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Supplemental Information

***Xa1* Allelic *R* Genes Activate Rice Blight Resistance Suppressed by Interfering TAL Effectors**

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SUPPLEMENTAL INFORMATION

***Xa1* allelic *R* genes activate rice blight resistance suppressed by interfering TAL effectors**

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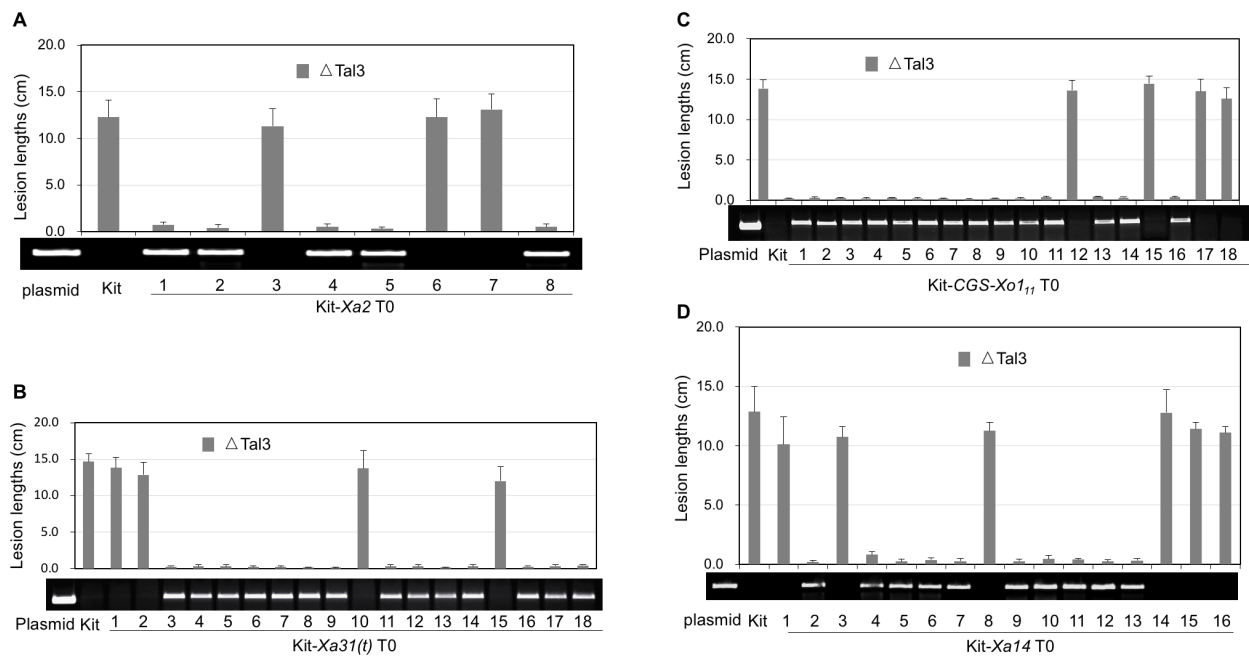
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Contain:

Supplemental Figure 1

Supplemental Table 1 to 5.



Supplemental Figure 1. Association of genotypes and phenotypes of the *Xa2*, *Xa31(t)*, *CGS-Xo11* and *Xa14* transgenic Kitaake plants in T0 generation. Lesion lengths (centimeter) derived from inoculation of Δ Tal3 are presented above the gel images of PCR-amplicons from individual plants with gene specific primers.

Supplemental Figure 2 Nucleotide sequences of and predicted amino acid sequences encoded by *Xa2*, *Xa14*, *Xa31(t)*, *CGS-Xo11* and *Xa45(t)*. The genomic fragments cloned into pCAMBIA1300 were Sanger sequenced. The promoter sequences are in green lower letters. The sequence for start and stop codons are red and shaded in yellow; between them are introns in blue lower letters shaded in grey, the sequences encoding for 93 amino acids repeats are alternating red and blue upper letters. The terminator sequences are in black lower letters. The predicted amino acids sequences follow the DNA sequences of individual genes.

>*Xa2*

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ggtgagcatcgcactacgcaagtttttttggtaacaaaggagtggttgacagcattgcagggttgctaaaaccgtgt
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gacagaatcactagagaagactaacgacaaaatcttctttttcaatttctgtggtgaaaaactcactaactccgcat
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agttgtaacaaaacaactgcattgagaactagaacagacagccacatgaacatattcacttcttcagatcagaaaag
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tcagaatagccacaaagccagttcactcgtacaaaattaatcttgactaaatccaaacagataccaactcctcttaa
tcaacttacaaaacacctacacttttgggtgtctctacaccaccaatcacacaaaaggaaattaatcatccaccaact
cgtatcctactgttagaatggaggccttacaccagagaatgggcattgccagattctgagacactgtcctttgagct
ccctga

>XA45(t)

MEEVEAGLLEGGIRWLAETILDNLADADKLEWIRQIRLAADTEKLRAEIEKVDGVVAAVKGRAIGNRSLARSLRRLR
GLLYDADDAVDELDFRLQQQVEGGVTRFEAEETVGDGAEDDDIPMDNTDVPEAVAAGSSKKRSKAWEHFTTVEF
TADGKDSKARCKYCHKDLCTSKNGTSALRNHLNVCKRKRVTSTDQPVNPSSAGEGASNATGNSVGRKMRMDGTST
HHEAVSTHPWNKAELSNRIQCMTHQLEEAVNEVMRLCRSSSNQSRQGTTPPATNATTSSYLPEPIVYGRAEMETIK
QLIMSNRSNGITVLPVINGNGGIGKTTLAQLVCKDLVIKSQFNVKIWWVYVSDKFDVVKITRQILDHVSNSQSHEGISNL
DTLQQDLEEQMKSCKFLIVLDDVWEIRTDDWKKLLAPLRPNQVNSQEEATGNMIILTTRIQSIAKSLGTVQSIKL
EALKDDDIWSLFKVHAFGNDKHDSSPGLQVLGKQIASSELKGNPLAAKTVGSLLGTNLTIDHWDSIIKSEEWKSLQQA
YGIMQALKLSYDHLNPLQCVSYCSLFPKGYSFSAQLIQIWIQAQGFVEESSEKLEQKGWKYLAELVNSGFLQQVE
STRFSSEYFVMHDLMDHLAQLKVSQTEYATIDGSECTELAPSI RHLSIVTDSAYRKEKYRNI SRNEVF EKRLMKVKS R

SKLRSLVLIGQYDSHFFKYFKDAFKEAQLRLLQITATYADSDSFLSSLVNSTHLRYLKIIVTEESGRTLPRSLRKY
 HLQVLDIGYRFGIPRISNDINLLSLRHLVAYDEVCSIANIGKMTSLQELGNFIVQNNLSGFVETQLKSMNKLQV
 SVSQLENVRTQEEACGAKLKDKQHLEKLHLSWKDAWNGYDSDES YEDEYGS DMNIETE GEEL SVGDANGA QSLQH
 NISSELASSEVLEGLEPHGLKYLRI SGYNGSTSP TWLPS SLTCLQTLHLEKCGKWQILPLERLGLLVKLVLIKMRN
 ATELSIP SLEELVLI ALPSLNTCSCTSIRNLNSSLKVLIKNC PVLKVFP LFEISQKFEIERTSSWLP HLSKLT IYN
 YPLSCVHSSSLPPSA
 ISGYGEYGRCTLPQSLEELYIHEYSQETLQPCFSGNLTLLRKLHVLGNSNLVSLQLHSCTALEELIIQSCESLSSLD
 GLQLLGNLRLRLQAHR
 LSGHGEDGRCILPQSLEELYIHEYSQETLQPCFSGNPTLLRKLHVLGNSNLVSLQLHSCTALEELIIQSCESLSSLD
 GLQLLGNLRLRLQAHR
 LSGHGEDGRCILPQSLEELYIHEYSQETLQPCFSGNLTLLRKLHVLGNSNLVSLQLHSCTALEELIIQSCESLSSLD
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 LSGHGEDGRCILPQSLEELYIHEYSQETLQPCFSGNLTLLRKLHVLGNSNLVSLQLHSCTALEELIIQSCESLSSLD
 GLQLLGNLRLRLQAHR
 LSGHGEDGRCILPQSLEELYIHEYSQETLQPCFSGNLTLLRKLHVLGNSNLVSLQLHSCTALEELIIQSCESLSSLD
 GLQLLGNLRLRLPAHR
 LSGHGEDGRCILPQSLEELFISEYSLETLQPCFLTNTLCKQLRVSGTTSFKSLELQSCCTALEHLKIQGCASLATLE
 GLQFLHALRHMEVFR
 PGLPPYLGSSSEQGYELCPRLERLDIDDPSILTTSFCKHLTSLQRLELNYCGSEVARLTDEQERALQLLTSLQELRF
 KYCYNLIDL PAGLHSLPSLERLEIRSCRSIARLPEKGLPPSFEELDI IACSNELAQQCRTLASTLKV KINGGYVN

Supplemental Table 1. List of PCR primers used and their applications

Primer	Sequence (5' to 3')	Usage
53120-F4b	AGCTATGACATGATTACGAATT CAGGAAGACGGGACTGA	Amplification of genomic regions (promoter, coding, terminator sequences) of <i>Xal</i> allelic members
53120-R4b	AACGACGGCCAGTGCCAAGCT TCAGGGAGCTCAAAGGACAG	
53120-F6b	AGCTATGACATGATTACGAATT CCTCGAGGGTATAGACCAT	Along with primer 53120-R4b to amplify genomic regions of <i>CGS-Xo1₁₁</i>
BB2-F1	TGCCACAGTTACAATCACCCA	Along with primer M13F to genotype transgenic plants of <i>Xal</i> allelic genes
XaL-F1	ATCAGGAACTTGA ACTCCAG	To screen <i>Xal</i> alleles in a collection of rice accessions
XaL-R1	AACCACTGATTGCGGAAGG	
XaL-F2	CCTTCGCAATCAGTGGTT	To amplify the LRR region of <i>Xal</i> alleles
XaL-R2	AATGTAGCAAGCGACGCACA	
Xa14L-R1	AGGGAATCAACATAGTTAATC	Along with primer XaL-F1 to screen <i>Xa14</i> in a collection of rice accessions
Cambia-F	TGAGCGGATAACAATTCACACAG	Sequence the whole genomic regions of <i>Xal</i> allelic <i>R</i> genes (<i>Xa2</i> , <i>Xa14</i> , <i>Xa31(t)</i> , <i>CGS-Xo1₁₁</i> and <i>Xa45(t)</i>) cloned in pCAMBIA1300.
BB2-F2b	ACACCCTTGTCCTCCTGCT	
Xa1-F2	CCCTCTGCACACGCCATTGG	
Xa1upT-F	CGTGTAACAAGTACTGACCA	
Xa14-F4	GAGGCTATGTGCATCCTCA	
gXa1BE-R4	CATTGTCTTAGATGATGTGT	
Xa1C-F	TCCAGTGAGAAGTTGGAGCA	
Xa14-R4	TGTGCACACAGGAAAGAGGA	
Xa1L-F	TCAGGAACTTGA ACTCCAG	

Xa1L-R4	TCGAGTGCAGTGCATGATTG	
Xa37d-R1	ACGGTTCTGAAGGTCGTCAT	
BB2-R2	GAAATTGGCTGATCCGAG	
M13F	TGTAAAACGACGGCCAGT	
86TalKDF1	TTCGGGGAAAGTAGCACTTGA G	Amplification of the upstream regions flanking sequences of <i>iTal3</i> and <i>iTal6</i> from PXO86
86TalKDR1	AATATCCGGGTAGGCGCAATC ACTCTACCGATGCGTGTCGTAA G	
86TalKDF2	AGCCTACACAATCGCTCAAGAC GTACGTGAACGAACGCCTCTAC	Amplification of the downstream regions flanking sequences of <i>iTal3</i> and <i>iTal6</i> from PXO86
86TalKDR2	TGACCTGTTCCAGCAGAGCTTG	
KD13-F	ACGTCTTGAGCGATTGTGTAGG CT	Amplification of kanamycin resistance gene
KD13-R	AGTGATTGCGCCTACCCGGATA TT	
86TAL3-F2	CAGACGTAAACGGTCCT	detection of the deletion of <i>iTal3</i> in PXO86 mutant
86TAL3-R2	ACGCTGCCAGGTCGGCAACC	
86TAL6-F2	GCATTCAAGGAAGAGGAAA	detection of the deletion of <i>iTal6</i> in PXO86 mutant
86TAL6-R2	AGTGTCTACGGAACCCTG	

Supplemental Table 2. Prevalence of *Xa1* allelic *R* genes in 3k rice

In a separate Excel file.

Supplemental Table 3. Prevalence of *Xa1* allelic *R* genes and disease reactions in 87 rice accessions.

Rice line	Source	Accession	Presence of <i>Xa1</i> marker	Number of 93 aa	PXO99 ^A	Δ Tal3	Δ Tal3 (piTal3a)	Δ Tal3 (piTal3b)
Kitaake			-		S	S	S	S
IRBB1	IRGC	418736	+	6	S	R	S	S
IRBB2	IRGC		+	5	S	R	S	S
Basmati	NSGC	Clor 12524	+	7	S	R		
Chikanari 2	NSGC	Clor 12452	-					
Taichung 65	NSGC	PI 275428	-					
Toyohikari	NSGC	Clor 12449	-					
Nagate Eikou	NSGC	Clor 12447	-					
Pi No. 1	NSGC	Clor 12445	-		S	S	S	S
Somewake	NSGC	Clor 12423	-					
Shinriki 1	NSGC	Clor 12401	-					
Palman	NSGC	Clor 12219	-					
Safed	NSGC	Clor 12218	-					
Jhona	NSGC	Clor 12217	-					
Mushkan	NSGC	Clor 12216	-					
Ziri	NSGC	Clor 12214	-					
Kinai 388	NSGC	Clor 12199	+	6	S	R		
Miyako	NSGC	Clor 12066	+	6	S	R		
Upland	NSGC	Clor 12001	+	6	S	R	S	S

Kinai Early No.70	NSGC	Clor 12197	-					
Aikoku Kinai	NSGC	Clor 12196	-					
Vansi	NSGC	Clor 12222	-					
Ainaura	NSGC	Clor 12252	+	6	S	R		
Mogamiuruti	NSGC	Clor 12254	+	7	S	R	S	S
Santaro	NSGC	Clor 12285	-					
Guneki	NSGC	Clor 12274	-					
Schou Sung Sensho	NSGC	Clor 12286	-		S	S		
Maratelli	NSGC	Clor 12294	-					
Dosan 50	NSGC	Clor 12398	-					
WC 5119	NSGC	Clor 12399	-		S	S		
Norin 23	NSGC	Clor 12400	-					
Shiokari	USDA	GSOR 300031	-					
Murasaki Daikoku	USDA	GSOR 310168	-					
P 79	USDA	GSOR 310380	-					
Toga	USDA	GSOR 310788	+	5	S	R	S	S
Zhongyu No.6	USDA	GSOR 311449	-					
Minghui 63	USDA	GSOR 311461	-					
NERICA 1	NSGC	WAB0007739	+					
NERICA 2	NSGC	WAB0018053	-					
NERICA 3	NSGC	WAB0037218	-					
NERICA 4	NSGC	WAB001802	-					
NERICA 5	NSGC	WAB0018042	+	5	S	R		
NERICA 6	NSGC	WAB0018092	-					
NERICA 7	NSGC	WAB0018095	+	6	S	R	S	S
NERICA 8	NSGC	WAB0019617	-					
NERICA 9	NSGC	WAB0019618	-					
NERICA 10	NSGC	WAB0019619	-					
NERICA 11	NSGC	WAB0019620	-					
NERICA 12	NSGC	WAB0019621	+	5	S	R		
NERICA 13	NSGC	WAB0019622	-					
NERICA 14	NSGC	WAB0019624	+	5	S	R		
NERICA 15	NSGC	WAB0019623	-					
<i>O.glaberrima-1</i>	IRGC	100854	-					
<i>O.glaberrima-2</i>	IRGC	100983	-					
<i>O.glaberrima-3</i>	IRGC	102277	-					
<i>O.glaberrima-4</i>	IRGC	102500	-					
<i>O.glaberrima-5</i>	IRGC	103700	-					
<i>O.glaberrima-6</i>	IRGC	103445	-					
<i>O.glaberrima-7</i>	IRGC	104033	-					
<i>O.glaberrima-8</i>	IRGC	104200	-					
<i>O.glaberrima-9</i>	NPGS	PI 369455	+	6	S	R		
<i>O.glaberrima-10</i>	NPGS	PI 450252	-					
<i>O.glaberrima-11</i>	NPGS	PI 450298	+	7	S	R	S	S
<i>O.glaberrima-12</i>	NPGS	PI 450353	-					
<i>O.glaberrima-13</i>	NPGS	PI 450363	-					

<i>O.glaberrima</i> -14	NPGS	PI 450396	-		S	S	S	S
<i>O.glaberrima</i> -15	NPGS	PI 450438	-					
<i>O.nivara</i> -1	IRGC	102463	+	7	S	R	S	S
<i>O.nivara</i> -2	IRGC	105722	-					
<i>O.nivara</i> -3	IRGC	105732	-					
<i>O.nivara</i> -4	IRGC	81825	-					
<i>O.barthii</i> -1	IRGC	100119	-					
<i>O.barthii</i> -2	IRGC	101248	-					
<i>O.barthii</i> -3	IRGC	106291	-					
<i>O.barthii</i> -4	IRGC	101937	-					
<i>O.officinalis</i> -1	IRGC	105081	-					
<i>O.officinalis</i> -2	IRGC	105080	-					
<i>O.officinalis</i> -3	IRGC	105223	-					
<i>O.officinalis</i> -4	IRGC	102386	-					
<i>O.officinalis</i> -5	IRGC	81972	-					
<i>O.officinalis</i> -6	IRGC	80730	-					
<i>O.minuta</i> -1	IRGC	101133	-					
<i>O.minuta</i> -2	IRGC	105132	-					
<i>O.minuta</i> -3	IRGC	105128	-					
<i>O.minuta</i> -4	IRGC	101097	-					
<i>O.rhizomatis</i> -1	IRGC	103421	-					
<i>O.rhizomatis</i> -2	IRGC	105949	-					

Supplemental Table 4. Bacterial strains used in this study

Strains or Plasmids	Relevant characteristics	Reference/Source
Strains		
<i>Escherichia coli</i>		
XL1-Blue	<i>recA1 endA1 gyrA96 thi-1 hsdR17 supE44 relA1 lac</i> [F' <i>proAB lacI^q ZAM15 Tn10</i> (Tetr)]	Stratagene
Trans1-T1	F- ϕ 80(<i>lacZ</i>) Δ M15 Δ <i>lacX74</i> hsdR(r_K^- , m_K^+) Δ <i>recA1398 endA1 tonA</i>	TransGen Biothch
<i>Agrobacterium tumefaciens</i>		
EHA105	C58 (<i>rif^R</i>) Ti pEHA105 (pTiBo542DT-DNA) Succinamopine	(Hood et al., 1993)
<i>Xanthomonas oryzae</i> pv. <i>oryzae</i>		
PXO99 ^A	Philippine race 6	This study
Δ Tal3	<i>iTal3a</i> and <i>iTal3b</i> knock-out mutant of PXO99 ^A	(Ji et al., 2016)
PXO86	Philippine race 2	This study
PXO86 Δ iTal3	iTALE A type gene knock-out mutant of PXO86	This study
PXO86 Δ iTal6	iTALE B type gene knock-out mutant of PXO86	This study
PXO61	Philippine strain	This study
PXO79	Philippine strain	This study
PXO112	Philippine strain	This study

KXO85	Korean strain	This study
JW89011	Korean strain	This study
K202	Korean strain	This study
T7174	Japanese strain	This study
H75373	Japanese strain	This study
Xoo2	Thai strain	This study
A3842	Indian strain	This study
PbXO7	Indian strain	This study
IXO56	Indonesian strain	This study
NXO 260	Nepalese strain	This study
CIAT1185	Colombian strain	This study
ZHE 173	Chinese strain	This study
C1	Chinese strain	This study
GD1358	Chinese strain	This study
HB21	Chinese strain	This study
Aust-2013	Australian strain	This study
Aust-R3	Australian strain	This study
AXO1947	Cameroon strain	This study
Plasmids		
pCAMBIA1300	Binary T-DNA vector for rice transformation	CAMBIA
piTal3a	pHM1 expressing <i>iTal3a</i> under <i>lacZ</i> promoter with FLAG in pZW	This study
piTal3b	pHM1 expressing <i>iTal3b</i> under <i>lacZ</i> promoter with FLAG tag in pZW	This study
piTal3aFb	<i>iTal3a</i> variant containing <i>iTal3b</i> C-terminus in pHZW	This study
piTal3bFa	<i>iTal3b</i> variant containing <i>iTal3a</i> C-terminus in pHZW	This study

Hood, E.E., Gelvin, S.B., Melchers, L.S., and Hoekema, A. (1993). New *Agrobacterium* helper plasmids for gene transfer to plants. *Transgenic research* 2:208-218.

Ji, Z., Ji, C., Liu, B., Zou, L., Chen, G., and Yang, B. (2016). Interfering TAL effectors of *Xanthomonas oryzae* neutralize *R*-gene-mediated plant disease resistance. *Nature communications* 7:13435.

Supplemental Table 5. Prevalence of iTALE genes in Xoo and Xoc genomes.

In a separate Excel file.