The Role of Phytochromes in Regulation of Auxin Transporter Expression in Hypocotyls of Solanum lycopersicum L.

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Light is an essential factor for plants – it provides plants with energy and reliable information about current conditions of their habitat. Under fluctuating light environments, plants dynamically adjust their architecture to optimize growth and performance. However, details of these acclimatization pathways are still underexplored. This project extends former research, in which a hypothesis explaining how light could influence plant growth and development via red light photoreceptors phytochromes and phytohormone auxin has been proposed. Now, I tested if phytochromes play roles in gene expression of auxin transporters and overall amount of phytohormones. The used methods include relative quantification of gene expression of auxin transporters SlLAX4 and SlPIN1 and analysis of hormones auxin and abscisic acid in hypocotyls of tomato (Solanum lycopersicum L.). Plants were grown in vitro under blue or red light as well as in the dark. The role of phytochromes in these pathways was examined by analysis of mutant tri1 with the defect in PhyB1 and mutant yg-2 deficient in phytochrome chromophore. The performed experiments imply that red light decreased expression of SlPIN1 gene via PhyB1. However, red light has almost none effect on SlLAX4 expression. Blue light reduces expression of both SlPIN1 and SlLAX4 genes but this action is likely mediated by other phytochromes. Light also influenced concentration of abscisic acid in plant hypocotyls, nevertheless it has minimal effect on the concentration of auxin. This project shed light on interactions of light and auxins influencing plant growth and development as well as raised new questions for further research.

Awards Won:

Third Award of $1,000