THE PRESENCE OF ASPLENIUM GENUS IN "ALEXANDRU BELDIE" HERBARIUM FROM "MARIN DRĂCEA" NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN FORESTRY

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Abstract. *Asplenium Genus is present inside Alexandru Beldie Herbarium from „Marin Drăcea" National Institute for Research and Development in Forestry. This fact is consolidated by the presence of 92 vouchers containing plants of this genus, as well as information about them. The data refers to their harvesting location which covers almost the entire country and important names of the specialists who contributed to the development of the collection by gathering or identifying Asplenium plants. The present paper organizes and presents the Asplenium species present in the herbarium, reaching a total number of 16 species and 88 samples based on the year and place of their harvest, as well as the specialist who collected the plant. Additional criteria are also followed, such as: drawer number, voucher number, botanical collection, species name, date of collection, place of collection, the specialist who collected and / or determined the species and the degree of conservation. This last criterion was placed on a scale from 1 to 4 with 1 meaning a very good state of preservation while 4 represents a very poor state of preservation. In addition, the most important Asplenium species from the herbarium are also described from the point of view of their abundance in the collection. The paper starts with a short description of the herbarium, followed by the presentation of the studied material (92 vouchers that contain 16 Asplenium species). This stage details also the materials and methods used for elaborating the paper, organizing the plants and describing the most important ones. The herbarium hosts a sample of a rare species mentioned in the Red Book of superior Romanian plants (Asplenium lepidum Presl.). Alternatively, the collection can take pride in old Asplenium plants with an historical value that were collected 180 years ago (Asplenium trichomanes L, 1842). In addition, the paper graphically represents the periods in which the plants were harvested, as well as a map with the harvesting places on the Romanian territory. The conclusions present important aspects regarding the species and samples of Asplenium present in this herbarium.*

Key words: *herbarium, plants, Asplenium, leaves, botanists.*

INTRODUCTION

„Marin Drăcea" National Institute for Research and Development in Forestry from Bucharest hosts in appropriate conditions the "Alexandru Beldie" Herbarium. Created in 1929, the herbarium is inscribed in Index Herbariorum, has the international BUCF code and contains approximately 40.000 vouchers (Vechiu et al., 2018; Dincă et al., 2018).

The significant contribution of important personalities from the systematic domain has led to the development of the herbarium, which was named after Alexandru Beldie, one of the most important Romanian botanists who has dedicated his work to the study of flora from Bucegi Mountains (Beldie 1967, Beldie 1972).

Besides Asplenium Genus, the herbarium also contains species such as: 21 *Agrostis* species (Cântar et al., 2019), 15 *Veronica* species (DINCĂ et al., 2017), 17 *Amaranthus* species (Dincă et al., 2018), 25 *Epilobium* species (Ciontu et al, 2018), 33 *Orobanche* species (Scărlătescu et al., 2017), 42 *Aconitum* species (Ciontu et al., 2019), 36 *Bronus* species (Tudor et al., 2019), 11 *Elymus* species (Pleșca et al., 2019), 42 *Alnus* species (Dincă et al., 2019), and 41 *Polygonum* species (Vechiu et al., 2018).

Besides the numerous species collected from mountain areas, the herbarium also contains species collected from different regions of the country such as plants collected from Bazoș Dendrology Park by Pașcovschi (Chisăliță *et al*., 2017), from Dolj County (Cântar et al., 2019), and even from abroad.

MATERIALS AND METHODS

The present paper organizes and presents the *Asplenium* species present in the herbarium, totalling a number of 16 species and 88 samples present in 92 vouchers.

The method used was systematization, each plant of this genus being organized on the basis of a number of criteria, such as: grass drawer number, drawer number, botanical collection to which it belongs, species name, date of harvest, place of harvest, the specialist who collected and / or determined it, as well as the degree of conservation of the plant. This last criterion was scored on a scale from 1 to 4, where 1 means a very good state of preservation and 4 a poor state of preservation.

Table 1

Asplenium Genus inventory from Al. Beldie Herbarium, INCDS Bucharest (excerpt)

Drawer number	Voucher number	Herbarium/ Botanic Collection/ Institution	Specie's name	Harvesting date	Harvesting place	Collected/ Determined by:	Conservation degree (1..4)
48	56	Flora Bavariae 1924-1925	Asplenium trichomanes L.	1924.05.29.	?	P. Cretzoiu	2
48	9	Flora Bulgarica Exsiccata	Asplenium fissum Kit.	1932.07.26.	Macedonia Orientalis	B. Stefanoff et T. Georgieff	1
48	4	Flora Norvegica	Asplenium adiantum nigrum L.	1897.01.01	?	Carl Stermer	2
48	43	Flora Olteniae exciccata	Asplenium septentrionale L. Hoffm	1968.04.16.	Oltenia, Distr. Gorj	I. Zaharia	1
48	58	Flora Olteniae exciccata	Asplenium trichomanes L.	1964.05.09.	Gorj, Oltenia	Al. Buia, Gh. Fulga	2
48	88	Flora Romaniae Exsiccata	Asplenium viride H	1936.07.15.	Crisana, Distr. Bihor	Vet. Borza	1
48	27	Botanic Laboratory Herbarium	Asplenium ruta-muraria l.	1931.08.13.	Domogled Mnt. Valea Cernei	C. C. Georgescu, P. Cretzoiu	1
48	57	Botanic Laboratory Herbarium	Asplenium trichomanes L.	1907.08.01	Slanic Bacau	N. Iacobescu	3
48	64	Botanic Laboratory Herbarium	Asplenium trichomanes L.	1931.07.08.	Hunedoara	C. C. Georgescu	1
48	65	Botanic Laboratory Herbarium	Asplenium trichomanes L.	1931.08.13.	Valea Cernei	P. Cretzoiu	1
48	19	Bucharest Polytechnic's Herbarium, Silviculture Faculty, Botanic Laboratory	Asplenium ruta-muraria	1941.07.01	Bucegi, Cheile ursilor	T. Bunea	1
48	41	Bucharest Polytechnic's Herbarium, Silviculture Faculty, Botanic Laboratory	Asplenium septentrionale L. Hoffm	1942.08.08.	Rodna	I. Morar	1
48	59	Bucharest Polytechnic's Herbarium, Silviculture Faculty, Botanic Laboratory	Asplenium trichomanes L.	1038.07.06.	Valea Barcanului	C. C. Georgescu	1
48	81	Bucharest Polytechnic's Herbarium, Silviculture Faculty, Botanic Laboratory	Asplenium viride H	1941.07.03.	Bucegi, Cheile ursilor	T. Bunea	1
48	2	ICEF, Institute of Forestry Research and Experimentation	Asplenium adiantum nigrum L.	1940.08.19.	Cibinului Mountains	I. Lupe	1
48	16	Museum Botanicum Universitatis, Cluj Flora Romaniae Exaiccata	Asplenium lepidum Presl.	1938.07.01.	Transilvania, Turda	C. Gurtler et. E. I. Nyarady	1

RESULTS AND DISSCUTION

Asplenium is a genus that contains approximately 700 species of ferns from the Aspleniaceae family.

The species present in the Herbarium were the following: *Asplenium fontanum B., Asplenium adiantum nigrum L., Asplenium angustatum B, Asplenium crenatum Fr., Asplenium cuneifolium Viv., Asplenium fissum Kit., Asplenium forisieuse, Asplenium lanceolatum H., Asplenium lepidum Presl., Asplenium maximum, Asplenium nidis L., Asplenium ruta-muraria, Asplenium septentrionale L. Hoffm, Asplenium serpentini Taush., Asplenium trichomanes L., and Asplenium viride H.*

The most numerous *Asplenium* species present in the Herbarium are: *A. adiantum nigrum L.* (7 plates), *A. fissum Kit.* (3 plates), *A. ruta-muraria* (12 plates), *A. septentrionale L. Hoffm* (4 plates), *A. serpentini Taush.* (4 plates), *A. trichomane L.* (24 plates), *and A. viride H.* (25 plates) (Fig. 1).

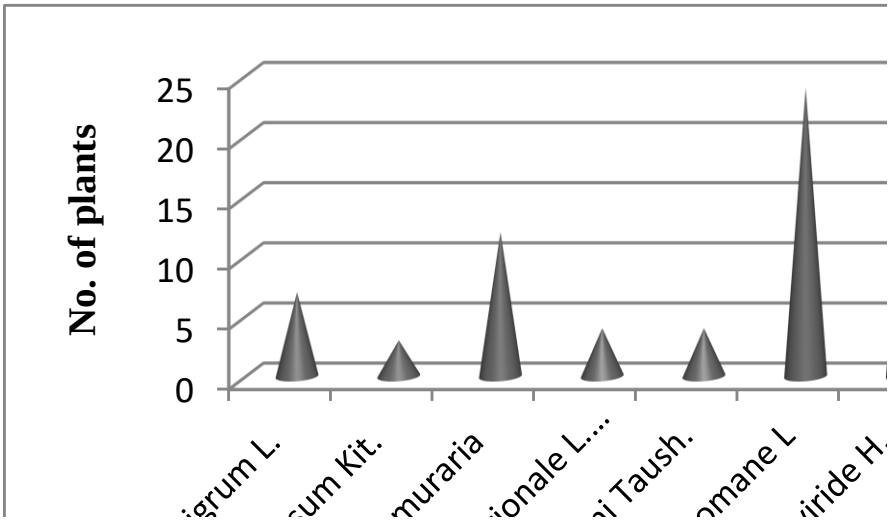

Fig. 1. *Asplenium* Genus species present in the herbarium

Asplenium adiantum-nigrum is an evergreen fern, producing a cluster of fronds that can reach up to 35cm in height from a short, creeping rootstock (fig. 2)

The plant is widespread in cold to warm temperate zones from Europe, northern and southern Africa, central Asia and the Caucasus and southwest N. America.

The plant is harvested for local usages as a medicine and hair treatment.

Many ferns also contain thiaminase, an enzyme that kills the body's vitamin B complex. In small amounts, this enzyme will not harm people on a proper diet, which is rich in vitamin B, although large amounts can cause problems. The enzyme is destroyed by heat or complete drying, so cooking the plant will remove thiaminase (temperate.theferns.info)

The most representative species from this Genus present in the Herbarium are: *Asplenium adiantum nigrum L., Asplenium crenatum L., Asplenium serpentini L., Asplenium viride L., Asplenium lepidum Presl. (this species appears in the Red Book of Higher Plants in Romania), and Asplenium trichomanes L.*

Fig. 2. *Asplenium adiantum nigrum*


Fig. 3. *Asplenium crenatum*


Fig. 4. *Asplenium serpentini*

(Photo:"Alexandru Beldie" Herbarium from INCDS „Marin Drăcea" Bucharest)

Asplenium viride (fig. 5) it is known as green spleen due to its green stems and spines.

A. viride is a native species of northern and western North America and northern Europe and Asia. It is a small rock fern, growing on calcareous rock (wikipedia.org). The species is the best represented from this genus in "Alexandru Beldie" herbarium with 25 samples.

Fig. 5. *Asplenium viride*

(Photo: "Alexandru Beldie" Herbarium from INCDS „Marin Drăcea" Bucharest)

Based on the systematization performed, the number of collected plants that enriched the herbarium in certain periods was represented graphically. Asplenium samples were collected over a period of almost 150 years, from the middle of the 19th century to the end of the 20th century.

As can be seen in fig. 6, the number of collected plants increased over time until 1920-1960, which became the peak for their harvest. The oldest plant belonging to this genus is represented by a sample Asplenium trichomanes L. collected in 1842 by the botanist Wolff. In addition, the herbarium hosts a sample of a species that belongs in the Red Book of superior

Romanian plants (*Asplenium lepidum* Presl.), collected in 1938 from Transylvania by C. Gurtler and E. I. Nyarady. Furthermore, fig. 6 also presents the distribution of *Asplenium* on Romania's territory and emphasizes its presence in all Romanian Carpathians.

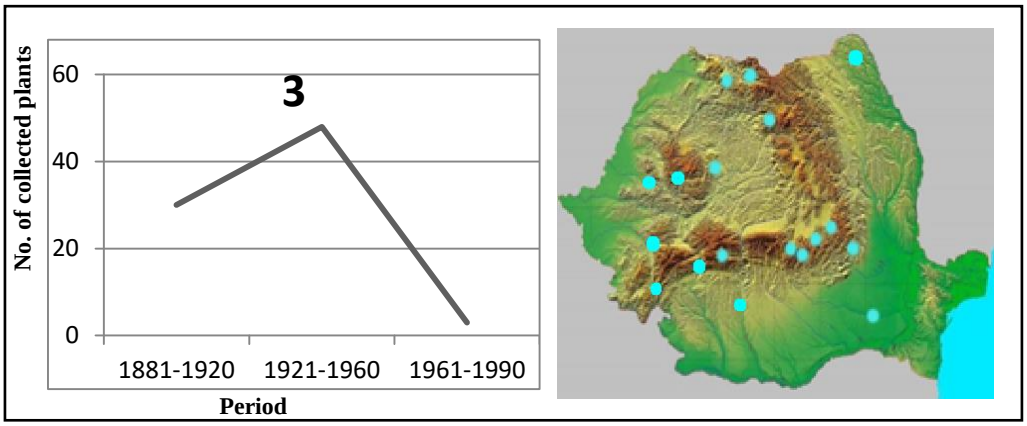

Fig. 6. Time (left) and place (right) of *Asplenium* collections

The Romanian specialists who enriched the "Alexandru Beldie" herbarium with species from the genus Asplenium are: Al. Beldie, C.C. Georgescu, G. P. Grintescu, M. Badea, S P. Cretzoiu, S. Pașcovschi, A.Coman, M. Naret, I. Lupe, I. Morar, I. Zaharia, N Iacobescu, etc.

Among the foreign botanists we mention: D. Wolff, C. Stermer, I. Kiss, R. Beyer, R. Masson, V. Grabmayr, H. Hofman, B. Stefanoff, T. Georgieff, C. Gurtler, E. I. Nyarady.

CONCLUSIONS

The genus Asplenium occupies an important place in Al. Beldie Herbarium from INCDS Bucharest through a total number of 16 species present in 92 vouchers. The best represented species of this genus present in the herbarium belong to A. viride H. and A. trichomane L. and can be found in 25 and 24 vouchers.

Within the herbarium, the genus is also represented by a rare species present in the Book of superior Romanian plants (rare, endangered or endemic species), namely Asplenium lepidum Presl. harvested in 1938 from Transylvania by botanists C. Gurtler and E. I. Nyarady.

The Asplenium species present in the herbarium also have an important historical value, the oldest specimen dating from 1842 (a sample of Asplenium trichomanes L. collected from the Bucegi Mountains).

The Asplenium species from the herbarium were collected from all Romanian regions, covering both the mountainous areas (Bucegi, Retezat) and the plains (Slobozia, Timiș). The samples were also collected from Europe, namely from Macedonia or Moldova.In regard with the plant's harvesting period, the Asplenium collection was created during a period of 150 years, starting with Asplenium trichomanes L. (harvested in 1842 in Bucegi) and ending with Asplenium ruta-muraria (gathered in 1983 in Maramureș). The collection's maximum development period was gathered between 1920 and 1960 when 52 samples were added. Even though the period coincides with the second world war, this fact did not stop our predecessors from their task of leaving us an exceptional heritage: Alexandru Beldie Herbarium.

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