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Letters

Don't be fooled by a name: a reply to Thompson and Davis

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Although it has long been acknowledged that many native and alien weeds colonising disturbed habitats share similar attributes, differences associated with biogeographic origin have been recognised for over 50 years [1]. Thompson and Davis [2], however, make the point that where plants are passengers rather than drivers of environmental change, one might expect selection for similar characteristics among the winners. Although there is some, although not universal, support for this belief, the proposal to ignore biogeographic origin when addressing threats from harmful species is fundamentally flawed [3].

First, it assumes that the native and alien species pools within a region are similarly adapted to the anthropogenic impacts imposed on ecosystems. This is rarely the case where major human impacts are relatively recent phenomena (e.g. oceanic islands). In New Zealand, marked differences exist in the composition of alien and native plant functional groups, with few annuals, succulents or nitrogen-fixing legumes in the native flora [4]. Whereas these aliens have benefited from the rapid anthropogenic transformation of the landscape, this is not the case for most endemic native species [4].

Second, it ignores that such 'novel' functional groups are often not simply passengers of anthropogenic disturbance but can lead to major biogeochemical changes and shifts in fire regimes, as well as to alterations in the course of secondary succession. Furthermore, alien plants, precisely because of their different origin, might result in more subtle, but nevertheless significant, impacts on biodiversity. These can occur through hybridisation among congeners following the breakdown of geographic barriers [5], the expression of novel traits that disrupt long-standing evolutionary relationships among natives [6,7] and/or increased competitive ability in the absence of natural enemies [8]. Disregarding these differences under the presumption that native species will, in due course, adapt to these new pressures overlooks the considerable timescale required and provides little comfort for those who have to manage the economic and environmental impacts today.

Third, it neglects that, for endemic species, 'losing' (e.g. failing to adapt to the new anthropogenic conditions) can result in extinction, whereas the stakes for alien species are simply a failure to become established. Finally, given that the pool of winners is increasingly dominated by alien species [9], understanding how traits can distinguish winners from losers among the pool of potential new introductions remains of paramount importance in weed risk assessment [10].

Thus, all taxa, irrespective of origin, will face environmental change [11]. Therefore, rather than ignore the differences between natives and aliens, researchers urgently need to understand the success of the latter as a guide to how species might adapt or evolve in response to the future conditions of the 21st century [12].

References

1 Salisbury, E.J. (1961) *Weeds and Aliens*, Collins
2 Thompson, K. and Davis, M.A. (2011) Why research on traits of invasive plants tells us very little. *Trends Ecol. Evol.* 26, 155–156
3 Pyšek, P. and Hulme, P.E. (2009) Invasion biology is a discipline that's too young to die. *Nature* 160, 324
4 Atkinson, I.A.E. and Cameron, E.K. (1993) Human influence on the terrestrial biota and biotic communities of New Zealand. *Trends Ecol. Evol.* 8, 447–451
5 Abbott, R.J. (1992) Plant invasions, interspecific hybridization and the evolution of new plant taxa. *Trends Ecol. Evol.* 7, 401–405
6 Inderjit and van der Putten, W.H. (2010) Impacts of soil microbial communities on exotic plant invasions. *Trends Ecol. Evol.* 25, 512–519
7 Schweiger, O. *et al.* (2010) Multiple stressors on biotic interactions: how climate change and alien species interact to affect pollination. *Biol. Rev.* 85, 777–795
8 Keane, R.M. and Crawley, M.J. (2002) Exotic plant invasions and the enemy release hypothesis. *Trends Ecol. Evol.* 17, 164–170
9 Winter, M. *et al.* (2009) Plant extinctions and introductions lead to phylogenetic and taxonomic homogenization of the European flora. *Proc. Natl. Acad. Sci. U.S.A.* 106, 21721–21725
10 Hulme, P.E. *et al.* (2009) Will threat of biological invasions unite the European Union? *Science* 324, 40–41
11 Walther, G.R. *et al.* (2009) Alien species in a warmer world: risks and opportunities. *Trends Ecol. Evol.* 24, 686–693
12 Olivieri, I. (2009) Alternative mechanisms of range expansion are associated with different changes of evolutionary potential. *Trends Ecol. Evol.* 24, 289–292

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