Public Abstract

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BLUE LIGHT- AND UBIQUITIN-DEPENDENT INFLUENCE ON PHOTOTROPIN 1 ABUNDANCE AND MOVEMENT WITHIN THE PLASMA MEMBRANE.

Phototropism is the bending of a plant in response to a directional light source. The shoot of a plant exhibits a positive response bending toward the light to optimize solar collection. The roots exhibit a negative response bending away from the light to stabilize the plant and to acquire moisture that accumulates away from direct light. Plants that are more phototropic produce more food and are more drought tolerant. The 'eyes' of the plant that initiate the phototropic response are phototropin 1 and phototropin 2. Phototropin 1 initiates phototropism when light is limited and the phototropic response is most critical. In response to high light levels the "eyes" of the plant reorganize from a random distribution at the inner face of the plasma membrane and accumulate into foci. Our data shows that the foci that form prevent receptor signaling and inhibit the phototropic response. In response to low light conditions the "eyes" of the plant do not collect into foci allowing for prolonged signaling of the activated receptor. This suggests a robust mechanism for light interpretation mediated by the phototropin 1 protein. Understanding the mechanism of the phototropic response will allow for the engineering of crop plants with enhanced food production and drought tolerance. In turn this will improve yield and allow crops to be grown in more regions of the earth providing more food for the growing global population.