

Overexpression of N-terminal lacking mutant HFR1 confers light-independence in a subset of photo-responses

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Footnotes:

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Abstract

Phytochrome controls diverse aspects of plant development in response to the ambient light conditions. HFR1, a basic helix-loop-helix protein, is required for a subset of phytochrome A (phyA)-mediated photo-responses in Arabidopsis. Here, we show that overexpression of HFR1-N105, but not the one of the full-length *HFR1*, confers exaggerated photo-responses. The transgenic plants overexpressing *HFR1-N105* exhibited light-independence in a subset of photo-responses, including germination, de-etiolation, gravitropic hypocotyl growth, and blocking of greening. Overexpression of *HFR1-N105* also caused constitutive light-responses in the expression of some light-regulated genes. In addition, the *HFR1-N105* overexpressor showed hypersensitive responses under R and FR light, dependently on phyB and phyA, respectively. End-of-day far-red light response and petiole elongation were suppressed in the *HFR1-N105* overexpressor plants. Together these results imply that overexpression of *HFR1-N105* activated a branch of light signaling, supporting the hypothesis that transcriptional regulation in the nucleus would be the primary mechanism of light signaling in Arabidopsis. We discuss the biotechnological potential of the mutant bHLH protein, HFR1-N105 in regard to suppressed shade avoidance syndrome.

Introduction

Light impacts on the diverse aspects of growth and development in higher plants