

BASIC INFORMATION ON SUB-PROJECT

NAME OF PROGRAMME/FUND	Scholarship Fund - Sciex NMS ^{ch}
RESEARCH FIELD AND OTHER RESEARCH FIELDS INVOLVED (if applicable)	Life Sciences
TITLE OF THE SUB-PROJECT	Traits of Rare And Invasive Terrestrial plant Species (TRAITS)
REGION OF THE CZECH REPUBLIC (according to the location of the home institution)	Prague
GRANT AMOUNT SPENT	97 526,53 CHF
INTERMEDIATE BODY	Swissuniversities
HOME INSTITUTION	Institute of Botany of the Academy of Sciences of the Czech Republic, v. v. i.
HOST INSTITUTION	University of Bern, Department of Biology
NAME OF THE FELLOW	Petr Dostál

ABSTRACT OF THE SUB-PROJECT

In Europe there are approximately 2600 rare native plant species that are facing high risk of extinction. At the same time, there are ca 200 exotic species that succeeded to become invasives. It is desirable to change the abundance of both plant groups, specifically to enhance the populations of rare natives but the opposite in case of exotic invasives. Besides extrinsic factors such as habitat destruction or climate change, species abundance is believed to be influenced by species functional traits. There have been compiled overviews of traits typical for weedy and for vulnerable species.

Curiously, many traits, but with opposite sign, appeared in both types of overviews. It is therefore hypothesized that plant decline and spread are determined by the same functional traits, but by the opposing ends of the trait spectrum. Although this assumption has been examined for rare and invasive animals, this idea has never been tested for plants. The aim of this project is to determine traits responsible for species rarity and invasiveness and to examine opposite-characteristics hypothesis. For that purpose we will carry out meta-analysis based on results of published studies.

We will also perform comparative multi-species experiments searching for the link between germination characteristics, growth rate and climatic tolerance, and species abundance. This project will significantly contribute to the field of applied conservation biology as well as to the more basic field of plant evolutionary ecology.

MAIN RESULTS

The principal task of the fellow's scientific activities was to determine functional plant traits responsible either for rarity or commonness of species in native and exotic ranges. As plant species traits are closely related to the productivity of habitats where species occur, the aim of the research project was to investigate the link between habitat productivity of Central European species, and abundance in native and new ranges. Petr Dostál and his collaborators also asked whether species able to grow in a wide range of habitat productivities are also more abundant.

Species adapted for growth in fertile habitats were shown to be more widespread in both native and exotic ranges. In addition, species with larger productivity tolerance were also more invasive. This research part resulted in a publication: Dostál et al. 2013, *Global Ecology & Biogeography* 22:64-72.

In parallel research, Petr Dostál investigated whether invasiveness of exotic species can also be determined by the biotic interactions with native organisms. Specifically, he and his collaborators investigated whether exotic plants are better competitors and have fewer enemies than native species, which in turn promotes their invasiveness. They also asked whether the difference between exotic and native species is habitat-specific, with larger difference in fertile habitats.

For this research part, data sets collected prior to the fellowship were used. Specifically, a large multi-species experiment was performed to explore competitive interactions between exotic and native species. Enemy load on exotic and native species was assessed for multiple populations of both species groups in the Czech Republic. Exotic species were shown to have similar competitive ability. They also accumulated similar diversity of enemies as native species, irrespective of whether they grew in nutrient-poor or -rich habitats. This research part resulted in two publications: 1) Dostál P. 2011, *The American Naturalist* 177: 655-667; 2) Dostál et al. 2013, *Journal of Ecology* 101:388-399.

Combined these two research parts indicate that species commonness is likely to be due to their pre-adaptations to grow in nutrient-rich habitats in both native and exotic ranges. These pre-adaptations are

DATE OF REALISATION OF THE FELLOWSHIP	1.11.2010 - 31.10.2011
MORE INFORMATION ON THE PROGRAMME	www.sciex.ch