Exotic plants do not necessarily become invasive

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Introduced plant species do not necessarily have to outgrow indigenous plant species. That makes it difficult to predict the potential harm of exotic plants. NWO-funded researcher Annelein Meisner recently published an article about this in the *Journal of Ecology*.

Ecologists frequently assume that exotic plant species make the growing conditions in their new living environment better for themselves. If a plant establishes itself then it can change the soil processes via its roots or via plant material that falls to the ground at the end of the growth season. By doing this plants ensure that unusable nutrients are converted into usable nutrients. Some exotic species can then transform into highly invasive species, such as the black cherry, water pennywort and Japanese knotweed.

Yet according to biologist Meisner, not all newcomers by far become invasive. That is because a change in the living environment must be matched by an increased ability to take up the new nutrients such as nitrogen. However, Meisner has shown that this rule does not always apply. The exotic groundsel Senecio inaequidens (originally from South Africa) can obtain nitrogen from the soil far better than the indigenous common groundsel (Senecio vulgaris). Yet for the Bidens genus, the indigenous three-lobed beggarticks (Bidens tripartite) scored better than the exotic Devil's beggarticks (Bidens frondosa) that originates from North America.

Meisner also examined the growth of mycorrhizal fungi in the soil

around the plant roots. These fungi help plants to obtain nutrients from the soil. Once again the researcher found no clear pattern in the difference between indigenous and exotic species. For groundsel, for example, the exotic species had more fungi than the indigenous species but for wormwood (Artemisia) it was the other way round. Soil processes such as ammonification, the conversion of organic nitrogen compounds into ammonium, also failed to yield a clear pattern.

Annelein Meisner, works at the Netherlands Institute for Ecology NIOO-KNAW in Wageningen, and chose five pairs of plants for her research. Each pair consisted of ten plants from an indigenous species and ten from a related exotic species that became established in the Netherlands during the second half of the last century. The exotic species were either brought here by people or have migrated northwards from Southern Europe. They can survive in the Netherlands now that the winters have become milder due to climate change. Over a period of eight weeks, Meisner let the young plants grow in separate pots and she observed the soil processes during their growth. Subsequently she measured the total quantity of nutrients taken up by the plants.

Predicting the harmfulness of exotic species has not become any easier as a result of her research. "Not every species responds in the same manner," concludes the researcher. "And an exotic species is not necessarily harmful. Many factors determine whether or not an introduced plant species is harmful."

Meisner works in invasive ecology, as relatively new discipline within biology that studies the influence of invasive plants on natural habitats. Meisner's work is part of the Vici project of her supervisor Prof. Wim van der Putten, Head of Terrestrial Ecology at NIOO-KNAW. Vici is one of the biggest grants for individual researchers in the Netherlands.