Supplementary Information

Ultraviolet-B enhances the resistance of multiple plant species to lepidopteran insect herbivory through the jasmonic acid pathway

Jinfeng Qi[a], Mou Zhang[b], Chengkai Lu[a], Christian Hettenhausen[a], Qing Tan[a], Guoyan Cao[a], Xudong Zhu[c], Guoxing Wu[b], and Jianqiang Wu[a, *]

[a] Department of Economic Plants and Biotechnology, Yunnan Key Laboratory for Wild Plant Resources, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming 650201, China

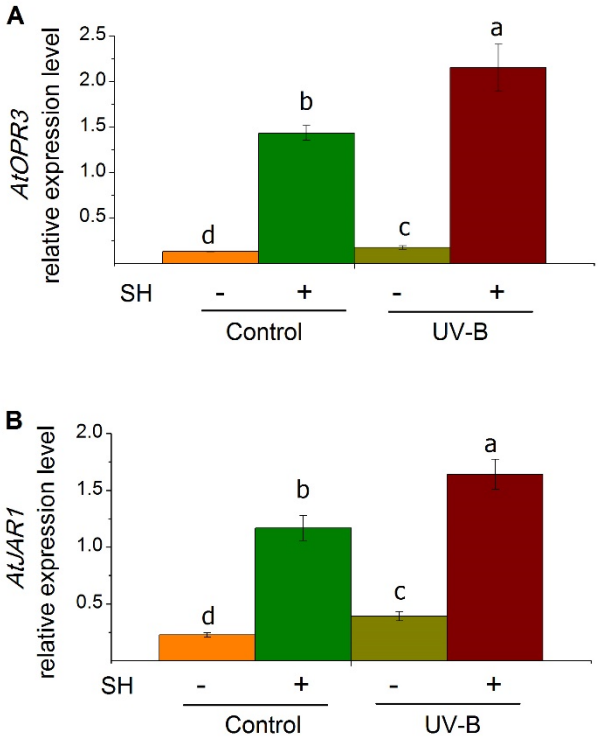
[b] College of Plant Protection, Yunnan Agriculture University, Kunming 650201, China

[c] State Key Laboratory of Rice Biology, China National Rice Research Institute, Hangzhou 31006, China

* Corresponding author: Jianqiang Wu

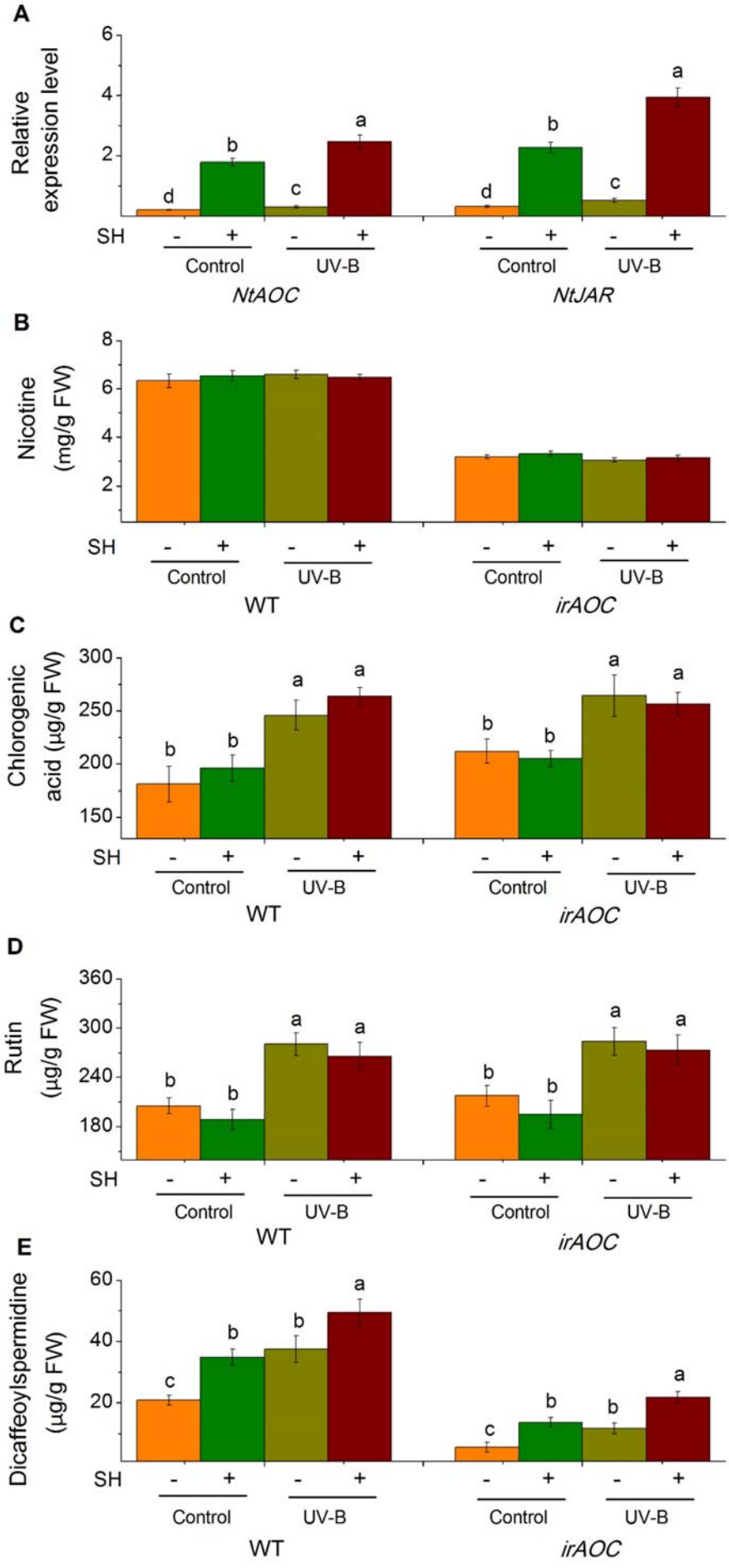
Phone/Fax: +86-871-65229562

Email: wujianqiang@mail.kib.ac.cn



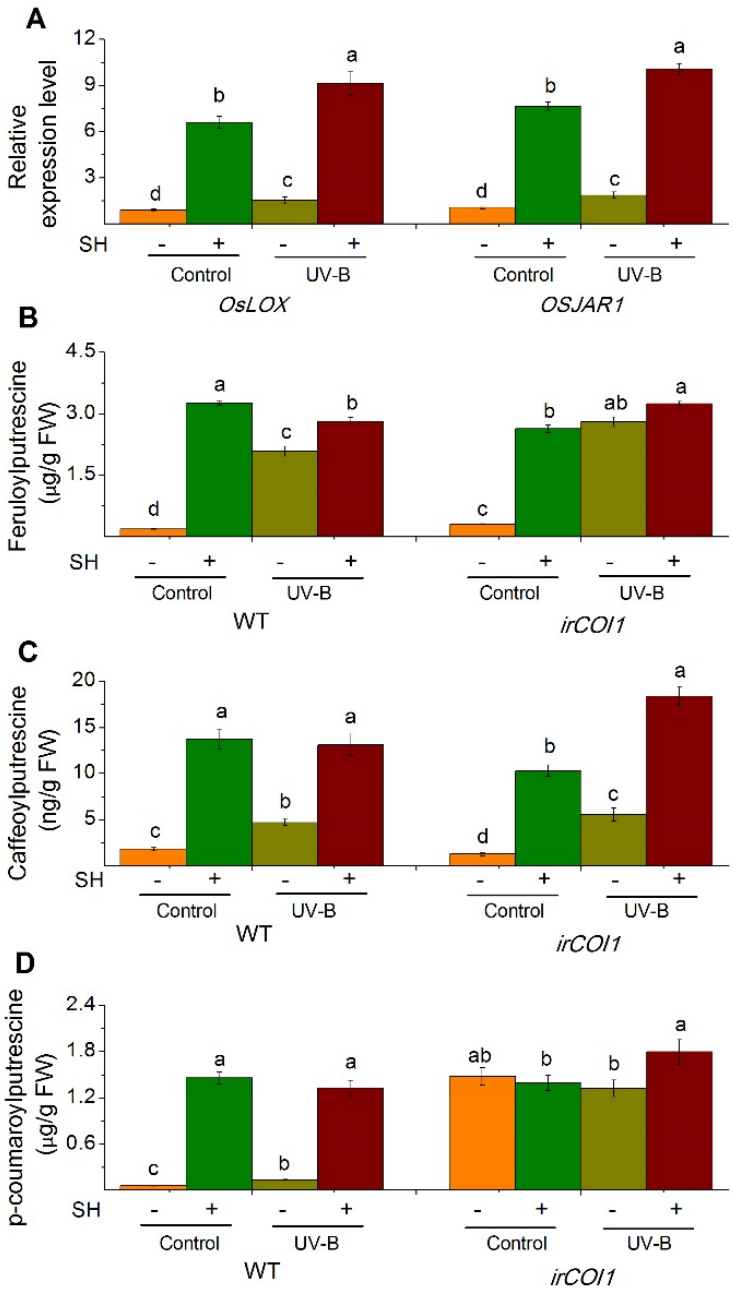
Supplementary Figure 1. UV-B treatment elevates the expression levels of *AtOPR3* and *AtJAR1*.

Control and UV-B-pre-exposed Arabidopsis plants were treated with simulated herbivory (SH +) or left untreated (SH -), and the levels (mean ± SE) of *AtOPR3* (A) and *AtJAR1* (B) were determined in samples collected at 2 h. n = 6-8. Different letters ($P < 0.05$, Duncan's multiple range test) indicate significant differences between groups.


A
Relative expression level
6
4
2
d
b
c
a
d
b
c
a
SH
- + - +
- + - +
Control
UV-B
Control
UV-B
NtAOC
NtJAR
B
Nicotine (mg/g FW)
8
6
4
2
SH
- + - +
- + - +
Control
UV-B
Control
UV-B
WT
irAOC
C
Chlorogenic acid (μg/g FW)
300
250
200
150
b
b
a
a
b
b
a
a
SH
- + - +
- + - +
Control
UV-B
Control
UV-B
WT
irAOC
D
Rutin (μg/g FW)
360
300
240
180
b
b
a
a
b
b
a
a
SH
- + - +
- + - +
Control
UV-B
Control
UV-B
WT
irAOC
E
Dicaffeoylspermidine (μg/g FW)
60
40
20
c
b
b
a
c
b
b
a
SH
- + - +
- + - +
Control
UV-B
Control
UV-B
WT
irAOC

Supplementary Figure 2. Gene expression and secondary metabolites of *N. tabacum* in response to UV-B treatment and simulated herbivory.

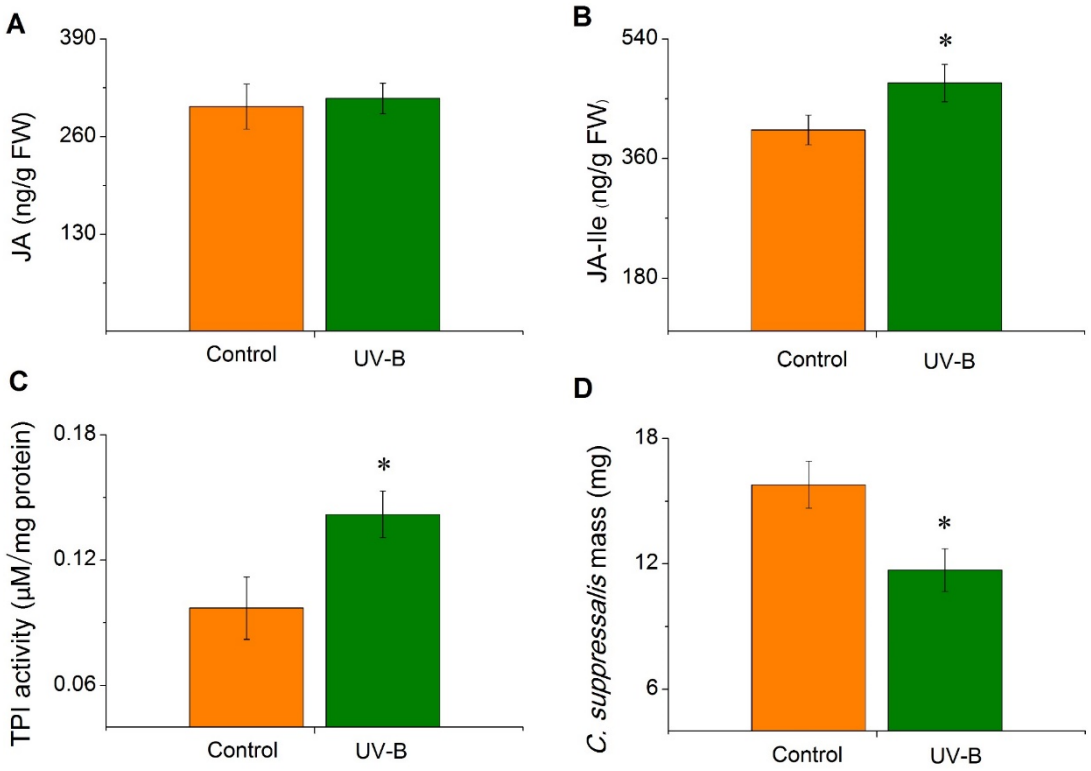
Control and UV-B-pre-exposed wild-type (WT) and irAOC tobacco plants were treated with simulated herbivory (SH +) or left untreated (SH -), and levels (mean ± SE) of *NtAOC1* and *NtJAR4* (A) and the contents of secondary metabolites nicotine (B), chlorogenic acid (C), rutin (D), and dicaffeoyl spermindine (E) were determined in samples collected at 2 h (for a) or 48 h (for b-e). n = 6-8. Different letters ($P < 0.05$, Duncan's multiple range test) indicate significant differences between treatment groups within the same gene (for A) or genotype (for B-E).



Supplementary Figure 3. Gene expression and secondary metabolites of rice in response to UV-B treatments and simulated herbivory.

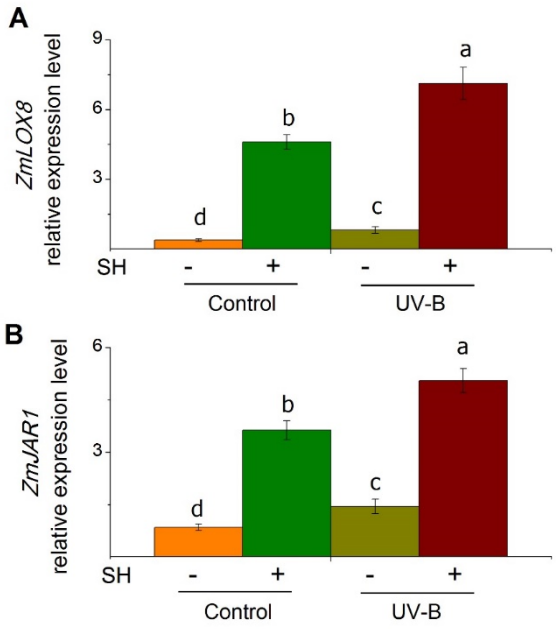
Control and UV-B-pre-exposed wild-type (WT) and irCOI1 rice plants were treated with simulated herbivory (SH +) or left untreated (SH -), and the levels (mean ± SE) of *OsLOX*, and *OsJAR1* (A) and the contents of secondary metabolites feruloylputrescine (B), caffeoylputrescine (C), and *p*-coumaroylputrescine (D) were

determined in samples collected at 2 h (for A) or 48 h (for B-D). n = 6-8. Different letters ($P < 0.05$, Duncan's multiple range test) indicate significant differences between treatment groups within the same gene (for A) or genotype (for B-D).



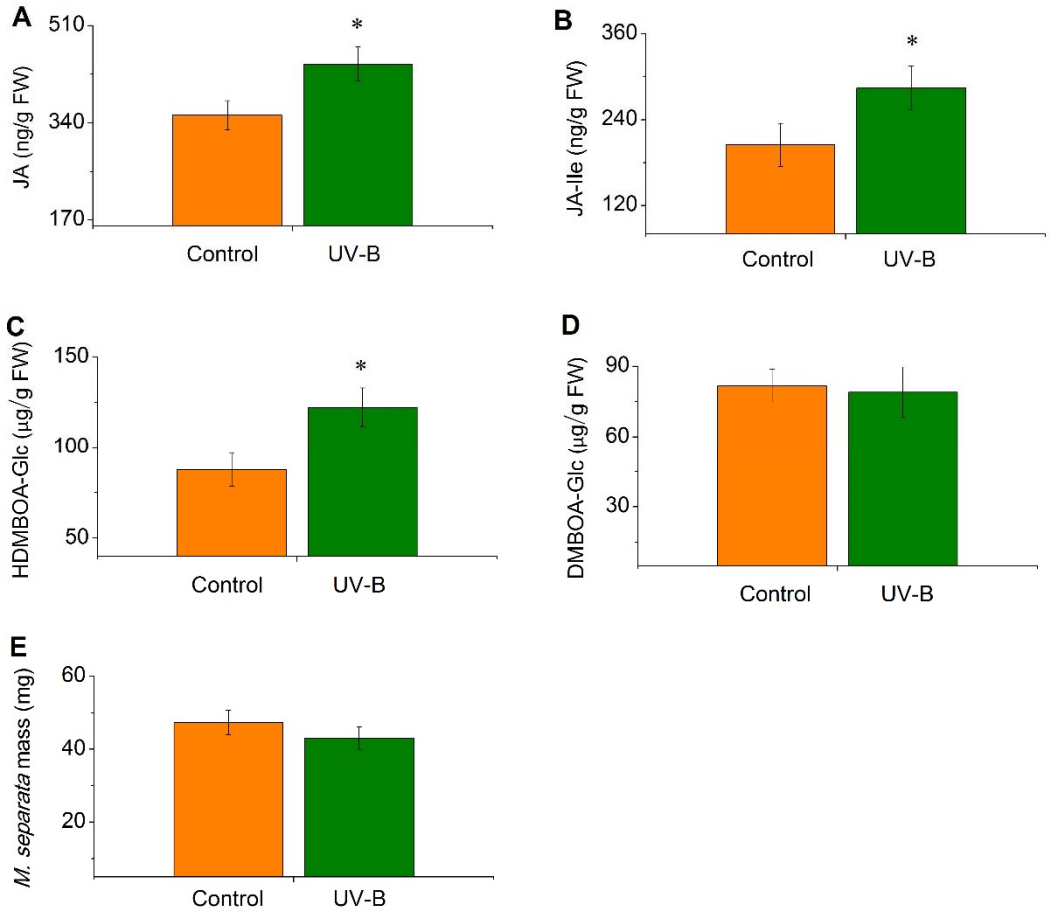
Supplementary Figure 4. UV-B-enhanced rice defense traits against the striped stem borer (SSB) *C. suppressalis*.

Control and UV-B-pre-exposed rice plants were infested by SSB (A-C) and levels (mean ± SE) of JA (A), JA-Ile (B), and TPI activity (C) were determined in samples collected at 2 h (for A and B) or 48 h (C); mean masses (± SE) of SSB after 12 days feeding on control and UV-B-pretreated WT rice plants (D). For A-C, n = 6-8, for D, n = 30-50. Asterisks (* $P < 0.05$, Student's t test) indicate significant differences between treatments.



Supplementary Figure 5. Responses of maize to UV-B pre-treatment and simulated *M. separata* feeding.

Control and UV-B-pre-exposed maize plants were treated with simulated herbivory (SH +) or left untreated (SH -), and the levels (mean ± SE) of *ZmLOX8* (A) and *ZmJAR1* (B) were determined in samples collected at 2 h. n = 6-8, letters ($P < 0.05$, Duncan's multiple range test) indicate significant differences between treatments.



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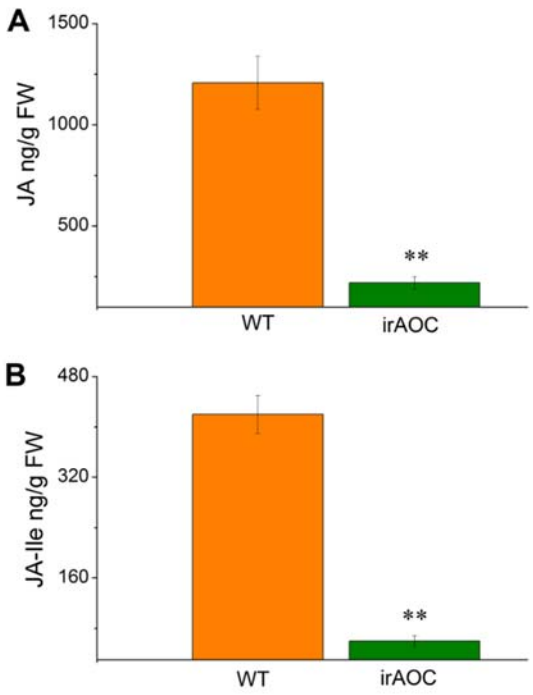
Supplementary Figure 6. Growth of *M. separata* on control and UV-B--pre-treated maize plants.

70 Both control and UV-B-pre-exposed (UV-B) maize plants were treated with simulated
71 herbivory, and contents (mean ± SE) of JA (A), JA-Ile (B), HDMBOA-Glc (C) and
72 DMBOA-Glc (D) were determined in samples collected at 2 h (for A and B) or 48 h
73 (C); mean masses (± SE) of *M. separata* 8 days after feeding on control and UV-B-
74 pretreated maize (E). For a-c, n = 6-8, for D, n = 30-50. Asterisks (* $P < 0.05$,
75 Student's t test) indicate significant differences between treatments.



Supplementary Figure 7. Silencing efficiently of irAOC tobacco plants.

Wild-type (WT) and irAOC plants were treated with wounding, and the levels (mean ± SE) of JA (A), JA-Ile (B) were determined in samples collected at 1 h. Asterisks (** $P < 0.01$, Student's *t*-test, n = 5) indicate significant differences between genotypes.

Supplementary Table 1. Primers used in this study

Gene name	Gene ID	Forward Primer (5' to 3')	Reverse Primer (5' to 3')
AtPP2AA3	AT1G13320	ACCTGCGGTAATAACTGCATCTAA	ACCAAGCATGGCCGTATCAT
AtOPR3	AT2G06050	GAAGATTCGATCTCTCTCATCG	GGTCCGTTGAGCATAATACTC
AtJAR1	AT2G46370	AGACGATCCGCACCAAATGT	TTTGGCACATACGGCTCCAT
NtACT	XM_009633597	TGATAACGGAACAGGAATGG	TCGAGGTCGACCAACAATAC
NtJAR	DQ359729.1	GCCTCCCGAGCTTGTTACAT	GACCGTCTAAATTTTCCATGAGA
NtAOC	NM_001324978.1	GAGCCAGCACCTGAAGCTAA	TTCTCCGGAAATGACCCCAC
NtAOC for RNAi	NM_001324978.1	CACCTCCACCAACTCCAAGT	TGCTGCAATTTCACTTGACC
OsACT	Os03g50885	TGGACAGGTTATCACCATTGGT	CCGCAGCTTCCATTCCTATG
OsLOX	Os08g39840	TCAAGGAGATCGAGGGCGT	TCGGAGAAGGGCTTCATCAG
OsJAR1	Os05g50890	AAGGTTTGTGAACCCATCAAACAGC	AATAATACTTTGCAGCACTTGTTACG
ZmACT	GRMZM2G006765	GGAGCTCGAGAATGCCAAGAGCAG	GACCTCAGGGCATCTGAACCTCTC
ZmJAR1	GRMZM2G091276	GGTCCATGGAGCCATACCTG	TAGAGCCGACCCATCCTTCA
ZmLOX8	GRMZM2G104843	CATCAAGAGTAAGCCAGCGC	GTTCGATGTTGACGGGGTTG