THE CHARACTERISTICS OF PLANTS FROM *HIERACIUM* GENRE PRESENT IN ALEXANDRU BELDIE HIERBARIUM FROM I.N.C.D.S. BUCHAREST

CARACTERISTICI ALE SPECIILOR DE PLANTE DIN GENUL *HIERACIUM* EXISTENTE ÎN HERBARUL ALEXANDRU BELDIE AL I.N.C.D.S. BUCUREŞTI

***DINCĂ L.*[1]*, VASILE Diana*[1]*, VOICULESCU I.*[1]
e-mail: dinka.lucian@gmail.com

Abstract. *The Alexandru Beldie Herbarium from I.N.C.D.S. Bucharest comprises approximately 60.000 plates of some herbaceous plants, trees and shrubs. Amongst them, the present article analyses the 273 plates dedicated to the plants from the Hieracium genre. After a short description of the genre, some of the 112 species present in this herbarium are described. The plants were gathered between 1858 and 1954, with a larger incidence in the periods 1890-1899 and 1940-1949. Their origin ranges from different areas of our country (Bucegi, Ciucas, Retezat, Turda, Buftea, Pojorata) as well as from abroad (Pyrenees, Tirol, Silesia) and were gathered by Romanian specialists (Beldie, Morariu, Georgescu, Cretzoiu) and foreign ones (Stefanoff, Baenitz, Richter, Weisenbeck, Sagorski, Weisenbach, Wolff).*
Key words: *Hieracium*, herbarium, inventory, botany specialists

Rezumat. *Herbarul Alexandru Beldie al I.N.C.D.S. Bucureşti este alcătuit din aproximativ 60.000 de planşe ale unor plante, arbori şi arbuşti. Articolul de faţă analizează 273 de astfel de planşe aparţinând genului Hieracium. După o scurtă descriere a genului, câteva dintre cele 112 specii prezente în herbar sunt descrise. Plantele au fost recoltate între anii 1854-1954, majoritatea datând din perioada 1890-1899 şi 1940-1949. Originea lor aparţine diferitelor regiuni din ţara noastră (Bucegi, Ciucaş, Retezat, Turda, Buftea, Pojorâta) precum şi din străinătate (Munţii Pirinei, Tirol, Silesia), fiind recoltate de specialişti români (Beldie, Morariu, Georgescu, Cretzoiu) şi străini (Stefanoff, Baenitz, Richter, Weisenbeck, Sagorski, Weisenbach, Wolff).*
Cuvinte cheie: *Hieracium*, ierbar, inventar, botanişti

INTRODUCTION

After H. Zahn's monographic studies (Zahn, 1922–1938), the *Hieracium* genre has been investigated by E. I. Nyárády who also presented a detailed account of this genus in the"Flora R. P. Romîne" (Nyárády, 1965). In recent times, the genre was revised by other authors for various identification books (Beldie, 1979; Ciocîrlan, 1990, 2000).

[1]National Institute for Research and Development in Forestry "Marin Drăcea", Romania

”Flora Europaea” (Sell and West, 1976) mentioned 134 *Hieracium* species for Romania (and additionally 72 hybrid species). However, the most recent checklist for the Romanian flora (Popescu and Sanda, 1998, accepted as ”Standard flora” by the Euro+Med Plant Base Editorial Committee 2001) mentions *Hieracium* with 139 species and 60 hybrids.

Numerous *Hieracium* species are collected in the Herbarium Al. Beldie from ”Marin Drăcea” National Institute of Research and Development in Forestry Bucharest. They are kept in their original portfolio in the drawers of 30 modules (Vasile *et al.,* 2017).

This collection is enrolled INDEX HERBARIUM and all the species are gathered by known personalities in the field of systematic botany, one of the Romanian botanists, being Al. Beldie himself who dealt especially with this herbarium.

The aim of this article is to present the state of this collection, describe the species, the total number of *Hieracium* specimens (112 species), the date when they were collected, and their location together with the botanist who collected each exemplary and their conservation degree.

MATERIAL AND METHOD

The study material was composed of the 273 plates present in the above mentioned herbarium that belong to the *Hieracium* genre. They were further organized based on species, year of harvest, origin place and the specialists who has gathered them. An excerpt of the *Hieracium* genre inventory is rendered in Table number 1.

RESULTS AND DISCUSSIONS

Hieracium* or *hawkweeds is a plant from *Asterales* Order, *Asteraceae* family (tab. 1) (considered one of the largest flower family, even the second according to Niehaus, 1976). As a total, *Hieracium* has recorded until now over 10.000 species and subspecies (IOPI, 2007). The majority of specialists and botanists agree that there are two subgenres: *Hieracium* and *Pilosella* although there are many controversies with regard to the accepted number of species (ranging between 800 and thousands of species).

The controversies arise from the reproduction of this plant. The asexual reproduction (through seeds that are identical to the mother plant) generates populations or clones that are formed of genetically identical plants. As such, some botanists decide to accept these clones as a species (in Russia, UK or Scandinavia), while others decide to be more selective and not include the clones (this is the case for USA and Central Europe).

Regardless of their number and categorization, the plant is recognizable through some characteristic features: *Hieracium* has a straight, single stem, that can be sometimes hairy or even branched. This characteristic varies a lot and can range from straight or curly surfaces to “stellar-pubescent” (surfaces that have scattered branched hairs) and “stipitate-glandular” (surfaces that have gland-tippled hairs). The flowers are usually yellow and packed around a single floret. Furthermore, the plant contains milky latex. The flowering period ranges from May to June, although it can also continue during late summer and up to September.

Table 1

The inventory of *Hieracium* genre from Al. Beldie INCDS Bucharest Herbarium (excerpt)

The drawer	The sheet nr.	Herbarium/ Botanical collection/ Institution	The name of the species	Date of collection	Place of collection	Collected/ Determined by:	Degree of conservation (1..4)
34	1	Museum Botanicum Universitatis Cluj	*Hieracium pocuticum* Wot.ssp.pocuticum	1928.08.09	Distr.Hunedoara Muntii Retezat	E.I. Nyarady	2
34	5	Dr.C.Baenitz Herbarium Europaeum	*Hieracium hostianum* Wiesb.f. stenophyllum	1883.08.25	Breiten Furt	J. Wiesbaur S.J.	1
34	8	Joseph Hervier,Saint-Etienne (Loire)	*Hieracium pseudo-hybridum* Arv.Touv.	1894.07	Spania Sierra del Pinar d'Albarracin	E. Reverchon	2
34	18	Herbarul Politehnicei Bucuresti Facultatea de Silvicultura	*Hieracium piloselloides*	1947.06.09	Ilfov Buftea	I. Morariu	1
34	35	Herbarium Al.Beldie	*Hieracium pilosella* L.	1948.05.21	Distr.Muscel Radesti	I. Morariu / M. Ciuca	1
34	50	Herbariul N.Al.Iacobescu	*Hieracium pavichii*	1903.08.08	Calimanesti	N.Al. Iacobescu	1
34	67	Societe Helvetique	*Hieracium piliferum*	1888.07.27	St. Bernard	F.Tripet	1
34	72	Horto Botanico Universitatis Iassiensis	*Hieracium pojoritense*	1964.08.08	Distr.Suceava Pojorata	E.Topa	1
34	126	Museum Botanicum Universitatis Cluj	*Hieracium pseudocaesium*	1927.07.20	Muntii Retezat	E.I. Nyarady / K.H.Zahn	1
37	1	Herbarul Institutului de Cercatari Silvice	*Hieracium nigrescens*	1905.03.09	Bucegi: Jepii Mici	Al. Beldie	1
37	18	Labor.Botanic Scoala Politehnica "Regele Carol"	*Hieracium nipholasium*	1891.08.18	Silezia	Callier	1
37	23	Herbarul Politehnicei Bucuresti Facultatea de Silvicultura	*Hieracium murorum*	1946.08.17	Dej (Somes)	I. Morar	1
37	35	Fl.Raverica	*Hieracium monanthum*	1904.12.27	Frölengell	Weisenbach	1
37	84	Flora Austriœ inferioris	*Hieracium humile*	1888.07	in valle Atlitzgraben	Dr. Karl Richter	1
37	145	Societe Helvetica	*Hieracium glaciale*	1888.08.01	Grana Saint-Bernan	F. Tripet	1
37	147	Museum Botanicus Universitatis Cluj, Flora Romanae Exxicata	*Hieracium fritzeiforme* Zahn	1928.08.10	Muntii Retezat distr.Hunedoara	E.I. Nyarardy	1

The plant prefers the mountain areas and usually grows near roadsides, meadows and pastures. It can also grow in forest openings as it is resistant to shade. The plant usually grows in well-drained soils that are low in organic matter and coarse.

Specialists differentiate two genres of *Hieracium*: *Hieracium* and *Pilosella*, differentiated by specific features. As such, the *Hieracium* plant produces only one kind of seed and reproduces through them, while *Pilosella* is renowned for producing both sexual and asexual seeds and can reproduce by seeds as well as by stolons. The plants can also be differentiated visually: *Hieracium* has a dentate and divided type of leaves, while the *Pilosella* leaves are smooth and full.

Regarding their role, the *Hieracium* genre is classified as an invasive species that poses an important threat in alpine ecosystems. In New Zealand the plant is prohibited from distribution or propagation (www.weedbusters.co.nz). This is caused by the fact that the plant reproduces massively and as such crowds native species, lowering the biodiversity.

The collection gathers **112 species** of this genre:

Hieracium bifidum Kitaibel: the stem is almost always divided in two parts from the basis, while the bracts are green, the leaves are oval-elongated and the fruits brown-reddish (http://christian000.free.fr/pages/191-hieracium.htm).

Hieracium carneum Greene (Figure 1): can be found on rocky areas from North America, especially at altitudes of 2000-3000m from Arizona, Texas or New Mexico. The plant can be recognized by its white-pink flowers and long, linear or lanceolate leaves that can reach 12 cm. The plant can grow up to 60cm. (https://en.wikipedia.org/wiki/Hieracium_carneum).

Fig. 1 *Hieracium carneum*

Hieracium floribundum Nägeli & Peter, considered for a long time a mixture of *Hieracium cespitosum* and *Hieracium latucella*, the plant is native of Europe (France),

Canada and the US. With a shaped spatula, hairy leaves and clustered flowers, the plant can grow up to 25-91 cm (https://en.wikipedia.org/wiki/Hieracium_floribundum).

Hieracium glaciale Lachenal: has involucres of 8-10 mm length, sharp bracts, yellow-gold flowers, 1-7 flower-heads, and a stem with stellar shinleaf. It prefers granite or schist fields.(http://christian000.free.fr/pages/191-hieracium.htm).

Hieracium glaucum All.: has a heigth of 10-50 cm, unhairy stem, glaucous elongated leaves, whole or slightly dented. The pale yellow flowers appear in July-August, the involucre is of 9-13mm, with unequal bracts, which cover one another, red-brownish fruits of 4 mm length. It generally prefers siliceous fields, but is also spread on limestone fields. It can reach up to 2500 m, but it rarely lowers to altitudes of 400 m altitude. It is spread out in France, Switzerland, Italy and the South part of Central Europe. (http://christian000.free.fr/pages/191-hieracium.htm).

Hieracium hoppeanum Schultes: has involucre with obtuse bracts at the top, of oval or elyptical shape, membranous on the sides, more or less provided with shin leaves on their external side. It is usually found at altitudes between 1200 and 2600 m (http://christian000.free.fr/pages/191-hieracium.htm).

Hieracium humile Vill.: grows on rocks from the mountain area and prefers limestone areas that do not reach a higher altitude of 2000 m. It can reach a height of 6-30 cm, with glandular stem and leaves. The inferior leaves have petiole, while the superior ones lack it. The yellow flowers bloom between June and August. 1-4 flower-heads with grey involucres of 12-17 mm, red fruits of 3-4 mm (http://christian000.free.fr/pages/191-hieracium.htm).

Hieracium lanceolatum Vill.: firm leaves (robust and solid), almost glaucous, with connected veins slightly prominent on the inferior side, ovoid or semi-sferic involucres that is larger than 10 mm with red or brown fruits (http://christian000. free.fr/pages/191-hieracium.htm).

Hieracium laevigatum Willd.: 30-120 cm height, springs in autumn and is pollinated by insects. It has a ramified steam and generally lacks basal leaves. It is a species of semi-shade or light spread on poor, acid soils that have a moderate type of humus, under quercus stands, peat bogs and outskirts (Rameau *et al.,* 1989).

Hieracium murorum L.: is a plant with a height that varies between 6 cm and up to 1 m, whose yellow flowers appear from May until September. The involucre has irregular bracts, the exterior ones being shorter and unequal. The inferior leaves are without shin leaves. The shin leaves of the superior leaves are simple and denticulate. The black fruits have a length of 2-4 mm. Variations of the species (especially the ones with speckled leaves) are cultivated for decorating old walls, ruins or rocks. The flowers are producing a nectar highly appreciated by bees. The entire plant was used against lung diseases, while its subterranean parts contain a significant quantity of inulin. The plant is spread through the entire Europe, Asia, Arctic America and Labrador (http://christian000.free.fr/pages/191-hieracium.htm).

H. paniculatum L.: is recognizable through its yellow flowers grouped on stalks, long jagged leaves that are mostly grouped on the stem. The plant can grow up to 90 cm (https://en.wikipedia.org/wiki/Hieracium_paniculatum).

Hieracium pilosella L. (fig. 2): spread out on sandy, arid areas, on meadows and pastures, the plant has 7-30 cm and yellow flowers from May up to September. The flower stem that rises above the basal leaves rosette does not have leaves and is almost always ending with a single capitol. The leaves, grouped in a rosette are oval elongated and obtuse. The involucre, more or less cylindrical, has unequal bracts, with the exterior ones obtuse at the top. The fruits can reach 1-2 mm. The plant can produce a type of natural lawn that covers a large area and which can derive from a single initial germination. During droughts, the leaves are re-bending downside towards the lateral margins in order to diminish the perspiration. As such, the plants has a whitish aspect. The plant is rarely cultivated as ornamental plant, but it was used against lung diseases, intermittent fevers and the trots (http://christian000.free.fr/pages/191-hieracium.htm).

Fig. 2 *Hieracium pilosella*

Hieracium umbellatum L.: 10-120 cm height, springs between July and October, being pollinated by insects and dispersed by the wind. It does not have basal green leaves during bloom, but has a glabrous stem, alternate sessile lanceolate leaves and ovoid involucre. It is a species of semi-shade or heliophile, being spread out on the outskirts of oak or beech forests or on meadows and dunes (Rameau *et al.,* 1989).

Hieracium vulgatum Fr.: with a height of 30-60 cm, it flowers between June-July. The stem is ramified at the top, while the basal leaves rosette is persistent during blooming. The yellow flowers are grouped in panicles. It is mainly a semi-shade species that is widespread on siliceous substrates (Rameau *et al.,* 1989).

Hieracium pojoritense Wol. (fig. 3): an endemic, rare and endangered species (Nyarady, 1965; Oltean *et al.*, 1994; Sanda et al., 2004; Sârbu and Ştefan, 2000) and it is also mentioned in the Carpathian List of Endangered Species (2003).It grows in calcareous crevices in the Eastern Carpathians. Morphology suggests some influence of *H. umbellatum.* Zahn (Zahn, 1938) considered it as an 'intermediate' species and

placed it between *H. sparsum* and *H. racemosum* and are characteristic for certain vegetation types in Romania, respectively *Vaccinio-Piceetea*, thus showing a strong correlation between features of the vegetation and the ecological requirement of this species (Ştefan *et al.*, 2002).It is considered that *H. pojoritense* is an old taxon that either for some reason does not resemble *H. alpinum* morphologically, or that it has originated from an extinct species closely related to, but morphologically different from recent *H. alpinum* (Krak, 2012).

Fig. 3 *Hieracium pojoritense*

Other species of this genre that are present in the herbarium are: *H. alatum*, *H. albidulum*, *H. arnedianum*, *H. arolae*, *H. baenitzianum*, *H. brevifolium*, *H. breviscapum* DC., *H. canum*, *H. cavillieri*, *H. collinum* Gochn., *H. comosum*, *H. cyaneum* Arv.-Touv., *H. cymosum subs. uplandiae* Nägeli & Peter, *H. dubium*, *H. echioides* Lumn., *H. epimedium* Fries., *H. epinephum*, *H. erianthum*, *H. eriophyllum* Schl., *H. fallax* Willd., *H. favratii* Muret, *H. flagellare* W., *H. flocciferum* Arum., *H. flomense*, *H. floribundum ssp. suecium* Fr., *H. fritzei*, *H. fritzeiforme* Zahn, *H. furculatum*, *H. fuscum* Vill., *H. gaudryi*, *H. glabratum*, *H. glanduliferum* Hoppe., *H. glandulosoventatum* Uechtv, *H. gronovii*, *H. horridum*, *H. Hostianum* Wiesb. *f. stenophyllum*, *H. intybaceum* All., *H. inuloides.* Tanfds., *H. jablonicense*, *H. jankae*, *H. kochianum* Jord., *H. kraśanii*, *H. lacerum* Reut., *H. lachenalii* Gmel., *H. lanatum* Seeds., *H. laniferum* Cav., *H. laurinum* Arv.-Touv., *H. lawsonii* Vill., *H. lepthopholis*, *H. levicaule* Jord., *H. lomnicense*, *H. longifolium*, *H. longiscapum* Boiss. & Kotschy, *H. lucidum* Guss, *H. lycopifolicum*, *H. macrocephalum* Huter, *H. maculatum* Sm.**,** *H. marmoreum*, *H. mattfeldianum*, *H. mixtum*, *H. monanthum*, *H. morisianum* Rchb, *H. naegelianum*, *H. napaeum*, *H. nigrescens*, *H. nillvenonň* Monier, *H. nipholasium*, *H. norvegicum*, *H. occidentale* Eastw., *H. oxyodon*, *H. paltinae*, *H. pamphili*, *H. pannonicum* Nägeli & Peter, *H. pannosum*, *H. pavichii*, *H. peleterianum* Mérat, *H. picroides*, *H. pietroszense*, *H. piliferum*, *H. piloselliflorum* Nägeli & Peter, *H. piloselloides* Vill., *H. plumbeum*, *H. pocuticum* Wot., *H. porrifolium*, *H. praecox* Sch. Bip, *H. praecurrens*, *H. prediliense*, *H. prenanthoides* Vill, *H. procurrens* Norrl., *H.*

pseudobifidum, H. pseudocaesium, H. Pyrenaicum Jord., *H. ramosum, H. rotundatum, H. sparsum* subs. *pisaturense* Nyar., *H. valesiacum* Fr., *Hieracium wolffii*.

Most plants present in the herbarium belong to the *Hieracium pilosella* (28), *Hieracium pseudobifidum* (19), *Hieracium murorum* (13), *Hieracium pavichii* (8), *Hieracium praecurrens* (11), *Hieracium levicaule* (5), *Hieracium fritzei* (4) and *Hieracium nipholasium* (4) species.

Plant's harvesting year. The plants were harvested in a time period ranging from 1858 until 1954. The oldest plants from this genre are *Hieracium glaucum*, harvested in 1829 and 1831, followed by *Hieracium pilosella*, harvested in 1850. Most plants were harvested between 1890-1899 and 1940-1949 (fig. 4).

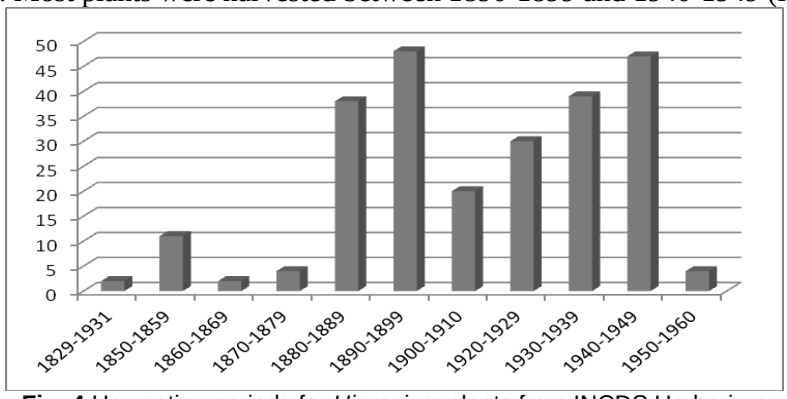

Fig. 4 Harvesting periods for *Hieracium* plants from INCDS Herbarium

Harvesting place from Romania: the majority of species (*Hieracium fritzei, Hieracium murorum, Hieracium napaeum, Hieracium nigrescens, Hieracium pilosella, Hieracium praecurrens, Hieracium prenanthoides, Hieracium pseudobifidum)* were harvested from Bucegi (Coştila, Zănoaga, Poarta, Peştera, Furnica, Poiana Kalinderu, Valea Jepilor, Valea Albă, Valea Cerbului, Valea Horoabei, Clincea, Plaiul Fânului) and from other mountain areas (Munţii Ciucaş, Munţii Harghitei, Munţii Retezat, Piatra Craiului, Sinaia). *Hieracium pilosella* plants were gathered from Vişeul de Jos, *Hieracium procurrens* from Albac, *Hieracium murorum* from Dej, *Hieracium pilosella* from Cluj, *Hieracium pseudobifidum* from Turda, *Hieracium praecurrens* from Păltiniş, *Hieracium vubelum* from Sibiu, *Hieracium umbellatum* and *Hieracium pseudobifidum* from Băile Herculane, *Hieracium Pavichii* from Svinița, *Hieracium pilosella* from Brăneşti, *Hieracium piloselloides* from Buftea and *Hieracium pojoritense* from Pojorâta (fig. 5).

The harvesting place from Europe: contains mountain areas from the Alps, Pyrenees, Tirol, as well as areas from USA (Sierra Nevada, Long Island-Brooklyn), Russia (previous Kőnisberg), Macedonia, Moravia, Switzerland (Lausanne, Simplon valley), Italy (Piemont, Palermo), Germany (Freiburg, Bavaria), Hungary, Austria (Carinthia), Spain (Sierra del Pinar), France (Loire) (fig. 6).

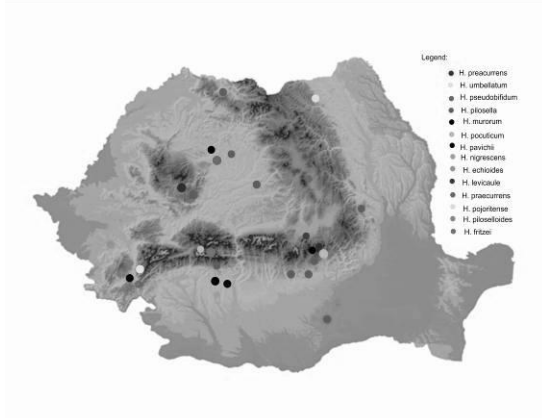

Fig. 5 Place of harvest for *Hieracium* plants in Romania

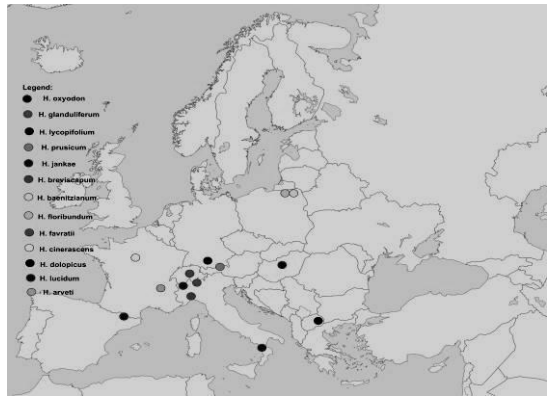

Fig. 6 Harvesting places of *Hieracium* plants from Europe

The persons that have gathered the plants are represented by Romanian specialists (Al. Beldie, C.C. Georgescu, E.I. Nyarady, I. Morariu, N. Al. Iacobescu, P. Cretzoiu) or foreign ones (B. Stefanoff, C. Baenitz, dr. Karl Richter, F.O. Wolf, Georg Weisenbeck, Sagorski, Weisenbach, Wolff).

CONCLUSIONS

1. The Al Beldie Herbarium from INCDS ”Marin Drăcea” has a rich collection of plants.

2. As such, from the 60.000 herbaceous plants, 112 are *Hieracium* species. *H pojoritense* is present amongst them, being a local endemism from Pojorâta, Câmpulung Moldovenesc, a species that can only be found in Romania.

3. This important plant collection is remarkable through the beauty of its exemplars, but especially because of their scientific value. Almost all of the species have kept their original labels and were identified and harvested by Romanian and foreign specialists.

REFERENCES

1. Beldie A., 1979 - *Flora Romaniei - determinator ilustrat al plantelor vasculare*. Editura Academiei RSR. p. 407.

2. Chapman H., Pearson M.L., Robson B., 2003 - *Genetic diversity in tussok hawkweed (Hieracium lepidulum) and use of allele frequencies for identifying patterns of spread*. Department of Conservation, Wellington, New Zealand, 19 pag.

3. Ciocârlan V., 1990 - *Flora ilustrată a României*, I, II. Ed. Ceres Bucureşti.

4. Ciocârlan V., 2000 – *Flora ilustrată a României. Pteridophyta et Spermatophyta*, Edit. Ceres, Bucureşti, 1138 p.

5. Grieve M., 1933 - *Hawkweed, Wood*. A modern Herbal. botanicum.com.

5. International Organization for Plant Information (IOPI) - *Plant Name Search Results*. International Plant Names Index.

6. Krak K., 2012 - *Molecular phylogeny and evolutionary trends in Hieracium (Asteraceae, Lactuceae).* Ph.D. thesis. Prague.

7. Niehaus T.F., 1976 - *Pacific States Wildflowers. The Peterson Field Guide Series. Illustrations* by Charles L. Ripper. New York, New York 100003: Houghton Mifflin Company. pp.102.

8. Nyarady E.I., 1965 - *Subfamilia Liguliflorae* DC (Fam. Compositae). In: Savulescu T. (ed.) Flora Romaniei, vol X (Compositae). Editura Academiei Romane, Bucuresti, Romania.

9. Oltean M., Negrean G., Popescu A., Roman N., Dihoru GH., Sanda V., Mihăilescu S., 1994- *Lista roşie a plantelor superioare din România*, Bucureşti, Studii, Sinteze, Doc. de Ecologie, 1: 52 P.

10. Popescu A. & Sanda V. 1998 - *Conspectul florei cormofitelor spontane din România*. 336 S. Editura Universitàţii din Bucureşti.

11. Sanda V., Bita D.C., Barabas N., 2004 - *Flora cormofitelor spontane si cultivate din Romania*, Edit. Ion Borcea, Bacau.

12. Sârbu I., Stefan N., 2000 - *Considerations on endemic species of Hieracium in the flora of Romania. In: Proceedings of the 4th Hieracium Workshop*, 31.05-05.06.2000, Niederspree, Oberlausitz, Germany: Abhandlungen und Berichte de Naturkundemuseums Görlitz, Band 72 Supplement S.13.

13. Sell P.O. and West C. 1976 - *Flora Europaea* 4: 395.

14. Ştefan N., Oprea A., Mânzu C., 2002 - *Phytocenological characterisation of Romanian Andryala and Hieracium species*. 6th Hieracium Workshop. Hirschegg (Austria).

15. Rameau J.C., Mansion D., Dumé G., Timbal J., Lecointe A., Dupont P., Keller R., 1989 - *Flore forestière Française.* Institute pour le Dévelopmment Forestier, 1783 pag.

16. Strother J.L. - *Hieracium in Flora of North America*._*FNA Vol. 19, 20 and 21. efloras.org. pp. Page 219, 278, 279.*

17. Vasile D., Dincă L., Indreica A., Voiculescu I., 2017 - *Herbarul Al. Beldie - o colecţie de plante şi o importantă bază de date pentru specialişti*. Revista de Silvicultură şi Cinegetică, nr.39, 2017, pag. 114-119.

18. Zahn K. H. 1922 - *Hieracium L*. In: A. ENGLER (ed.), Das Pflanzenreich Regni Vegetabilis Conspectus 82: 865–1146. Wilhelm Engelmann, Leipzig.

19. Zahn K. H. 1938 - *Hieracium* L. In: P. GRAEBNER FIL. (ed.), Synopsis der mitteleuropäischen Flora. 12(3): 1–708. Borntraeger, Berlin.

20.*******, www.weedbusters.co.nz

21.*****,** http://invasives.org.au/blog/hawkweeds-a-recent-discovery-in-victorias-alps-and-a-taxonomic-name-change

22. *******, https://en.wikipedia.org/wiki/Hieracium_carneum

23. *******, https://en.wikipedia.org/wiki/Hieracium_floribundum

24. *******, https://en.wikipedia.org/wiki/Hieracium_paniculatum

25. *******, https://plants.usda.gov/core/profile?symbol=HIERA

26. *******, http://christian000.free.fr/pages/191-hieracium.htm