ASTRAGALUS DASYANTHUS PALL. AS A MODEL FOR WILD PLANT SPECIES CONSERVATION: CURRENT STATUS

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Conservarea diversităţii speciilor este unul dintre cele mai importante scopuri ale „2010 Biodiversity Target". *Astragalus dasyanthus* Pall. a fost selectată ca o specie model pentru analiza eficacităţii conservării *in situ* a unor arii protejate. Au fost analizate literatura de specialitate şi datele din ierbar. Pentru a se determina prezenţa *A. Dasyanthus*, au fost măsurate trei arii din Republica Moldova: rezervaţia ştiinţifică „Codru", rezervaţia naturală „Bugeac" şi o arie de lângă satul Ghidighici. Numai ultima din ele a avut reprezentanţi ai speciei cercetate. Au fost stabilite unele cauze de dispariţie a acestei specii. În rezultatul cercetărilor, au fost elaborate recomandări privind crearea ariilor protejate cu reprezentanţi ai speciei *A. dasyanthus*.

Introduction

Conservation of species diversity is one of the main goals of the 2010 Biodiversity Target [5]. Human activities and use of natural resources induce changes in the global environment [11]. Biological diversity is declining at an unprecedented speed [12]. The attention of the world's best scientists is focused on finding ways to preserve biological diversity.

Each country has its own unique set of species and genetic varieties which have to be assessed, preserved and restored. Many environmental organizations and research institutions are trying to find ways to monitor and control species diversity and ecosystem health [13]. A critical part of research connected to biological diversity problems is concentrated on conserving species which are considered strategically important for agriculture or those ones that maintain ecosystem functions [9].

An urgent goal is to conserve, maintain and restore the full range of biological diversity present in an area [4]. Furthermore there is a whole variety of species: some of them are the part of ecosystem services production, the others are the elements of significant habitats, or natural weed competitors, or the ones which contain medical substances. All of them are considered as ones of great importance [1].

Concentrating research on the aforementioned ecosystem elements will help to conserve significant ecosystem units. In addition there is a great need to elaborate and research various methods that could be applicable for wild plants conservation [10]. Some plant species can be valuable for science as research objects like key species, indicator species or species which could be used as sources of genes [15]. This kind of implication might be recognized much later, which makes the conservation species selection a vexed problem.

One of the biggest issues that complicate this process is the lack of information and practical experience, which slows down the development of plant genetic resources (PGR) conservation. The Biodiversity Conservation Strategy and Action Plan was elaborated in Moldova, however its implementation is just in the starting stage. The Centre for Plant Genetic Resources, founded in 1999, is basically directed towards conservation of crops and their close relatives[6].

Because of lack of attention, very little has been done in relation to wild plants conservation [14]. According to the third national report on biological diversity, a number of *in-situ* conservation projects have been started. However this process still requires big improvement. The number of protected areas present in Republic of Moldova is insufficient [16]. Areas are poorly managed, with only a small number of research projects taking place. In addition there is a big deficiency of practical experience and personnel [2]. Taking into consideration Moldova's economic situation, some inexpensive and effective methods for wildlife conservation should be adopted and introduced.

With the support of Moldova State University and the Swedish Biodiversity Centre the research project for *Astragalus dasyanthus Pall*. (Fabaceae) conservation was started in July 2006. It is spread all over the territory of the Eastern European steppes. *A. dasyanthus* is a rare plant species and vulnerable in Republic of Moldova, and has been also listed as endangered in Red List Europe since 1991 [6]. The description can be found in determinant [17]. This species was selected as a model because it has several characteristics which are related to the present research. In Moldova it is settled on its edge of habitat so it can be used as an indicator species in future research, and is also very exacting on conditions of sun and soil.

A. dasyanthus has medicinal properties due to the presence of glycosides which have different effects. Like other species of genus *Astragalus*, *A. dasyanthus* has small dry seeds, which require further research to be made on in order to stabilize the conditions for its preservation. This species has problems connected to reproduction and propagation as it requires many conditions to be kept for seeds to germinate. Vegetative propagation is not successful for this species [20].

This study is aimed at investigating the current situation with *A. dasyanthus* in some known populations both in protected areas and areas with human interaction, to analyse the success of *in situ* conservation within protected areas, to assess human impact on these populations, to produce some general advice for future conservation of the given species.

Analysis of current status

The Herbarium of Moldova State University's Museum of Nature has 55 accessions of *A. dasyanthus*. They were used to analyse its propagation in Republic of Moldova. At the same time available papers and publications were reviewed for the same purpose.

Two protected areas were visited to establish existing populations and to evaluate the success of *in situ* conservation for *A. dasyanthus*. One plain area close to a populated locality was selected as well. All the selected territories are mentioned previously in literature for the presence of research species [17,19,18].

Standard line transect method was used [3] to analyze selected areas for desired species detection. 2 meter wide transects were used and two observers checked the same plots independently. GPS device was used to map every recognized individual to prevent repetitions.

In Scientific Reserve "Codrii" a meeting with the reserve's botanist took place when the local herbarium was checked for the presence of the research species. In addition, field notes for 10 years were reviewed to check *A. dasyanthus* appearance within this period.

Results and Discussion

Two protected areas have been analysed for *A. dasyanthus* presence. The first one was "Bugeac" (central point coordinates 46°25'59"N, 28°41'52"E) situated in the forest-steppe district between Bugeac, Dezghingea, Ciucur-Mingir and Topala which are inhabited localities in the southern part of Moldova, Anenii Noi region, close to the city Comrat. The area was divided into 317 transect lines. There were no representatives of *A. dasyanthus* found. One plain region to the south-west was also analysed. That was a slope where only hay cutting and grazing have been taking place, nevertheless the research species was not detected in surrounding areas as well.

The last mentioning of the research species in Nature Reserve was in a book by Nikolaeva L.P. in 1963 [19]. There could be several reasons of disappearance of this species from "Bugeac", but the first and most significant is isolation. The habitat is very fragmented and there was not enough shifting space for species to adapt and survive in changing conditions [16]. The other reasons can be various depending on human activities, though not taking place at Nature Reserve "Bugeac" but close by, like usage of herbicides on the neighbourring fields. On the protected area there can be several reasons for the disappearance like soil composition changes or loss in competition with more aggressive species. Obvious traces of hay cutting were noticed on the slope area which is not suitable for agricultural use. If hay cutting will take place at the time right before reproduction, or during the reproduction period, then full disappearance of *A. dasyanthus* can be expected as it was observed in reality. There are still some accessions of the research species close by surrounding villages according to the results of Moldova State University herbarium analysis; however, these have to be checked for authenticity in future projects.

The second protected area is the scientific reserve "Codru" (coordinates 49°28'00"N, 45°28'00" S, 26°30'00" W, 30°05'00" E) which lies close to Lozova village and covers 12300 ha. There is one mentionning of *A. dasyanthus* by Geideman T.S. (1986). The author indicates that the research species can be found at the edge of the forest and at clearings in the wood. After analysing the botanical notes taken during field visits by the reserve's botanists and reviewing species available in local herbarium, not a single accession of *A. dasyanthus* was found. Still it was advisable to sample the area of Codru forest edge close to the crossroads (47°5'19.90"N, 28°23'26.52"E). The area was divided into 73 transect lines and after sampling there was no representatives found. Hay cutting is allowed in this area, forest edge is the limit of distribution for *A. dasyanthus* from one side and the road or agricultural land limits its spreading from the other side.

Finally, a third area was sampled. A plain area with recent accessions of *A. dasyanthus* was selected (according to Moldova State University herbarium). That steppe slope next to Ghidighici village (central point 47°5'20.04"N, 28°44'35.20"E) was divided on 47 transect lines. There were 38 individuals detected, two groups of 24 and 5 individuals each and the rest was spread as standalone. A certain amount of human impact is present in this area. Mostly grazing and some hay cutting occur at random places where the access is easy.

Conclusions

Continuous monitoring and attempts to find the best way to preserve endangered species can solve many problems facing biodiversity conservation. This research shows that the current system of protected areas requires improvement.

Bugeac Natural reserve restricts any human activities and this helps to preserve many steppe species, however *A. dasyanthus* have disappeared from this site. Some of the possible reasons were mentioned before. One of the other reasons could be the complete absence of grazing, which would remove some part of the vegetation giving a chance for other species to grow. It is therefore important to have buffer zones around protected areas and let some amount of controlled human activities take place there. Furthermore there should be enough of extra buffer zone space for species shift, in case of environmental condition changes.

The scientific reserve "Codru" has a forest as the main object to be preserved. The area is not exactly suitable for A. dasyanthus, as it can only grow on the edge of forest or within forest clearings. In Codru the forest edge is the same as the boundary of the reserve's buffer zone, so there is no special management taking place.

The area next to Ghidighici village has naturally maintained human activities, which are limited only by landscape and possibility to access the area. The status of *A. dasyanthus* is showing aggravation of conditions because the numbers of individuals have reduced lately [20]. This could be caused by the open mine which is constantly enlarging and taking territory used by research species to grow. Besides that *A. dasyanthus* could have been experiencing global disadvantageous environmental conditions for some time.

Analyzing data obtained by this project, the following conclusion can be drawn: The best way to manage protected areas for *A. dasyanthus* conservation is to observe successful wild population's conditions of existence and use this as a model.

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