

Economic alien plants more likely to go wild

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Oxalis pes-caprae or Bermuda buttercup is native to South Africa, and has been introduced elsewhere as bee plant (for honey production) and for ornamental purposes. It is now widely naturalized elsewhere, like here on Crete (Greece).
Credit: Mark van Kleunen

An international team of researchers led by University of Konstanz ecologist Mark van Kleunen has compiled a global overview of the

naturalization success of economic plants, showing that economic use in general, as well as the number and nature of economic uses, are crucial to their establishment in the wild.

Humans have cultivated [plants](#) outside their native ranges for thousands of years. But as the world became increasingly interconnected over the past five hundred years, the scale of cultivation of non-native plants for [economic value](#)—for example as food, ornamentation or for medicinal purposes—has intensified. For the first time, a team of researchers led by University of Konstanz ecologist Mark van Kleunen has carried out scientific analyses to assess how economic use of non-[native plants](#) relates to their naturalization success (i.e. their establishment in the wild) around the world.

Cultivation a major driver of the introduction of alien plants

The international team of biologists from the University of Konstanz, Taizhou University and Fudan University (both in China), the University of Vienna, the Czech Academy of Sciences, Durham University and Georg August University of Göttingen analyzed a global dataset on 11,685 economic [plant species](#) (World Economic Plants database) in combination with a global dataset on 12,013 naturalized plant species (Global Naturalized Alien Flora database).

The results, which were published in *Nature Communications* this week, suggest that cultivation for economic use is the major pathway for the introduction of naturalized alien plants in regions across the globe.

Economic plants are more likely to naturalize

"As an ecologist, I'm mainly interested in what determines the success of

a plant species, particularly alien plant species", says Mark van Kleunen, lead author on the study. "Many contemporary studies look into their spread, trying to understand why these aliens are able to establish themselves in areas well beyond their native ranges. What these studies tend not to take into account is how and why they were introduced in the first place".

The results of the study confirm that there is a direct link between cultivation for economic purposes and naturalization: Plants with an economic use were 18 times more likely to naturalize than species without any known economic use, and plants with multiple economic uses were the most likely to naturalize. More than 50 percent of the plant species used as ornamental garden plants or for the production of animal food, which are among the most widely cultivated plants, have become naturalized somewhere in the world.

Plants from Northern Hemisphere among the most successful

Previous studies have shown that Northern Hemisphere continents are the most prolific when it comes to donating naturalized species, especially Europe. "Our research suggests that this is because more plants from the Northern Hemisphere have been cultivated for economic use elsewhere, and not because they are in some way superior or have an innate ability to naturalize outside their native environments", says Dr. Trevor Fristoe, another University of Konstanz author on the study. Economic plants of Asian origin, however, were shown to have the greatest naturalization success.

Cultivation bias drives phylogenetic patterns in naturalization

The study further shows that phylogenetic patterns in the naturalized flora are partly due to which plants we cultivate. Naturalized species have been shown to be far more frequent in some families of the world's global seed plant flora than in others. While these patterns have been attributed to shared traits among closely related species that promote naturalization success, the new insights generated by van Kleunen et al. raise the possibility that these patterns are caused by a phylogenetic bias in the [species](#) selected and cultivated for their economic value.

More information: Mark van Kleunen et al. Economic use of plants is key to their naturalization success, *Nature Communications* (2020). [DOI: 10.1038/s41467-020-16982-3](https://doi.org/10.1038/s41467-020-16982-3)

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