A biogeographical and functional approach to improve our understanding of invasive plant species on Sub-Antarctic Islands.

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As alien species continue to spread across the globe, they increasingly threaten native biodiversity. In predominantly isolated island systems, where native species diversity tends to be low, alien invasions particularly pose a risk to native species. With human assistance aliens are even reaching climatically severe areas, invading higher altitudes and higher latitudes. The Sub-Antarctic Islands (SAIs) are little influenced by human development and disturbance; however, humans remain responsible for substantial amounts of propagules reaching these areas. This has led to over 300 alien plants establishing across the SAIs, of which 28 have been reported to be invasive on single or multiple islands. To mitigate future invasions, understanding and predicting the potential of aliens becoming invasive in the Sub-Antarctic is thus essential.

Here we use a climate matching approach to predict which plant invaders around the globe have the potential to establish on the SAIs if they were to reach the islands. We obtained a list of over 13000 plant species, which have become naturalised or invasive somewhere in the world, from GloNAF and the Global Invasive Species Database. Occurrence data for all species were extracted from GBIF and a species distribution modelling approach (BIOCLIM) was used to establish whether the climate envelope of the alien species overlaps with the climatic conditions of the SAIs. We were able to identify 19 species that pose a potential high risk if introduced. Although climate matching is an important and cost-effective precursor to prevent alien species establishment, it is still not enough to fully understand invasion potential in the Sub-Antarctic. We thus also took a comparative trait-based approach, identifying the key characteristics that differentiate successful invaders from non-invasive aliens. The comparisons were performed by grouping species currently on the island with those species modelled to have a high, medium and low probability of occurring on the SAIs. This is a novel approach for the Sub-Antarctic and will benefit the research community working towards a better understanding of the biogeography and functional characteristics of successful alien species.