Time for Flowers

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Flowering time is genetically determined and environmentally controlled by signals that act together to co-ordinate the transition from vegetative to reproductive growth. Change in daylength is perceived as a seasonal signal for the control of flowering of many plants. The measurement of daylength is thought to be mediated through the interaction of phototransduction pathways with a circadian rhythm. We used varying, non-24 hr light-dark cycles to alter the timing of circadian rhythms of gene expression relative to dawn and dusk in order to test this hypothesis in the facultative long-day plant, *Arabidopsis thaliana*. Effects on circadian rhythms were correlated with those on flowering times. We showed that conditions that displaced subjective night events into the light portion of the cycle were perceived as longer days (1). In sugar beet, long days exert their effect only in plants made receptive by vernalization. Photoperiod is perceived in the leaves and is thought to trigger the production of transmissible signals. The identity of such signals is as yet unknown, but in sugar beet, the levels of gibberellins (GAs) that promote flowering are increased in response to long days. We wanted to study the effect of GA metabolism on the bolting and flowering behaviour of vernalized transgenic sugar beet plants in which GA 2-oxidase expression is specifically targeted to the shoot apex.

Understanding the integration of photothermal and hormonal regulation of photoperiodic responses will provide vital information about the control of flowering time which will assist plant breeders in developing varieties with improved flowering times.

1. Roden, L.C., Song, H.-R., Jackson, S., Morris, K. and Carre, I.A. (2002) Floral responses to photoperiod are correlated with the timing of rhythmic expression relative to dawn and dusk in *Arabidopsis*. *Proceedings of the National Academy of Sciences USA* **99**, 13313-1318