PLANTS CONSERVED IN "ALEXANDRU BELDIE" HERBARIUM – EPILOBIUM GENUS

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Abstract: *Well represented within the Al. Beldie Herbarium from „Marin Drăcea" National Institute for Research and Development in Forestry, the Epilobium Genus stands out through its abundant number of plant vouchers, as well as through the information contained in them. As such, they relate to the harvesting places, covering our entire country, and renowned names of specialists who have contributed to the collection's development. The present article organizes and presents the Epilobium species present in the herbarium based on their harvesting place and location as well as the specialist who has harvested them. Furthermore, the most important Epilobium plants are described based on their abundance in the herbarium or their rarity and endangerment in the natural environment. The paper starts with a description of the herbarium, continuing with a presentation of the studied material (98 vouchers containing 25 Epilobium species). This part also describes the used materials and methods, the plant's systematization and the description of the most important ones. Within the Epilobium Genus, the herbarium hosts three samples of a species that appears in the Red Book of vascular plants from Romania (Epilobium alpestre jacq., Epilobium alsinifolium Vill. and Epilobium anagallidifolium Lmk.). At the same time, the Herbarium takes pride in its old plants that have an historical value and that were collected almost 180 years ago (Epilobium montanum L., 1842, Wolff). In addition, the paper graphically represents the plant's harvesting periods as well as a map of the harvesting locations from Romania. The material presented above was then organized with each plant systematized based on more criteria such as: drawer number, voucher number, botanic collection, species name, harvesting date, harvesting place, the specialist that has collected and/or determined the species as well as the conservation degree. This last criterion was graded on a scale from 1 to 4, where 1 means a very good conservation state, while 4 represents a very poor conservation state. The conclusions present some peculiar aspects regarding these Epilobium species and samples from the Herbarium.*

Key words: *Epilobium, herbarium, species, botanists.*

INTRODUCTION

"Alexandru Beldie" Herbarium from *Marin Drăcea* National Institute for Research-Development in Forestry (INCDS) from Bucharest hosts approximately 40.000 vouchers with plants conserved in their original maps. Their value is exceptional, both from a scientifical as well as historical point of view (CHISĂLIȚĂ et al., 2017; DINCĂ AND CÂNTAR, 2017).

„Alexandru Beldie" Herbarium is inscribed in INDEX HERBARIUM, being comprised of different private donated collections and samples from foreign collections obtained through exchanges.

The Herbarium was developed due to the work realized by important personalities interested in collecting and determining varied plants. In this regard, the Herbarium was named after Alexandru Beldie, one of the most important Romanian botanists who has dedicated his life to studying the flora from Bucegi Mountains (BELDIE, 1967; BELDIE, 1972).

Besides the *Epilobium* species described in this paper, the herbarium also contains numerous other species and genres such as: 69 *Potentilla* species (CRIȘAN et al., 2017), 19 *Androsace* species (DINCĂ M. et al., 2017), 15 *Ornitogalum* species (ENESCU et al., 2017), 15 *Veronica* species (DINCĂ et al., 2017), 29 *Allysum* species (CÂNTAR et al., 2018), 7 *Lycopodium* species (VECHIU et al., 2018), or the 16 *Abies* species (ENESCU et al., 2018).

MATERIAL AND METHOD

The study material for this paper was represented by the "Alexandru Beldie" Herbarium collections that contained vouchers with *Epilobium* species. As such, the Herbarium contains 98 such vouchers, amounting to 25 *Epilobium* species.

The material presented above was then organized with each plant systematized based on more criteria such as: drawer number, voucher number, botanic collection, species name, harvesting date, harvesting place, the specialist that has collected and/or determined the species as well as the conservation degree. This last criterion was graded on a scale from 1 to 4, where 1 means a very good conservation state, while 4 represents a very poor conservation state.

Furthermore, the paper includes a short description of the *Epilobium* Genus with a focus on its most important characteristics or curiosities.

Table 1

Epilobium Genus inventory from Al. Beldie Herbarium hosted at INCDS Bucharest (excerpt)

Drawer number	**Voucher number**	**Herbarium/ Botanic collection/ Institution**	**Species Name**	**Harvesting Date**	**Harvesting Place**	**Collected/ Determined by:**	**Conservation Degree (1..4)**
83	35	Museum Botanicum Universitatis, Cluj Flora Romaniae Exaiccata	Epilobium hirsutum L.	1933.08.14.	Hunedoara	Al. Borza et E. I. Nyarady	2
83	46	ICEF, The Institute for Forest Research and Experimentation	Epilobium lanceolatum	1944.08.21.	Muscel, Mihaesti	I. Morar, M. Cinca	3
83	55	ICEF, The Institute for Forest Research and Experimentation	Epilobium limosum	1944.07.31.	Muscel	I. Morar, M. Cinca	3
83	56	ICEF, The Institute for Forest Research and Experimentation	Epilobium montanum L.	1937.07.17.	Hunedoara	I. Iacob, S. Pascovschi	1
83	60	Bucharest's Polytechnic School Herbarium, Botanic Laboratory	Epilobium montanum L.	1939.08.01.	Brasov, Ciucas	P. Cretzoiu	2
83	62	Bucharest's Polytechnic School Herbarium, Botanic Laboratory	Epilobium montanum L.	1935.07.01	Calimani Mountains	C. C. Georgescu	3

83	64	Bucharest's Polytechnic School Herbarium, Botanic Laboratory	Epilobium montanum L.	1947.07.12.	Bucegi	Beldie Alexandru	1
83	46	ICEF, The Institute for Forest Research and Experimentation	Epilobium lanceolatum	1944.08.21.	Muscel, Mihaesti	I. Morar, M. Cinca	3
83	37	Al. Beldie Herbarium	Epilobium hirsutum L.	1947.08.02.	Bucegi, Poiana Tapului	Al. Beldie	1
83	33	Museum Botanicum Universitatis, Cluj Flora Romaniae Exaiccata	Epilobium adnatum Gris.	1923.07.09.	Valcea	G. P. Grintescu	3
83	29	Bucharest's Polytechnics Herbarium, Silviculture Faculty, Botanic Laboratory	Epilobium alpestre jacq.	1942.08.01	Bucegi	Al. Beldie	1
83	23	ICEF, The Institute for Forest Research and Experimentation	Epilobium alpinum L.	1933.01.01	Parang	At. Haralamb, J. Neuwirk	1

RESULTS AND DISCUSSIONS

Epilobium is a well-known genus, with over 97 species distributed worldwide, especially in regions with a subarctic, temperate or sub Antarctic climate. However, the genus can also be found in subtropical and tropical areas such as the New Guinea Highlands.

Belonging to the *Onagraceae* Family, the genus is renowned for its usage in medicinal purposes, namely for treating hormonal and bladder disorders or even prostate (BATTINELLI et al., 2001; KISS et al., 2004; SCHEPETKIN et al., 2009; REY et al., 2005; TITA et al., 2001). Its usage extends towards landscape and gardening, with numerous plants used in ornamental purposes even though small species are considered weeds.

Some of the *Epilobium* species present in Al. Beldie Herbarium are rendered in Figure number 1.

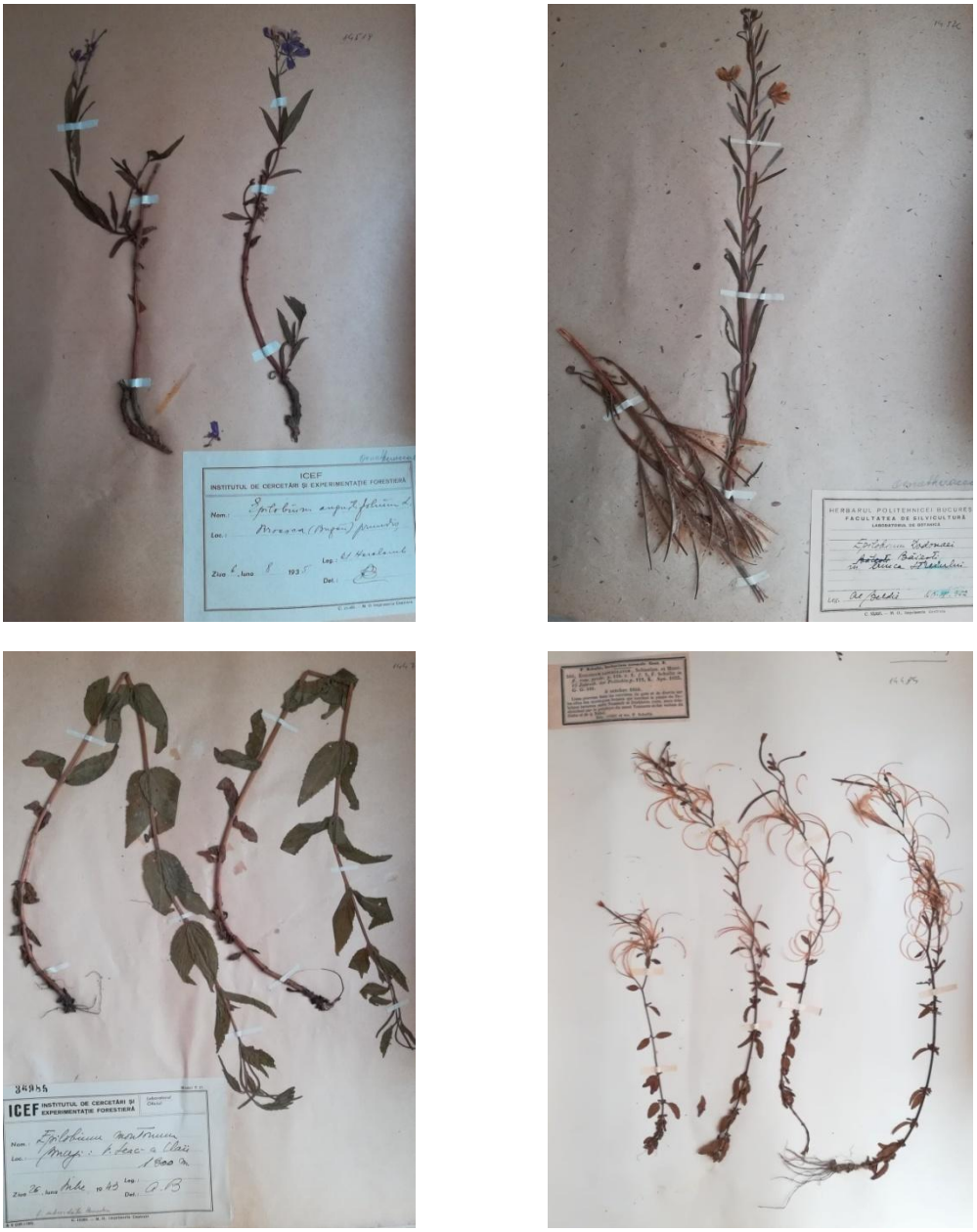

Fig. 1. *Epilobium* species (*E. angustifolium, E. dadonaei*, *E. montanum, E. lanceolatum*) from Al. Beldie Herbarium

Harvesting places of *Epilobium* species present in the Herbarium

Based on the obtained systematization, the number of collected plants that have enriched the herbarium over time was determined and represented in a graphic manner. As can be seen below, the *Epilobium* samples were collected on a period of approximately 120 years, starting with the middle of the XIX century up to the middle of the XX century. As it is rendered in Figure number 2, the number of collected plants has recorded a constant growth in time, with the most number of plants collected in the period 1940-1960.

From the *Epilobium* Genus, the Herbarium hosts three samples of some species that appear in the Red Book of vascular plants from Romania (*Epilobium alpestre jacq.*, *Epilobium alsinifolium Vill.*, and *Epilobium anagallidifolium Lmk.*). The oldest plant belonging to this genus is an *Epilobium montanum L.*, sample that was collected in 1842 by Wolff from an unknown location.

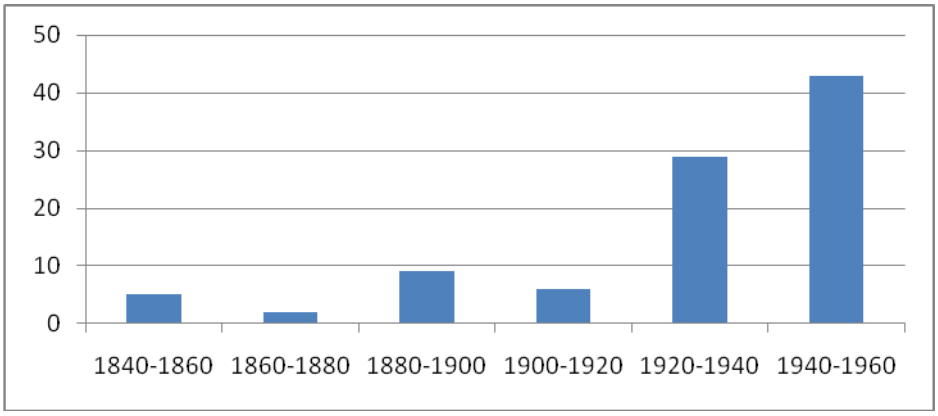

Fig. 2. Harvesting periods for *Epilobium* plants hosted in INCDS Herbarium

The harvesting location mentioned on each voucher that accompanies each plant from the herbarium has allowed the creation of maps rendering these places. As can be seen in Figure number 3, the majority of *Epilobium* plants were collected from mountain areas from Romania, namely from the Southern and Oriental Carpathians. Other plants were collected from other relief areas, such as hills (Getic and curvature Sub Carpathians) or plains (Romanian and West Plains). A special case is represented by *Epilobium angustifolium* who is present in Canadian forests with *Picea glauca* (LIEFFERS AND STADT, 1994), or in the USA (CARROLL et al., 2001; HUSBAND AND SCHEMSKE, 1998).

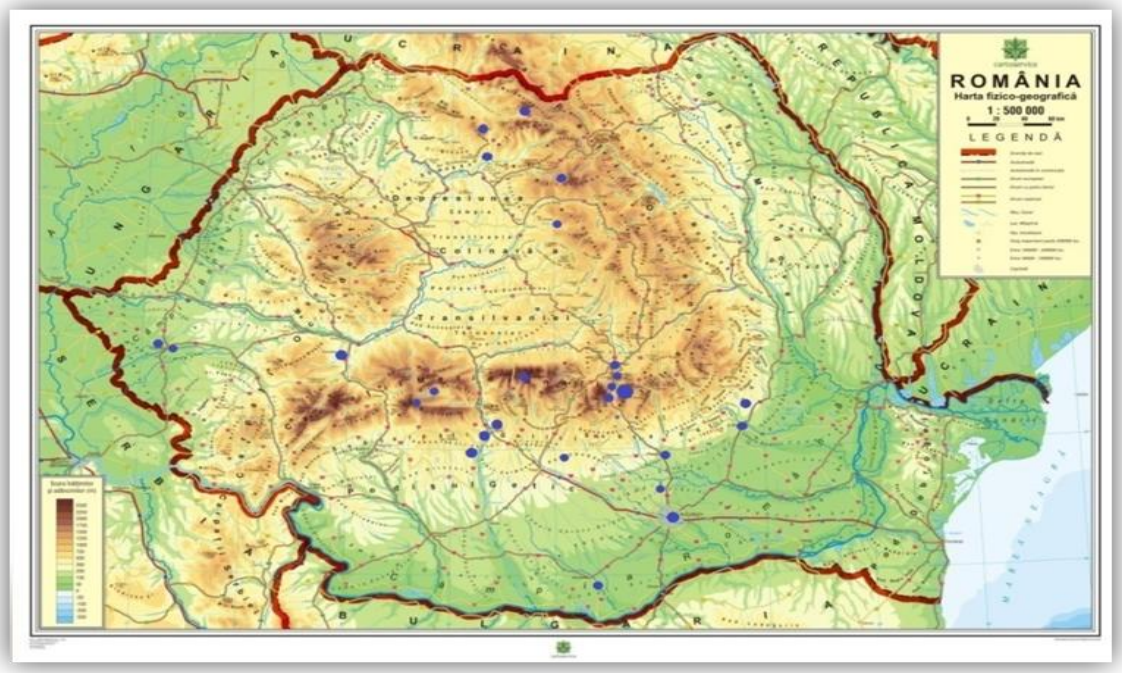

Fig. 3. Fig.3. The map of harvesting places for the *Epilobium* samples present in "Alexandru Beldie" Herbarium

The number of samples provided by the 25 *Epilobium* species from this Herbarium can be observed in Figure number 4. The majority of samples belong to *Epilobium montana* L., namely 23 samples. They are followed by *Epilobium paviflorum* Schreb., with 14 samples. The *Epilobium* species can be recognized by using the high-accuracy FT-IR method based on attenuated total reflection (ATR) (KRAJSEK et al., 2008).

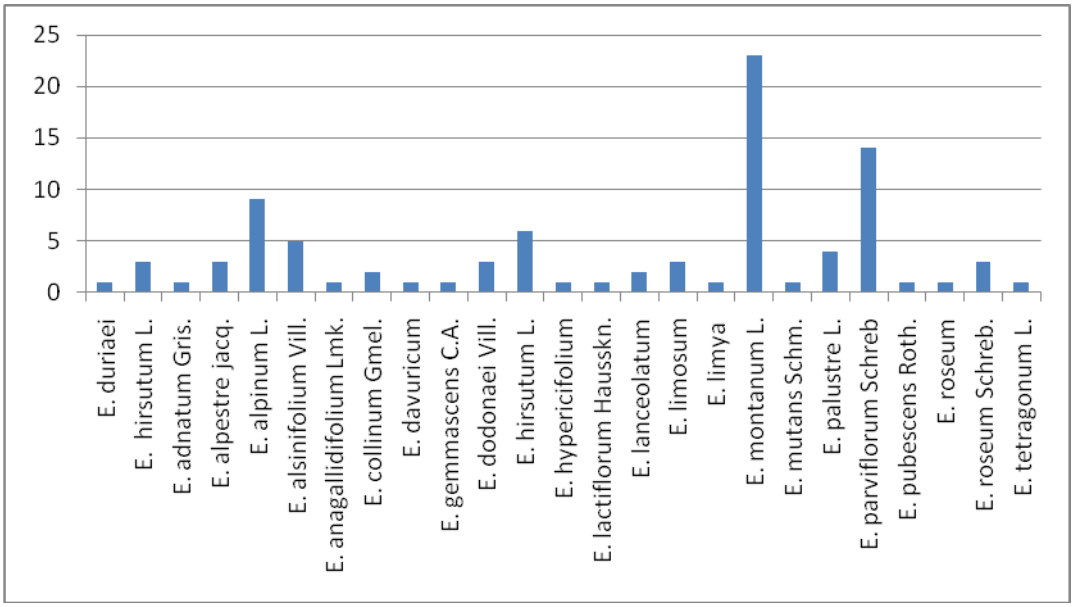

Fig. 4. Number of *Epilobium* species present in the herbarium

The specialists involved in the development of the *Epilobium* collections

Through their work, Romanian and foreign specialists have contributed to the improvement and development of the collections that contain *Epilobium* samples by harvesting or determining these species.

The Romanian specialists that have enriched "Alexandru Beldie" Herbarium with *Epilobium* species are: Al. Beldie, I. Morar, G. P. Grintescu, I. Iacob, S. Pascovschi, St. Purcelean, M. Iacobescu and P. Cretzoiu. Amongst the foreign ones we mention J. Neuwirk, D. Wolff, and N. Johansson.

CONCLUSIONS

„Marin Drăcea" National Institute for Research and Development in Forestry hosts a herbarium named after one of the most renowned Romanian botanists, "Alexandru Beldie". This Herbarium is inscribed in Index Herbariorum and contains approximately 40.000 vouchers that are organized in 600 drawers. For example, the herbarium contains numerous plant species from Romania or from other areas of the globe.

Together with the above-mentioned genres, *Epilobium* Genus is as well represented and important for the herbarium, containing 25 species and 92 samples.

The *Epilobium* species were collected over a long period of time, with the oldest sample dating back to 1842. The most abundant period for the number of collected *Epilobium* samples was during 1940-1960.

Furthermore, the *Epilobium* samples from the herbarium were collected from all the relief areas of Romania, as well as from the most important ones.

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