

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA18201 - An integrated approach to conservation of threatened plants for the 21st Century

STSM title: Identifying hybridization in *Minuartia smejkalii* endemic from Czech Republic.

STSM start and end date: 06/01/2020 to 15/03/2020

Grantee name: Sissi Donna Lozada Gobillard

PURPOSE OF THE STSM:

The main purpose of the STSM was to contribute with information about ex-situ cultivation for later restoration purposes of the endemic from Czech Republic, species *Minuartia smejkalii*. In particular, the aim was to identify the possible consequences of ex situ hybridization of *Minuartia smejkalii* with *M. caespitosa*. This was done by comparing MS and *M. smejkalii* x *M. caespitosa* hybrids using extensive data collected from artificial inter-specific crossings part of the project LIFE FOR MINUARTIA, in combination of new data about seed morphology and dispersal traits.

Specifically, we addressed the following questions: (i) What is the effects of hybridization on plant fitness (seed production, germination), seed morphology and dispersal ability? (ii) What is the effect of hybridization on species adaptation to its natural environment?

DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

The work during the STSM was divided in two parts, analyses of data that was previously collected from experiments and generation of new data to complement previous results.

Analyses of previously collected data: Fitness and adaptation

Seeds collected from three populations of *Minuartia smejkalii* from Želivka region and seed from *Minuartia caespitosa* from Hradčany region were used for ex-situ cultivation and artificial inter-specific crossings. Half of *Minuartia smejkalii* individuals were crossed with *M. smejkalii* individuals within the same population and the other half with *M. caespitosa* individuals. To assess whether fitness differs between *M. smejkalii* and the hybrids, we compared total seed production and germination rate. In addition, an experiment to evaluate the adaptation capability was performed in a total of 120 individuals considering two treatments: Shading (open vs. shade) and Soil type (sand vs. serpentine). Two variables were measured plant growth as the area occupied by the individual and total number of flowers.

Collection of new data: Seed dispersal

To complement previous results, we further evaluated the dispersal ability in *M. smejkalii* and hybrids. Area and perimeter of the selected seeds were assessed from electronic pictures using ImageJ software. And additional dispersal traits such as seed release height and terminal velocity were measured. Seed release height was measured directly on individual plants and terminal velocity was calculated using a standardized method of a tunnel wind. The latter two traits combined with wind data and vegetation height from the sites, were used to fit a model to estimate the seed dispersal distances.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

Fitness and adaptation

Our results showed that *Minuartia smejkalii* and *M. caespitosa* can hybridize and produce viable seeds. Number of seeds per capsule produced by *M. smejkalii* and hybrids did not differ but number of flowers and germination rate were higher in the hybrids. In addition, hybrids produced a higher number of flowers than *M. smejkalii* in open sites and serpentine soils, indicating that the hybrids are better adapted to the extreme serpentine conditions than the original serpentine species.

Seed dispersal

Seed morphology did not differ between *M. smejkalii* and the hybrids, but was different compared to *M. caespitosa*. Seed size (area) did not differ but *M. smejkalii* and the hybrids possess a much rougher seed coat compared with *M. caespitosa*. Seed dispersal related traits suggest a lower dispersal rate in the hybrid compared with *M. smejkalii*, but simulations showed a higher maximum dispersal distance in hybrids.

Conclusion and recommendation

Our results provide evidence of a better fitness and potential adaptation of hybrids compared to *M. smejkalii*. Therefore, we recommend a careful management of these crossable species in ex situ facilities, where spatial isolation should be considered for reintroduction purposes to minimize the possibility of spontaneous hybridization assuring a successful long-term survival of *M. smejkalii* in the wild.

A manuscript is in preparation entitled:

Potential risk of ex situ hybridization of the endangered endemic species *Minuartia smejkalii* (Caryophyllaceae).

FUTURE COLLABORATIONS (if applicable)

In the near future the plan is to get more involved in *Minuartia* and continue working with data related to management generated by the project.