

Invasive plant species are locally adapted just as frequently and at least as strongly as native plant species. (2016).

Ayub MO Oduor^{*1}; Roosa Leimu²& Mark Kleunen³

***Department of Applied and Technical Biology; Technical University of Kenya;
University of Konstanz³**

Summary

1. Concerns over the ecological impacts of invasive alien plant species have generated great research interest in understanding the mechanisms that underlie the capacity of such plants to occupy a broad range of habitats. It has been repeatedly suggested that rapid evolution of local adaptation to novel environments may enable invasive plants to occupy a broad range of habitats.

However, the classical Darwinian view on evolution by natural selection is that the process is slow and gradual, occurring over thousands of years. Invasive plants typically have a relatively short residence time in their introduced ranges (decades or just a few centuries). Besides the time constraint, founder effects (reduction in population size and genetic diversity) may also limit the capacity of invasive plants to rapidly evolve local adaptation. Thus, invasive plants may be less likely than native plants to evolve local adaptation. Interestingly, however, an expanding body of literature documents the existence of local adaptation in invasive plant species within their exotic ranges.

2. Here, we did a phylogenetically controlled meta-analysis to compare invasive and native plant species for differences in the frequency and magnitude of local adaptation. The meta-analysis was based on different experiments performed in various habitats including grasslands, steppes, deserts, forests, mountains, wetlands and dunes, and used a total of 134 plant species in 52 families. Forty seven of these species (in 24 families) are alien invaders in the region where the studies were undertaken, while the other 91 species (in 38 families) are native.

3. On average, local plants performed better than foreign plants, and invasive plant species expressed local adaptation just as frequently, and at least as strongly as that exhibited by native plant species. An analysis performed while taking into account different plant life-history traits showed that self-incompatible invasive plants exhibited significantly higher frequencies of local adaptation than native plants characterized by the same breeding system.

4. Synthesis. The present results support the suggestion that rapid evolution of local adaptation may enable invasive plant species to occupy a broad range of novel habitats.

Key-words: adaptive divergence, biological invasions, colonization, common garden experiment, invasion ecology, local adaptation, local vs. foreign criterion, phenotypic plasticity, pre-adaptation, reciprocal transplant experiment, translocation experiment

Journal of Ecology, Vol 104, pp. 957-968 (2016)

See more at: <http://onlinelibrary.wiley.com/doi/10.1111/1365-2745.12578/epdf>