

A SHORT DESCRIPTION OF SCORZONERA PLANT SPECIES PRESENT IN ALEXANDRU BELDIE HERBARIUM FROM I.N.C.D.S. BUCHAREST

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ABSTRACT

The present paper reunites the morphological and ecological description of *Scorzonera* plant species present in the Al. Beldie Herbarium from Marin Drăcea National Institute for Research and Development in Forestry (INCDS) in Bucharest. Furthermore, this article organizes the herbarium exemplars based on species, harvest year, the place from where they were taken and the specialist that has gathered them.

The first part of the article starts with a short description of the herbarium and its specific, followed by presenting the material and method used in elaborating the paper. As such, the material is represented by the 83 plates containing exemplars of some *Scorzonera* species.

A very important aspect which must be specified is the fact that the herbarium has a significant number of rare endangered or endemic specimens. One example, the protect species *Scorzonera rosea*, is present in the herbarium with 26 plates that were mainly gathered in the year 1936 by Al. Beldie himself.

Another rare species, *Scorzonera hispanica*, is represented in 16 plates from within the herbarium and is of a high interest as it is the oldest species of the genre, being harvested in the year 1794.

Beside the description of the gathered *Scorzonera* species, the present paper presents the gathering map of the species present in the herbarium at an European level, together with analyzing the gathering periods of these species. Some of the oldest gathered species are also presented in this article.

The paper ends with some conclusions regarding the *Scorzonera* species' analysis and exemplars present in the herbarium, while briefly presenting their most novel aspects and characteristics.

INTRODUCTION

Marin Drăcea National Institute for Research and Development in Forestry (INCDS) from Bucharest hosts an extremely valuable collection of herbaceous plants registered in INDEX HERBARIUM. This collection is composed of private donated collections and exchange pieces from foreign collections gathered and determined by renowned personalities from the field of systematic botanic. The herbarium contains approximately 60 000 plates of some plant species. The herbarium's historical value is given by the fact that these plates are kept in their original maps, arranged in 30 modules of 30 drawers each (Vasile *et al.*, 2017).

The herbarium is named after Alexandru Beldie, a renowned Romanian botanist which has studied predominantly the flora of Bucegi Mountains (Beldie 1967, Beldie 1972). This aspect can be seen in the herbarium's specific, which reunites numerous plants from the mountain area, such as the 32 species of the *Arabis* genre (Dincă L. *et al.*, 2017) or the 112 species of the *Hieracium* genre (Dincă L. *et al.*, 2017). Besides the numerous mountain species, the herbarium also contains species collected from different parts of the country, such as the ones gathered by S. Pașcovschi in Bazoș Dendrology Park, near

Timișoara (Chisăliță *et al.*, 2017) or from different countries. Together with the above mentioned genres, the *Scorzonera* genre is also well represented in the herbarium and constitutes the subject of the present paper

MATERIALS AND METHODS

The study material was represented by the 83 plates present in the above mentioned herbarium and belonging to the *Scorzonera* genre.

As work methods, we can mention *research and bibliographic documentation* regarding the species morphology and ecology, with the purpose of describing them in detail and as precisely as possible.

This was followed by *analysis and synthesis*, which played an important part in preparing the present paper, validating the data and creating the maps. These methods were also used in elaborating the investigation's results and conclusions.

In order to elaborate this study, the *Scorzonera* species were systemized based on the species (the herbarium holds 19 species of this genre), harvest year, the place from where they were gathered and the specialists that has gathered them. An excerpt of the *Scorzonera* inventory is rendered in Table number 1. Furthermore, the *Scorzonera* species present in the herbarium were described after a thorough bibliographic research.

The inventory of *Scorzonera* genre from INCDS Bucharest Iuliu Moldovan Herbarium (excerpt)
Table 1

Drawer number	Plate number	Herbarium/ Botanic collection/ Institution	Species	Harvest date	Harvest place	Collected/ Determined by:	Conservation degree (1..4)
6	25	Porta et Nugoiter III Hispanicum	<i>Scorzonera aristata</i>	1891.06.27	Sierra de Alcaraz	Albacete	1
6	30	Museum Botanicum Universitates Cluj Flora Romaniane exiccata	<i>Scorzonera austriaca</i>	1923.05.18	Fenesul Sasesc Cluj	E.I.Nyarady	1
6	33	Buc. F.S. Polytechnic Herbarium	<i>Scorzonera cana</i> Simk	1941.05.10	Istrita	M. Ciuca	1
6	40	Bucuresti Polytechnic Herbarium Silviculture Faculty Botanic Laboratory	<i>Scorzonera hispanica</i>	1942.06.16	Pad Raioasa Chitila Bucuresti	Morariu	1
6	55	Museo Botanico Universitates Clusiensis (in Timisoara)	<i>Scorzonera humilis</i>	1935.06.05	Volosca Cernauti	E. Topa	1
6	78	N.Al. Iacobescu Herbarium	<i>Scorzonera purpurea</i>	1907.07.01	Obarsia Clabucetului	Dim.C. Ionescu	1
6	101	ICEF Bucuresti	<i>Scorzonera rosea</i> W.et.K.	1936.06.22	Muntele Ciucasului	Al.Beldie	1

RESEARCH RESULTS

Scorzonera Genre belongs to the *Asterales* Order, *Asteraceae* Family.

Scorzonera is a flowering plant belonging to the Daisy family (Bremer, 1994). The plant can be mainly found in Europe, Africa and Asia (Duran & Hamzaoglu, 2014). The name can be traced back to the French word *scorzonère* (meaning the "viper's grass") or to the Italian *scorza negra* meaning "black bark". As such, the most diverse cases are recorded in the Mediterranean area (Karaer & Celep, 2007). The plant's usage range from a source of natural rubber (*Scorzonera tau-saghyz*), (Buranov & Elmuradov, 2010), to a food source for the Nutmeg larva. Most species contain lactones (including [sesquiterpene lactones](#) known as guaianolides) (Zidorn, 2010), [flavonoids](#) (such as [apigenin](#), [luteolin](#), [quercetin and kaempferol](#)) (Sareedenchai & Zidorn, 2010), or *metabolites* ([caffeoylquinic acids](#), [coumarins](#), [lignans](#), [stilbenoids](#), and [triterpenoids](#)) (Jehle *et al.*, 2010).

The species of this genre present in the above mentioned collection are the following:

1. ***Scorzonera aristata* Ramond** (fig. 2), is a plant commonly found in pastures from alpine and subalpine areas. The plant can reach 15-45 cm in height and it blooms in August, having yellow flowers. The leaves have 3-5 nerves, more or less bulky involucre at the basis, 1-3 external bracts, which are almost sharp at the peak. The flowers are twice longer than the involucre. The plant reproduces through sprouts that appear on its subterranean stem (<http://christian000.free.fr/pages/000-accueil.htm>).

2. ***Scorzonera austriaca* Willd.** is a plant that can reach 10-45 cm and which grows on arid pastures, in groves or rocky areas from France, Central Europe (up to Transylvania), Italy, Montenegro, South Russia or Siberia. It blooms between May-June, sometimes even up to July and it has yellow flowers, oval-elongated leaves with a length between 3 mm and 4 cm, without shinleaves and usually narrow towards the petiole. The involucre, larger than 1 cm, is composed of unequal bracts, the inferior ones larger and shorter than the superior ones. The fruits are white or whitish and smaller than 9 mm. The stem has a single capitulum and is surrounded at the basis by numerous hairy and filamentous leaf remnants from previous seasons (<http://christian000.free.fr/pages/000-accueil.htm>).

3. ***Scorzonera crispatula* Boiss** has wavy, oval or oval-elongated leaves, serrated on the margins, elongated in the superior part and concentrated around the stem's base. They have a bulky involucre at the inferior part, elongated fruits with longitudinal stria that present small tubercles (<http://christian000.free.fr/pages/000-accueil.htm>).

4. ***Scorzonera hirsuta* L.** grows on rocky areas, pastures and garrigues. The stem is 20-40 cm long and arched. As most species from this genre, the flowers are yellow, while the blooming takes place between May-June. The leaves, more or less hairy, are green, numerous in the stem's medium and inferior part, while missing or being scarcely in its superior part. The leaves are arched, very narrow (less than 2 mm length) and elongated, very sharp in their superior half, while the inferior ones have 3 main nerves. This specie's main characteristic is represented by red trichomes that cover the fruit. The plant grows at altitudes larger than 500 meters in France, Spain, Italy and Greece (<http://christian000.free.fr/pages/000-accueil.htm>).

5. ***Scorzonera hispanica* L.** (fig. 3), is commonly known under a lot of names: black or Spanish salsify, black oyster plant, serpent root, viper's herb, viper's grass or

simply scorzonera. The plant is a perennial plant that is cultivated as a root vegetable and can be recognized by its yellow flowers, black skin and the black taproot that can grow one meter in height and 2 centimeters in diameter.

Black salsify is native to [Southern Europe](#) and the [Near East](#). It is believed that the plant has spread from Spain towards the rest of Europe. However, the plant is also mentioned in other cultures. As such, Celtic and Germanic tribes used to eat this plant as it was recommended against snake bites and the bubonic plague. A Western writer, Leonhard Rudolf, mentions the plant in 1575 in Syria, at the Aleppo market. The plant is also mentioned in Italy, France and Belgium in the seventeen century where it was cultivated as a vegetable.

As such, Black salsify is mainly a European crop and continues to be cultivated in countries such as [Belgium](#), [France](#) and the [Netherlands](#). The plant grows well in most cool-temperate climates and can generate 15-20 meters of tons of roots per hectare. In Germany, the plant is cultivated as a vegetable ('Hoffmanns Schwarzer Pfahl') (figure 1) or by gardeners ('Duplex'). However, the [harvesting process is quite complicated due to the fact that roots are fragile and the](#) broken material loses freshness. In order to preserve their freshness, roots have to be stored in cellars or cool dark places. In Britain, the common practice is to leave the plant in the ground until the roots have grown enough for harvesting, a process that can take up to two years.

From a nutritious point of view, the black salsify is highly recommended as it contains [proteins](#), [fats](#), [asparagine](#), [choline](#), [laevulin](#), minerals such as [potassium](#), [calcium](#), [phosphorus](#), [iron](#), [sodium](#), and [vitamins](#) A, B₁, E and C. Furthermore, the plant is indicated for diabetics as it contains [polysaccharide inulin](#). As such, the plant is often used as a food source, being most often eaten besides other vegetables (peas, carrots etc.), or with certain types of sauces (béchamel, mustard, hollandaise sauces). Furthermore, *Scorzonera* is commonly used in [Portugal \(Évora, Alentejo\)](#) as an ingredient in making a desert called scorzonera sweet (listed on the Ark of Taste).

However, the black skin of the root is inedible and has to be removed before (and immediately immersed in water to prevent losing its color) or after boiling (a more convenient method as the root contains highly sticky latex) (https://en.wikipedia.org/wiki/Scorzonera_hispanica).



Fig.1. Black salsify roots and commercial production in Germany
(https://en.wikipedia.org/wiki/Scorzonera_hispanica)



Fig. 2. *Scorzonera aristata*

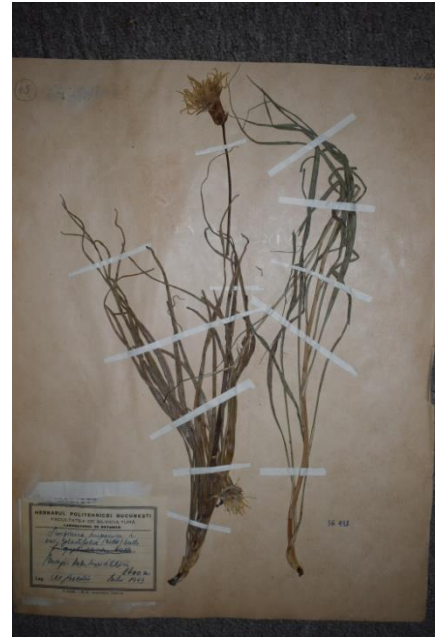


Fig. 3. *Scorzonera hispanica*

6. ***Scorzonera humilis* L.**, also known as the viper's-grass or tyrollobibenzyls (after the place from where it was collected – Tyrol) is a [perennial plant](#) that can grow from 7 up to 50 cm. The plant can be recognized through its short, pale green bracts, unbranched and elliptical-lanceolate leaves. The plant blooms between May and June with 2.5 cm wide yellow flowers. The stem produces a milky juice. (https://en.wikipedia.org/wiki/Scorzonera_humilis). It is pollinated by insects or autogamy, dispersed by wind, being a heliophilous species that appears on clay or sandy soils, with neutral pH – weakly acid. As such, the plant is spread on humid or even peat meadows (Rameau *et al.*, 1989).

7. ***Scorzonera laciniata* DC.** has variable shapes and is spread on uncultivated areas from south, south-east and central Europe, south-east Asia and North Africa. It can also be found in the Alps where it reach 1700 m. The plant prefers lime and clay fields, but it also grows on sandy ones. With 10-45 cm in height, the plant is recognizable by its pale yellow flowers that bloom from April until July. The fruits are grayish, while the leaves are variable. It is a biannual plant, with a very elongated and slightly ramified root. The plantule has very long, narrow cotyledons without petiole. The leaves, stems and roots of young plants are consumed as vegetables (<http://christian000.free.fr/pages/000-accueil.htm>).

8. ***Scorzonera parviflora* Jacq.** is a plant that grows in salty areas and coast pastures from the Mediterranean area. The plant has average leaves that surround the stem at its basis, involucre without shinleaves with elongated triangular branches on the outside (<http://christian000.free.fr/pages/000-accueil.htm>).

9. ***Scorzonera purpurea* L.** (fig. 4), is recognizable through its purple or amethyst flower capitols. The plant blooms in May-June and can be found on meadows, pastures, limestone areas, groves, at altitudes of up to 1000 meters in France, Central Europe, Bosnia, Macedonia, South Russia and Meridional Siberia. The leaves are similar between them, without shin leaves, while the involucre is composed of different bracts, the inferior ones elongated at the top, while the superior ones are blunt at the top. The fruits, reaching 1 cm in length, are yellowish, without shin leaves, grooved in length, with a short peduncle at the basis, which is part of the fruit. The stem is straight, without shin leaves and slightly

branched. Cultivated as an ornamental plant, these species has horticultural varieties amongst which the most remarkable is grandiflora. The root and subterranean stem contain an important percentage of inulin (<http://christian000.free.fr/pages/000-accueil.htm>).

10. *Scorzonera rosea* W.et.K. (fig. 5), is a rare threatened and endemic species, being a perennial herbaceous species in terms of habitat and growth form, with scapous emicryptophyte biological form. The plant can reach 25-40 (60) cm in height, having rhododendron roots and oblique rhizomes with brushed fibers. The stem is erect, simple, glabrous and leafy of 2/3 or 3/4 of the plant. The leaves are linear, flat; the lower ones can reach 20-30 cm, while the upper ones 4-8 cm, being half-embracing. The inflorescence is single blossom with a diameter of 3-4 cm, piriforme-elongated casing and with lanceolate-acuminate scales flowers, covering 1/3 of the surface. All the flowers are ligular, with a pink corolla. The fruit is alkene, reaching about 15 mm and is curb on the margins. In terms of regional distribution *S. rosea* can be found across the pre-alpine and alpine areas, at altitudes between 800 and 2000 m in European mountain areas on alpine meadows, where it blooms from July to August. *S. rosea* is a species that can also be found in shrubs and mountain foothills. (<http://mitel.dimi.uniud.it/flora/scheda.php?id=801>).

11. *Scorzonera tuberosa* Pall. is a perennial plant that can grow up to 0.1 m. The flowers are hermaphrodite (having both male and female organs) and are pollinated by insects. The plant is suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. The suitable pH is represented by acid, neutral and basic (alkaline) soils. It cannot grow in the shade, preferring dry or moist soil. As such, it grows in the sandy steppes of SE Russia and in SE Europe. (<http://pfaf.org/user/Plant.aspx?LatinName=Scorzonera+tuberosa>).



Fig. 4. *Scorzonera purpurea*



Fig. 5. *Scorzonera rosea*

The most widespread *Scorzonera* species present in this herbarium are: *S. rosea* (26 plates), *S. hispanica* (16 plates), *S. purpurea* (9 plates), *S. parviflora* (6 plates) and *S. humilis* (5 plates). The herbarium also holds plates of the following species: *Scorzonera albicans* Coss., *Scorzonera baetica* Boiss., *Scorzonera cana* C.A. Meyer, *Scorzonera*

crispa Bieb., *Scorzonera graminifolia* L., *Scorzonera marschalliana* C.A. Mey. and *Scorzonera montana* Mutel.

The plant's harvest year. The plants were gathered in a time period ranging between 1794 and 1953. The oldest plants of this genre are *Scorzonera hispanica*, gathered in 1794 and *Scorzonera humilis*, gathered in 1832. The periods in which most plants were gathered were 1930-1939 and 1940-1949 (Figure 6).

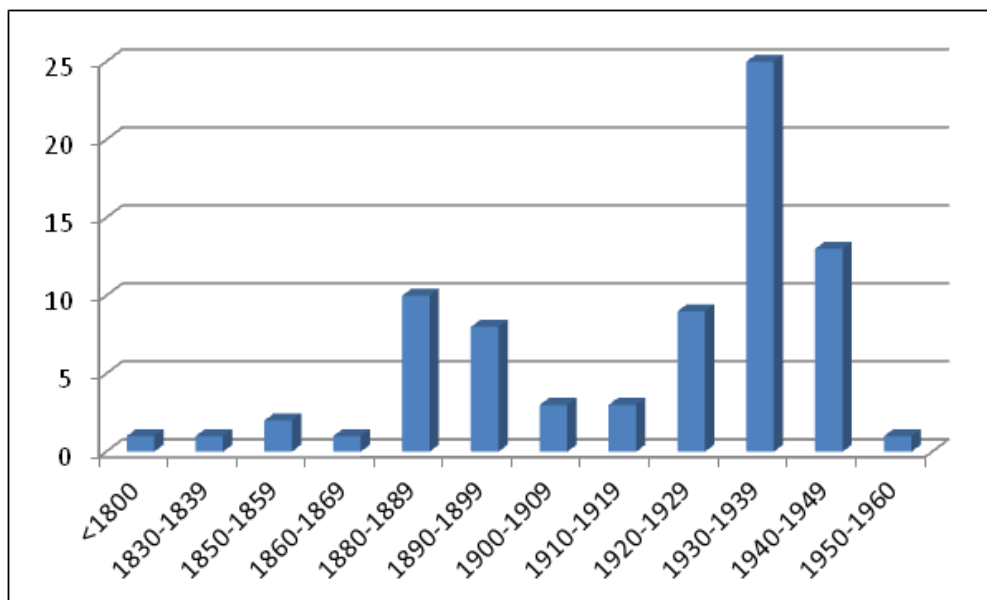


Figure 6. Harvesting periods of *Scorzonera* plants from INCDs Herbarium

The harvesting place of species from the herbarium are represented by alpine areas from Romania (Valea Seacă, Mălăiești - Bucegi; Ciucaș; Baiului Mountains; Parâng; Penteleu) or Europa (Pyrin Mountains, Pyrenees Mountains), as well as hill ones (Săbed, Mureș; Feneșul Săsesc, Cluj; Cojocna, Buzău; Volosca, Cernăuți; Chambery; Laufenburg; Pisa; Valencia; Sierra de Alcaraz, Spain) or field ones (Armășești, Ialomița; Chitila; Cetatea Albă, Basarabia; Sarepta, Russia) (Figure 7).

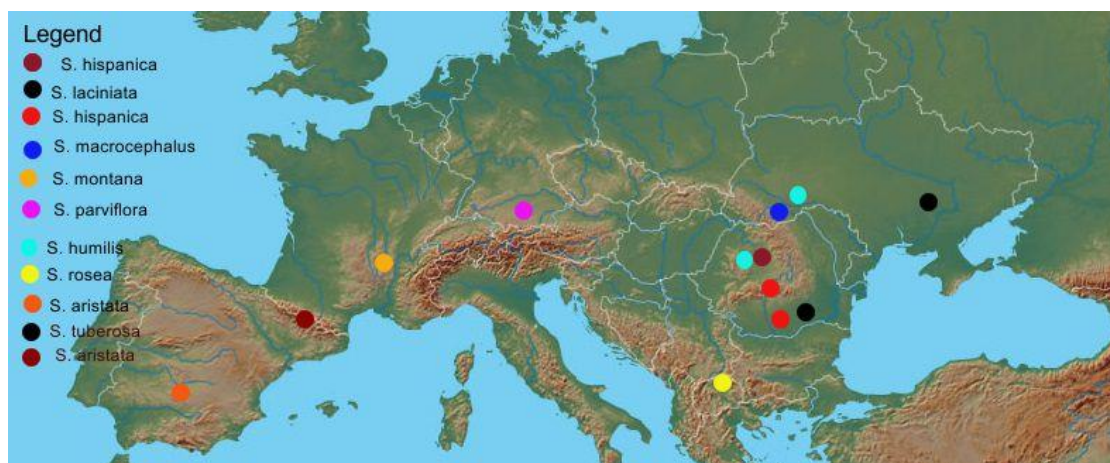


Figure 7. *Scorzonera* plants place of harvest

The persons that have gathered the plants are renowned Romanian specialists (Al. Beldie, E. I. Nyarady, G. Bujorean, I. Morariu, At. Haralamb, I. Tudor, E. Pop, M. Ciucă, G.P. Grințescu, Al. Borza, E. Topa, M. Năut) or foreign ones (Bordere, A. Berker, E. Reverchon, T. Georgieff, Wolff).

CONCLUSIONS

Well emphasized within the Al. Beldie Herbarium from INCDS Bucharest, the *Scorzonera* genre is represented within it by a number of 19 species presented in 83 plates. One of the most representative species of this genre, present in the herbarium in no less than 26 plates, is *Scorzonera rosea*, a protected and endangered species. One of this plants were gathered by Al. Beldie himself in the year 1936.

Another rare species, representative for the „Al. Beldie” Herbarium is *Scorzonera hispanica*, present in 16 plates and holding an important historical value. Exemplars of this plant are amongst the oldest exemplars of the genre, being gathered in 1794.

As it can be seen in Figure 7, the gathering place of these samples is represented both by alpine areas from Romania, Ukraine, Alps, Pyrenees or Pysin Mountains, as well as hill or field areas from Romania, Ukraine, Macedonia, Germany, France or Spain.

In regard with the harvesting period, by analyzing Figure 6, it can be observed that they were gathered in a long period of time, almost 2 centuries, gathered between 1794 and 1953. The genre’s oldest plants are *Scorzonera hispanica*, gathered in 1794 and *Scorzonera humilis*, gathered in 1832. The maximum number of gathered plants from this long period of time is recorded in the period 1930-1950. However, a significant number of plants was also gathered in the period 1880-1900.

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<http://pfaf.org/user/Plant.aspx?LatinName=Scorzonera+tuberosa>