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Does the environment influence the frequency of sexual reproduction in facultative apomicts?

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Hieracium pilosella L. (*Pilosella officinarum* F.W.Schultz & Sch.Bip.) in New Zealand is known to be a facultative apomict. Diploids and some tetraploids are regarded as obligate sexuals in Europe, whilst other ploidy levels are thought to be apomictic (Krahulcová, A. & Krahulec, F. 1999. Preslia 71: 217-234). In New Zealand, diploids are absent, and both tetraploids and pentaploids are facultative apomicts. Pentaploids comprise approximately 60% of most field populations, with tetraploids, and rarely aneuploids also present.

This research aims to determine whether environmental conditions influence the expression of sexual reproduction in facultative populations of *Hieracium pilosella.*

Six field populations of *H. pilosella,* over rainfall and altitudinal gradients, were pollinated with the closely related but morphologically distinct *H. aurantiacum.* The frequency of sexual reproduction at each site was determined by the proportion of the progeny from the crosses that was hybrid in origin. The frequencies of sexual reproduction at each site was regressed against the environmental gradients.

A positive relationship was found between the amount of sexual reproduction and rainfall, but this was not statistically significant. No significant relationship was found between altitude and the frequency of sexual reproduction. Due to high levels of sexual reproduction at one site, there was a significant effect of location on the amount of sexual reproduction. Further resolution of the role of the environment on the expression of sexuality in *H. pilosella* will be possible after the completion of the second field season at the same sites.

Further investigation of the site with elevated levels of sexual reproduction and another site in the area has led to the discovery of two obligate sexual tetraploid biotypes of *H. pilosella*. This is the first report of obligately sexual *H. pilosella* in New Zealand. Due to the presence of the morphological distinctiveness of the two biotypes, and geographic barriers between sites, we suspect independent origins.

The discovery of obligately sexual *H. pilosella* could mean that biocontrol with host-specific agents may prove to be problematic. If it is possible to relate the incidence of sexual reproduction with environmental conditions, this may allow predictions of the optimal areas for the release of biocontrol agents.