

# Abstract

The aim of this thesis was to identify factors that contribute to invasiveness of species in the genus *Impatiens*. This genus is horticulturally attractive and includes several species that are known to have naturalized outside their native ranges, while others did not escape, in spite of being frequently cultivated. When looking for traits associated with invasiveness, it is useful to focus on congeneric species. Their traits and dispersal modes are less influenced by phylogeny, than when comparing unrelated species or even complete floras. This helps to account for traits that favour invasive species over native ones and thus identify potential invaders more precisely. A superior invader performance is attributed to a competitive advantage over native species that can lead in extreme case to competitive exclusion of the latter. Invasive and native species compete only if their niches overlap and the strength of competition depends on niche similarity. Importantly, invasive species are considered to be able to maintain their high competitiveness over a wide range of environmental conditions, while native ones often have narrower environmental optima. Lastly, competitive outcome can vary over life stages and depends on the degree of species dominance, which is rarely taken into account. Spread and resulting distribution of invaders is further affected by distributional and environmental constraints in the secondary range. As a result, many invasive species have naturalized in riparian habitats, characterised by patchy environment with range of microhabitats, reduced competition in disturbed sites and easy propagule transport.

The aims of my PhD. thesis were

- to identify traits associated with invasiveness and assess the role of planting frequency within selected *Impatiens* species
- search for microsite differentiation in one native and two invasive *Impatiens* species that coexist in the field
- investigate competition of these species under manipulated environmental conditions, varying plant densities and different life stages in an experimental garden;
- determine factors that affect distribution and abundance of *Impatiens glandulifera* along river corridors.

The results can be summarized as follows: (i) juvenile traits, namely heavy seed, fast seedling growth, and germination postponed to the period of more favourable conditions were more strongly associated with invasiveness than adult traits, such as fecundity and final biomass; (ii) frequently planted species naturalized more easily; (iii) niches of invasive and native species partially overlapped; (iv) in mixed stands, abundances of all species were negatively related to those of the other congeners, and the coexistence in one locality is possible due to different

microhabitat use; (v) competitive interactions had stronger effects on plant fitness than had environmental settings; (vi) the most invasive representative, *Impatiens glandulifera*, was competitively superior across all experimental conditions and its dominance increased over time, while the native *I. noli-tangere* is being outcompeted from shared part of its niche; (vii) the largest populations of *I. glandulifera* were located in flooded patches in the vicinity of the rivers, specifically flooded patches had twice as many individuals as those that were not flooded; (viii) populations in tributaries were twice as far from the main river than those not associated with tributaries.

Based on these results I conclude that more *Impatiens* species might invade in the future if their planting becomes more widespread. Juvenile traits are of crucial importance, because establishment determines the success of these mostly annual aliens. Niche width and species performance shape the pattern of coexistence among native and invasive species. Native *I. noli-tangere* will be restricted to wet and shady parts of the niche, while competitively superior *I. glandulifera* will reduce these native populations when growing together in mixed stands. The other very successful invasive species, *I. parviflora*, is competitively inferior and has negligible impact on the native species. In terms of landscape dynamics, flooding accounts for the dominance of *I. glandulifera* along rivers due to spreading the seed, disturbing native vegetation and increasing the nutrient availability.