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**Breeding systems and reproduction of indigenous
shrubs in fragmented ecosystems**

A thesis
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Abstract

Sixteen native shrub species with various breeding systems and pollination syndromes were investigated in geographically separated populations to determine breeding systems, reproductive success, population structure, and habitat characteristics. Of the sixteen species, seven are hermaphroditic, seven dioecious, and two gynodioecious. Two of the dioecious species are cryptically dioecious, producing what appear to be perfect, hermaphroditic flowers, but that function as either male or female. One of the study species, *Raukaua anomalus*, was thought to be dioecious, but proved to be hermaphroditic. *Teucrium parvifolium*, was thought to be hermaphroditic, but some populations are gynodioecious. There was variation in self-compatibility among the four *Alseuosmia* species; two are self-compatible and two are self-incompatible. Self-incompatibility was consistent amongst individuals only in *A. quercifolia* at both study sites, whereas individuals in *A. macrophylla* ranged from highly self-incompatible to self-compatible amongst four study sites. The remainder of the hermaphroditic study species are self-compatible. Five of the species appear to have dual pollination syndromes, e.g., bird-moth, wind-insect, wind-animal.

High levels of pollen limitation were identified in three species at four of the 34 study sites. Moderate to high levels of pollen limitation were evident in 50% of the gender dimorphic populations compared with 31% of hermaphroditic populations. *Melicope simplex* populations were female-biased in 14 study plots and successful fruit set was influenced by combinations of male plant density, male flower numbers and distance to the nearest pollen. Natural fruit set in wind-pollinated species was generally higher than in animal-pollinated taxa. Populations of *Coprosma spathulata* were mostly male-biased, and male plant density and proximity influenced natural fruit set, with a correlation between low fruit set and low male density. Population recruitment was evident in 32 of the 34 sites. In *Pimelea arenaria*, recruitment failure was widespread in populations throughout the North Island despite high seed set. Gender ratios showed variation from north to south, with a lower proportion of females with increasing latitude. Many of the sixteen shrubs in this study show remarkable resilience to the effects of fragmentation of natural ecosystems, and many of the species have benefited from the creation of new edge habitat after perturbation – it may be that edges are important refugia for some native taxa, especially shrubs.

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