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Reaching out for the sun: dealing with the threat of carbon deprivation

Light is a vital resource for plants, which compete for its availability particularly in dense communities, which are typical in agriculture. Plants possess multiple photosensory receptors to detect the presence of competitors and thereby adjust their growth and developmental strategies accordingly. I will discuss the photoperception mechanisms and growth responses elicited by the neighboring vegetation in *Arabidopsis* and *Brassica rapa*, two typical shade-avoiding species. These responses include rapid shade-induced organ-specific transcriptional reprogramming mediated by Phytochrome Interacting Factors (PIFs). In young seedlings shade leads to a rapid burst of auxin production in cotyledons that is then transported to the hypocotyl where it promotes elongation. Later in development similar regulatory mechanisms underlie leaf repositioning that is restricted to the shaded part of the plant. Finally, I will present evidence for rapid reallocation of carbon from the main photosynthetic source tissues towards elongating stems. This resource reallocation is essential for rapid growth elicited by neighbor threat.

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