Identification of critical life history stages in the life cycle of endangered species, *Dracocephalum austriacum* L.

In this study I wanted to compare population dynamics of an endangered species, *Dracocephalum austriacum* L., in two distant regions (the Czech and Slovak Karst). I also wanted to estimate genetic diversity in this species and assess the importance of genetic diversity for population dynamics of this species. The species is one of critically endangered species in the Czech Republic and effective conservation strategies are very needed nowadays.

Population dynamics was studied using analysis of population transition matrices from years 2003-2005. For estimating of genetic diversity I used allozyme analysis and analysed 10 variable loci in 4 enzymatic systems.

Population growth rates in both regions differ. Czech Karst populations showed higher population growth rates in the second transition interval of the study and Slovak Karst populations in the first transition interval of the study. Population growth rate (λ) for separate years was significantly different from 1 only in two localities (Haknovec in Czech Karst and Domické škrapy in Slovak Karst) during 2003-2005.

Analysis of elasticities showed that transitions that most contribute to population growth rate are transitions of stasis. In Czech Karst it is mainly stasis of large plants and in Slovak Karst of small plants. This indicates that in both regions we have to try to maintain vitality of flowering small and large plants. But from life table response experiments (LTRE) we can see that seed production (for all populations but mainly for Zádielský kameň in Slovak Karst) and growth from seedlings to small plants (for Slovak populations and Kodská stěna in Czech Karst) are transitions, which contribute most to changes in population growth rate. The relatively comparable results of elasticity analysis indicate that information about population dynamics is transferable between regions. The results of LTRE, however, indicate different transitions as the most important transitions for observed variation in population growth rate in different populations. All the transitions are, however, related to seed production and seedling establishment indicating that even here knowledge of dynamics in one population may help to design conservation action in the others.

Slovak populations showed higher genetic diversity within populations. Differences in genetic diversity among Czech populations (Fst-CK = 0.333) were higher than among Slovak populations (Fst-SK = 0.090). There were small or even no genetic differences between regions. In three populations (Vanovice, Radotínské údolí and Domické škrapy) I found significant heterozygote deficiency.

Genetic diversity has strong positive effect on seed set and this positively influences population growth rate. Decrease of genetic diversity by about 50 % resulted in 50 % decrease in seed production. But although there is positive correlation between population growth rate and genetic diversity, only large decrease of genetic diversity lowered population growth rate below 1 and populations started to decrease in size.

In pollination experiments I found higher seed set in flowers pollinated by pollen from other population than in plants pollinated by their own pollen or by pollen from the same population. Flowers, which were prevented from natural pollen and pollinators access, produced no seeds.

Mean higher seed production, higher stochastic population growth rate and lower inter population genetic variability in Slovak *Dracocephalum austriacum* populations found in this study could be caused by the fact that Czech populations are in the northern distribution limit of the species distribution range. Although the whole distribution range of the species is discontinuous, position in the distribution limit can be quite important.

In studied larger populations in the Czech and Slovak Karst the stochastic population growth rates are never significantly below 1 and so populations are not decreasing. It is, however, necessary to maintain at least present state of the habitats by cutting shrubs and trees. Small populations of *Dracocephalum austriacum* are more endangered with demographic and environmental stochasticity. This is true especially for populations with 10 and less plants. Genetic diversity of small populations is decreased and it results in lower seed production. Transfers of plants (or seeds) from other population with higher genetic diversity could be considered to support them but proper test for possibly outbreeding depression must be done first.