ARPHA Conference Abstracts 9: e201752
doi: 10.3897/aca.9.e201752

OPEN ACCESS

Conference Abstract

Consistent evidence for Darwin's pre-adaptation hypothesis across local plant communities globally

Shuya Fan[‡,§,|], Mark van Kleunen[|]

‡ Czech University of Life Sciences Prague, Prague, Czech Republic
§ University of Vienna, Vienna, Austria
| University of Konstanz, Konstanz, Germany

Corresponding author: Shuya Fan (shuya_fan@foxmail.com)

Received: 29 May 2026 | Published: 29 May 2026

Citation: Fan S, van Kleunen M (2026) Consistent evidence for Darwin's pre-adaptation hypothesis across local plant communities globally. ARPHA Conference Abstracts 9: e201752. https://doi.org/10.3897/aca.9.e201752

Abstract

Darwin's naturalization conundrum predicts that alien plant naturalization may depend on phylogenetic relatedness to native communities, with closely related aliens favored by pre-adaptation to local conditions and distantly related aliens favored by reduced biotic resistance. Yet evidence from local communities worldwide remains limited, and whether support for these alternatives varies across ecological contexts remains unclear. Using a global dataset of over 1.7 million vegetation plots, we tested how phylogenetic relatedness between alien plants and native communities shapes alien plant naturalization success, and whether this effect is context dependent. Our results show that plant naturalization across local communities worldwide was overall most consistent with the pre-adaptation hypothesis. Alien plants were more likely to naturalize in communities of closely related natives. Moreover, close phylogenetic relatedness to native communities became a more important factor in naturalization success in plots at lower elevation, with greater native community phylogenetic diversity, and under stronger human modification, where alien plants also had higher naturalization probabilities. In invaded plots, native and naturalized plants were less closely related in larger, warmer, more phylogenetically diverse, and less human-modified plots. Together, these findings indicate that support for the pre-adaptation hypothesis remains consistent across local communities worldwide, but varies in strength across abiotic, community and

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anthropogenic contexts, providing a community-scale perspective on Darwin's naturalization conundrum.

Presenting author

Shuya Fan

Presented at

Neobiota 2026, the 14th International Conference on Biological Invasions

Acknowledgements

We gratefully acknowledge the GloNAF members, the sPlot Consortium members, and all data contributors for their valuable efforts and contributions.

Conflicts of interest

The authors have declared that no competing interests exist.