

Elevated Temperature Treatment Induced Alteration in Thylakoid Membrane Organization and Energy Distribution between the Two Photosystems in *Pisum sativum*[#]

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Two-week-old pea (*Pisum sativum* var. Arkal) plants were subjected to elevated temperature (38 °C/42 °C) in dark for 14–15 h. The effect of heat treatment on light-induced phosphorylation of LHCII and LHCII migration in the thylakoid membranes were investigated. The heat treatment did cause a substantial (more than two fold) increase in the extent of LHCII phosphorylation as compared to the control. Upon separation of appressed and non-appressed thylakoid fractions by digitonin treatment, the heat-treated samples showed a decrease in LHCII-related polypeptides from the grana stack (appressed region) over the control. Further, a small increase in the intensity of these (LHCII-related) bands was detected in stromal thylakoid fraction (non-appressed membranes). This suggests an enhanced extent of migration of phosphorylated LHCII from appressed to non-appressed regions due to *in vivo* heat treatment of pea plants. We also isolated the LHCII from control and heat treated (42 °C) pea seedlings. Analysis of CD spectra revealed a 5–6 nm blue shift in the 638 nm negative peak in heat treated samples suggesting alteration in the organization of Chl *b* in the LHCII macro-aggregates. These results suggest that *in vivo* heat stress not only alters the extent of migration of LHCII to stromal region, but also affects the light harvesting mechanism by LHCII associated with the grana region.