Summary [Abstract]

This thesis is aimed at better understanding of cytotype co-existence in mixed-ploidy populations with an emphasis on a microevolutionary processes behind it. Our past knowledge was based on a few thoroughly investigated model taxa like *Chamerion angustifolium* and *Heuchera grossulariifolia*, but some generalizations seem to be premature in the light of new findings. A detailed research of other taxa included in the thesis showed that polyploid complexes can vary dramatically in their ability to cope with the co-existence of cytotypes in mixed-ploidy populations. Whereas mixed-ploidy populations are virtually lacking in some species (an example being *Vicia cracca*, Paper III.), ploidy-heterogeneous populations are very common in others, maintained by free mating interactions and the absence of reproductive isolation among cytotypes (e.g. *Pilosella echioides*, Paper II.). The strenght and cumulative effect of various breeding barriers (both pre- or post-zygotic) govern the position of a particular multi-ploidy complex between these two extremes and co-determine the type of cytotype co-existence in its mixed-ploidy populations.

Despite the fact that the number of studies revealing cytotype co-existence has been increasing rapidly, evolutionary background and consequences of such co-existence are usually unknown. To answer these questions, a detailed and time consuming research involving long-term field observations and experiments is needed. Results presented in this thesis are mostly based on pilot investigation, which is essential to reveal the *status quo*, but is insufficient for the understanding of the evolutionary processes behind it. Therefore, an ongoing thorough research on selected plant groups (namely *Gymnadenia conopsea* agg. and *Pilosella echioides*) is being conducted to gather as much information as possible from various points of view. This research is focused on: (i) the determination of the rate of inter-ploidy crosses in field conditions, (ii) the understanding of further fate of inter-ploidy hybrids under natural selection, their ability to backcross and produce viable progeny, and finally (iii) the detection of the role of such hybrids in further evolution of mixed-ploidy populations.

Although the papers included in this thesis hopefully broaden our horizon and shed some light on possible ways of cytotype co-existence, further thorough investigation is needed to cover the spectrum of evolutionary mechanisms shaping the population structure in species with ploidy heterogeneity. The value of such research lies in our understanding of processes behind polyploid evolution and the evolution of plant biota in general.