

TITLE of AGREEMENT	CWR in EURISCO
AGREEMENT NUMBER	L22ROM103
IMPLEMENTING PARTNER	Gene Bank, Crop Research Institute, Prague (CRI)
AUTHOR OF THE REPORT	Vojtěch Holubec
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TYPE OF REPORT	Extension of EURISCO for Crop Wild Relatives (CWR) in situ data and preparation. 3 rd report
ABSTRACT (Maximum 200 words)	<p>Within the Czech Republic a strategy for conservation of CWR was compiled and published (Taylor et al. 2017). This Strategy is used for further planning of in situ and on farm conservation of PGR. Selection of CWR species and populations preferably in the category of endangered species for in situ conservation was done. Botanical monitoring of selected populations was undertaken. The system GRIN Czech was revised for minimum descriptors required to upload in situ data to EURISCO. Currently the system is able to accommodate <i>in situ</i> data. Two sites were uploaded as testing. Collaboration with ENVI sector was started on joining efforts on “donor plots” for seed collecting within protected areas that can be used as <i>in situ</i> plots. Here the material is protected and could be also available. The original collected seeds can be deposited in the Gene bank as a liaison institution. The AGRI partner, the GB will select target populations of CWR of interest.</p>
KEYWORDS	<p>Country/Region: CZE</p> <p>Crop(s): CWR</p> <p>Subject: selection of species, monitoring, documentation</p>

Periodical Report

Introduction

Populations of crop wild relatives (CWR) occurring *in situ* are potentially valuable resources for crop science and plant breeding. Therefore, they need to be conserved and made available to users. However, the current conservation of, and access to these CWR populations varies strongly. *In situ* conservation of CWR is often in the hands of nature conservation organizations, who are sometimes not even aware that they are managing these resources. Other CWR populations occur in farmers' fields, roadsides, and other locations, where they are not managed at all. Furthermore, information about the CWR populations, their occurrence and availability, is hardly available.

The ECPGR Concept for *in situ* conservation of crop wild relatives in Europe (Maxted *et al.* 2015) stressed the importance of identifying the important CWR diversity both at the national and regional level. In this context, Weise *et al.* (2020) explored the possible extension of EURISCO for *in situ* crop wild relatives and on-farm landrace data and proposed a set of descriptors that could be used for this purpose. The Secretariat of the ITPGRFA published an international standard of descriptors for CWR conserved *in situ* in an attempt to promote the documentation of these genetic resources and enable countries to compile and exchange data held by different national and international organizations (Alercia *et al.*, 2021).

CWR in *ex situ* genebank collections are included in the Czech documentation system and thus mirrored to EURISCO. And although it is in principle possible to include *in situ* populations in EURISCO, provided that they are managed at the standard of *ex situ* collections, i.e., with a 'holding institute' that can also be approached for access.

Strategy for conservation of CWR

The Flora of Czech Republic counts 3713 species and subspecies belonging to 965 genera. The documentation system GRIN Czech under the National programme for conservation a use of plant genetic resources and agrobiodiversity includes 1392 species belonging to 463 genera. The system also includes 137 spp. of rare, protected and threaten species.

Within the Czech Republic we proposed a strategy for conservation of CWR and published (Taylor *et al.* 2017). We collated data from the species occurrence database of the Nature Conservation Agency of the Czech Republic (AOPK CR, 2012). Another important source of data were collecting databases at the Genebank, Crop Research Institute, Prague (Holubec *et al.*, 2014). The coverage of collecting activities is good for mountainous areas (Fig. 1). However we found collecting gaps in central and southern part of the country (Fig. 2). The brown marked spots show still rich regions in CWR, however not covered by collecting missions.

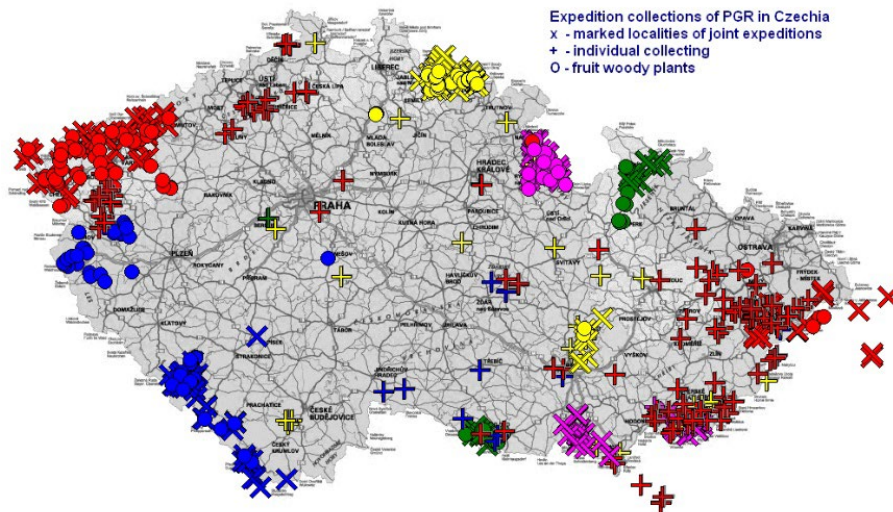


Fig. 1 Collecting and monitoring missions in the Czech Republic

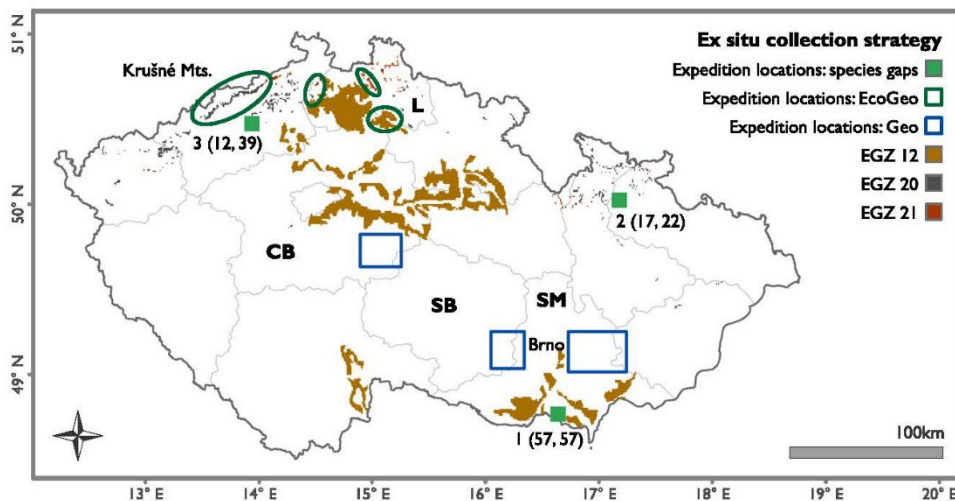


Fig. 2. Gaps in collecting activities of CWR in the Czech Republic.

We generated a CWR checklist of food and feed species for the Czech Republic (Appendix 1) and generated a map of observed priority richness in the Czech Republic (Fig. 3). The richest grid cells with over 80 present CWR were found in Southern Moravia and Czech Karst, in the area SW of Prague.

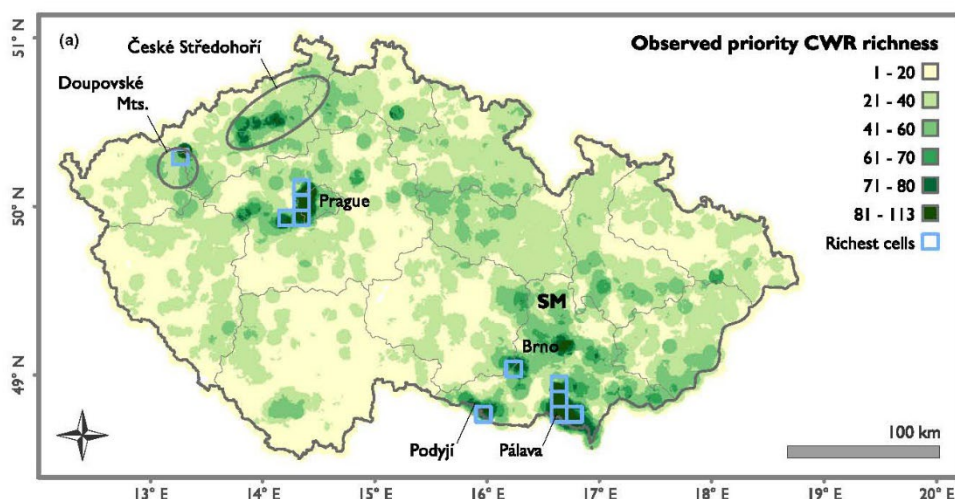


Fig. 3. Observed priority richness in the Czech Republic.

We prioritized taxa, using widely adopted criteria modified with input from local experts, to create a national CWR inventory. The final distribution database contained distinct georeferenced accessions of 66 species. For 204 priority CWR species, we collated 206,760 presence records. We carried out spatial analyses to identify patterns in species richness, gaps in existing conservation actions, complementary conservation networks and collecting strategies to increase representativeness of gene bank accessions. 160 species (78.4% of the inventory) occur in five or more spatially distinct PAs, providing some insurance against stochastic or anthropic extinction. However, 16 priority CWR have been recorded in only one PA. Active in situ conservation of priority CWR should be instigated within 14 overlapping protected areas.

Documentation of *in situ* conservation

Czech Gene Bank runs the National PGR documentation system GRIN Czech since 2015 after replacing of an old system EVIGEZ (running since 1984). The GRIN Czech documentation system enables a wide extension of descriptors to increased diversity of data. The system was revised for minimum descriptors required to upload in situ data to EURISCO. Currently the system is able to accommodate in situ data.

Descriptors for in situ conservation recommended by Theo van Hintum (van Hintum, 2022) were activated in the documentation system GRIN Czech. The data for population of *Allium schoenoprasum* monitored in the locality Děčín was taken as the second case study and all available site info were uploaded in the documentation system. Descriptors activated are shown in the table 1.

Table 1. Documentation GRIN Czech adjusted to in situ conservation. Case sample: *Allium schoenoprasum* population

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GRIN Czech 1.9.1

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Accession ID	09H04
DOI	N

Taxon	Allium schoenoprasum ssp. schoenoprasum
Name	
Origin	Czech Republic
Maintenance Site	Decin
Is Backed Up?	Y
Backup Location	CZE122 (CRI Gene Bank)
Status	Not active
Life Form	Perennial
Level Of Improvement	Wild
sampstat	100
Reproductive Uniformity	Population
Received As	Seed collection
Received Date	2023
Is Web Visible?	N
Note	Curator: Vojtěch Holubec
ploidy	2

Accession Source ID	1028907
Source Type	Collection source event
Source Date	2023
Geography	Czech Republic
Is Origin?	N
Collecting or Acquisition Source	Weedy, disturbed, or ruderal habitat
Quantity Collected	30
Unit Quantity Collected	gram
Collected Form	Seed collection
Number Plants Sampled	20
Environment Description	Bank of Elbe River
Collector Verbatim Locality	Děčín, 50 m N of railway bridge
Elevation (meters)	125
Latitude	50.7768808N
lat_str	50°46'36.771"N
Longitude	14.2046225E
long_str	14°12'16.641"E
Georeference Protocol	Lat/lon determined by GPS
Associated Species	<i>Lolium perenne</i> , <i>Phalaris arundinacea</i> , <i>Poa pratensis</i> , <i>Plantago lanceolata</i>
Is Web Visible?	N

Research and monitoring of *in situ* populations

The research of CWR populations was preferably devoted to endangered species marked by red list categories C1, C2, C3 and C4 (Procházka, 2001, PLADIAS, 2022). Czech Republic does not provide CWR for the main economic crops like wheat, maize, potato, rice, but is rich in many minor crops like

grasses, fodder crops, fruits, vegetables, condiments etc. The main Czech herbaria (PR, PRC, BRNU) were visited and plant databases were checked. Selected endangered species were considered for *in situ* conservation within CWR category.

A long-term monitoring programme is applied to two populations of *Allium schoenoprasum* in Vltava and Elbe River Basin (Zbraslav/Jarov, Děčín), two populations of *Hierochloë odorata* in Elbe River basin (Grado, Václavka) and *Astragalus excapus* in Czech Middle Mts. (Radobýl). Long, but not continuous monitoring of populations of endangered grasses and legumes was conducted in S Moravia. Recent monitoring of *Triticeae* grasses (*Agropyron pectinatum* and *Aegilops cylindrica*) was undertaken during the past two years.

The monitoring has taken place during the period of full vegetation in May to June. All types of vascular plants were recorded at the locations (nomenclature was unified according to Kaplan et al. (2021). Permanent plots of 3 x 3 m size were marked on each locality, where phytosociological relevés were recorded using the Braun-Blanquet combined scale of abundance and dominance (Hédl 2005). Relevé comparison was used to monitor floristic development over time. Botanical diversity was assessed based on the calculation of the Shannon (H) and Simpson index (D) and their standardized version of Evenness (Eh and Ed). Development of the number of species on the area and the value of the Shannon index was evaluated graphically in terms of the trends of individual indicators in connection with previous years.

Monitoring the sites of *Hierochloë odorata*. At the Grado site there is a rich population on the sands along the side arm of the Elbe River. The abundance/dominance scale was assessed between 2b and 3. The overall dominance is permanently at the level of 70-80% due to the significantly lower representation of other species on the drying sandy beach. The site is often damaged by cottagers through sand mining and dumping of garden waste. The most significant risk factor is the shade of tall trees. The population was stabilized despite these negative factors. At the Václavka locality, this is the bank of the closed pool of the original side river arm. A significant damage to the habitat occurred due to shading and competition caused by the invasion of bushes and trees the total dominance was scored to 30-40%. Shannon's index had a slightly increasing tendency at both locations due to the spread of other species. Unrestricted natural succession of tree species on both sides is causing subsequent population extinction.



Fig. 3, 4. Locality Grado with monitored plot of *Hierochloë odorata*

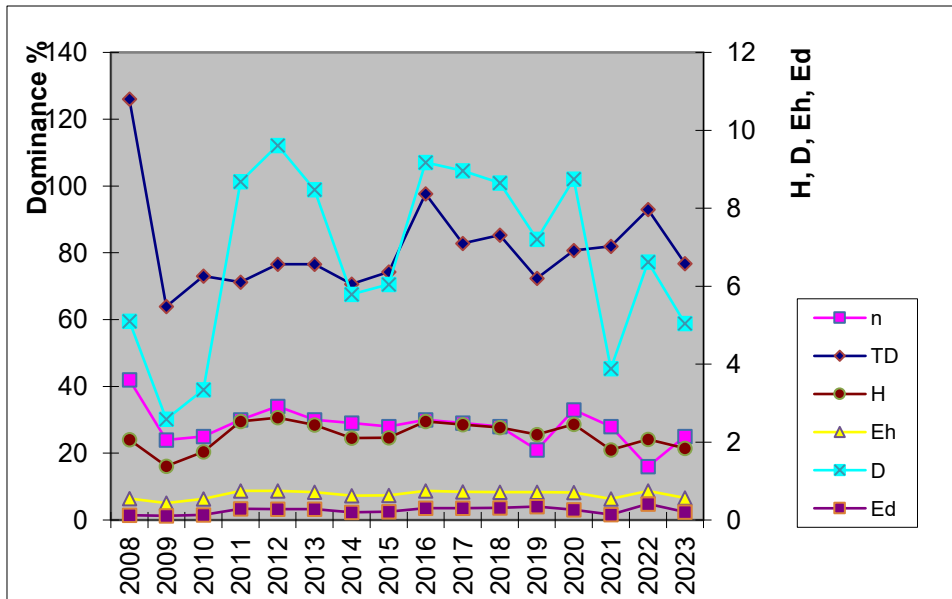


Fig. 5. Monitoring of site with *Hierochloë odorata* in Grado, Elbe River Basin. Phytosociological relevés (n- number of spp, TD – total dominance, Shannon Index, Evennes Shannon, Simpson index, Evennes Simpson)



Fig. 6, 7. Locality Václavka with monitored plot of *Hierochloë odorata*

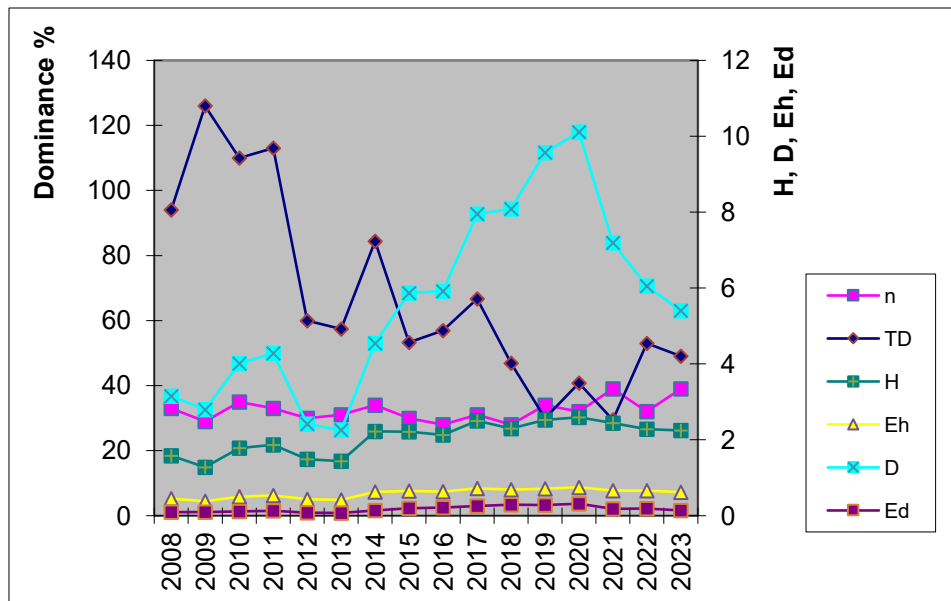


Fig. 8. Monitoring of site with *Hierochloë odorata* in Václavka, Elbe River Basin Phytosociological relevés (n- number of spp, TD – total dominance, Shannon Index, Evennes Shannon, Simpson index, Evennes Simpson)

Monitoring of coastal chive sites – *Allium schoenoprasum* ssp. *schoenoprasum*. The Děčín location represents the occurrence of chives on the paved navigation of the Elbe River bank. The total coverage on the permanent area is 90-100%, of which the coverage of chives on the standard area was permanently rated as grade 3. The Shannon and Simpson index values are at medium levels. Additional chive seedlings in the number of 100-200 plants are spread around the monitored population. Despite the growing nitrification and ruderalization from the nearby sewage outlet, the chives are stabilized and, on the contrary, their abundance is increasing. Děčín's population is permanently stabilized despite the occurrence of floods.



Fig. 9, 10. Locality Děčín with monitored plot of *Allium schoenoprasum* var. *schoenoprasum*

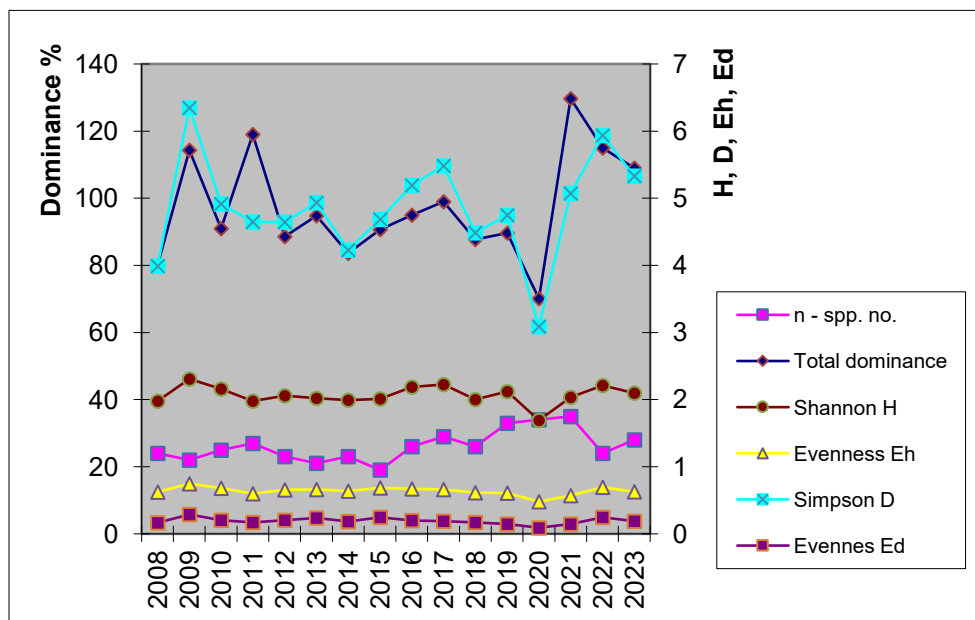


Fig. 11. Monitoring of site with *Allium schoenoprasum* var. *schoenoprasum* in Děčín, Elbe River Basin
Phytosociological relevés (n- number of spp, TD – total dominance, Shannon Index, Evennes Shannon, Simpson index, Evennes Simpson)

The occurrence of chives near Zbraslav along Vltava River was first recorded in 2001. In 2002 and 2006, floods affected the locality, which almost destroyed it. Genetic diversity was greatly depleted by subsequent bank restoration. Since 2008, the residual population has been monitored. Another population on the opposite river bank was taken for monitoring since 2022. This population belonging to the village Horní Břežany – Jarov is distributed in rocky pavement of the bank in the length of ca 50 m. It is very viable and stable for many years and will be used for *in situ* conservation.

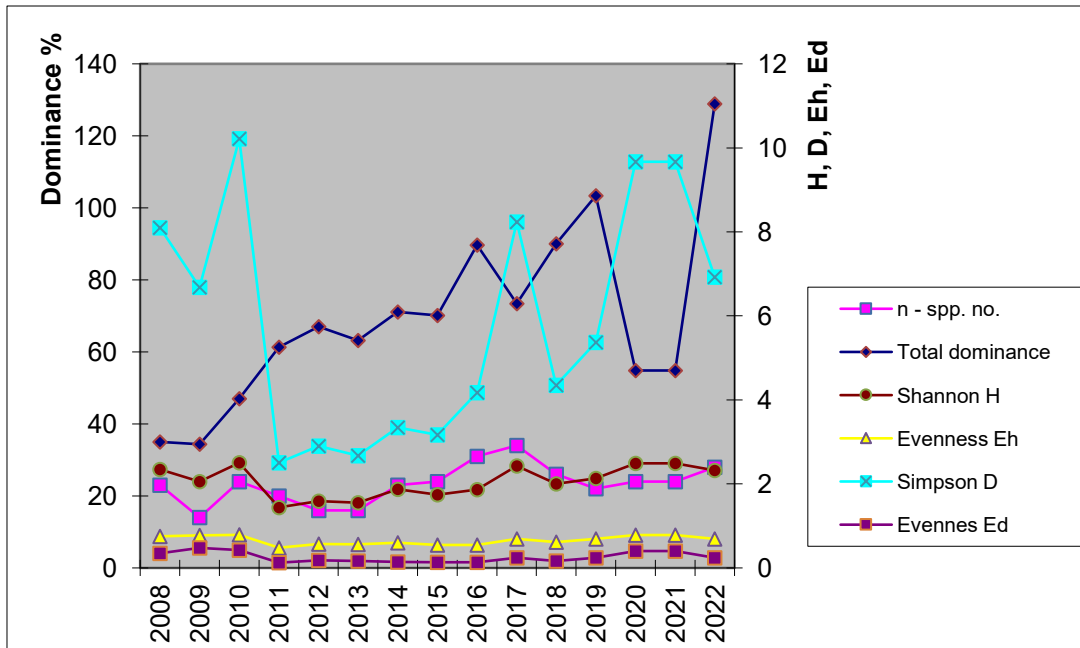


Fig. 12. Monitoring of site with *Allium schoenoprasum* var. *schoenoprasum* in Zbraslav, Vltava River Basin Phytosociological relevés (n- number of spp, TD – total dominance, Shannon Index, Evenness Shannon, Simpson index, Evenness Simpson)

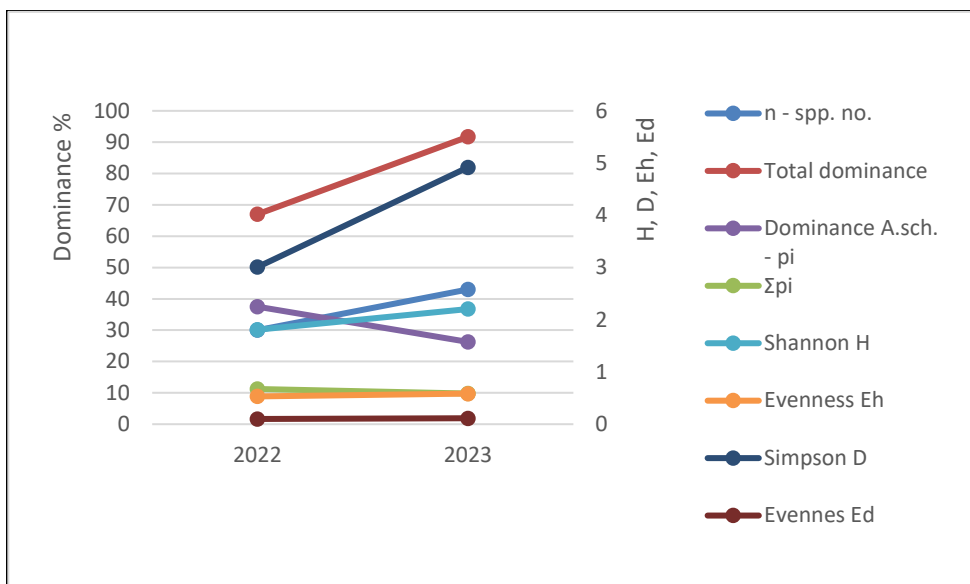


Fig. 13. Monitoring of site with *Allium schoenoprasum* var. *schoenoprasum* in Horní Břežany - Jarov, Vltava River Basin Phytosociological relevés (n- number of spp, TD – total dominance, Dominance of *A. schoenoprasum*, Shannon Index, Evenness Shannon, Simpson index, Evenness Simpson)

Monitoring of *Astragalus excapus* . The locality Radobýl near Litoměřice is in a good state of vegetation and without threats. The values of the number of species and their coverage are stable, the total coverage is around 50-70%. *Astragalus excapus* occurs only on the edge of the basalt quarry. The coverage of both species in the monitoring area is permanently at the level of 2m and 1. The Shannon and Simpson index were lower due to the later aspect of the vegetation.



Fig. 14, 15. Locality Mt. Radobýl with monitored plot of *Astragalus excapus*

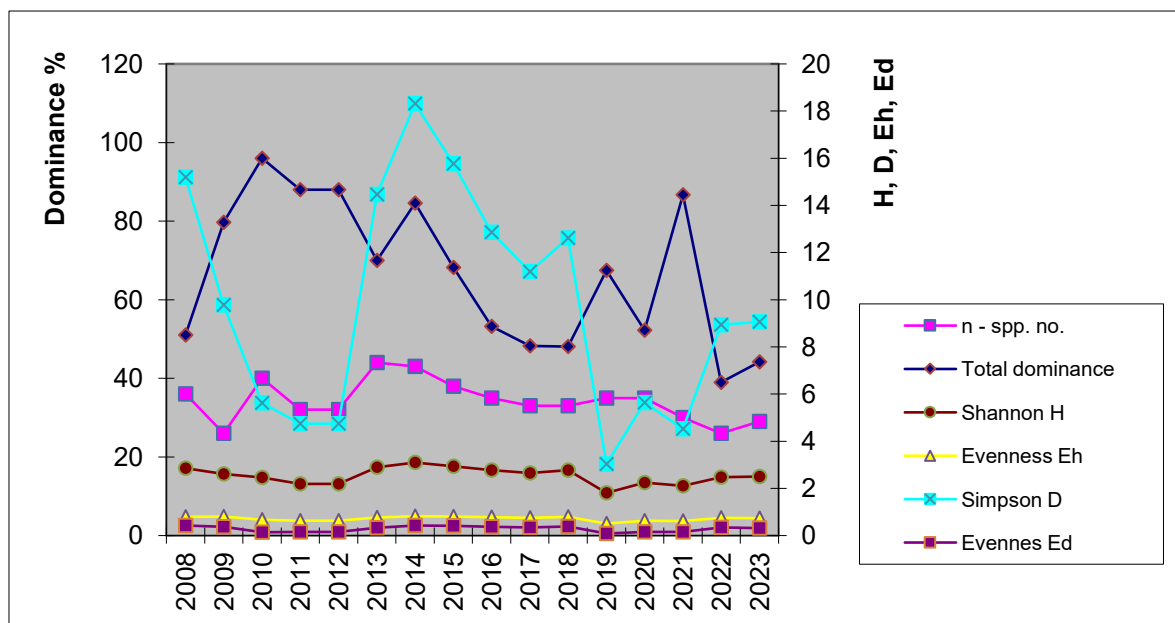


Fig. 16. Monitoring of site with *Astragalus excapus* in Mt. Radobýl, České Středohoří. Phytosociological relevés (n- number of spp, TD – total dominance, Shannon Index, Evennes Shannon, Simpson index, Evennes Simpson)

Monitoring of *Aegilops cylindrica*

The locality of *Ae. cylindrica* is on railway bridgehead to Branický Bridge, in Chuchle district, southern part of Prague. The railway body was made of limestone gravel brought from Czech Karst in 1960ies. Together with limestone there were introduced karst species, therefore it is botanically interesting place. *Ae. cylindrica* was introduced by rail in 1980ies and now it is well naturalized. The site is a stripe with a size is 50 x 4 m. The vegetation consists of mainly ephemeric species, phytosociological relevé is shown in the Table 2. Botanical diversity is low reflecting ecologic conditions of gravel embankment with quite high value of Shannon and Simpson indices. The population of *Ae. cylindrica* counted several hundred individuals in 2022. In August the bridge was taken to reconstruction and the gravel with plants was excavated. Currently we have to wait if the population recovers from the sides.



Fig. 17, 18. Locality Prague - Chuchle with monitored plot of *Aegilops cylindrica* in 2022



Fig. 19. Locality Prague - Chuchle with damaged plot of *Aegilops cylindrica* in 2023

Table 2. Summary of phytosociological relevé of *Ae. cylindrica* site in bridgehead to the Branický Bridge, Prague – Chuchle.

	2020	2021	2022	2023
3	0	0	0	Not evaluated
2a	0	0	1	
2m	0	0	2	
1	6	7	4	
plus	8	7	6	
r	0	0	0	
n - spp. No.	14	14	13	
Total dominance	16	18.2	29.35	
Shannon H	2.007	2.109	1.919	
Evenness Eh	0.76	0.799	0.748	
Simpson D	6.643	7.559	5.681	
Evenness Es	0.474	0.54	0.437	

Monitoring of hop - *Humulus lupulus*

Wild hop is distributed along rivers, and locally in forest margins and in secondary vegetation around villages. Responsibility for the hop collection is in the Hop Institute Žatec, curator Vladimír Nesvadba. He monitors distribution of hop in Jeseníky Mts. N Moravia (Fig.). The monitoring sites are inside and outside of Protected Landscape Area (PLA) Jeseníky. Several sites are also on private land. Selected suitable sites are prepared for *in situ* conservation. Negotiations have already started with PLA headquarters and private owners. The problem of private owners is that they do not want to sign agreement for requested 10 years.



Fig. 20. PLA Jeseníky Mts. And marked sites of wild hop (*Humulus lupulus*)



Fig. 21, 22. Sites of wild hop (*Humulus lupulus*) in PLA Jeseníky Mts.

Monitoring of *Glycyrrhiza glabra* site and *Cerasus x eminens*

Glycyrrhiza glabra was cultivated in the past from 18th to beginning of 20th century. These plantations disappeared except one naturalized population, currently in Natural Reserve (NR) Pouzdřany steppe. The population is distributed along the border, partly within and partly outside the NR. This is very positive situation, because it may be possible avoid collecting of seeds for Genebank within NR.

In addition, a natural hybrid of *C. fruticosa* (*Cerasus x eminens*) is occurred in the NR Pouzdřany steppe. It may be a good source of genes for breeding. It is now a well naturalized population for about 50 years counting ca 10 individuals. This site is a very hot candidate for in situ conservation.



Fig. 23, 24, 25. The site of *Glycyrrhiza glabra* in NR Pouzdřany Steppe



Fig. 26,27. The site of natural hybrid of sour cherry *Cerasus x eminens* in NR Pouzdřany Steppe

Collaboration with Nature protection sector

The consultations with Headquarters of AOPK (Agency for Nature and Landscape Protection) under the Ministry of Environment continued on line to reach agreement on collaboration on *in situ* protection of CWR. Position documents of ENVI and AGRI sector were presented including exchanging of published material. AOPK informed about a programme preparing donor plots for collecting of seeds in the buffer /surrounding botanically rich zones of national parks (NP) and Landscape protected areas (PLA) for the use of constructing regional grassing mixtures (*Poaceae*, *Fabaceae* and meadow dicots). The grassing mixtures should be used for reconstructing rich meadows within protected areas, where some deteriorations occurred e.g. due to improper management. Both sides agreed on collaboration on selecting and running such donor plots. Here the material is protected and could be also available. The original collected seeds can be deposited in the Gene bank as a liason institution. The AGRI partner, the GB will select target populations of CWR of interest.

Two sites (donor plots) were selected within the PLA Bílé Karpaty: Medlánky and Čertoryje as the initial case study. Bílé Karpaty (White Carpathians) in South-East Moravia belong to the most important hot spots selected in the Conservation Strategy of CWR for the Czech Republic (Czech Strategy, Taylor et al 2017). Both sites are monitored and phytosociological relevés are available. Species of agricultural interest were highlighted. Additional sites were promised for consideration in autumn 2023. These will be prioritized according to the Czech Strategy (Taylor et al, 2017). Final selection will be done after field evaluation. Seeds for backup in the Gene bank will be collected.

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