lines with *YrTr1*, *YrExp2*, *YrSP* and *Yr76* for race-specific all-stage resistance to stripe rust at different days after inoculation (dai) with races PSTv-4 (incompatible to *YrTr1* and *YrExp2* and compatible to *YrSP* and *Yr76*) and PSTv-37 (compatible to *YrTr1* and *YrExp2* and incompatible to *YrSP* and *Yr76*) of *Puccinia striiformis* f. sp. *tritici* in seedling stage

Yr & PR protein gene	Mean relative expression ^A																
	0 dai			1 dai			2 dai			7 dai			14 dai				
	PSTv-4	PSTv-37		PSTv-4	PSTv-37		PSTv-4	PSTv-37		PSTv-4	PSTv-37		PSTv-4	PSTv-37			
<i>YrTr1</i>																	
<i>PR1</i>	0.30 ^a	0.19 ^a		4.58 ^{ab}	3.93 ^a		8.22 ^c	2.20 ^b	*		5.35 ^c	2.28 ^b	*		3.21 ^c	0.22 ^a	*
<i>PR1.2</i>	0.57 ^a	0.54 ^a		9.53 ^c	6.90 ^b	*	0.65 ^a	0.24 ^a			6.17 ^c	0.87 ^a	*		0.59 ^a	0.57 ^a	
<i>PR2</i>	1.14 ^a	0.30 ^a		7.56 ^c	1.33 ^a	*	3.21 ^c	2.06 ^b	*		6.05 ^c	2.32 ^b	*		0.34 ^a	0.10 ^a	
<i>PR3</i>	1.34 ^a	0.65 ^a		8.05 ^c	6.40 ^b	*	5.68 ^d	3.34 ^{bc}	*		4.96 ^b	1.62 ^a	*		1.55 ^{ab}	0.40 ^a	
<i>PR4</i>	0.67 ^a	0.32 ^a		5.30 ^b	2.79 ^a	*	6.33 ^d	3.30 ^{bc}	*		6.58 ^c	0.78 ^a	*		0.23 ^a	0.21 ^a	
<i>PR5</i>	0.17 ^a	0.28 ^a		5.65 ^b	4.14 ^{ab}		6.35 ^d	4.14 ^c	*		4.77 ^b	1.19 ^a	*		0.51 ^a	0.52 ^a	
<i>PR9</i>	1.61 ^a	1.29 ^a		5.11 ^b	3.66 ^a	*	0.02 ^a	0.03 ^a			0.08 ^a	0.00 ^a			0.32 ^a	0.36 ^a	
<i>PR10</i>	0.82 ^a	0.31 ^a		6.40 ^b	3.33 ^a	*	4.40 ^c	1.41 ^a	*		5.47 ^b	2.15 ^b	*		1.07 ^{ab}	0.23 ^a	
<i>YrExp2</i>																	
<i>PR1</i>	0.02 ^a	0.00 ^a		6.10 ^d	0.44 ^a	*	2.14 ^{bc}	0.77 ^a	*		1.93 ^c	0.16 ^a	*		1.79 ^b	0.39 ^a	*
<i>PR1.2</i>	0.67 ^a	0.29 ^a		2.99 ^c	1.14 ^{ab}	*	6.28 ^d	1.56 ^{ab}	*		2.60 ^{cd}	1.36 ^b	*		4.23 ^d	2.96 ^c	*
<i>PR2</i>	1.33 ^b	0.83 ^b		3.62 ^c	1.88 ^b	*	5.87 ^d	1.95 ^b	*		6.87 ^e	1.95 ^c	*		6.12 ^e	2.12 ^b	*
<i>PR3</i>	0.42 ^a	0.33 ^a		3.62 ^c	1.88 ^b	*	10.26 ^e	3.34 ^c	*		1.79 ^c	0.90 ^{ab}	*		2.21 ^b	0.53 ^a	*
<i>PR4</i>	0.85 ^b	0.17 ^a	*	2.62 ^{bc}	0.77 ^a	*	5.26 ^d	3.33 ^c	*		2.38 ^c	0.94 ^{ab}	*		1.90 ^b	0.83 ^{ab}	
<i>PR5</i>	0.78 ^a	0.76 ^a		5.80 ^d	2.96 ^c	*	16.18 ^f	0.97 ^a	*		1.54 ^b	0.50 ^a	*		2.85 ^c	0.71 ^{ab}	*
<i>PR9</i>	1.57 ^b	0.30 ^a	*	2.35 ^{bc}	0.54 ^a	*	2.40 ^c	1.54 ^{ab}	*		3.02 ^d	0.87 ^{ab}	*		1.87 ^b	0.28 ^a	*
<i>PR10</i>	0.11 ^a	0.05 ^a		8.03 ^e	1.63 ^b	*	2.95 ^c	1.38 ^{ab}	*		1.59 ^b	0.76 ^{ab}			1.82 ^b	0.75 ^{ab}	
<i>YrSP</i>																	

PR1	0.00 ^a	0.00 ^a		0.13 ^a	2.38 ^{bc}	*	2.32 ^c	15.72 ^h	*	0.50 ^a	4.07 ^c	*	0.23 ^a	0.56 ^a
PR1.2	0.00 ^a	0.00 ^a		0.00 ^a	4.78 ^d	*	1.28 ^b	11.71 ^f	*	0.10 ^a	5.39 ^d	*	0.03 ^a	0.38 ^a
PR2	0.25 ^a	0.73 ^a		0.98 ^a	9.56 ^f	*	3.66 ^c	25.88 ⁱ	*	0.01 ^a	0.00 ^a		0.12 ^a	0.31 ^a
PR3	0.83 ^b	0.88 ^b		1.80 ^b	24.24 ^h	*	0.30 ^a	5.99 ^d	*	0.68 ^a	5.86 ^d	*	0.80 ^a	0.81 ^a
PR4	0.20 ^a	0.94 ^b	*	0.30 ^a	4.85 ^d	*	0.60 ^a	2.68 ^c	*	0.16 ^a	4.00 ^c	*	0.15 ^a	0.46 ^a
PR5	0.27 ^a	0.16 ^a		0.97 ^a	5.94 ^e	*	0.15 ^a	2.96 ^c	*	0.26 ^a	0.30 ^a		0.01 ^a	0.01 ^a
PR9	0.08 ^a	1.56 ^c	*	0.11 ^a	1.56 ^b	*	1.68 ^b	11.66 ^f	*	2.02 ^b	10.05 ^f	*	0.18 ^a	2.52 ^b
PR10	0.00 ^a	1.68 ^c	*	0.39 ^a	8.32 ^f	*	0.17 ^a	0.95 ^b	*	0.06 ^a	0.40 ^a		0.05 ^a	0.17 ^a
Yr76														
PR1	0.46 ^a	1.00 ^a		1.20 ^{ab}	3.02 ^{bc}		2.76 ^b	7.81 ^e	*	0.72 ^a	3.20 ^{bc}	*	0.15 ^a	0.34 ^a
PR1.2	0.01 ^a	0.02 ^a		1.63 ^{ab}	3.40 ^{bc}		3.50 ^{bc}	4.69 ^c		0.62 ^a	10.48 ^b	*	0.40 ^a	0.51 ^a
PR2	2.30 ^b	5.94 ^c	*	1.03 ^a	2.15 ^{ab}		2.43 ^b	6.57 ^d	*	0.06 ^a	0.14 ^a		0.23 ^a	0.20 ^a
PR3	0.53 ^a	7.28 ^d	*	1.22 ^{ab}	4.92 ^d	*	1.20 ^a	4.10 ^c	*	2.15 ^b	6.56 ^d	*	0.55 ^a	6.41 ^d
PR4	0.98 ^a	13.93 ^e	*	1.82 ^{ab}	9.48 ^e	*	1.15 ^a	3.64 ^{bc}	*	1.84 ^{ab}	3.85 ^{bc}		0.60 ^a	5.24 ^c
PR5	1.45 ^{ab}	7.94 ^d	*	3.71 ^c	9.40 ^e	*	0.92 ^a	6.19 ^d	*	0.21 ^a	2.32 ^b		0.28 ^a	0.49 ^a
PR9	0.72 ^a	6.07 ^c	*	0.74 ^a	2.31 ^{ab}		0.36 ^a	0.37 ^a		0.83 ^{ab}	3.16 ^{bc}		2.39 ^b	4.79 ^c
PR10	0.19 ^a	0.37 ^a		1.40 ^{ab}	18.33 ^f	*	0.81 ^a	5.91 ^d	*	2.00 ^{ab}	4.59 ^c	*	0.04 ^a	0.53 ^a

^A Different letters after the values within a time point among the different PR protein genes indicate significant difference according to Tukey's test ($P < 0.05$) and a * indicates the means of expression values of the PR protein gene between the compatible and incompatible interactions are significantly different ($P < 0.05$).