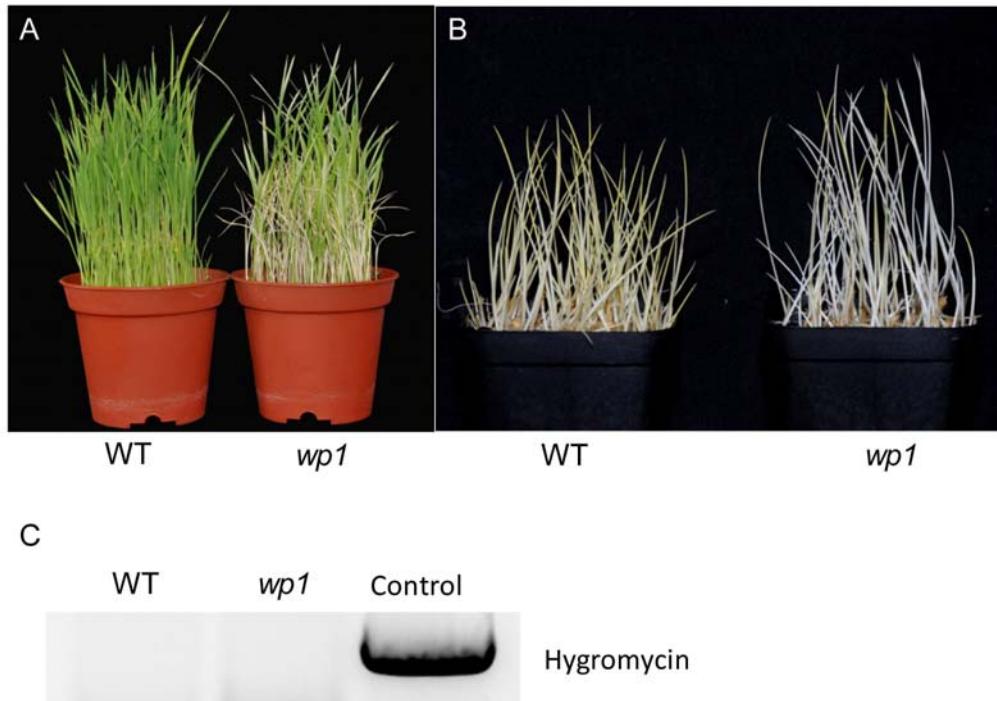


1 **Supporting Information Figs S1–S8, Tables S1–S4**

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3 **Fig. S1**



4 **Fig. S1** Phenotypes of wild type and *wp1*

5 A, 20-day-old seedlings of wild type and *wp1*

6 B, 5-day-old seedlings of wild type and *wp1* grown in the dark..

7 C, PCR detection of *wp1*. 0.9 kb product could be amplified from positive sample using primers
8 of hygromycin resistant gene

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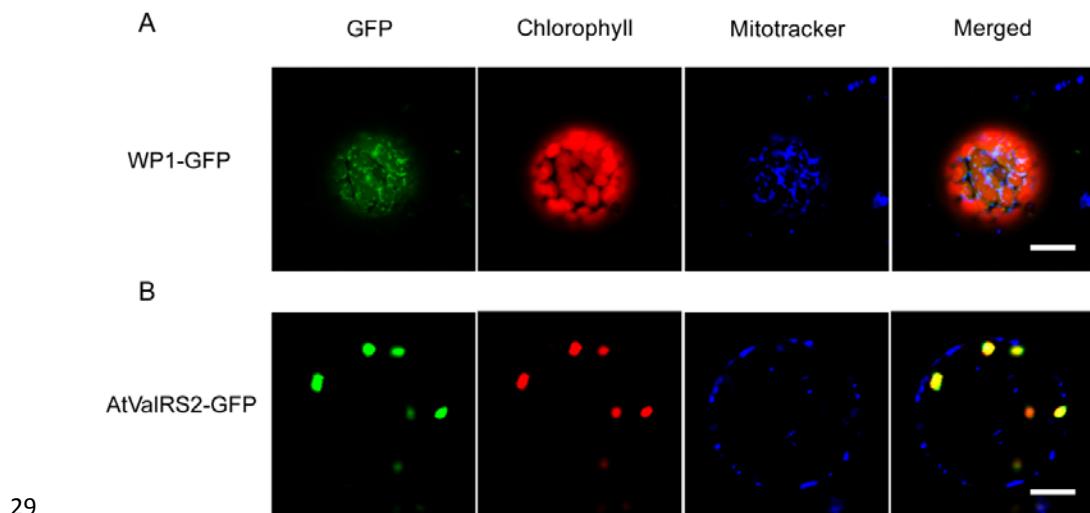
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28 **Fig. S2**



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30 **Fig S2** Subcellular localization of ValRS2

31 A, Subcellular localization of OsValRS2 in Nicotiana protoplasts. Bar = 20 μ m.

32 B, Subcellular localization of AtValRS2 in rice protoplasts. Bar = 10 μ m.

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59 **Fig S3**

OsValRA2 -----MALAGASSSACLRRINPILFSAHHRPAWTPR----RAARRCAAVASERDV 48
 AtValRS2 -----MILKTAFLSLPTTTLSPSSPHONTFFTRRRLISPSRLNSIFSQRREFSAAAASNNV 63
 OsValRS1 MSSVTPAADAQPLDEKELERLKKKDQAKEKEKR---LAKAKAEARLQQAQDCKPKSEKKQRKKAVEDENPEDIDPPDTPHGQKK 86
 AtValRS1 ----MSESEKKILTEEELERKKKEEKAKEKEKLKKQALEKERLAELKAKQKDKTNVPKSAKSSKRDASEENPEDVDVDPETPLGERK 86

OsValRA2 FTSP[EVAKS]DFTNEER-[IYKWEQSQGF]KP[FDRGGDPFV]MPPEPNVTGS[LR]GHAMFVT[EDIMUR]PRMKGRPA[LW]PC[D]DHAGIA 137
 AtValRS2 FTSP[E]TSKTD[DFSS]E[K]-IYKWEQSQGY[KP]FDQGGS[P]FV]MPPEPNVTGS[LR]GHAMFVT[EDIMUR]RNNGRPT[LW]PC[D]DHAGIA 152
 OsValRS1 FLAS[MA]K[SPTAVE]KSW[SWESSGYGA][AASSKE]PFVIVLPPPNVTGALH[GHALTVA]EUSM[R]WRS[G]NT[LW]PC[D]DHAGIA 176
 AtValRS1 RLSS[MA]K[SPTAVE]KSW[WAWEKSDLKA]AKSSKEPFVIVLPPPNVTGALH[GHALTSA]EUTI[RW]RMS[G]N[ALW]PC[D]DHAGIA 176
 High motif

OsValRA2 TQIVVERM[AA]SG-IKNTDTREEFTKRW[EKE]KG[SITNC]IKRLGASCDWSRER[FTL]EQI[RAV]EAFV[RLHEK]GLIYQGSY[VNW] 226
 AtValRS2 TQIVVERM[AA]SG-IKNTDTREEFTKRW[EKE]KG[G[SITNC]IKRLGASCDWSRER[FTL]EQI[RAV]EAFV[RLHDK]GLIYQGSY[VNW] 241
 OsValRS1 TQIVVERK[IMR]ERNLTHD[G]REEFVSE[LU]KKEB[VG]G[IL]N[CL]RLGASLDWSRECFTM[KPRS]AV[TEAFV]LYKQGLIYR[D]RIV[VNW] 266
 AtValRS1 TQIVVERK[IMR]RGMT[H]D[G]REEFVKE[W]KKEB[VG]G[IL]N[CL]RLGASLDWSRECFTM[BQR]S[AV[TEAFV]LYK]GLIYR[D]RIV[VNW] 266

OsValRA2 SPNIOTAVSDLEVEYVSE-----PGNLYFTK[K]PVAGGSRD-----DFMTIATT[RP]T[LP]FGVAVAVNPEDPRAKYVCKIAIVPLT 302
 AtValRS2 SPNIOTAVSDLEVEYVSE-----PGFLYH[K]PVAGSP-----DFLTIATT[RP]T[LP]FGVAVAVNPEDPRTSKYVGQTAIVPMT 315
 OsValRS1 DCT[IRTA]SD[EV]DY[EIKE]ETMLKVEG[NT]VQ[G]VLSFAYPLEGLGEII[VATR]T[ETML]GTA[AV]P[EED]G[RYK]L[H]G[RYA]I[PEFN] 356
 AtValRS1 DCT[IRTA]SD[EV]EY[EIKE]KTLKVEG[Y]K[P]VEG[LT]SFA[P]LEGLLG[EV]I[VATR]T[ETML]GTA[AV]P[EED]G[RYK]L[H]G[RYA]I[PEFN] 356

OsValRA2 FG[H]VFIADRYVDP[EG]TVL[K]IS[G]H[HN]YH[IA]RK[L]G[PI]LNVMNKD[TL]NDVAG-[L]GSMRER[RE]K[LS]D[VETN]LAVKKEPYT 391
 AtValRS2 YG[H]VFIADKYVDP[EG]TVL[K]IS[G]H[HN]YH[IA]RK[L]G[PI]LNVMNKD[TL]NDVAG-[L]GGLRER[RE]K[LS]D[VETN]LAVKKEPYT 404
 OsValRS1 GR[LP]K[CD]AEI[VDP]EGTGA[VI]PAH[P]N[FE]V[G]K[HN]L[E]F[N]I[FTD]D[E]K[IN]N[G]Q[A]Q[VS]I[E]F[R]V[A]V[IEA]KAK[G]LYK[E]T[K]N 446
 AtValRS1 GR[LP]I[CDG]IL[VDP]NEGTV[VI]PAH[P]N[CE]V[G]K[HN]L[E]F[N]I[FTD]D[E]K[IN]T[G]CSD[AG]M[R]E[A]R[EA]V[EA]QKQ[G]LYR[G]AK[N] 446

OsValRA2 LR[PR]SRGGEVIEFLISK[OW]V[HP]DPL[E]K[AI]H[A]V[E]K---GQ[T]I[PER]E[K]I[IN]H[WT]N[IK]DW[C]IS[R]Q[L]W[G]H[R]I[F]W[Y]V[VS]----- 472
 AtValRS2 LR[PR]SRGGEVIEFLISK[OW]V[HP]DPL[E]K[AI]H[A]V[E]N---K[E]T[I]P[E]R[E]K[I]I[IN]H[WT]N[IK]DW[C]IS[R]Q[L]W[G]H[R]I[F]W[Y]V[VS]----- 485
 OsValRS1 MS[GV]CSRTNDV[VER]M[K]P[OW]V[N]N[MT]Q[OS]G[DA]V[RS]---K[R]E[I]P[OC]Q[ED]Y[VR]W[IA]N[IK]DW[C]IS[R]Q[L]W[G]H[R]I[F]W[Y]V[VS]I[ED]DQ[E]K 533
 AtValRS1 M[R]GLCSRTNDV[VER]M[K]P[OW]V[N]N[SM]I[K]E[ED]D[V]T[D]EN[K]L[E]F[V]Q[X]T[A]P[R]W[EN]N[IK]DW[C]IS[R]Q[L]W[G]H[R]I[F]W[Y]V[VS]I[ED]DQL[K] 536

OsValRA2 --KKCEEDY[V]A[S]AEE[R]LAKA[E]K[WT]G[S]V[E]YQ[DD]PVLDTWFSSA[L]P[P]ST[L]GWP[LS]S[E]F[K]H[F]Y[P]AT[V]LET[G]H[D]I[FF]WVAR[M]M 559
 AtValRS2 --KDCEEDY[V]A[S]AEE[R]LAKA[E]K[WT]G[S]V[E]YQ[DD]PVLDTWFSSA[L]P[P]ST[L]GWP[LS]S[E]F[K]H[F]Y[P]TNM[LET[G]H[D]I[FF]WVAR[M]M 572
 OsValRS1 IL[G]SANC[R]W[V]A[N]E[S]A[N]L[E]A[Q]K[P]G[K]F[EP]H[Q]D[DD]PVLDTWFSSA[L]P[P]ST[L]GWP[PD]T-[A]L[K]A[F]Y[P]GS[V]LET[G]H[D]I[FF]WVAR[M]M 622
 AtValRS1 EV[G]AYSDH[W]V[A]R[T]E[D]A[R]E[E]A[Q]K[L]G[K]F[E]T[R]D[P]DVLDTWFSSA[L]P[P]ST[L]GWP[PD]T-[D]F[K]A[F]Y[P]TS[V]LET[G]H[D]I[FF]WVAR[M]M 625

OsValRA2 GIEFT[V]P[ES]SY[V]L[G]I[RD]SE[GR]KMSK[TL]GNVIDP[PL]T[K]-----[E]GTDALRF[PP] 612
 AtValRS2 GIEFT[V]P[ES]SH[V]L[G]I[RD]SC[GR]KMSK[SL]GNVIDP[PL]T[K]-----[E]GTDALRF[PP] 625
 OsValRS1 GMQLG[EV]P[E]K[V]L[G]P[MR]DAH[GR]KMSK[SL]GNVIDP[V]L[V]N[G]ISLDGLL[K]R[K]E[N]LDPN[E]L[N]IATE[G]KKD[F]PD[G]IA[CG]TDALRF[PP] 712
 AtValRS1 GMKLG[EV]P[E]SK[V]F[PM]RDAH[GR]KMSK[SL]GNVIDP[L]E[V]N[G]VT[LE]GLH[K]R[LE]G[N]LDP[K]E[V]I[A]K[G]Q[V]KDF[P]NG[IP]CG]TDALRF[PP] 715
 MASKS motif

OsValRA2 SM[G]AGC[C]I[N]LSTER[TS]T[CA]ST[N]KLNWNA[G]F[TL]Q[N]PDRS DATA WDVLLANKFDTEA[L]Q[K]L[P]ES[W]V[V]G[HE]I[DRV]ST[S]Y[K]F 701
 AtValRS2 AL[G]AGC[C]I[N]LSTER[TS]T[CA]ST[N]KLNWNA[G]F[VL]HS[P]SLS DTS AWE NLLDLKLDKEE[L]L[S]I[L]P[E]C[W]V[S]K[L]H[I]DSVT[A]S[Y]K[L]F 714
 OsValRS1 VS[V]SQ[S]K[C]I[N]LDIR[V]G[V]S[O]C[N]KLNWNA[I]F[G]M[G]I[S]N-----HYP[P]AT[V]T[M]PICK[W]L[S]V[N]K[G]KT[V]T[S]L[A]Y[K] 791
 AtValRS1 VS[V]AQ[S]K[C]I[N]LDIR[V]G[V]S[O]C[N]KLNWNA[V]F[G]M[G]I[S]D-----GYP[P]QT[L]S[P]T[M]FSCQ[W]L[S]V[N]K[G]SKT[V]V[S]L[A]F[E] 794

OsValRA2 EGD[A]REI[Y]C[EW]G[F]ADM[V]I[E]SK[TR]LYH[G]SD---D[G]ASSMAQ[S]V[L]Y[V]F[EN]L[LL]H[P]FMP[V]TE[EL]W[Q]L[P]Y[R]K[AI]VAHWPATD[L] 789
 AtValRS2 EGD[A]GRE[Y]C[EW]S[F]ADM[V]I[E]SK[SR]LY[G]GG---N[V]SLASQ[A]V[L]Y[V]F[EN]L[LL]H[P]FMP[V]TE[EL]W[Q]L[P]Y[R]K[AI]LIVSPWPQN[S]L 802
 OsValRS1 EGD[A]TS[AI]S[V]W[Q]C[L]D[V]B[E]I[K]P[Y]FFNDSQE[FE]SARAASR[D]L[W]V[C]L[P]G[L]L[H]P[F]MP[V]TE[EL]W[Q]L[P]Q[K]SCR[K]DSIMV[SE]Y[P] 881
 AtValRS1 EGD[A]NTI[Y]V[W]Q[C]F[C]D[V]B[E]I[K]P[Y]FAGDNPTFASERAHAQ[H]L[W]S[L]D[G]L[H]L[H]P[F]MP[V]TE[EL]W[Q]L[P]P[K]TER[K]ASIMC[D]Y[P] 884

OsValRA2 KNSLSIKRFQNLQLSLIR[G]RN[RAE]S[V]P[EP]-----AKR[ISS]V[V]AA[V]LVDYISKEK[Q]V[LL]SKLDMQSIH[SE]LPPGDANQSVHIV 872
 AtValRS2 RNVESIKRFENLQLALTR[RAE]S[V]P[EP]-----V[K]RISAS[V]GSA[V]IEYISKEK[Q]V[LL]SRLDLNNVHF[SN]APPGDANLSVHLV 885
 OsValRS1 S[V]VKEWTDDKLENEIDI[A]DT[N]KLR[S]I[K]P---PSDTNE[R]P[A]F[AL]CRG[EE]TATI[Q]CY[Q]S[V]VSL[S]TSSL[K]I[L]EN-D[ET]PPDCATAV 967
 AtValRS1 SAIENWSNEKVESEMD[V]AT[V]KCMR[A]L[R]AGLLEKQKNERLPAF[AL]CENN[V]TSEIV[K]SH[EL]EIR[TL]ANLSSLEV[V]KGQHAAPP[G]SSVET 974

OsValRA2 A[DEG]L[E]Y[I]P[ADM]V[V]S[E]V[K]R[LS]K[RL]SKM[SE]YDS[LL]ARLNSGS[VE]K[A]B[E]I[V]R[G]VRE[K]A[SE]E[K]ISLTKNRLAF[Q]STVSS[---] 958
 AtValRS2 A[SEG]L[E]Y[I]P[ADM]V[V]S[E]V[K]R[LS]K[RL]SKM[TE]YDA[IT]R[LS]P[K]V[E]K[A]B[E]I[V]R[G]VKEQ[V]EELE[K]IKLTKARLDF[K]STT[SL]V[S]Q[---] 974
 OsValRS1 V[N]K[D]S[Y]I[V]Q[G]A[U]L[E]V[E]L[B]K[R]K[R]EEI[K]LQ[H]A[Q]K[M]E[A]S[G]V[E]K[A]B[E]I[V]Q[E]EDM[R]K[TS]F[Q]L[E]I[SE]A[K]K[DA]KT[G]NN[---] 1054
 AtValRS1 V[N]EN[K]Y[I]V[D]G[A]I[T]E[A]Q[E]K[R]N[R]G[I]G[L]Q[K]K[E]Q[K]MMS[V]T[B]E[K]U[PA]N[K]EDN[A]N[K]L[E]FDF[E]K[E]S[A]R[A]ET[S]NS[G]N[Q] 1064

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61 **Fig. S3** Alignment of OsValRS1, OsValRS2 (WP1) , AtValRS1, AtValRS2

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Fig. S4

WP1

OsVal/RS1

OsVal/RS3

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64 **Fig. S4** Expression profiles of *WP1*, *OsVal/RS1* and *OsVal/RS3* from
 65 <http://ricexpro.dna.affrc.go.jp/>

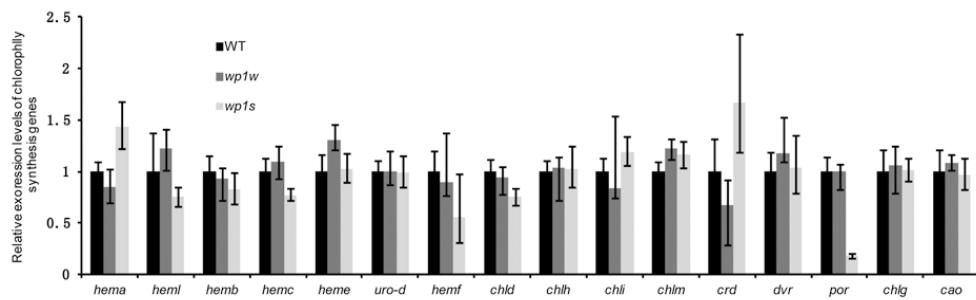
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70 **Fig S5**



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72 **Fig. S5** Expression levels of chlorophyll synthesis genes in wild type and *wp1*

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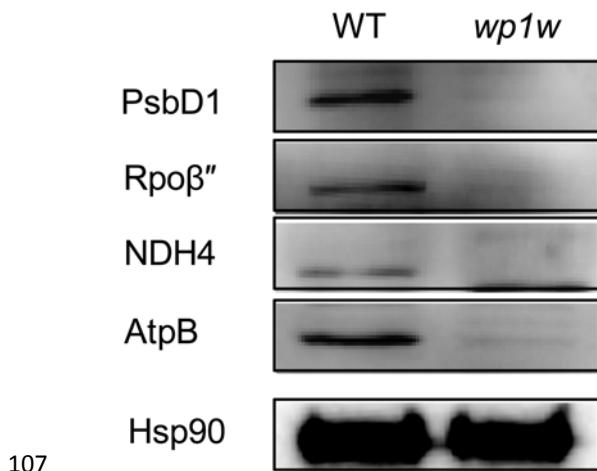
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106 **Fig. S6**



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108 **Fig. S6** Western-blot analysis of chloroplast proteins in wild type and *wp1w* glumes.

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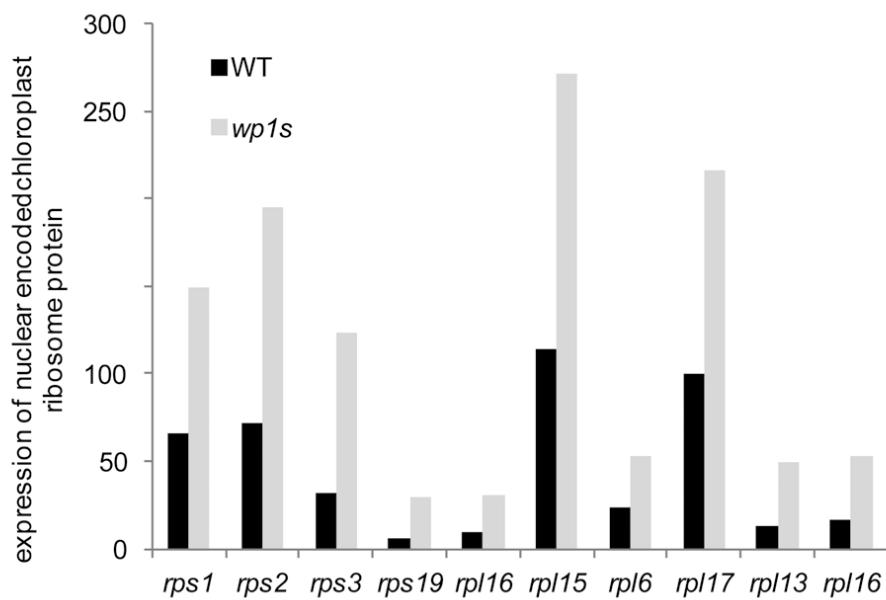
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Fig. S7

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140 **Fig. S7** Expression of nuclear-encoded chloroplast ribosomal protein genes in seedlings

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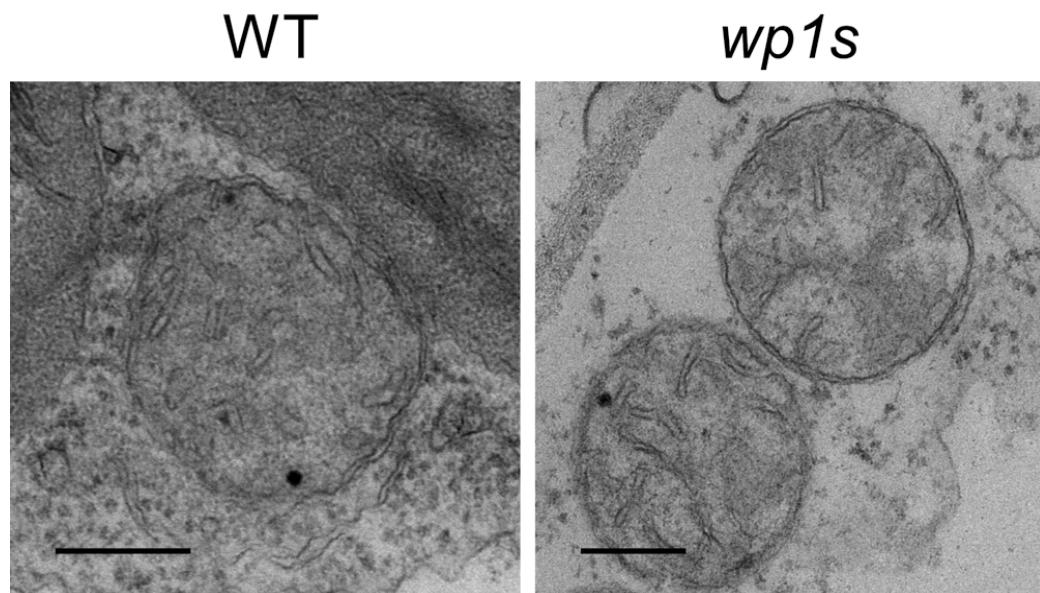
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Fig. S8



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Fig S8 TEM observation of mitochondria of wild type and *wp1s*. Bars = 200 nm.

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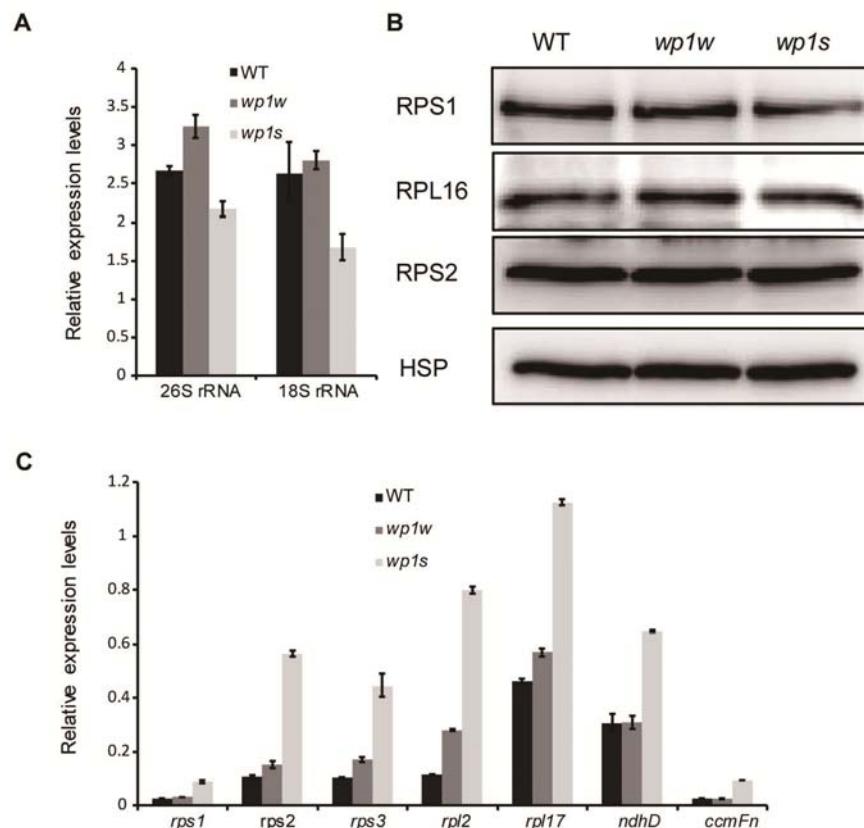
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Fig. S9

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Fig. S9 Analysis mitochondrial ribosomes and mRNA levels of some mitochondrial genes.

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A, Relative expression levels of mitochondrial 26S and 18S rRNAs in *wp1* and wild type.

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B, Western-blot analyses of mitochondrial ribosomal proteins in *wp1* and wild type.

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C, Relative expression levels of some mitochondrial genes in *wp1* and wild type. Error bars

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indicate SD (n = 3).

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213 **Table S1** Agronomic characteristics of WT and *wp1w*

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	plant height (cm)	thousand kernel weight (g)	flag leaf length (cm)	flag leaf width (cm)	tiller number	spike length (cm)
WT	77.4 ± 3.4	23.58 ± 0.34	30.5 ± 2.6	1.26 ± 0.08	5.4 ± 0.9	20.9 ± 1.1
<i>wp1w</i>	76.6 ± 3.2	23.96 ± 0.26	29.7 ± 2.6	1.31 ± 0.05	5.4 ± 1.1	19.9 ± 0.9

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251 **Table S2** Primers used in mapping

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primer name	Forward sequence	Reverse sequence
RM82	TGCTTCTTGTCAATTGCC	CGACTCGTGGAGGTACGG
Bs1	GAGTGAAACCCTGCTCCAG	GAACACCACCTTATTCTATT
Bs2	CTGTGGAAAAGGACGCATAAA	ATTGAATAGTGGCGGTGGATT
Bs8	GCTACTGTCTGCCTCCTCG	GGTTCAAAATGAGACGCTTG
Bs12	GGGCATTCTGTGCATTTC	TGTCATTGTTTGCCTCTTA
Bs15	GCTTGTTGCTGCTGCTCT	ACAGAATTATGTAGGGACTGC
Bs17	AGGGCATGTATCTAACAAAGG	AGCTACTCGAAGCATCCACTAA
Jc-1	GAAGTGATGCCACTCCATG	TACCAATCAGCAAAGTCCC

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276 **Table S3** Primers used in Real-time PCR

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Primer name	Forward sequence	Reverse sequence
ACTIN	TGGTCGTACCACAGGTATTG	CCACATCTGCTGGAATGTGCTG
HEMA	GATGCAATCACTGCTGGAAAGCGT	CCATCTGCCAGCACCAATCAACA
HEML	AGAACAAAGGGCAGATTGCTGCTG	TGTTTCAAGTCACGGAGAGCA
HEMB	TGGCATTGTCAGGGAAAGATGGAGT	CCAAAGCAGCACGTATTGCTCAA
HEMC	TCATTCCGAGGGCTATTGGCTTCA	ACACTCTAGTTGCCAATGGTGA
HEME	AATGGAGGCTTGCTTGAGCGAATG	TTGTTACCAAGGCCTCCTTCCA
URO-D	AGGCTTCCACTGACAGGTGTTGAT	AAAGAACGCCAGGGTCAACATTCC
HEMF	ACTGACTGCACGATGGCAGTATGA	AGAGATCGAGCCATTCTTGGGT
CHLD	TAGCACAGCTGTCAGAGTGGTTT	TTGCCAGCCACCTCAAGTATCTCA
CHLH	GCACGGGAACTTGGCGTTTCATTA	ACATGTCCTGGAGCTGCTCTCAT
CHLI	AGGGATGCTGAACTCAGGGTGAAA	AAGTAGGACTCACGGAACGCCTT
CHLM	GCTTCATCTCCACGCAGTTCTACT	GCAATGACGAATCGAAGACGCACA
CRD	TGGATCTAACATGACACGCACCCA	ACTGTAACGGCATTCTCTCCGGT
DVR	TTCTCGAGAGGGTGATCAGGGAA	GAAACTGGCAATGGCAGCCAAGAA
POR	TCGTCGGCCTCGTCTGAGTTATT	AGGCCTCTCACTGAAAGCTGAA
CHLG	CCAGCCACTGATGAAAGCAGCAAT	AGAGCGCTAATACACTCGCGAAC
CAO	ACACCTTCATCTGGCTTCAAGGA	AGATGCGTGAACATTGCTTGGTG
DL-2	TCAGAAACTACCACTGCCAGAACATC	AGTCCCCCCCAGAAATCG
PsaA1	GGGAGGTGGCGAGTTAGTAG	AATGCGTGAATGTGATGGAC

PsaA2	TTATCTTCAACGAGCGGT	TATCTCCAGGT CCTATTGTT
PsbD1	CTGCTACTGCTGTTTCT	GATGTTATGCTCTGCCTG
Rpoα	GCGTCTTATTATGGTCG	TGTTCCCTCTGTTCTCC
Rpoβ	GTGGGGAACTTGCTTAGG	GCTTGTTGTATCCGTCTGA
Rpoβ'	CATAGATTAGGCATACAGGC	AATAGCAGGAGATAGGAG
Rpoβ''	AAAAGAGGAGGCTCGTGC	GATGTTGGCTAAGTGATTGA
NADH2	ATCACTGTAGGACTTGGTT	TTTCCAGAAGAAGATGCC
NADH4	TCCTTATTGCTTATGCTGTC	CCGTATGCTCCCATTTA
ATPα	TCAAAAAGGGCAAGATGT	TTGTAATGTAGCAGGGAAAT
ATPβ	TTATTGGACCCGTGCTGG	TTGCTTACCGTCAGTGTCTCG
RCA	CTCTTGTGCCCGTGTTCAC	TCGGAGTTAGCGTCACCAAG
RbcL	CAACTGTTGGACTGATG	GTTACCCACAATGGAAGT
Rps1	GGAAACGCCCTCACAACT	TCCCACCTTATTCTCAAACC
Rps2	TTCGATTCCCTTATACGC	TTCCCGAGATACTGGTGG
Rps3	CCATCTCGCTTTCCCT	CAATTG C CTATCCTACCT
Rpl2	TCGTCTATTGGCATTGTGG	GGTGGATT CGAGGATCTTAC
Rpl17	CGTCTTCATATCGAGCCA	GAGCAATCCAACCCGTAG
Ndh4(mt)	ACAGGAACCACCGATTAA	ACCATAGGCAC TTTGACG
ccmFn	CTTCATTCTGGACCTCG	AAATCTCCTCGTGTATCG
26S rRNA	ACAACGACCAATCCTGAA	AGGCAGGCTTATACCATTAC
18SrRNA	AAGACCGAAACTCAAAGGA	TGTCAAGGGCTGGTAAGG

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279 **Table S4** Primers used in vector construction

Primer name		Sequence	Used for
1390-WP1	Forward	TTCTGCACTAGGTACCTGCAGATGGCGCTCGCGGGCGC	Ubi-WP1
	Reverse	TCTTAGAATTCCCGGGATCCCTAACAAATTGTTATTAA	
pA7-WP1-GFP	Forward	CCGCTCGAGATGGCGCTCGCGGGCGC	Subcellular localization
	Reverse	GGACTAGTGCATCAAATTGTTATTAA	
pA7-WP1 ₁₋₁₀₀ -GFP	Forward	CCGCTCGAGATGGCGCTCGCGGGCGC	Subcellular localization
	Reverse	GGACTAGTGCCAGCGATCCGGTAACATT	
1305-WP1-GFP	Forward	AAGTCGGAGCTAGCTCTAGA ATGGCGCTCGCGGGCGC	Subcellular localization
	Reverse	GCCCTTGCTCACCATGGATCCATCAAATTGTTATTAA	
pA7-AtVaLRS2-GFP	Forward	AAGTCGGAGCTAGCTCTAGAATGATTCTCAAACGGCTT	Subcellular localization
	Reverse	GCCCTTGCTCACCATGGATCCCTGAGACACTAAAGAAGTA	
pA7-OsValRS1-GFP	Forward	CCGGACGTCATGTCCAGCGTTACCCCTGCTGCC	Subcellular localization
	Reverse	TCCCCCCGGGATTATTGCCAGTTTGCTCATCTAG	

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