

How is mast seeding triggered? Observational and experimental data on Chionochloa and Celmisia

Prof Dave Kelly¹, Sana Lehre¹, Samarth Samarth¹, Prof Paula E Jameson, Prof Richard Macknight², Prof Matthew H Turnbull¹

¹University Of Canterbury, ²University of Otago

Mast seeding (highly variable synchronous flowering by perennial plants) can have widespread consequences, including in New Zealand for conservation outcomes such as Battle for the Birds. Therefore accurately predicting masting is important. It was previously thought that for New Zealand species, the cue for mast years was warm summers, but the best current predictor is the delta-T model based on the temperature difference between the previous two summers. Here we test the delta-T model in herbaceous plants: snow tussocks (*Chionochloa* spp) and alpine daisies (*Celmisia* spp). Observational data of unmanipulated plants can give extra insights when unusual temperature combinations happen to occur. Experimentally over several seasons, by transplanting plants to higher and lower elevations, we created changes in temperature, and recorded the subsequent flowering. The direction of the response was as expected, with moves to lower elevations causing higher flowering, but the size of the response seemed to be smaller than predicted. The delta-T and warm-summer models differ in what plants would be predicted to do in their second year at lower elevations. Using our experimental data and past published experiments, we review how plant responses match predictions. Interactions with plant resources and depletion of competent tillers (grass shoots old enough to flower) may partly limit what plants are able to do in response to altered weather cues.