

CONTRIBUTIONS TO THE STUDY OF RARE PLANT POPULATIONS IN THE “PLAIUL FAGULUI” RESERVE

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INTRODUCTION

The “Plaiul Fagului” reserve hosts dozens of rare plant species for the Republic of Moldova, with a limited distribution, which can only be found in small ecological niches. These species are extremely fragile, mainly due to the vulnerability given by rarity, endemism or human action. All of this combined put's pressure on valuable natural habitats, endangering the existence of species, but also making it difficult for them to adapt to climate change. We note that the monitoring of rare species, sustained over a longer period of time, unequivocally contributes to consolidating information on endangered taxa, for better protection of them. In order to know the status of rare species populations, data are collected annually on the number of individuals, their ontogenetic stage, chorological data, the status and dynamics of rare species populations in natural habitats. The collected data set is recorded and updated as part of scientific field research every year. Rare plants usually grow in small populations, so any fluctuation in the number of individuals represents a potential threat to the survival of the species. As a first step, we attempted to both validate existing information and contribute to the knowledge of the distribution of these species on the territory. At the same time, we initiated the mapping of the species (Figure 1.), but also the implementation of a long-term demographic study, which will result in the establishment of population indices of all endangered species in the Strictly Protected Area and beyond. The most important areas of concentration of endangered plant species are the beech, hornbeam and pedunculate oak forests, where several areas with valuable spontaneous vegetation from the point of view of biodiversity conservation have been preserved.

MATERIAL AND METHODS

The rare plant species in this study are found in the Strictly Protected Area

within the Natural Reserve, “Plaiul Fagului” on an area of 789.1 ha and fall within plots 31, 32, 38, 39, 40, 41, 44, 49 [1, 2]. Twenty-eight rare species were taken into study for monitoring. These are rare species included in the Red Book of the Republic of Moldova [3] or in the Law on State Protected Natural Areas [4] with limited distribution or with points of presence only in the “Plaiul Fagului” Reserve, whose populations should be monitored periodically.

The monitoring of rare species was carried out over the last three years, through systematic observations carried out during the vegetation period, within representative areas of the Strictly Protected Area. The assessments aimed to identify populations, estimate their abundance and size, as well as characterize the occupied habitats. For each species, the coordinates of the observation points, the number of individuals or population size (as appropriate), the conservation status and any pressure factors identified in the field were recorded. The data collected annually were compared to highlight population trends and changes in the distribution and conservation status of the monitored species.

RESULTS AND DISCUSSIONS

The results obtained during the field trips for monitoring purposes indicate a worrying general state of most orchid populations and other rare species studied. The most affected are the species dependent on humid and shady microhabitats, which have suffered due to the accentuated drought and thermal variations in recent years. The numerical decrease of individuals, the absence of flowers or fruiting and the predominant presence of juvenile stages are indicators of a growing ecological pressure, which could lead to the local extinction of some species, therefore it is imperative to continue the systematic annual monitoring of rare species, with emphasis on phenology and population dynamics. Based on the results of the monitoring activities carried out in the Strictly Protected Area, rare species have been classified according to population trend and conservation status into two main categories: (i) species with stable populations, which present a favourable conservation status, characterised by the maintenance of populations and habitats in conditions that ensure their long-term persistence, and (ii) species with declining populations, corresponding to a precarious conservation status, highlighted by the reduction of populations, restricted distribution or deterioration of habitat conditions. This classification constitutes a tool for assessing the current status of species and provides scientific support for prioritising management and conservation measures within the Strictly Protected Area (Table 1).

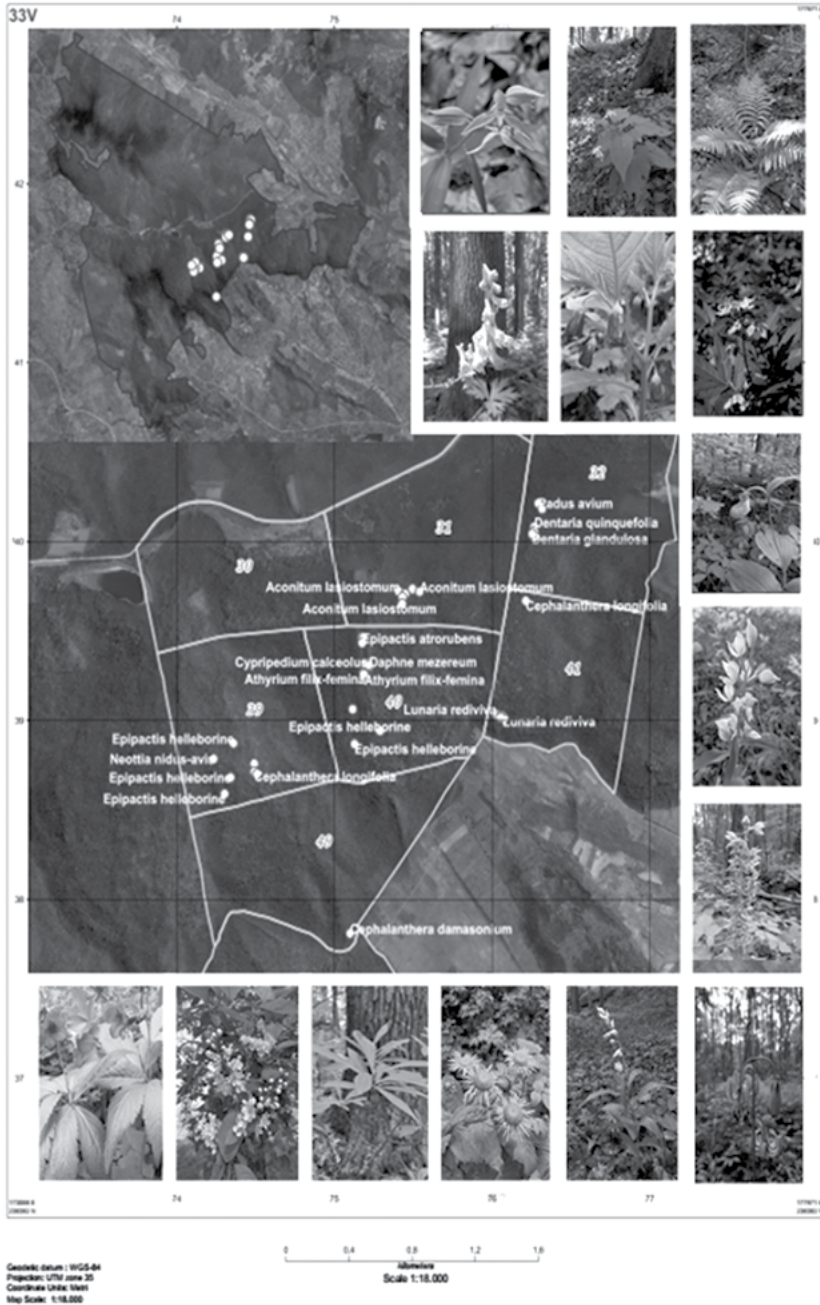


Figure 1. Distribution of rare species in the Strictly Protected Area, "Plaiul Fagului" Reserve

Species with stable populations that present a favorable conservation status: *Cephalanthera rubra* (L.) Rich. – presents a satisfactory conservation status in plot 27, with over 16 flowering specimens and 22 juvenile individuals.

Its presence was also confirmed in plots 40 and 41, where reduced populations were identified (2 and 3 specimens, respectively); The species *Dryopteris filix-mas* (L.) Schott and *Athyrium filix-femina* (L.) Roth from plot 27 are in good ecological status, with stable populations, located in the wetland created by the Rădeni stream, while the specimens from plot 40 are in decline, counting only 2 specimens of *Athyrium* and one of *Dryopteris*; *Platanthera bifolia* (L.) Rich. – The population in plot 30 is satisfactory, but dominated by juvenile specimens. The number of flowering individuals is reduced, but the general condition is considered favorable; *Scopolia carniolica* Jacq. – The population in plot 32D is made up of about 17 mature phytoindividuals that flower and fruit annually; *Dentaria glandulosa* Waldst. et Kit., and *Dentaria quinquefolia* Bieb. form extensive populations with a large number of individuals; *Petasites hybridus* (L.) Gaertn, from plot 39B is located in the valley clearings in the lake area, on moist soils. It forms dense populations with an abundance of 3-5; *Galanthus nivalis* favorable population condition with a stable number of individuals.

Species with declining populations, corresponding to a precarious conservation status: *Cephalanthera longifolia* (L.) Fritsch and *Cephalanthera damasonium* (Mill.) Druce – from all the plots where they were previously reported, they present an unfavorable condition, with only a few specimens identified. The water stress caused by the lack of precipitation and the extreme temperatures of the previous year affected the development of the individuals; *Cypripedium calceolus* L. – The population in plot 40 is in decline, with 3 specimens (1 flowering and 2 vegetative) recorded in recent years in 2024, and in 2025 a single vegetative specimen was identified; The flowering specimen that produced seeds in the previous year was no longer observed. The decrease in precipitation seems to be the main causal factor; *Lilium martagon* L. – The populations in plots 39 and 40 indicate a negative trend: only 3 mature individuals and about 8 juveniles were identified in plot 40, and 5 mature specimens and 14 juveniles in plot 39, down from the previous year. Due to the lack of precipitation, in the reference year the species recorded lower heights, fewer flowers and fruits. Other orchid species monitored: The species *Epipactis helleborine* (L.) Crantz, *Epipactis purpurata* Smith, *Platanthera bifolia* (L.) Rich., *Listera ovata* (L.) R.Br. and *Platanthera chlorantha* (Cust.) Reichenb. were identified in several plots, but all show signs of numerical regression and decreased biological vigor; *Telekia speciosa* (Schreber) Baumg. – species protected by law, in the country's flora identified only in the „Plaiul Fagului” Reserve, in plot 41. As a result, it was found that the population is in decline, being represented only by vegetative specimens, and the number of individuals is very small; *Euonymus nana* Bieb. – vulnerable taxon, protected by law, identified in plot 32. Research was carried out on the population of the species, reporting about 20 vegetative, gracile phytoindividuals, which vegetate on an area of 20-25 m²; *Paris quadrifolia* L. rare species, protected by the state, with a decreasing numerical population in the current year, which was unfavorable for the species. In some growth points, no specimen was identified; *Aconitum lasiostomum* Reichenb., monitored in plot 32 D, the presence of a very small

number of individuals compared to previous years and poor fruiting was attested. The populations are mainly composed of vegetative, short specimens; *Daphne mezereum* L. is monitored in plot 40. It grows on the banks of the ravine in the middle part of the slope. The number of individuals in the population has been drastically reduced. Currently, it lists 8 mature specimens and only 17 juvenile specimens, which grow in groups of 3-5 specimens. Negative temperatures during the flowering period of the species caused damage to the flower buds. Within the framework of the monitoring of rare species in the Strictly Protected Area, the search for the species *Pyrola rotundifolia* L. and *Orthilia secunda* (L.) House, continued for the third consecutive year. These two species were reported only from the „Plaiul Fagului” Reserve and are extremely rare. It is necessary to mention that, according to the data in the literature [5], these species have not been found in the last 20 years.

Table 1.

List of rare plant species monitored in the strictly protected area of the
“Plaiul Fagului” Nature Reserve

Nr. d/o	Species name	Protection status		State of conservation	Plots
		Law ... (1998)	The Red Book, 3 rd ed.		
1	<i>Aconitum lasiostomum</i> Rchb. ex Besser	+	EN	Favorable	31, 32D
2	<i>Athyrium filix-femina</i> (L.) Roth	+	VU	Favorable	39, 40, 41
3	<i>Cephalanthera damasonium</i> (Mill.) Druce	+	VU	Favorable	40, 41
4	<i>Cephalanthera longifolia</i> (L.) Fritsch	+	VU	Favorable	39, 40, 41
5	<i>Cephalanthera rubra</i> (L.) Rich.	+	CR	Favorable	28, 38
6	<i>Cypripedium calceolus</i> L.	+	CR	Unfavorable	40, 41
7	<i>Daphne mezereum</i> L.	+	CR	Favorabilă	39, 40, 41
8	<i>Dentaria glandulosa</i> Waldst. et Kit	+	VU	Favorable	31, 32
9	<i>Dentaria quinquefolia</i> M.Bieb.	+	EN	Favorable	31, 32, 39, 40
10	<i>Dryopteris filix-mas</i> (L.) Schott	+	VU	Unfavorable	38, 39, 40, 41
11	<i>Epipactis purpurata</i> Smith.	+	CR	Favorable	39, 40, 41
12	<i>Epipactis helleborine</i> (L.) Crantz	+		Favorable	39, 40, 41
13	<i>Epipactis leptochyla</i>			Favorable	40, 41

14	<i>Euonymus nanus</i> Bieb.	+	VU	Favorable	32
15	<i>Galanthus nivalis</i> L.	+	VU	Favorable	18, 30
16	<i>Lilium martagon</i> L.	+		Favorable	28, 39, 40
17	<i>Listera ovata</i>	+		Favorable	28, 39
18	<i>Lunaria rediviva</i> L.	+	VU	Favorable	40, 41
19	<i>Orchis purpurea</i> Huds	+	CR	Unfavorable	30
20	<i>Orthilia secunda</i> (L.) House	+	CR	Unknown	41
21	<i>Padus avium</i> Mill.	+	EN	Favorable	32
22	<i>Paris quadrifolia</i> L.	+		Favorable	31, 32, 41
23	<i>Petasites hybridus</i> (L.) Gaertn.	+		Favorable	32, 40, 41
24	<i>Platanthera bifolia</i> (L.) Rich.	+		Favorable	39, 40, 41
25	<i>Platanthera clorantha</i> (Cust.) Reichenb.	+		Favorable	39, 40
26	<i>Pyrola rotundifolia</i> L.	+	CR	Unknown	40
27	<i>Scopolia carniolica</i> Jacq.	+	VU	Favorable	31, 41
28	<i>Telekia speciosa</i> (Schreb) Baumg.	+		Favorabilă	41

CONCLUSIONS

A comprehensive analysis of the presence of rare plants in the “study area” revealed sectors with a high concentration of rare plants, as well as species whose distribution areas fall only within the Reserve (e.g. *Daphne mezereum* L. and *Telekia speciosa* (Schreb) Baumg.). Although the species in our study area are protected, they are still vulnerable to threats, such as extreme temperatures, prolonged droughts, torrential rains, but also constant predation by deer. The data on the presence of rare plants will be continuously updated and for the rarest species, long-term monitoring plots are needed to highlight population trends and changes in the distribution and conservation status of the monitored species.

Acknowledgements: The study was carried out within the following research project: Subprogram entitled: “Research and ex situ, in situ conservation of the plant diversity of the Republic of Moldova” (subprogram code 010101), funded by the Ministry of Education and Research of the Republic of Moldova.

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