Globalization and the spread of invasive ants

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Abstract

The invasion process is generally viewed as a sequence of barriers related to the invasion stages of introduction, establishment, spread and impact. Here, we use spatiotemporal analyses of distribution and interception of ants (Hymenoptera: Formicidae) to describe the invasion process as a whole at a global scale and test for interdependencies between different invasion stages. Our results show 1) a positive feedback loop between the introduction and establishment stage, via a high proportion of secondary introductions, and 2) three types of spatial spread at a global scale: (i) species spreading by regional colonization of neighbouring countries, (ii) highly successful exotic species spreading by intercontinental transport and subsequent regional spread and (iii) species that have been introduced via intercontinental trade but have only colonized a small number of countries. The driving force behind these complexities was global trade, which left its signature in the colonization dynamics of accidentally introduced ants. These findings show that the invasion process in more complex and less linear than previously thought and that the classification of a species as 'invasive' is less static in time. Based on spatiotemporal trajectory analyses, we identify a group of species with a high potential for increasing their spatial distribution in the future.

Keywords: invasions, global change, globalization, trade, ants

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