Plant Communications, Volume *4*

Supplemental information

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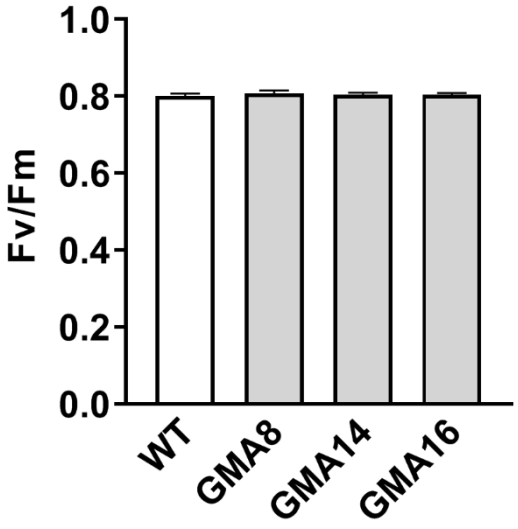
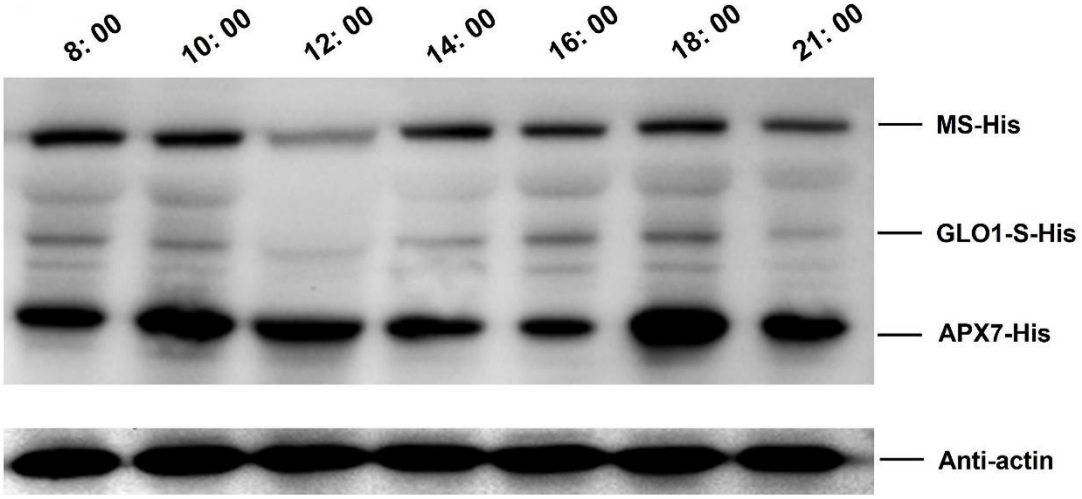
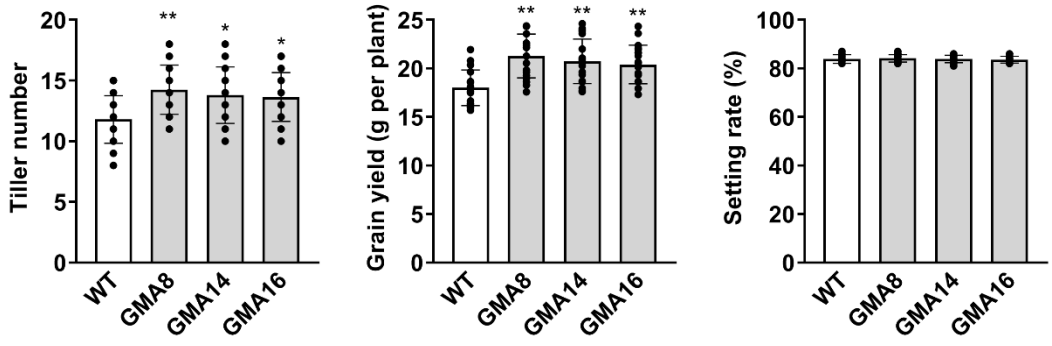


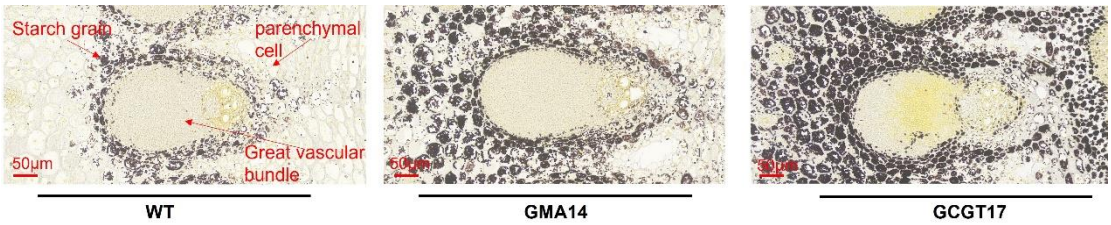
Supplemental Figure 1 The level of Fv/Fm in GMA and WT plants at the seedling stage in greenhouse



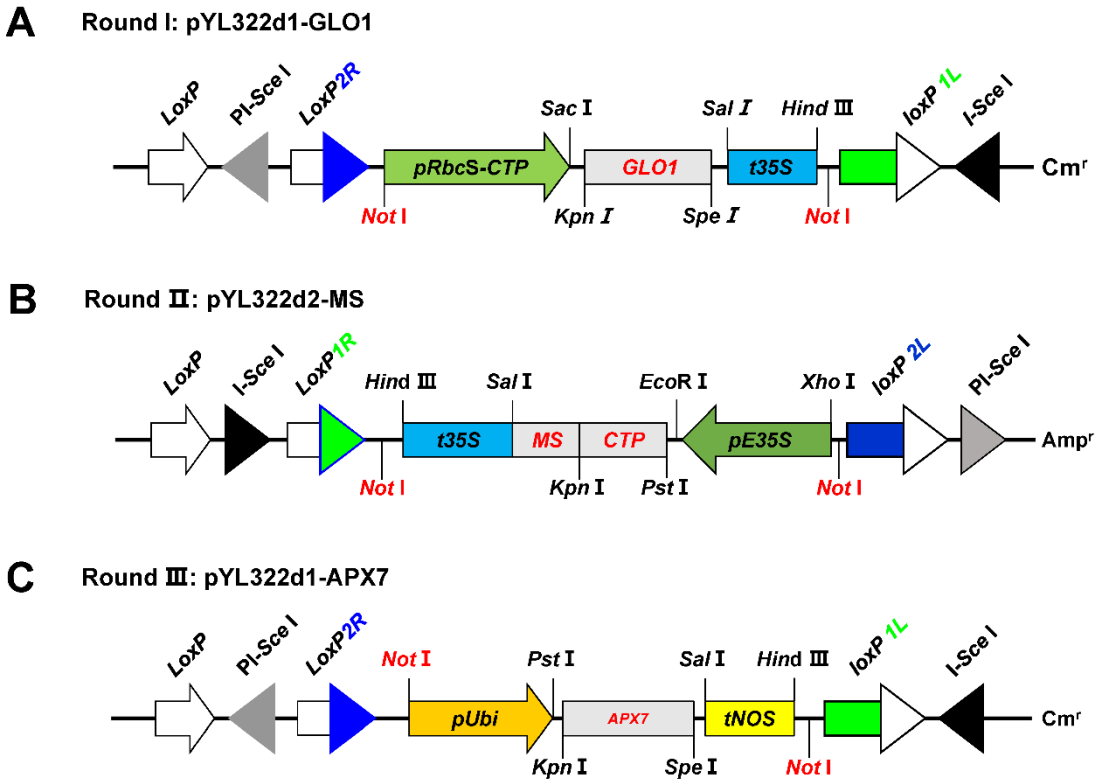
Supplemental Figure 2 The protein level of GLO1-S during the daytime and nighttime.



Supplemental Figure 3 A synthetic light-dependent GMA bypass increases tiller number and grain yield without affecting the seed setting rate in the field of Wuhan**.**



Supplemental Figure 4 Accumulation of starch around great vascular bundle in stems.



Supplemental Figure 5 Physical maps of the photorespiratory bypass genes in the donor vectors. (A) *OsGLO1* expression cassette in pYL322d1. (B) *CmMS* expression cassette in pYL322d2. (C) *OsAPX7* expression cassette in pYL322d1.

Supplemental Table 3 List of primers used in this study.

Primers name	Description	Sequence (5'-3')
T35s-SalI-F	Amplification of *T35s* for pYL322d1-GLO1	CATAGTCGACGTCCGCAAAAATCACCAG
T35s-HindIII-R		CCGGAAGCTTGTCACTGGATTTTGGTTT
PrbcS-R147-NotI-F	Amplification of *Prbcs* for pYL322d1-GLO1	TTCTGCGGCCGCCGGGGATCGAATTCTGGTGT
PrbcS-R147-SacI-R		TATAGAGCTCCTGCATGCACCTGATCCTGC
GlO1-KpnI-F	Amplification of *GLO1* for pYL322d1-GLO1	CGCGGGTACCAATGGGGGAGATCACCAATGTCA TGG
GlO1-SpeI-R		ACTTACTAGTCTAATGGTGATGGTGATGATGGCG GGCGAGGCGGTCGGCGT
PE35S-XhoI-F	Amplification of *PE35S* for pYL322d2-MS	ACATCTCGAGGTGGAGCACGACACACTT
PE35S-EcoRI-R		TGCAGAATTCCTATCGTTCGTAAATGGT
T35S-SalI-F	Amplification of *T35S* for pYL322d2-MS	ACTAGTCGACGTCCGCAAAAATCACCAG
T35S-HindIII-R		CCGCAAGCTTGTCACTGGATTTTGGTTT
CTP-MS-PstI-F	Amplification of *CTP* for pYL322d2-MS	GATGCTGCAGATGGCCCCCTCCGTGATG
CTP-MS-KpnI-R		ATCGGGTACCCATGCACCTGATCCTGCC
MS-KpnI-F	Amplification of *MS* for pYL322d2-MS	GTACGGTACCTCGCTGGGAATGTATTCT
MS-SalI-R		GGACGTCGACTTAATGGTGATGGTGATGATGCC TGGGATGATGTATGACTA
Tnos-SalI-F	Amplification of *Tnos* for pYL322d1-APX7	GTACGTCGACGTTTCTTAAGATTGAATCCT
Tnos-HindIII-R		GCGCAAGCTTCCCGATCTAGTAACATAGAT
Pubi-NotI-F	Amplification of *Pubi* for pYL322d1-APX7	TGACGCGGCCGCGAATTCGTCGTGCCCCTCTC
Pubi-PstI-R		TACGCTGCAGAAGTAACACCAAACAACAGG
APX7-KpnI-F	Amplification of *APX7* for pYL322d1-APX7	GTACGGTACCATGGCGGCCCAGCGACTCGC
APX7-SpeI-R		CTAGACTAGTTTAATGATGATGATGATGATGACC GTCCAACGTGAATCCCT
HPT-F	PCR detection of gDNA for *HPT*	CTGAACTCACCGCGACGTCTGTC
HPT-R		TAGCGCGTCTGCTGCTCCATACA

GLO1-F	PCR detection of gDNA for *GLO1*	CTTCGGCAACGTCAGCAATG
GLO1-R		AGGCGACCTCCTCAACACTT
MS-F	PCR detection of gDNA for *MS*	CTGAATCGGCAGTAAGGAAGAAA
MS-R		AGCTCCAGAATTGAGTGCGTTGA
APX-F	PCR detection of gDNA for *APX7*	ACCCTGTTGTTTGGTGTTACTT
APX-R		CTCGTTGTGGCCACTCTTTA
GLO1-sq-F	Semi-quantitative RT-PCR analysis of *GLO1*	TCCAGGGGCTCAAGTC
GLO1-sq-R		CCAGAGGCGTAGTAGTCG
MS-sq-F	Semi-quantitative RT-PCR analysis of *MS*	TTCGGCAACGTCAGCAATG
MS-sq-R		GCTCCAGAATTGAGTGCGTTGA
APX7-sq-F	Semi-quantitative RT-PCR analysis of *APX7*	TTGATGTGGGTTTTACTGATGC
APX7-sq-R		GAGGAGCCGAGAAGGTGC
ACT-sq-F	Internal control for semi-quantitative RT-PCR	CCTCGTCTCGACCTTGCTGGG
ACT-sq-R		GAGAACAAGCAGGAGGACGGC
GLO1-S-q-F	qPCR analysis of *GLO1-S*	GCAACGTCAGCAATGG
GLO1-S-q-R		CCAGAGGCGTAGTAGTCG
GLO1-T-q-F	qPCR analysis of GLO1-T	TCGTTCTGCCACCATACTTG
GLO1-T-q-R		GCCACTTCACATCCTTCCAG
SHMT1-q-F	qPCR analysis of *SHMT1*	CAAGCAAGGCAAAGAGGTTATG
SHMT1-q-F		CAGCTAAGCCAGTAATGGTATGA
HPR1-q-F	qPCR analysis of *HPR1*	GCAACACTTGCTGCTCTAAAC
HPR1-q-R		CTTGAGAAATGGCTCCACTAGAT
ACT-q-F	Internal control for quantitative RT-PCR	TTATGGTTGGGATGGGACA
ACT-q-R		AGCACGGCTTGAATAGCG