Abstract

Polyploidization (whole-genome duplication) is widely considered one of the most important evolutionary forces driving the diversification of flowering plants. Polyploids tend to originate recurrently and many plant species retain individuals of two or more different ploidy levels in certain parts of their distributional range of even within their populations. The main aim of this thesis was to address the understudied aspects of polyploid speciation by employing new, convenient methods and/or studying plant model systems with unique features. Difference in monoploid genome size of *Tripleurospermum inodorum* (Asteraceae) cytotypes provided a unique opportunity for addressing the rate of spontaneous polyploidization in natural populations by enabling the easy distinction of neopolyploid mutants from long-established polyploids in routine flow-cytometric analyses. Repeated ploidy screening in mixed-ploidy populations of annual *T. inodorum* have been, to our knowledge, the very first attempt to document temporal changes in cytotype composition *in situ*. In spite of considerable between-year oscillations in cytotype frequencies, both diploids and tetraploids usually persisted locally for several consecutive years. The common incidence of such ploidy mixtures along with a partial fertility of triploid hybrids then likely result in gene flow between coexisting di- and tetraploids. A new insight into the direct phenotypic and ecological consequences of genome doubling was accomplished in a unique primary contact zone of diploids and their recent autotetraploid derivates in *Knautia serpentinicola* (Caprifoliaceae). Not only did the tetraploids attain higher values of both aboveground and belowground biomass compared to their diploid progenitors, when provided enough nutrients, they were also more successful in tolerating interspecific competition, which might have been the key to their successful establishment. When evaluating the importance of habitat differentiation for cytotype coexistence in both *T. inodorum* and *K. serpentinicola*, we demonstrated that independent replicates and/or across-scale comparisons may significantly improve the performance of ecological niche assessments. In the contact zones of both model species, at regional and finer scales, non-adaptive processes (e.g. non-random migration patterns, the founder effect) were more important determinants of cytotype distribution patterns than environmental heterogeneity. Finally, we reviewed the available literature on intraspecific ploidy variation, highlighting unexpectedly high cytotype diversity and a frequent ploidy coexistence in the cytologically intensely surveyed species. Numerous mechanisms facilitating the ploidy coexistence have been suggested, however, only a few of these were sufficiently explored. The roles of a spatial segregation of cytotypes and asexual reproduction were emphasized in our survey.