Plant recruitment across alpine summits in south-eastern Australia

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Summary

This thesis investigated aspects of plant recruitment across an altitudinal gradient of mountain tops in the Victorian Alps, Australia, and provides a baseline for the patterns and processes of alpine plant recruitment in the absence of large-scale disturbance.

The patterns in alpine vegetation across the study sites were described in relation to abiotic environmental factors. Temperatures were lower and precipitation was higher at the high altitude sites. The vegetation did not differ significantly between the sites, although sites at low altitudes were shrubbier than those at high altitudes.

Analysis of the soil seed bank revealed high mean densities of germinable seed (80 to 1400 seeds m⁻²) across the gradient of sites. The similarity between the seed bank samples and the standing vegetation was low (qualitative similarity: 0.08 to 0.2; quantitative similarity: 0.03 to 0.19).

In laboratory germination experiments, I found rapid and substantial germination. Final percent germination was above 90% for most species. One species, *Aciphylla glacialis*, showed evidence of dormancy mechanisms. In subsequent experiments, I found that innate primary seed dormancy in this species could be broken with cold-wet stratification.

There were no significant patterns in natural seedling recruitment across the altitudinal gradient. Similarities between the seedling flora and the standing vegetation were low (qualitative similarity: 0.18 to 0.45: quantitative similarity 0.04 to 0.09). Mean seedling density was best predicted by a combination of soil wilting point, altitude and plant litter. In some cases, seedling density was greater than 80 seedlings m⁻².

The relative importance of either negative (competitive) or positive (facilitative) interactions between seedlings with adjacent vegetation were investigated in relation to seed germination, seedling growth and seedling survival. Facilitative interactions were common at the higher altitude sites. At lower altitudes, facilitative and competitive interactions were common. Without close neighbours at high altitudes, seedlings were unlikely to survive into their second year.

An understanding of plant recruitment can provide a useful basis for predicting species responses to large-scale disturbance and climate change.

Statement of Authorship

Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis submitted for the award of any other degree of diploma.

No other person's work has been used without due acknowledgment in the main text of the thesis.

This thesis has not been submitted for the award of any degree of diploma in any other tertiary institution.

Susanna Elizabeth Venn 31st August 2007

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