PHYA and PHYB regulate adventitious rooting in response to dark-light transitions in Arabidopsis seedlings

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Adventitious rooting can be induced without exogenous hormones in some species by transitioning plants from dark to light environments. We are investigating the role of light quality, plant photoreceptors, and auxin levels in this process. Etiolated wild type Arabidopsis seedlings exposed to red, white, or blue light for one week produced significantly more adventitious roots than seedlings that were kept in continuous darkness or exposed to far red light only. Phytochrome B (phyB) mutants produced significantly more adventitious roots than wild type in response to red or white light treatments, but also produced very few adventitious roots under dark conditions. Phytochrome A (phyA) mutants and phyAphyB double mutants produced significantly fewer roots than wild type under all light treatments tested. These results suggest that PHYA and PHYB regulate adventitious rooting in response to dark-light transitions, with PHYA being required for adventitious root formation and PHYB functioning as an inhibitor. We are currently investigating whether differences in auxin levels or metabolism may contribute to differences in root formation among wild type, phyA, and phyB seedlings using highly sensitive GC-MS/MS analysis. These findings have implications for better understanding and potentially improving adventitious rooting in horticulturally important species, which is often a bottleneck to propagation and production.