

Abstract

This MSc. thesis deals with karyological, genetic and phenotypic variation of selected taxa from the genus *Dianthus* L. in the Czech Republic and adjacent countries. The evolutionary history of the genus has been shaped by several microevolutionary processes, including interspecific hybridization, genome duplication, and edaphic speciation. These processes led to the origin of a number of phenotypically similar taxa, which are often restricted to a narrow geographic area. One subendemic and three endemic taxa occur in the Czech Republic. These (sub)species were used as model groups to gain insight into microevolutionary processes in small populations and the postglacial development of the genus in Central Europe. The thesis consists of three parts, each addressing different evolutionary phenomenon:

- *Dianthus arenarius* subsp. *bohemicus* is a critically endangered endemic psammophyte currently known from a single population in Central Bohemia. The site is also inhabited by widespread *D. carthusianorum*. Interspecific hybridization has been suspected on the basis of morphological characters, but this has never been confirmed by any other technique. I exploited differences in the number of chromosomes between both species and, with the aid of DAPI flow cytometry, estimated relative DNA contents of most plants present at the locality. The karyologically-confirmed individuals were subjected to conventional and geometric morphometrics, and the direction of hybridization was assessed using cpDNA sequencing. The results show that although interspecific hybridization does occur, crosses are rare, hybrids have limited reproductive potential (mostly aborted pollen grains, non-viable seeds), and most likely do not backcross to parental species. The comparison of chloroplast haplotypes provided evidence for reciprocal hybridization. Species- and hybrid-specific morphological characters were revealed, the most important of which is corolla shape and colour.
- *Dianthus carthusianorum* L. is perhaps the most variable carnation species, with a number of recognized intraspecific taxa. Four subspecies native to Central Europe were investigated, including subsp. *sudeticus* (endemic to the Jeseníky Mts.) and subsp. *capillifrons* (restricted to serpentine rocks of the Czech Republic and Austria). Similarities in genome size, morphology as well as genetic variation (assessed using microsatellite) indicate low inter-subspecies differentiation and mostly continuous variation. Until more comprehensive investigation is performed, the level of subspecies seems to be justifiable.
- Two cytotypes (4x and 6x) in both ploidy-uniform and mixed populations have been reported in *Dianthus moravicus*. A revision of the karyological variation using DAPI flow cytometry, however, confirmed only the incidence of hexaploid populations, challenging the previous records of ploidy heterogeneity.

Keywords: *Dianthus*, endemic, hybridization, risk assessment, edaphic speciation, flow cytometry, morphometrics, microsatellites