

COLLECTION SPECIES FROM *POTENTILLA* GENUS

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Abstract

The present paper reunites the morphological and ecological description of the main species belonging to *Potentilla* genus present in "Alexandru Beldie" Herbarium from Romanian National Institute for Research and Development in Forestry "*Marin Drăcea*" (INCDS), Bucharest. Furthermore, the paper systemize the herbarium specimens based on species, harvest year, the place from where they were harvested and the specialist that gathered them. The first part of the article shortly describes the herbarium and its specific, together with a presentation of the material and method used for elaborating this paper. As such, the material that was used is represented by the 276 plates that contain the specimens of 69 species belonging to the *Potentilla* genus. Besides the description of harvested *Potentilla* species, the article presents the European map of their harvesting locations, together with a synthetic analysis of their harvesting periods. The paper ends with a series of conclusions regarding the analysis of the *Potentilla* genus species and specimens present in the herbarium.

Key words: herbar, plante, flowers, frunze, *Potentilla*.

INTRODUCTION

Romanian National Institute for Research and Development in Forestry "*Marin Drăcea*" (INCDS) from Bucharest hosts an extremely valuable collection of herbaceous plants. This herbarium is registered in "INDEX HERBARIORUM" which is a guide to the world's herbaria and their staff established since 1935. The herbarium is named after Alexandru Beldie, a renowned Romanian botanist, which was very interested by the flora of Bucegi Mountains (Beldie 1967, Beldie 1972). This collection which contains more than 60.000 plates is a part of world's herbaria which, collectively, contain an estimated 387.007.790 specimens with information for the past 400 years of earth's vegetation. In this collection, it can be found very rare species, endemic species or endangered species which are in the red list.

"Alexandru Beldie" herbarium reunites numerous plants from the mountain area, such as the 9 species of *Melica* and 11 species of *Eragrostis* genus (Cântar C. *et al.*, 2017), 32 species of the *Arabis* genus (Dincă L. *et al.*, 2017a), 15 species of *Ornithogalum* genus (Enescu R. *et al.*, 2017), 33 species

of the *Orobanche* genus (Scărlătescu V. *et al.*, 2017), 19 species of *Androsace* genus (Dincă M. *et al.*, 2017), or the 112 species of the *Hieracium* genus (Dincă L. *et al.*, 2017b). Besides the numerous mountain species, the herbarium also contains species collected from different parts of the country, such as the ones gathered by S. Paşcovschi in Bazoş Dendrology Park, near Timişoara (Chisăliţă *et al.*, 2017) or from different countries.

MATERIALS AND METHODS

The study material was represented by the 272 plates present in the above mentioned herbarium and belonging to the *Potentilla* genus.

It was used research and bibliographic documentation methods in order to describe species morphology and ecology.

In order to elaborate this study, all 69 species of *Potentilla* genus were systemized based on the species, harvest date, the place where they were gathered and the specialists that has gathered them. An excerpt of the *Potentilla* genus inventory is rendered in Table number 1.

Table 1

The inventory of *Potentilla* genus from INCDS Bucharest Al. Beldie Herbarium (excerpt)

Drawer no	Plate no	Herbarium/ Botanic collection/ Institution	Species	Harvest date	Harvest place	Collected/ Determined by:	Conservation degree (1..4)
21	83	Herb. Siegfriedii	<i>Potentilla agrivaga</i>	1893.03.27	Genova	G. Bastreri	1
60	24	Herbarium H. Hofmann. Doebeln, S.	<i>Potentilla cinerea</i> <i>Chaix</i>	1892.05.01	Piskovitz, Germania	Herm. Hoffmann	1
60	53	Herbarul Politehnicei Bucuresti, Fac. de Silvicultura	<i>Potentilla crantzii</i> <i>Beck. var. Typica f.</i> <i>Pigmaea</i>	1943.08.01	Bucegi, Romania	Th. Wolff	1
60	67	Flora Helvetica	<i>Potentilla frigida</i> <i>Vill.</i>	1890.07.20	Tirol, Austria	R. Huter	1
21	28	Herb Politeh. Bucuresti Fac.de Silvicultura	<i>Potentilla mixta</i> <i>Nolte</i>	1894.06.15	Korsenz Silezia	H. Siegfried	1
21	16	ICEF	<i>Potentilla recta</i> L.	1939.07.23	Păd.Bozed Mureş	S. Pascovschi	1
21	149	Herbarium Al.Beldie	<i>Potentilla reptans</i> L.	1941.07.04	Cheile Urşilor Bucegi	M. Ciucă	1
21	47	ICEF	<i>Potentilla rupestris</i> L.	1858.01.01	Turda	Wolff	1
21	57	Herb. Siegfriedii	<i>Potentilla spuria</i> <i>Kerner</i>	1887.01.01	Lossanum Elvetia	H. Siegfried	1
21	64	Dr.C.Baenitz Herb Europaeum	<i>Potentilla sterilis</i> L.	1887.05.01	Barr	Emil Hausser	1
21	74	Herb Politeh. Bucuresti Fac.de Silvicultura	<i>Potentilla supina</i> L.	1942.09.01	Bucureşti	I. Morariu	1
21	70	Flora Romaniae Exisccata	<i>Potentilla taurica</i> <i>Wild</i>	1929.07.18	Stâna Oanciu Tulcea	E.I. Nyarady	1

21	122	Herbarul Scoalei Politehnicei Bucuresti	<i>Potentilla ternata C.</i>	1919.08.22	Vf.Omu Bucegi	M. Haret	1
21	141	Herb Politeh. Bucuresti Fac.de Silvicultura	<i>Potentilla Thuringica Bernh</i>	1946.07.01	Zănoaga Bucegi	Al. Beldie	1
21	79	ICEF	<i>Potentilla verna L.</i>	1858.06.01	Gobre Pirinei	Rusaneanu	1
21	99	ICEF	<i>Potentilla villosa</i>	1934.05.15	Rezerv. Bratocea	J. Nemoritz	1

RESULTS AND DISCUSSION

Potentilla, is a genus containing over 400 species of annual, biennial and perennial herbaceous flowering plants in the rose family, *Rosaceae*. That family belongs to *Rosales* order, *Magnoliopsida* class. *Potentilla* are generally spread in the temperate zone of the northern continents of the world. This plants have leaves trifoliate or digitate, many species having palmate leaves. The flowers are usually yellow, but may be white, pinkish or red. The accessory fruits are usually dry but may be fleshy and strawberry-like (hence the name "barren strawberry" for some species), while the seeds are tiny nuts (<https://en.wikipedia.org/wiki/Potentilla>).

The species of this genus present in the above mentioned collection are the following: *P. acaulis*, *P. adscendens* Waldst.& Kit., *P. agrivaga* Jeanb.&Timb.-Lagr., *P. alpestris* Hall., *P. aurea* santa Gremlin, *P. australis*, *P. bolzanensisiformis* Sauter., *P. canescens* Bess., *P. chrysantha* Trev., *P. chrysocraspeda* Leh., *P. cinerea* Chaix, *P. clauscens* L., *P. clementi* Jord., *P. clusiana* Jacquin., *P. coronensis* Schur., *P. crantzii* Beck., *P. crassinervia* Viv., *P. delphinensis* Gr. et Godr., *P. detomasii* Tenore, *P. elatior* Wild., *P. emilii* Popi Nyar, *P. erecta* L., *P. falax* Marss, *P. favrati* Greml, *P. fenzlii* Lehm., *P. fragiformis* Willd., *P. frigida* Vill., *P. fruticosa* L., *P. gaudini* Greml., *P. gramopetala* Moretti, *P. grandiflora* L., *P. gremlii* Zimm., *P. güntheri* Pohl., *P. guyotana* Nyar, *P. leiocarpa* Vis, *P. lindackeri* Tausch, *P. mathoneti* Jord., *P. mixta* Nolte, *P. montivaga* Jeanb., *P. petiolulata* Gaudin., *P. pseudo-chrysantha* Borbas, *P. recta* L., *P. reptans* L., *P. rupestris* L., *P. sadlerii* Reichb., *P. saxifraga* Ardoino, *P. schurii* Fuss, *P. sciaphila* Zimm., *P. siegfried* Zimmer, *P. silvestris* Neck., *P. spuria* Kerner, *P. sterilis* L., *P. suberecta* Zimmeter, *P. subnivalis* Brugger, *P. supina* L., *P. tabernaemontani* Asch., *P. taurica* Wild, *P. ternata* C., *P. thuringiaca* Bernh, *P. thyrsiflora* Hulsen, *P. tirolensis* Zimmeter, *P. tommasiniana* F. Schultz, *P. tormentilla* Sibth., *P. turicensis* Sieg., *P. verna* L., *P. vindobonensis* Zimmeter, *P. wimanniana* Gunther, *P. wolffiana* Siegr.

The most widespread *Potentilla* species present in this herbarium are: *P. recta* (22 plates), *P. reptans* (16 plates), *P. ternata* (16 plates), *P. crantzii* (12 plates) and *P. silvestris* (11 plates).

***Potentilla recta* L.** is a perennial herb and is a tufted plant growing from a woody taproot (figure 1). The upper part of the stem is branched and densely hairy, and it also bears some glandular hairs. The lower leaves have long stalks and the stem leaves are arranged alternately and have short stalks. All the leaves are palmate, divided into usually six or seven leaflets, sometimes up to nine, with the uppermost ones just having three leaflets. The leaflets are linear-lanceolate, hairy in texture and toothed along the edges. The inflorescence is a cyme of several flowers which are generally light to pale yellow in color, with white to gold-flowered individuals occurring at times. The fruit is a receptacle containing several glossy, pale brown achenes. The plant may reproduce by seed or vegetatively and flowers from June to August. *Potentilla recta* is native to much of Europe, Asia, and parts of North America, and it can be found in other parts of the world as an introduced species. Its natural habitat is arable fields, gardens, banks, hedgerows, wasteland, logging clearings, loading areas and occasionally shores (https://en.wikipedia.org/wiki/Potentilla_recta).

***Potentilla reptans* L.**, is a creeping perennial plant native to Europe, Asia and Northern Africa. Leaves are borne on long stalks as it can be seen in figure 2. It blooms in June - August with yellow flowers (about 2 cm in diameter) that have five heart-shaped petals. Alcoholic extracts from roots of *Potentilla reptans* showed a moderate antimicrobial activity against common wound pathogens. *Potentilla reptans* can be difficult to eradicate because is an invasive weed in lawns and flowerbeds. This species grows in wet meadows, in river valleys, in glades and thickets, along roadsides. It is a pioneer species (https://en.wikipedia.org/wiki/Potentilla_reptans).

***Potentilla supina* L.**, is included in the red list of threatened species. Plants are herbs annual or biennial and roots are slender, with sparse lateral rootlets (figure 4). Flowering stems are spreading, ascending, or erect, dichotomously branched, with petioles pilose or glabrescent. Leaves are radical with stipules brown, membranous, abaxially pilose or glabrescent. Inflorescence is terminal, with axillary flowers on lower part of flowering stem. Flowers have between 6 and 8 mm in diameter, pedicel have between 0.8 and 1.5 cm and is densely pubescent. Sepals are triangular-ovate and petals are yellow, obovate, slightly shorter than sepals. This species is widespread both in temperate and tropical regions; it is found from Africa and temperate Asia to

China, Japan, tropical Asia, the Indian subcontinent and throughout much of Europe and North America (<http://www.iucnredlist.org/details/164521/0>).

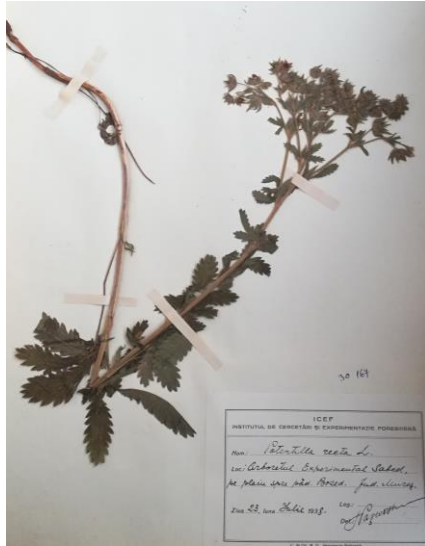


Fig. 1. *Potentilla recta*



Fig. 2. *Potentilla reptans*

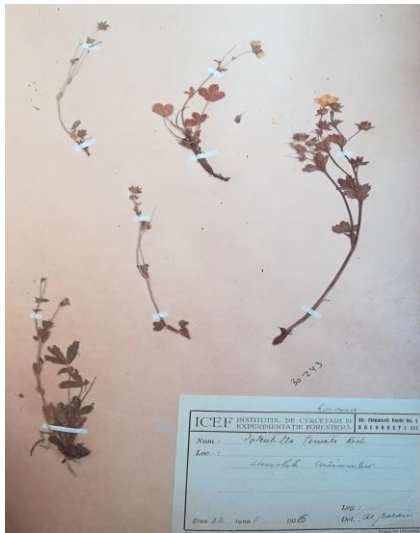


Fig. 3. *Potentilla ternata*



Fig. 4. *Potentilla supina*

Potentilla sterilis L., are 5-15 cm in inaltime, tulpina stolonifera acoperita cu perisori moi, frunze cu trei foliole de forma ovala infloreste in mai, flori mici albegrupate cate 1-3 pe un pedicel subtire; calicul mai scurt decat

caliciul; specie de smi-umbra, raspandita pe soluri bazice pana la slab acide, in paduri, pasuni, margini de drumuri (Rameau *et al.*, 1989).

Potentilla tabernaemontani Asch, named by P.F.A. Ascherson in 1832 is nowadays known as *P. neumanniana*. The plant is a cinquefoil species, characterized by its star shaped leaves and yellow flowers that bloom on a single stem. It can be usually found growing on periphery areas, namely on meadows, roadsides or embankments. As such, the plant is recommended for planting in rocky gardens as it blooms early and offer a beautiful yellow coverage (https://en.wikipedia.org/wiki/Potentilla_neumanniana).

Potentilla delphinensis Gr. et Godr., a plant that can be found at altitudes ranging between 1500 and 2800 meters, namely on mountain pastures and rocky areals. The species can be recognized through its height (30-50 cm), hairy leaves that are grouped in rosettes and large yellow flowers (reaching approximately 2.5 centimeters in diameter). The flowers bloom between July and August and are pollinated by insects (https://en.wikipedia.org/wiki/Potentilla_delphinensis).

Potentilla erecta L., a plant usually found in Europe, Scandinavia and Asia, in a large range of habitats, from mountains to dunes, moors, grasslands and meadows (Stace, 2012). It prefers acid soils or sandy soils. The plant can be recognized through its upright stalk (that can reach 10-30 centimeters in height) and yellow flowers that bloom between May and September. Due to its content of tannin, the plant is predominantly used in herbal medicine (https://en.wikipedia.org/wiki/Potentilla_erecta).

The plant's harvest year. The plants were gathered in a time period ranging between 1847 and 1964. The oldest plants of this genre are *Potentilla supina*, gathered in 1847 and *Potentilla reptans*, gathered in 1850. The periods in which most plants were gathered were 1890-1899 (Figure 5).

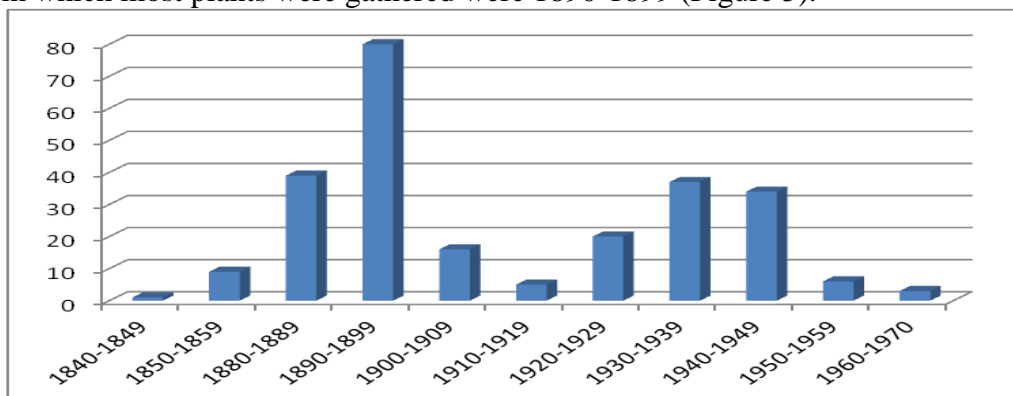


Fig. 5. Harvesting periods of *Potentilla* plants from INCDs Herbarium

The persons that have gathered the plants are renowned Romanian specialists (Al. Beldie, G. Bujorean, M. Ciucă, P. Cretzoiu, C.C. Georgescu, Al. Iacobescu, At. Haralamb, M. Haret, I. Morariu, E. I. Nyarady, V. Pașcovschi, Șt. Purcelean) or foreign ones (A. Biancheri, A. Callier, C. Scholz, Emil Hausser, H. Siegfried, A. Huguenin, A. Waisbecker, A. Zimmerer, E. Chiovenda, H. Guyot, M. Besse, M. Tommasini, P. Schweizer, R. Huter).

The harvesting place of species from the herbarium are represented by alpine areas from Romania (Bucegi, Retezat, Domogled, Muntele Mic, Parâng) or Europe (Pyrin Mountains, Pyrenees Mountains, Tirol, Alps), as well as hill ones (Cluj, Fieni, Muscel, Râmnicu Vâlcea, Tulcea, Turda, Carlowitz-Silezia, Praga, Triest) or field ones (Brănești, Ciolpani, Torontal) (Figure 6).

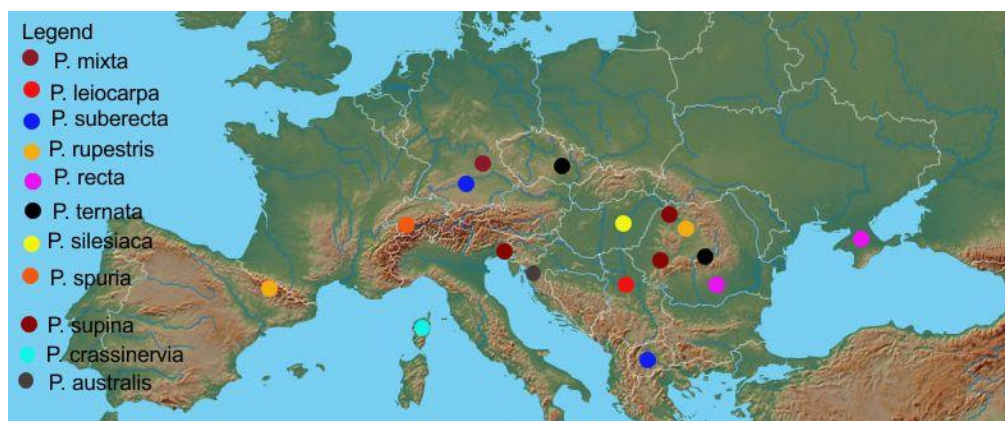


Fig. 6. *Potentilla* plants place of harvest

CONCLUSIONS

In the "Alexandru Beldie" Herbarium from INCDS Bucharest, the *Potentilla* genus is represented by a number of 69 species presented in 276 plates.

As it can be seen in Figure 6, the gathering place of these samples is represented by areas from Romania, Ukraine, Alps, Pyrenees or Pyrin Mountains, as well as hill or field areas from Romania, Ukraine, Macedonia, Germany, France, Spain or Czech Republic.

In regard with the harvesting period, by analyzing Figure 5, it can be observed that they were gathered in a long period of time, almost 120 years, gathered between 1847 and 1964. The maximum number of gathered plants from this long period of time is recorded in the period 1890-1899. However, a significant number of plants was also gathered in the periods 1930-1949 and 1880-1889.

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