

How far do invasive species travel?

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The orange day-lily is an alien species in Central Europe and was introduced over a distance of around 10,000 km from East Asia. Credit: Franz Essl, University of Vienna

Around the globe, an increasing number of plant and animal species are introduced into new regions through human activity. However, the global patterns of their distribution are only poorly understood to date. Researchers at the Senckenberg and at the universities of Oldenburg and Vienna have now discovered that the spread of species can be

convincingly explained by a combination of global trade flows and the species' original distribution. And, contrary to previous assumptions, the spread basically follows very simple laws.

As a result of the globalization of [trade](#) and transport, in the past decades, tens of thousands of species have spread into regions where they were not originally at home. Potentially serious consequences of this include the displacement or extinction of native species and the spread of health risks. Even though trade flows are known to represent an important path for the introduction of invasive species, this fact alone is not enough to explain the observed distribution patterns of species.

Scientists from Germany and Austria have examined the global spread of 1,380 exotic animal and plant species under consideration of the trade flows. "A clear pattern is apparent. A particularly large number of species originates in areas that are located at a [distance](#) of approximately 10,000 kilometers from the place of introduction. Contrary to this, the majority of the imported goods come from the immediate neighboring countries," explains Dr. Hanno Seebens of the Senckenberg Biodiversity and Climate Research Center.

In order to study this apparent contradiction, the team developed a computer model that combines the international trade flows with the species' worldwide distribution. The model shows that short distances of less than 3,000 kilometers primarily serve the transport of species that already occur in the target country. On the other hand, [non-native species](#) are usually introduced over comparatively much longer distances.

Here, the global patterns of the species' spread closely mirror the global trade flows. However, this only holds true when a species conquers new ground for the first time. Once an [exotic species](#) has gained a foothold outside its region of origin, it can also spread to new areas over short

distances.

The manner in which these 'new settlers' spread to new areas differs between various groups of plants and animals. Mammals, reptiles and fishes, in particular, often spread over rather short distances (3,000 kilometers). Plants and birds tend to invade regions at a much greater distance

"The spread of non-native species is a complex process, and the data situation is far from complete. Therefore, it is even more astonishing that the spread can be explained with simple models," says Prof. Dr. Bernd Blasius of the Institute for Marine Chemistry and Biology (ICBM) at the University of Oldenburg. "This gives us reason to hope that in the future, the introduction of exotic [species](#) can be better understood and more efficiently contained with the aid of such models."

Provided by Carl von Ossietzky Universität Oldenburg

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