Floral Induction and Development in *Myosotidium hortensia* and *Phormium cookianum*

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Abstract

Little is known of the stimuli needed for flowering in two New Zealand endemic plants, *Myosotidium hortensia* and *Phormium cookianum*. These plants are widely recognised by the horticulture sector and the concerns of this thesis were to aid understanding of floral induction and development in the two species. Environmental stimuli were investigated by growing plants under factorial combinations of daylength and temperature in controlled growth rooms. The two daylengths used, termed long days (LD) and short days (SD), consisted of night / day periods of 8 / 16 h and 16 / 8 h respectively. Two night / day temperature regimes of 4 / 7°C and 18 / 24°C referred to as Cold and Warm respectively, were combined with the daylengths to make four treatments.

Floral induction in both species was unaffected by temperature or daylength, with approximately 50% of the *P. cookianum* flowering under all environmental treatments. *M. hortensia* did not flower. The absence of flowering seen in half of the *P. cookianum* plants was associated with a small size (fewer nodes at the commencement of the environmental treatments). Floral development in those plants that did flower was accelerated in *P. cookianum* by eight weeks growth under Cold compared with Warm treatment. Floral development of *P. cookianum* was further enhanced by four weeks treatment at Cold temperatures followed by transfer for four weeks at Warm temperatures. Vegetative growth was enhanced under Warm temperatures compared with Cold, in both *P. cookianum* and *M. hortensia*.

Hormonal floral stimuli were investigated by application of the gibberellin A_3, followed by growth under Cold SD conditions. The proportion of plants flowering was increased by GA_3 in *P. cookianum*. GA_3-treated *P. cookianum* flowered with fewer nodes as GA_3 concentration increased. In *M. hortensia*, GA_3 application did not cause flowering although stem elongation was increased.

A region of the *P. cookianum FLORICAULA / LEAFY* (*FLO / LFY*) homologue (*PFL*) mRNA was isolated by reverse transcriptase-PCR and sequenced, and shown to share strong sequence identity with other *FLO / LFY*-like genes. *PFL* mRNA

expression was compared with levels of actin mRNA using Real Time reverse transcriptase-PCR, performed using a LightCycler and the double stranded DNA binding dye SYBR Green 1. Upregulation of *PFL* mRNA at the meristem occurred over time, and increases coincided with changes in morphology from vegetative to inflorescence development. As predicted, greater *PFL* expression was observed in fans of larger size, these being the fans with greater likelihood of flowering.

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