**Constitutive presence of zeaxanthin in the *zea1* mutant of the unicellular green algae *Dunaliella salina* slows down photodamage of PSII under irradiance stress conditions**

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A novel mutant (*zea1*) of the halotolerant unicellular green alga *Dunaliella salina* is impaired in the zeaxanthin epoxidation reaction, thereby lacking a number of the -branch xanthophylls.

HPLC analysis revealed that the *zea1* mutant lacks neoxanthin (N), violaxanthin (V) and antheraxanthin (A) but constitutively accumulates zeaxanthin (Z). The photosynthetic apparatus organization and function of a mutant of *Dunaliella salina (zea1)* were investigated. Despite the strong differences observed in the carotenoid compositions in *zea1* and wild type, *zea1* could hardly be distinguished from wild type on the basis of photosynthetic performance such as photochemical conversion efficiency of PSII (Fv/Fmax) and relative photon efficiency of photosynthesis (). In *zea1* the contents of photosystem II (PSII) and PSI were similar to the wild type. Because zeaxanthin is believed to be participate in photoprotection of growing cells under different light intensities, measuring photosynthetic parameters assessed the difference of photoinhibiton in WT and *zea1* cells that contain zeaxanthin constitutively. No differences were found in *in vivo* photoinhibition, measured either by Fv/Fm of functional PSII or photon efficiency of photosynthesis. For both wild type and *zea1* mutant levels of total LHCII apoproteins declined as a function of irradiance, but one of the LHCII complex proteins was significantly decreased in the *zea1* mutant compared to WT. No detectable difference existed in the levels of D1 protein as well as 160 kDa intermediate repair protein complex of PSII between WT and *zea1* when compared at different irradicances. However, following a transition from LLHL in the presence of the plastidal protein biosynthesis inhibitor lincomycin revealed that the reduction of D1 protein, indicating PSII photodamage, was significantly slower in *zea1* than wild type.