Alien Hybrids

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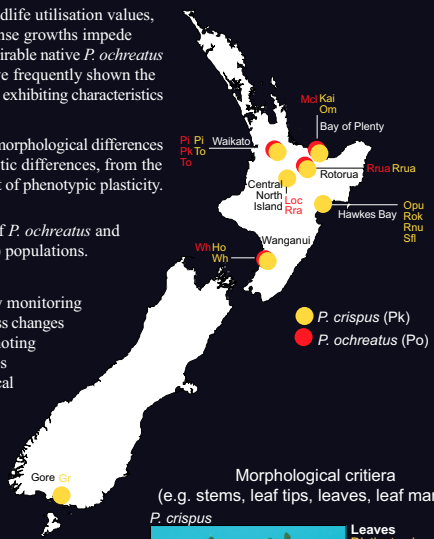
Introduction

Does the alien *Potamogeton crispus* hybridise with the native *Potamogeton ochreatus* in New Zealand?

In New Zealand there are five pondweed species, four native and one, *Potamogeton crispus* is alien. The native species are *P. cheesemanii, P. suboblongus, P. pectinatus and P. ochreatus*. The native species, *P. ochreatus* has similar habitats to *P. crispus* (alien) and it is not uncommon to find the two species in the same lakes and waterways.

Both species *P. ochreatus* and *P. crispus* have high wildlife utilisation values, but *P. crispus* can be a serious weed problem when dense growths impede waterflow, and may impact on the biodiversity of the desirable native *P. ochreatus* as a result of putative hybridisation. Lake surveys have frequently shown the occurrence of pondweeds with intermediate morphology, exhibiting characteristics of both *P. crispus* and *P. ochreatus*.

This study was undertaken to determine if the observed morphological differences among some New Zealand pondweeds are due to genetic differences, from the hybridisation of *P. crispus* and *P. ochreatus*, or the result of phenotypic plasticity.



Sampling Morphology

Pondweeds were collected from distinct populations of *P. ochreatus* and *P. crispus* and morphologically intermediate (variable) populations.

Plants were initially described and cultivated. Monthly monitoring using vegetative morphological criteria was used to assess changes in plant appearance. Plants were assigned a 1 or 0 denoting the presence or absence of each feature. Average scores identifying *P. crispus* (1), *P. ocreatus* (0) and morphological intermediate plants (between 1 and 0).

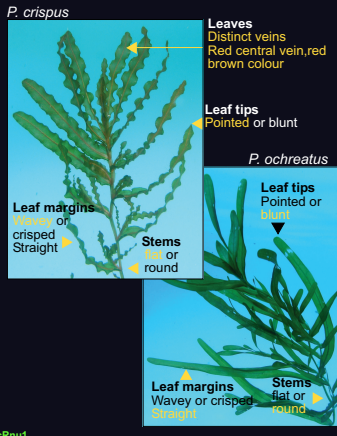
Results show highly variable morphology.

Following six months in cultivation there have been significant changes in the appearance of some plants, particularly *P. crispus.*

For example PkGr (*P. crispus* from Gore) at the time of collection scored 1 for every feature, six months later this same individual now has shoots that do not exhibit any of the diagnostic *P. crispus* features.

Is the variation that we see in the field due to phenotypic plasticity (morphological variation), or hybridisation?

Morphological critiera
(e.g. stems, leaf tips, leaves, leaf margins)



Genetics

DNA was extracted from all cultivated samples of *P. ochreatus* and *P. crispus* and at least one representative individual of *P. cheesemanii* (Pc), *and P. perfoliatus* (Pr) (culture specimen), using a CTAB method.

PCR was used to amplify two regions of ribosomal DNA (ITS and ETS) and one region of the chloroplast DNA (trnL intron, Taberlet).

Preliminary results show that all three regions are useful at delimiting between all species including *P. ochreatus* and *P. crispus* (Figures 1, 2 and 3).

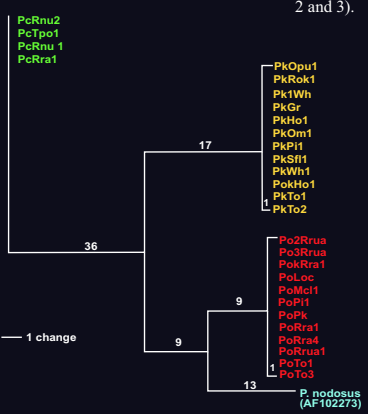


Figure 1. ITS analysis (Heurisitc search, 1 of 8 trees of 86 steps CI = 0.9651)

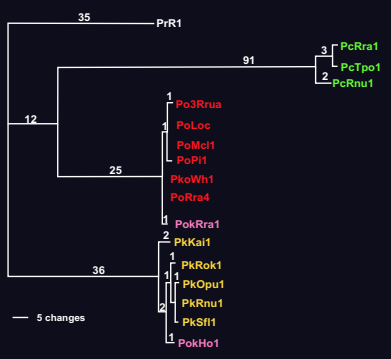


Figure 2. ETS analysis (Heuristic search, 1 of 6 trees of 215 steps, CI = 0.9442).

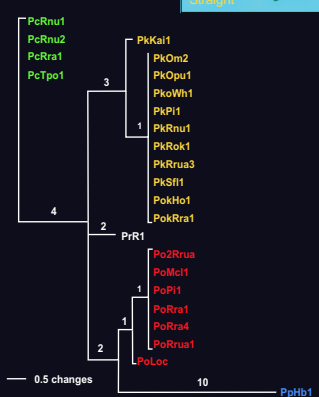


Figure 3. Taberlet analysis (Heurisitic search, 1 of 3 trees of 24 steps, CI = 1.0)

Conclusions

P. crispus in particular exhibits highly variable morphology under culture conditions. Individual plants have produced shoots that are both characteristic of *P. ochreatus* and *P. crispus*. This may account for some of the past field observations.

To date no hybrids have been identified.

Future Directions

Undertake experimental crosses to assess the potential for hybrid formation and to compare progeny morphology and genetics with parents.

Assess further molecular techniques and DNA regions for the identification of potential hybrids.

Reassess field observations from key sites and the occurrence of putative hybrids. Is it an infrequent event?

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