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Arabidopsis genome uncoupled 4 mutant have a greater light energy transfer efficiency despite low chlorophyll content.

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Arabidopsis mutant *gun4* was identified as a mutant that have defects in plastid-to-nucleus signaling pathways. Since no detailed physiological characterization was done in this mutant, the aim of this study was evaluate the photosynthetic responses of wild type (WT) and *gun4* plants of *Arabidopsis thaliana* under light stress (LS). The plants were growth in temperature and light intensity controlled, and subjected to LS for 0, 14 or 28 h under 800 µmol photons m^{-2} s^{-1}. Gas exchange and chlorophyll-*a* fluorescence were accomplished with IRGA (Li-cor 6400) and Mini-Pam (Walz). The effective quantum yield of the PSII (Φ_{PSII}) and photochemical quenching (qL) were higher in *gun4* plants. Higher values of electron transport rate, Φ_{PSII} and qL were also found in *gun4* under different light intensities, showing that *gun4* can maximize the transfer of light energy absorbed in the light harvest complex of PSII for the photosynthetic process. The rate of net carbon assimilation and stomatal conductance were 43% and 61% lower in *gun4* respectively, despite no difference in the flow of absorption of $^{14}CO_2$, suggesting that the lower magnitude of photosynthesis in *gun4* plants could be due in part to reduction in influx of CO_2. After 14 h of LS, the quantum yield potential of PSII decreased significantly only in WT, suggesting that *gun4* may have a greater ability to minimize photoinhibitory effects. These results provide additional evidences for the higher non-photochemical quenching in *gun4*. Altogether the data suggest that *gun4* transfers and dissipates more efficiently the excess of light energy absorbed, despite a strong reduction in chlorophyll content. The results indicate the existence of other new mechanism for the adjustment of the photosystem in order to compensate

reductions of light absorption, indicating the importance of this mutant to explore the mechanisms that control the plasticity of the photochemical protein complex.

Key words: *Arabidopsis thaliana*, *gun4* mutant, light stress, light harvest complex, photosystem II, energy dissipation

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