

Alien impact 5. Taking the heat: will climate warming fuel alien plant invasions and enhance impact on the native flora?

Nijs Ivan & Verlinden Maya

Research Group of Plant and Vegetation Ecology, Department of Biology, University of Antwerp, Belgium

Future alien plant species will not experience the climate of today. Global surface temperatures are projected to increase by 1.1 to 6.4 °C over the next 100 years, in response to the rising atmospheric concentrations of greenhouse gases. There are several reasons to believe that alien invasive plant species will react differently to such changes than their native counterparts, but experimental data are scarce. We show results from a range of studies on terrestrial species in climate-controlled greenhouses, most of which were done in the ALIEN IMPACT project. These studies illustrate effects of climate warming on: (i) congeneric alien and native species grown as single plants under optimal rainfall conditions; (ii) highly invasive alien species competing with native counterparts under optimal rainfall conditions, and (iii) highly invasive alien species competing with native counterparts, allowing for drought associated with warming. In the congeneric pairs, the native species generally became less productive in the warmer climate. Their alien counterparts, on the other hand, on average showed no productivity response, but some aliens were favoured by warming and others were set back. The alien species that responded highly positively are currently non-invasive but all of them originate from regions with a warmer climate. Still, other alien species that also originate from warmer regions became less or remained equally productive. In competition experiments, simulated climate warming modified current competitive interactions between native and invasive terrestrial plants. However, the way in which the balance between invasive and native species was altered depended on the studied species pair. Most of the changes could be ascribed to warming influences on nutrient uptake. From the species pairs examined, it appears that the sensitivity of the native-invasive interaction to climate warming does not necessarily mirror the intrinsic sensitivities of the species. This poses a challenge for identifying the winners and losers in a future, warmer world.