

C.1. DESCRIPTION FOR THE GENERAL PUBLIC

The aim of the study is an assessment of the factors influencing ecological success of invasive woody species using *Padus serotina*, *Quercus rubra* and *Robinia pseudoacacia* as the examples. The most important research questions are:

1. Whether and how reactions to environmental conditions of the species studied differ among seedlings (plants germinated in a current year) and older plants? Seedlings are more vulnerable to limited resources than older plants, but on the other hand – due to storage compounds in cotyledons – are able to persist under the tree stand canopy for a longer time. Taking into account environmental requirements and constraints of invasive species, we will describe crucial factors responsible for their regeneration in order to understand the mechanism responsible for their survival and success. It is especially important because seedlings shape the future tree stand species composition. Therefore, seedling survival is a ‘bottleneck’ for the spread of invasive species.

2. Whether and how disturbances of forest ecosystems influence ecological success of the invasive species studied? In general, more disturbed ecosystems are more vulnerable to biological invasions because disturbances cause mortality and decline of competitive ability of native species, and cause random pulses of resources availability. Thus, these habitats are more predisposed to colonization, both by native and alien species. On the other hand, most of the invasive woody species are species with the C (competitive) life strategy, and are better adapted to more stable ecosystems.

3. How do environmental conditions (light availability and soil fertility) influence functional traits which are responsible for ecological success of invasive species? Plants invest more carbohydrates into development of organs responsible for acquiring those resources that are most required. Especially important factor is efficiency of resources use, connected with the functional traits such as specific leaf area (expressed as $\text{cm}^2 \text{g}^{-1}$ of leaf) and specific fine root length (expressed as m g^{-1} fine roots), because these traits are strongly correlated with photosynthesis and nitrogen uptake rates.

4. Does ecological success of the studied neophytes result from higher phenotypic plasticity of seedlings? Ability to grow in different environmental conditions may allow neophytes to obtain ecological success in changing ecosystems more easily. Thus, many invasive species have high phenotypic plasticity. The plasticity of many traits has not been fully recognized, comparing to herbaceous plants, which were more often the subject of these studies. At this time, only few papers have compared phenotypic plasticity of functional traits among groups of invasive woody species with their native competitors.

5. How big is the difference in variance explained by models of the relationship between seedling growth and environmental conditions (light availability and soil fertility) between controlled conditions (pot experiment) and the forest ecosystem? Controlled conditions allow us to isolate the impact of only one or a few environmental factors, whereas in the forest ecosystem the number of factors influencing seedling growth is much higher. However, it is not known how much of the variability in growth is not explained by environmental factors, because these approaches have not yet been compared.

Due to their negative impact on biodiversity, invasive species are one of the most important threats for nature conservation. The impact of woody invasive species is less well understood than that of herbaceous species. Trees and shrubs strongly modify light availability, microclimate, as well as water and nutrient cycling in the plant community. The main benefits from realization of proposed experiments will be to increase knowledge of invasive woody seedlings growth limitations and to recognize the mechanisms responsible for their ecological success. Obtained results will allow better understanding of relationships between ecophysiological traits of the studied species and the wide range of environmental conditions in forest ecosystems.