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Floral Induction and Development in
Myosotidium hortensia and
Phormium cookianum

A thesis presented in partial fulfilment of the requirements for the degree of
Master of Science in Plant Biology
at Massey University, New Zealand

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2004

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 A₃, followed by growth under Cold SD conditions. The proportion of plants flowering was increased by GA₃ in *P. cookianum*. GA₃-treated *P. cookianum* flowered with fewer nodes as GA₃ concentration increased. In *M. hortensia*, GA₃ 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.

Acknowledgements

I am most grateful towards my supervisors Dr. John Clemens and Professor Paula Jameson, you have earned my most heartfelt thanks. You make a great team. Your faith, guidance, encouragement, and smiles helped me achieve all this.

Thanks to my lab colleagues for your patience, advice, and friendship. Jason for watching over me, Alexa and Angie for your help, and Elizabeth and Anu for your smiles. Thanks to the many friends I have made in the Institute, I will always remember.

To my parents Ed and June, you have always listened. I am thankful for your interest and encouragement.

I would like to acknowledge, through a subcontract from Crop & Food Research, the Public Good Science Fund. Also the Institute of Molecular BioSciences for contributions made towards research, conference travels and general living expenses, for which I am grateful.

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