

Abstract

This work is about diploids and tetraploids of *Vicia cracca* species, the two commonly occurring cytotypes. The first part is devoted to the distribution of cytotypes of this species in the secondary range in North America. It was hypothesised that polyploid species become invasive more frequently than diploid species. Their greater success may be given by greater variability of genes obtained by polyploidisation and gene subfunctionalizing. All invasive populations of *Vicia cracca* species involved in this study were tetraploid. Based on this we can say that only tetraploids are invasive in this secondary colonized area. Polyploid species can be better competitors thanks to their expected better growth characteristics and stress resistance. Therefore the second part of this work is testing the hypothesis that polyploids are more variable in size of different parts of the plant body and therefore more able to grow even in conditions that are not suitable for diploids. As predicted by the EICA hypothesis (evolution of increased competitive ability), secondary colonized area also provide more space for further evolution and we can expect that growth characteristics of plants from the invasive range will differ from plants of the same ploidy from the original distribution range. This part of the work thus contains the results of comparison of selected growth characteristics of original diploids and tetraploids and invasive tetraploids. The purpose is to evaluate the growth characteristics of these cytotypes and assess what could be the reason for the current occurrence. Shadow stress reaction observed in invasive tetraploid plants was more similar to natural tetraploids than diploids. This suggests that polyploid plants are preadapted to new environmental conditions and the process of polyploidization was therefore important precursor to invasive species. When we compare plants from natural and secondary area is also helpful to know what part of the natural range of the invasive population come from. Therefore, the third part deals with the determination of genetic distance between populations of *Vicia cracca* from Europe and North America. Detection of the differences in selected sequences generally allows to assess the relationship between cytotypes and populations. The sequence of nuclear and chloroplast DNA markers tested in this work, however, were not sufficiently different to specify genetic distances of the populations.

KEYWORDS: *Vicia cracca*, tetraploid, invasive species, growth experiment, genetic distance, genetic markers