ABSTRACT

To assess the status of a rare plant species, we must first understand the factors that affect the size of populations and their numbers. In this thesis, I study processes affecting plant species prosperity on local scale (paper 1), factors influencing species distribution in landscape and ability of species to colonize new habitats (paper 2) and species traits responsible for gene flow between established populations (paper 3). Since I work with rare plants, I also aim to turn theoretical knowledge into practical recommendations for nature conservation (paper 4) to help effectively preserve rare and endangered species.

In the first 3 papers, I work with two rare fern species restricted to serpentine rocks, *Asplenium adulterinum* and *A. cuneifolium*, in a study system covering 10 × 10 km. I found that both species are long living (several decades) and in the study region, populations are in a good state and slowly growing. Even very small populations (10 individuals) have quite high chance to survive. In both fern species, I found dispersal limitation, which might be surprising regarding huge production of small spores in ferns (paper 2). The species differ in ploidy and thus, also mating system. *A. adulterinum* is tetraploid and its main breeding system is intragametophytic selfing. *A. cuneifolium* is diploid and is mainly outcrossing (paper 3). The breeding system has vast influence on colonization ability – the selfing species is better colonist of empty habitats, since it is able of single spore colonization (paper 2), resulting into faster metapopulation dynamics in this species. In the outcrossing species, there is more effective gene flow between already established populations (paper 3).

The two fern species are rare, but since they are not endangered within the study region, there was no need to transfer theoretical knowledge to the conservation practice. This I performed on another species, *Gentianella praecox* subsp. *bohemica*, endemic species of Central European seminatural grasslands with rapidly declining number of populations due to the management change. I carried out population viability analysis using matrix model. I found that management of seminatural grasslands is of crucial importance for survival of this species. If management is performed, even small populations (10 individuals) of this species are able to survive. Climate change (simulated as increased frequency of dry years) will have small impact on the populations. However, unmanaged populations are not able to survive in long-term period (several decades). Extremely small populations may be recovered from the seed bank by management induction (paper 4). Results of the study were implemented into recently prepared action plan for this species in the Czech Republic.