

Publication

Invasive knotweed has greater nitrogen-use efficiency than native plants: evidence from a N-15 pulse-chasing experiment

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4522468

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Year 2019

Title Invasive knotweed has greater nitrogen-use efficiency than native plants: evidence from a N-15 pulse-chasing experiment

Journal OECOLOGIA

Volume 191

Number 2

Pages / Article-Number 389-396

Keywords Biological invasions; Fluctuating resources; Interspecific competition; Invasiveness; Stable isotopes

Mesh terms Science & TechnologyLife Sciences & BiomedicineEcologyEnvironmental Sciences & Ecology

Habitats with fluctuating resource conditions pose specific challenges to plants, and they often favor a small subset of species that includes exotic invaders. These species must possess a superior ability to capitalize on resource pulses through faster resource uptake or greater resource-use efficiency. We addressed this question in an experiment with invasive knotweed, a noxious invader of temperate ecosystems that is known to benefit from nutrient fluctuations. We used stable isotopes to track the uptake and use efficiency of a nitrogen pulse in competition pairs between knotweed and five native competitors. We found that nitrogen pulses indeed promoted knotweed invasion and that this is explained by a superior efficiency in turning the taken-up extra nitrogen into biomass, rather than capturing an overproportional share of the nitrogen. Thus, temporary increases in nutrient availability might help knotweed to invade natural environments, such as river banks or nitrogen-polluted margins and wastelands, where nutrient fluctuations occur. Our experiment shows that resource-use efficiency can drive invasion under fluctuating resource conditions, and that stable isotopes help to understand these processes.

Publisher SPRINGER

ISSN/ISBN 0029-8549

edoc-URL <https://edoc.unibas.ch/73513/>

Full Text on edoc No;

Digital Object Identifier DOI 10.1007/s00442-019-04490-1

ISI-Number 000500533700013

Document type (ISI) Article