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Activities of Violaxanthin de-epoxidase in Soybean Callus under High Irradiance

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Objectives

Dynamic changes of NEO, VIO, ANT, ZEA, α -carotene and β carotene under high irradiance had investigated in soybean callus culture (Pandey *et al.* 2003). However, information on the activity of violaxanthin de-epoxidase (VDE) in the XC with the PSII membranes in the callus system will exhibit different response with the HI, are not available. Therefore, the present work was undertaken to investigate the additional information on the activity of VDE with high irradiance (HI) for 24 h in *in vitro* green calli of soybean.

Materials and Methods

The whole etiolated excised hypocotyls (0.2 - 0.3 cm in length) from the 5 d seedlings of soybean (*Glycine max cv.* Pungsannamulkong) were cultured on the solid (1.1% agar) MS medium supplemented with 4.52 μ M 2,4-D and 2.32 μ M kinetin, and 3 % sucrose. After 30 d of culture, the green calli with the thickness of 0.4 - 0.8 cm were irradiated with "white light" from 150W HQI lamp with the irradiance of 133 W m⁻² for 0 and 24 h.

- Preparation of the PSII membranes
- Extraction of VDE
- Assay of the VDE activity in a term of the de-epoxidation index (DEI), (ANT+2ZEA)/(VIO+ANT+ZEA)
- Extraction of xanthophylls cycle pigments
- Analysis of XCP with high-performance liquid chromatography

Results and Discussion

1. XCP contents (%) of 0 and 24 h HI-illuminated calli had been determined. Under control (0 h), the reaction of VDE with PSII membranes in the absence of Tween 20 at 30°C for 1 h resulted that NEO and VIO decreased, but ZEA increased. Further, the reaction of VDE with PSII membranes in the presence of Tween 20 stimulated the reduction of NEO without affecting the content of VIO, but the contents of ANT and ZEA increased. Under 24 h-HI, the reaction with PSII membranes in the absence of VDE at the same condition resulted that VIO and ANT decreased, ZEA increased, but NEO remained similar to the control. Also, reaction of VDE with PSII membranes in the absence of Tween 20 exhibited that NEO and ANT increased, but VIO and ZEA decreased. However, the reaction of VDE with PSII membranes in the presence of Tween 20 was further induced.
2. Under the control (0 h), VDE activities, DEIs (1.04 and 1.06, respectively) in reactions with PSII membranes in presence of VDE supplemented with or without 0.1% Tween 20 at 30°C for 1 h were significantly higher than that (0.76) in the absence of VDE. Under 24h-HI, DEI (1.03) in the absence of VDE was similar to those reactions in the presence of VDE supplemented with or without 0.1% Tween 20 under the control condition. And also, DEIs (0.98 and 0.96, respectively) in the presence of VDE supplemented with or without 0.1% Tween 20 were similar to that (1.03) in the absence of VDE.