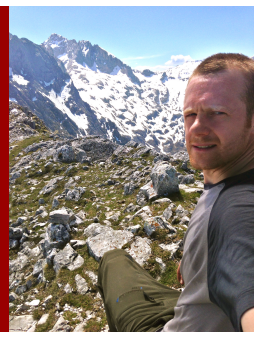
Adaptive differentiation in European *Arabis alpina* populations

UPPSALA UNIVERSITET

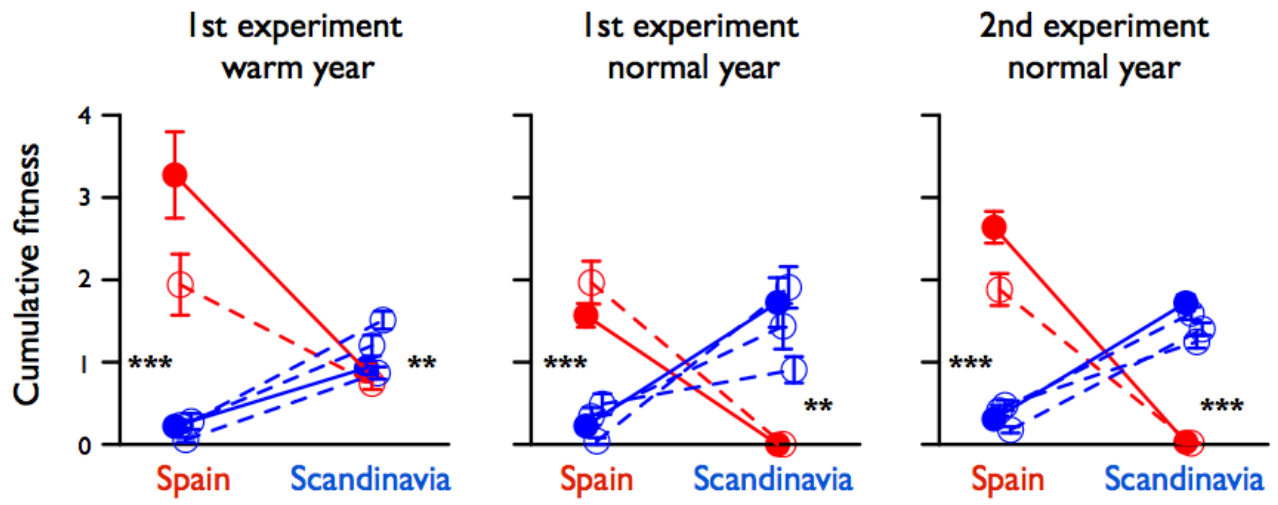
P. Toräng*[1], J. Wunder†, J.R. Obeso‡, G. Coupland†, & J. Ågren*

[1]email: per.torang@ebc.uu.se, phone: +46 18 471 2862



Results

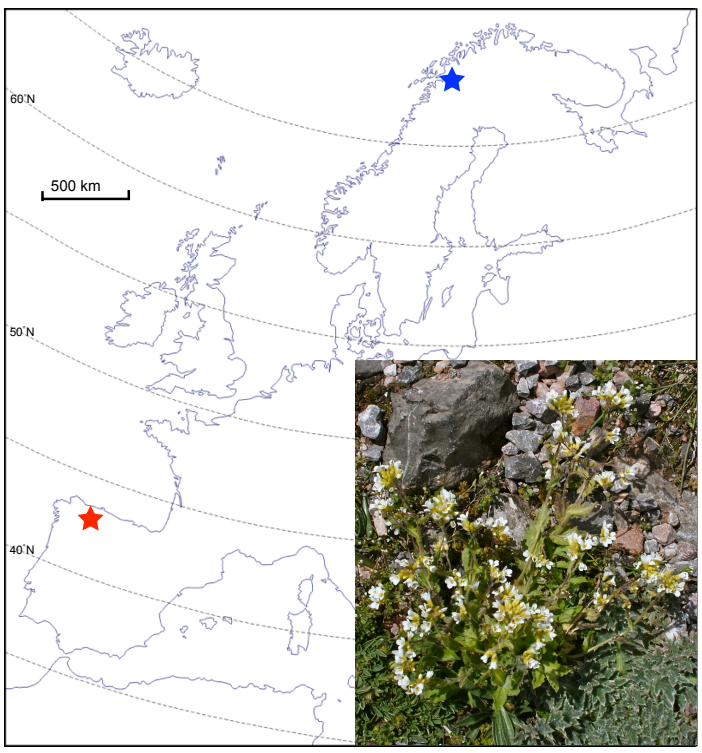
- Reciprocal transplant experiments demonstrated strong adaptive differentiation between Scandinavian and Spanish populations of the alpine perennial herb *Arabis alpina*.
- Local populations had higher survival and fruit production than had foreign populations.
- The magnitude of the home advantage was highest in a drought year in Spain and after a cold winter in Sweden.



Fitness of Spanish (red) and Scandinavian (blue) populations of Arabis alpina *in reciprocal transplant experiments conducted in Spain and Scandinavia. Filled circles and solid lines indicate the two native populations near which the transplants were located. Open circles and dashed lines indicate additional study populations.*

Conclusions

- Alpine plant populations may show strong adaptive differentiation, which should be considered when predicting consequences of global change.
- Differences in tolerance to drought and cold are likely to contribute to adaptive differentiation between populations from the two regions.
- The study populations represent a highly suitable system for examining the functional and genetic basis of plant adaptation in alpine environments.



Map showing the location of the transplant sites in Spain (red star) and Scandinavia (blue star).

Background

- Documenting patterns of local adaptation is a first step in examining processes governing adaptive evolution, and is of considerable applied interest for the management of natural resources in the face of global change.
- Reciprocal transplant experiments can be used to determine the magnitude of adaptive differentiation among natural populations and to help identify putative adaptive traits and selective agents.

Methods

- In two years, we planted 20 maternal families from each of two Spanish and four Scandinavian populations in native habitats near indigenous source populations at one site in Spain and one site in northern Scandinavia.
- In total, we transplanted 4800 seedlings grown from seeds collected in the wild.
- Cumulative fitness was estimated as the product of survival, the proportion of survivors flowering, and the number of fruits produced per flowering plant

Field work at the Scandinavian transplant site.

Affiliations:

*Department of Ecology and Genetics, EBC, Uppsala University, 752 36 Uppsala, Sweden; †Department of Plant Developmental Biology, Max-Planck-Institute for Plant Breeding Research, 50829 Cologne, Germany; ‡Unidad Mixta de Investigación en Biodiversidad, Universidad de Oviedo - Campus de Mieres, 33600 Mieres, Spain