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Effect of Strong Light on Violaxanthin De-epoxidase Activity in Spinach Leaf

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Effect of strong light on the activity of violaxanthin de-epoxidase (VDE) and characteristics of xanthophyll cycle pigments such as neoxanthin (NEO), *cis*-neoxanthin (*cis*-NEO), violaxanthin (VIO), anteraxanthin (ANT), zeaxanthin (ZEA), and lutein (LUT) were studied in PS? membranes of the spinach leaf. After 24 h of intense light illumination (12000 lumen), the contents of NEO, *cis*-NEO, ZEA, chlorophyll (Chl) *b*, total Chl, ratio of total Chl/total carotenoids (Cars), and ZEA/total Chl increased significantly, while violaxanthin (VIO), anteraxanthin (ANT), total Cars, and ratio of Chl *a*/*b*decreased. Reaction with the presence of VDE resulted in decreased VIO content as compared with the absence of VDE under normal as well as intense light treatment, while contents of ANT and ZEA increased. The content of LUT remained nearly constant during the whole experiment, irrespective to the light intensity and/or the presence of Tween 20. Under normal light intensity, addition of exogenous VDE significantly increased the de-epoxidation index (DEI). Under intense light, absence of VDE and addition of exogenous VDE supplemented with 0.1% Tween 20 exhibited similar DEI to that in the presence of VDE under the normal light condition, reflecting the inductive effect of strong light as well as Tween 20.

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Strong Light Effect on the Kinetics of Violaxanthin De-epoxidase in Soybean Callus Cultures

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Strong light effect on the kinetics of violaxanthin de-epoxidase (VDE) in a term of de-epoxidation index (DEI) and characteristics of xanthophyll cycle pigments such as neoxanthin (NEO), violaxanthin (VIO), anteraxanthin (ANT), and zeaxanthin (ZEA) were analyzed by HPLC in the PS?membranes of soybean calli. The calli were induced from the hypocotyls segments of 5 d seedlings on a solid MS medium (pH 5.8) supplemented with 4.52 M 2,4-D and 2.32 M kinetin 3% sucrose 1.1% agar. After 60 d culturing, the green calli were illuminated with a strong light (12000 lumen) for 24 h. VDE was isolated from the PSII membranes that were extracted from the normal, week light-illuminated calli as well as the high intensity light-illuminated calli. The proteins contents during different preparations of VDE were estimated. The protein contents decreased in all the preparations of the high intensity light-illuminated callias compared to the normal, week light. Under intense light, absence of VDE and addition of exogenous VDE supplemented with or without 0.1% Tween 20 exhibited similar DEI to that in the presence of VDE with or without 0.1% Tween 20 under the normal light condition, reflecting the inductive effect of strong light. SDS-PAGE patterns of the different preparations of normal and strong light-treated VDE are under investigation.

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New Biosynthetic Pathway for Castasterone from Cholesterol via 28-Norbrassinosteroids in Plants

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A cell-free enzyme solution prepared from young tomato plants successfully catalyzed conversions of cholesterol to cholestanol,6-deoxo-28-norteasterone to 28-norcastasterone via 6-deoxo-3-dehydro-28-norteatserone, 6-deoxo-28-nortyphasterol, and 28-norteasterone to 28-norcastasterone via 3-dehydro-28-norteasterone and 28-nortyphasterol. In addition, the enzyme solution mediated conversion of 28-norcastasterone to castasterone in the presence of S-adenosyl-methionine and NADPH. These results indicate that castasterone can be biosynthesized from 28-norcastasterone, which is biosynthesized from cholesterol via two parallel biosynthetic pathways, namely the early and late C-6 oxidation pathway for 28-norbrassinosteroids in the tomato plants. The conversion of 28-norcastasterone to castasterone was also detected in cell-free enzyme solutions prepared from *Phaseolus vulgaris* and *Arabidopsis thaliana*, suggesting that the biosynthesis of castasterone from cholesterol via 28-norbrassinosteroids is common in plants.

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Function of Expansin5 in *Arabidopsis thaliana*

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Arabidopsis expansin5 (*AtEXP5*)-knockout mutant, which was identified in T-DNA inserted mutants pools, (*AtEXP5*) showed a slightly longer root than that of wild-type *Arabidopsis* (Columbia-0), indicating that growth of Arabidopsis roots may be controlled by *AtEXP5*, most likely negatively. Exogenously applied brassinosteroid inhibited growth of Arabidopsis roots, and gene expression of *AtEXP5*by brassinolide application was detected several times higher in roots than in shoots, which suggested that *AtEXP5* and brassinosteroid were associated in Arabidopsis roots growth. In fact, *AtEXP5* mutant displayed normal sensitivity toward other plant hormones, but application of brassinolide to *AtEXP5* mutant diminished the growth inhibition shown in wild-type Arabidopsis roots. Expression of *AtEXP5* was dramatically decreased in roots of brassinosteroid-related mutants (*det2, bri1-201*), indicating that the expression of *AtEXP5* in roots was specifically up-regulated by brassinosteroids. In the presentation, gravitropic response and lateral roots formation of *Arabidopsis*in relation to *AtEXP5* protein will be also discussed.