**TABLE S1** | Primer sequences used for vector construction and qRT-PCR analysis.

| Gene | Accession number | Forward primer (5'-3') | Reverse primer (5'-3') | |
|---|---|---|---|---|
| ***PGR5*** | Solyc09g090570 | ATCAACTTAGGGGCAAAGCT | CCTTTGCTTCTGATCTGCTCC | qRT-PCR |
| ***PGRL1A*** | Solyc08g080050 | CGATGATTTGACTGGATTCG | CCACAATATGAAGGGCAATG | qRT-PCR |
| ***PGRL1B*** | Solyc08g007770 | CGATTTGACTGGATTCGAGA | AACAATGGCGTTTGTGATTG | qRT-PCR |
| ***NDHM*** | Solyc04g057980 | CTCCATTGACGGAGTACACG | ACCCAACTCTTGGTTTCCC | qRT-PCR |
| ***NDHB*** | Solyc09g083190 | CATTTCATGGCTGTTTCCTCC | TGTGCTTCACTTGGTTTGTCC | qRT-PCR |
| ***NDHH*** | Solyc07g032430 | ATGTGAGAGTTGAAGCCCCA | ACATGGTGGGCGAATTTTCC | qRT-PCR |
| ***ACTIN*** | Solyc11g005330 | TGTCCCTATTTACGAGGGTTATGC | CAGTTAAATCACGACCAGCAAGAT | qRT-PCR |
| ***PGR5*** | Solyc09g090570 | CGgaattcGCCTCTTCATTACCACTCA | CCGctcgagCCCATCATTATCCTTGATCTCACTG | VIGS |
| ***PGRL1A*** | Solyc08g080050 | CCGgaattcTCAAGAACAAGAATGGCCACC | CGCggatccCACTGCTCCCTTCCCACATA | VIGS |
| ***NDHM*** | Solyc04g057980 | CGgaattcGATCCCGAAACCTTTGCTT | CCGctcgagTCCATTGTAATTGAACCCA | VIGS |

**TABLE S2** | Definition of terms and formulae for calculation of the JIP-test parameters from the Chl a fluorescence transient OJIP emitted by dark-adapted leaves.

| Fluorescence parameters | Description |
|---|---|
| $\psi_0 \equiv T_0/TR_0 = (1 - V_J)$ | probability (at t = 0) that a trapped exciton moves an electron into the electron transport chain beyond $Q_A^-$ |
| $\phi_{Eo} \equiv ET_0/ABS = [1 - (F_0/F_M)]\ \psi_0$ | quantum yield of electron transport (at t = 0) |
| $\phi_{Po} \equiv TR_0/ABS = [1 - (F_0/F_M)]$ | maximum quantum yield of primary photochemistry (at t = 0) |
| $V_I = (F_I - F_0)/(F_M - F_0)$ | relative variable fluorescence at time I-step ($F_I \equiv F_{30ms}$, fluorescence at the 30 ms of O-J-I-P) |
| $1\text{-}V_I = 1\text{-}(F_I - F_0)/(F_M - F_0)$ | reflects the content of PSI reaction centers as well as the electron flow capacity from plastoquinone to the PSI electron acceptors |
| $V_K = (F_{300} - F_0)/(F_M - F_0)$ | relative variable fluorescence at time K-step ($F_{300\mu s}$, fluorescence at 300 μs) |
| $V_J = (F_J - F_0)/(F_M - F_0)$ | relative variable fluorescence at time J-step ($F_J \equiv F_{2ms}$, fluorescence at the 2 ms of O-J-I-P ) |
| $V_K/V_J = [(F_{300} - F_0)/(F_M - F_0)]/[(F_J - F_0)/(F_M - F_0)]$ | a relative measure of inactivation of OEC and/or the functional antenna size |
| $OEC = [1\text{-}(V_K/V_J)_{treat}]/[1\text{-}(V_K/V_J)_{control}]\times 100$ | the fraction of $O_2$ evolving centre (OEC) |
| $M_0 \equiv (\Delta V/\Delta t)_0 \equiv 4\ (F_{300\mu s} - F_0)/(F_M - F_0)$ | approximated initial slope (in $ms^{-1}$) of the fluorescence transient V = f(t) |
| $\phi_{Ro} = (1 - F_0/F_M)(1 - V_I)$ | quantum yield for reduction of end electron acceptors at the PSI acceptor side (RE) |
| $\delta_{Ro} = (1 - V_I)/(1 - V_J)$ | efficiency/probability with which an electron from the intersystem electron carriers moves to reduce end electron acceptors at the PSI acceptor side (RE) |
| $ABS/RC = M_0\ (1/V_J)\ (1/\phi_{Po})$ | absorption flux per RC |
| $ABS/CS_M \approx F_M$ | absorption flux per CS, approximated by $F_M$ |
| $TR_0/CS_M = \phi_{Po}\ (ABS/CS_M)$ | trapped energy flux per CS (at t=0) |
| $ET_0/CS_M = \phi_{Eo}\ (ABS/CS_M)$ | electron transport flux per CS (at t = 0) |
| $DI_0/CS_M = (ABS/CS_M) - (TR_0/CS_M)$ | dissipated energy flux per CS (at t = 0) |
| $RC/CS_M = \phi_{Po}\ (V_J/M_0)\ (ABS/CS_M)$ | density of RCs ($Q_A^-$ reducing PSII reaction centers) |
| $PI_{ABS} \equiv (RC/ABS)\ [\phi_{Po}/(1 - \phi_{Po})]\ [\psi_0/(1 - \psi_0)]$ | performance index (potential) for energy conservation from photons absorbed by PSII to the reduction of intersystem electron acceptors |
| $PI_{total} = (PI_{ABS}) \times [\delta_{Ro}/(1 - \delta_{Ro})]$ | performance index (potential) for energy conservation from photons absorbed by PSII to the reduction of PSI end acceptors |