

Juvenile Phase Change: Towards a physiological and genetic understanding

Ioannis G. Matsoukas, Brian Thomas, Veronica Valdes-Ruiz, Stephen Jackson, Alison Jackson, Steven Adams, Andrea Massiah

Warwick HRI, The University of Warwick, Wellesbourne, Warwick, UK, CV35 9EF

Abstract

Plants undergo a series of qualitative transitions during their life-cycle in response to both environmental and internal factors. One of the most distinguishable is the transition from a vegetative to reproductive phase of development. This stage is preceded by the juvenile to adult transition within the vegetative phase. During the juvenile phase (JP) plants are incompetent to initiate reproductive development and are effectively insensitive to photoperiod. With the change to adult phase, plants attain competence to respond to floral inducers, which is required for the transition to the reproductive phase.

Here we exploit *Antirrhinum*, a facultative long day plant that has a defined JP that is sensitive to light, to understand the genetic and environmental factors that regulate juvenility. A physiological assay has been developed in *Antirrhinum* that exploits photoperiod sensitivity to allow the length of the JP to be estimated. Environmental factors such as irradiance and CO₂ concentrations have been found as key modifiers of the length of the JP. A correlation between limiting photosynthetic assimilates and vegetative phase transition has been revealed by HPLC analysis of total soluble carbohydrates in plants at defined developmental stages. Studies are being carried out to determine whether plants are florally incompetent during the JP due to inactivity of the photoperiodic floral induction pathway.

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