

The role of arbuscular mycorrhizal fungi in plant invasion trajectory

ABSTRACT

Background: Invasive plant species pose a global threat because they alter ecosystem functioning and biodiversity. The majority of plants form mutualistic mycorrhizal associations with mycorrhizal fungi, which contribute to the nutrient and water supply as well as diversity, competitive ability, and ecosystem productivity. In addition, the role of mycorrhizal interactions in plant invasiveness and the susceptibility or resistance of a habitat to invasion is increasingly recognized. However, the mechanisms by which mycorrhizae contribute to invasion remain unresolved. Scope Here, we provide an overview of the empirical evidence and discuss the prospects for mycorrhiza-mediated plant invasion. Overall, mycorrhizal fungi appear to have impacts on plant invasion that depend on the similarities between the mycorrhizal associations of the alien and native plants. We introduce plant mycorrhizal niche space (PMNS) as a plant's ability to exploit and shape the mycorrhizal fungi pool of a habitat based on its dependency on mycorrhizal fungi, traits and priority effects. Conclusions Collectively, the available evidence supports the idea that PMNS is independent of place of origin (invasive status). Understanding the drivers of the PMNS of both native and alien plant species may help to predict the potential invasiveness of plants and the invasibility of a habitat, to elucidate the role of the mycorrhizal fungal community in plant invasion and the impact of plant invasion on the structure of the mycorrhizal fungal community in new habitats (i.e., neighbour effect) and to improve restoration planning. In this regard, we highlight a number of knowledge gaps and discuss future research directions.

Keyword: Mycorrhizal adaptation; Plant-mycobiome interactions; Invasion ecology; Fungal diversity; Symbiosis