

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: CA18201

Grantee name: Theresa Milena Grooss

Details of the STSM

Title: Environmental predictors of *Minuartia smejkalii* population dynamics in garden cultivation

Start and end date: 20/06/2022 to 28/08/2022

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

In the first two weeks of the STSM, we conducted field work to map and measure *Minuartia smejkalii* populations cultivated in gardens. The distribution of individuals in the gardens was mapped. Survival status, count of individuals and seedlings, size, amount of flowering and non-flowering stems as well as number of flowers per stem were recorded. Furthermore, the environmental factors slope, chemical soil composition (N, C, Mg, P, pH) and surrounding vegetation (species and cover in percentage) were measured.

The light availability/canopy openness were measured separately at the beginning of August, using a fish-eye lens camera. The pictures were analyzed using the software Gap Light Analyzer, version 2.0 (Simon Fraser University & Cary Institute of Ecosystem Studies). Precipitation data from April, May and June in the years 2017 to 2021 for the three weather stations closest to the sites were taken from the website of the Czech Hydrometeorological Institute. For each site, the nearest weather station was identified and the precipitation data assigned to the site.

The data recorded in the gardens during the field work as well as data from previous years was compiled and transcribed for further analysis. The recorded and transcribed garden data of the previous years, which had never been used for analysis before, was cleaned to bring the data from all years and locations into a format that could be used for analysis.

The data analysis was conducted in R (version 4.0.4). The effect of the different predictors on individual

¹This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

count was analyzed using linear mixed effects modelling. The factors that were found to be significant were precipitation in the previous months, canopy openness (light availability) and cover of other plants in the area, with low precipitation, high light availability and high amounts of other plants decreasing counts of *M. smejkalii*. Furthermore, the amount of individuals was significantly influenced by the amount of years that had passed since planting.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

The planting of *M. smejkalii* in private gardens represents a new approach to plant conservation efforts in the Czech Republic. In addition to the direct benefits of cultivating a threatened plant, the project has the benefit that it entails direct interactions with the public and therefore increases public awareness of this threatened plant and its conservation.

The detailed data that was measured and transcribed contributes to the collected body of knowledge about *M. smejkalii* conservation practices and successes. This project is the first time that this dataset has been systematically prepared and analyzed. The data will be used for further analyses in the future.

Conclusions for best conservations practices can be drawn from the results of the statistical analysis of the environmental factors. From the finding that occurrence of other species in general significantly affects survival of *M. smejkalii*, it can be concluded that in garden cultivation, removal of other plants (weeding) will increase the success of *M. smejkalii*. Since canopy openness was found to correlate slightly negatively with *M. smejkalii* counts, it might also be preferable to select shaded locations to plant it. Further research will be necessary to corroborate the findings from this study and identify the effects of different environmental factors in more detail.

The collected data are a basis for future research on *M. smejkalii* survival in cultivation. It will be possible to build upon these findings and expand the knowledge on which conditions contribute to optimal survival. We plan to publish the results of the project with additional data that were not included in this mission in a peer-reviewed journal article.

Citations

- Gap Light Analyzer (GLA) Version 2.0, Simon Fraser University, Burnaby, British Columbia, Canada & Institute of Ecosystem Studies, Millbrook, New York, USA (1999)
- Czech Hydrometeorological Institute (Český hydrometeorologický ústav), daily precipitation data <https://www.chmi.cz/historicka-data/pocasi/denni-data/Denni-data-dle-z.-123-1998-Sb> (accessed 20 July 2022)
- R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>