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<AT>High genetic diversity in fragmented *Iris pumila* L. populations in Ukrainian steppe enclaves

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<ABS-HEAD>Abstract

<ABS-P>Habitat fragmentation can prevent gene flow between plant populations and lead to a loss of genetic diversity. However, such impact of fragmentation has not always been consistently confirmed by previous studies and the issue still needs further research. Particularly little is known about the impact of fragmentation on steppe plants. Steppe once covered vast, continuous areas, and nowadays is among the most fragmented biomes. In Ukraine, remnants of this habitat survived in large but few nature reserves and loess ravines as well as on kurgans (burial mounds of ancient nomadic people), which, despite their small size, are still numerous and scattered throughout the landscape.
<ABS-P>We studied the impact of fragmentation on the genetic diversity and structure of *Iris pumila*, a typical species of European steppes. Our main focus was to compare the genetic characteristics between kurgan populations (n=8), and populations from larger refugia (n=6). We assessed the genetic diversity of the studied populations with Universal Rice Primers.
<ABS-P>Our analyses revealed high genetic diversity across all investigated populations (mean *He*: 0.233; mean PPB: 58.57). However in kurgan populations genetic diversity was significantly higher than in larger refugia. Genetic diversity (*He*) was negatively correlated with population size. Most of the molecular variance (82%) was represented within populations, whereas genetic differentiation among populations was moderate (Φ_{ST}=0.160), and low among refugia types (Φ_{RT}=0.026).
<ABS-P>The maintenance of high genetic diversity despite two centuries of fragmentation may be related to the moderate disturbance occurring on kurgans, which enhances the sexual reproduction of the species. Moreover, we assume that species traits such as longevity and polyploidy might counterbalance genetic drift, while its self-incompatibility and presence of a soil seed bank allows for the replenishment of the gene pool. Overall, our results suggest that kurgans can protect genetic diversity of steppe species.
<KWD>Keywords: dry grassland; fragmentation; genetic drift; genetic structure; habitat island; population genetics; steppe; self-incompatibility; Ukraine; Universal Rice Primers.

Introduction

The influence of anthropogenic habitat fragmentation on gene flow between populations is one of the core issues in current landscape genetics studies and nature conservation (Manel & Holderegger 2013; Richardson, Brady, Wang, & Spear 2016). Small, genetically isolated populations can be prone to genetic drift − a process of genetic diversity loss, in which allele frequencies within a population change by chance due to the random exclusion of individuals