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HISTORICAL RESEARCH OF *LIGULARIA* GENUS – OVERVIEW

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Abstract
The viability of the rare plant species populations, including also the relict species, indicates a population decline due to the independent or simultaneous action of several factors such as: habitat quality, population size and genetic diversity.
This paper aims to synthesize the studies conducted over time both on Ligularia sibirica species and Ligularia genus. The main objective of the paper is to identify the following research steps necessary for the optimal characterization, monitoring and conservation of the studied species and of its related populations.
Ligularia genus includes species adapted to different climatic and environmental conditions from the European and Asian continent. Following the collected scientific material which holds data about L. sibirica, the author found a total of 166 bibliographic sources, of which 107 belong to Romania. The number of scientific materials found in Romania is correlated with the distribution of the L. sibirica species in the country. At European and Asian level, have been carried out phytosociology, genetics, biochemistry, biotechnology and phytopathology studies on Ligularia, while in our country taxonomic studies predominate, being part of some floristic surveys, monographs, etc., which need to be updated and completed. It can be noticed that biochemical and cytotoxical studies could bring new perspectives on L. sibirica benefits.

Keywords: Hystorical research, Ligularia, Ligularia sibirica

1. INTRODUCTION

Starting with Darwin, the evolutionary history of populations and the phylogenetic interpretation of the relationships between organisms, served to elucidate the natural system (Andrersson-Kottö and Gairdner, 1931; Mettler and Greg, 1974; Onete, 2008).
The paleoclimatic changes produced during the geological eras have led to the migration of a very large number of plant species (Bănărescu et al., 1973). The species considered to be geographic or phylogenetic relics is a real source of information on identifying the possible characters that allowed their survival from Holocene or Paleocene to nowadays (Graham, et al., 2006; Carnaval et al., 2009; Murienne et al., 2009; Grandcolas et al., 2011; Grandcolas et al., 2014).
Annually, many species and their populations are at risk of extinction, which is reflected in the decline of biodiversity (Primack et al., 2008). Numerous rare plant species, including relict species, are currently showing a population decline as a result of factors such as habitat quality, population size and genetic diversity. These factors, through their independent or simultaneous action, affect the viability of existing populations (Fischer et Matthies 1998; Oostermeijer et al. 1998; Vergeer et al. 2003; Lienert 2004; Heinken-Šmídová, 2012).

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Monitoring of threatened species has recently been closely linked to national commitments under the European Union Habitats Directive and closely linked to the concept of "favorable conservation status" (Pakalne et al., 2005). Through the Convention on Biological Diversity (CBD), many countries have agreed to reduce biodiversity losses by pursuing three main objectives: preserving biological diversity, sustainable use of biological diversity components and fair and equitable sharing of benefits from the use of genetic resources (https://www.cbd.int/intro/default.shtml).

2. MATERIALS AND METHODS

The elaboration of the present paper aimed to synthesize the studies performed on *Ligularia sibirica* species, but also on *Ligularia* genus. The main objective of the paper is to identify the following research steps necessary for the optimal characterization, monitoring and conservation of the studied species. For a better structure and a better highlighting of the degree of knowledge and therewith the characterization of relict species, two distinct studies were carried out, one at national level and one study at international level. The scientific material needed to complete the database was obtained through various bibliographic sources such as: registries, monitoring programs, databases (*Global Compositae Checklist, Flora Europaea, The Plant List, Euro+Med Plant Base, Google Scholar, etc.*), scientific articles and specialized books (*Flora Republicii Populare/Socialiste Române, Flora Ilustrată a României. Pteridophyta et Spermatophyta, Plante Vasculare din România. Determinator ilustrat de teren, Flora of the U.S.S.R, Flora of China*, etc.).

3. RESULTS AND DISCUSSIONS

Ligularia Genus

Ligularia, is a Latin name, "ligula" = tongue, the name comes form the specific ligules encountered at the edge of calathium (Sârbu et al., 2013).

The *Ligularia* genus, according to *Flora of China, The Plant List, Flora Europaea* and according to *The Botanic Garden and Botanical Museum Berlin BGBM* data, includes about 150 species, distributed in the temperate areas of central and eastern Asia as well as in Europe. There are six species throughout Europe territory: *L. sibirica* (L.) Cass., *L. glauca* (L.) O. Hoffm., *L. carpathica* (Schott) Pojark., *L. dentata* (A. Gray) H. Hara, *L. hodgsonii* Hook., *L. przewalskii* (Maxim.) Diels şi *L. stenocephala* (Maxim.) Matsum. & koidz.. The species are found under different categories: introduced, introduced – naturalized, introduced – occasionally adventitious, native species, doubtless native, cultivated – ornamental (Table 1.).

The area of *Ligularia* varies according to the resort, on the river banks, on the lakes banks, in the eutrophic marshes, in the wetlands, wet meadows and marshes sometimes in the wet forests, forest edges, forest meadows, rocky slopes and grooves in the alpine area. The altitude of the species ranges from 100 m in North Asia to 4800 m in the rest of the continent. The habitats occupied by the studied species, develop into the alpine area, in arid places on the high mountains screes, such as the Hengduan Mountains or alpine meadows such as those in Tibet. Both ecological conditions and altitude cause an increased variability in the species height, ranging from 5 cm on the rocky slopes and reaching up to 200 cm high on the grooves in the alpine area, in the river valleys, in eutrophic marshes, meadows, etc. (Komarov et al., 1961; Tzvelev et al., 2002; Slavík, 2004; Wu et al., 2011).

China is the state with most species belonging to the *Ligularia* genus, of which 89 from 123 are endemic (Wu et al., 2011). On the other hand, Russia comprises 38 *Ligularia* species throughout its territory. Most often they occupy habitats similar to those from China (Komarov et al., 1961).

According to the main botanical publications which describe Romania flora, (*Flora ilustrată a României. Pteridophyta et Spermatophyta, Plante vasculare din România. Determinator ilustrat de*

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teren, Flora mică ilustrată a Republicii Populare Române, Plante Vasculare din România) on our country territory, there are only two species belonging to *Ligularia* genus, respectively: *Ligularia sibirica* (L.) Cass. and *Ligularia glauca* (L.) Hoffm.

Table 1. The Ligularia genus distribution in Europe
Introduced (I), Introduced – naturalized (IN), Introduced – occasionally adventitious (IAO), Native (N), Doubtless native (ÎN), Cultivated – Ornamental (C)

Nr.	*Ligularia* sp.	Sinonim	Europa	Categorie
1	*L. sibirica* (L.) Cass.	*Othona sibirica* L. (non *Senecio sibiricus* L.f. 1782); *S. cacaliifolius* Sch. Bip., nom. nov.	Bulgaria Belarus Czech Republic Croatia Estonia France Hungary Latvia Russia Romania Slovakia Turkey Ukraine	N
			Austria	ÎN
			Italy	C
2	*L. carpathica* (Schott) Pojark.	*Senecillis carpathica* Schott	Romania Bulgaria Ukraine Slovakia	N
3	*L. dentata* (A. Gray) H. Hara	*Erythrochaete dentata* A. Gray *Ligularia clivorum* Maxim.	United Kingdom Czech Republic Germany Sweden	IN IAO IAO IAO
4	*L. hodgsonii* Hook.	-	Sweden	IAO
5	*L. przewalskii* (Maxim.) Diels	*Senecio przewalskii* Maxim.	United Kingdom Austria	I
6	*L. stenocephala* (Maxim.) Matsum. & koidz.	*Senecio stenocephalus* Maxim.	Sweden	IAO

The *Ligularia* Cass. genus belonging to the *Asteraceae* family, the *Senecioneae* tribe and the *Tussilagininae* subtribes, its a highly diverse genus, many species being located in the Qinghai-Tibet Eastern plain and its surroundings; *L. dentata* and *L. hodgsonii* are considered some of the less evolved species (Jeffrey et al., 1984). This region is considered the center of origin and diversity of the *Ligularia* genus (Liu, 1989; Liu et al., 1994). Some of the identified species, more than half of them (60), are considered to be endemic to the area. All species belonging to the *Ligularia* genus in that area have the same number of chromosomes 2n = 58, a similar karyotype 2A and x = 29 representing the base number. The number of chromosomes x = 30 is mainly found in Europe and north Asia, far away from the center of origin and diversity of the *Ligularia* genus. If the number is derived from x=29 through a secondary aneuploid event, then this can be one of the reversal chromosomal evolution situations (Liu, 2004).

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The *Ligularia* genus has been extensively studied in the recent years from the phytochemical compounds point of view, with significant results useful in traditional medicine, in the treatment of bronchitis, asthma, tuberculosis, arthritis, cough, inflammation, jaundice, scarlet fever, and in relieving liver pain (Li et al., 2008; Xie et al., 2010). Species belonging to the *Ligularia* genus possess many properties in terms of biological activity, such as: antibacterial properties, cytotoxic, tyrosine phosphatase inhibitory activity, insecticidal properties, antihepatotoxicity, antioxidant properties, as well as antithrombotic and anticoagulant activities. Pharmaceutical and chemical studies conducted on *Ligularia* species show the presence of specific constituents such as sesquiterpenes (Wu et al., 2016).
The *L. sibirica* species has not been studied much from the biochemically or cytotoxically point of view either, however it should be noted that the species can be used in the treatment of excessive phlegm and cough reduction (Liao et al., 2002; Tori et al., 2008; Yuan et al., 2013).

Ligularia sibirica (L.) Cass.
Ligularia sibirica (Linnaeus) Cassini (Cuvier, 1823) is a polymorphous, perennial species, sometimes green, with purple tint, which can reach heights from 15 cm up to 150 cm (Chater, 1976).

- In soil, the species has a short rhizome, densely covered with thick or thin adventive roots, and in the upper part covered with fibrous debris of dead leaves (Komarov, 1961; Tzvelev, 2002).

- The stem is erect, thick, streaked-striated, greenish or reddish-violet, completely glabrous, pubescent or hairy up to inflorescence (Komarov, 1961; Tzvelev, 2002).

- The basal leaves are green on the top, with dimensions ranging between: 3 / 10-25 and 3 / 7-20 cm. These may be triangular-reniform to sagittal, dentate, more or less glabra, to dense hair on the lower or upper surface along the ribs, rarely being entirely hairy. The petiole usually can be of 2-2.5 / 3 times longer than the blade (Komarov, 1961; Chater, 1976; Tzvelev, 2002). The blades have different shapes, with dimensions ranging from: 5.5 / 9-24 cm long and 7-22 cm wide, cordate or ovate-cordate, sometimes deltoid, sinuous-toothed with deltoid teeth longer and shorter (Komarov, 1961; Chater, 1976; Tzvelev, 2002).

- The cauline leaves are of two types: inferior and superior. The lower ones have shorter blade and petiole, narrowed at the base in a longer sheath. On the upper cauline leaves the blade is deltoid or deltoid-cordate and delicate-toothed, with a short petiole, much of which is modified in a large sheath. At the same time, one can notice that the last leaf is brown or red, amplexicaul, in the form of a scale or a lower bracteal leaf (Komarov, 1961; Chater, 1976).

- The inflorescence is simple, racemose, more oblong, with a length of more than 12 cm, consisting of 5 / 10-52 heads with a diameter of 2.5-4.5 cm, lateral oblique bent (Komarov, 1961; Tzvelev, 2002). The involucre is campanulate or campanulate-turbinate, glabra or arachnoid-hairy and is based on 11-12 hairy bracts on the outer face. The lower bracts are ovate-lanceolate, carinated and long-acuminate, with a length of 2.5-6 cm, occasionally with the upper part toothed. The upper bracts are ovate-lanceolate, even linear. The lower and upper peduncle are thick, the lower ones are 5-10 cm long with 1 or 2 capitulas, and the upper ones measure 5-12 cm, with brown / white arachnoide hair (Komarov, 1961; Tzvelev, 2002).

- Capitulas are made up of two types of flowers: 7-8 / 11 ligulated flowers and 18 / 23-32 tubular flowers. The external ligulate flowers are yellow, oblong-ovate with a tube of 5-6 mm long, the ligules are crossed by 4-9 ribs, while the central flowers are campanulate-turbinate, with a narrow limb and tube with 1-1.5 mm lenght. At the stamen level the anteras have an oval-lanceolate apical appendix, the basal one being short and obtuse. The gynoecium has the style branched, the

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branches are covered with short and thin hairs, on top being slightly flattened in a short, obtuse appendix (Komarov, 1961; Tzvelev, 2002).

Figure 1. Ligularia sibirica (L.) Cass. – Hărman Marsh (Original)

- Achenes size is between 4-6 mm lenght, the pappus being longer or equal to achene with a white-dirty colour (Komarov, 1961; Chater, 1976; Tzvelev, 2002).
At Hărman Marsh it can be seen *L. sibirica* var. *araneosa* (DC) or *L. sibirica* f. *araneosa* (DC) (Nyárády E. I., 1964; *The Plant List*) – the plant is sublanted with white-haired pedicles.

***Ligularia* glauca** (L.) Hoffm.
The main morphological differences between *L. sibirica* (L.) Cass. and *L. glauca* (L.) Hoffm. species, can be noticed at the level of vegetative organs and at the fruit level. Thus, the basal leaves are narrowed or slightly cordate at the base (Nyárády, 1964; Sârbu et al., 2013), being more or less suddenly attenuated in the petiole. From the shape point of view, the leaves are ovate-elliptical or elliptical, glabrous, with an entire edge or small denticulate (Komarov, 1961; Nyárády, 1964; Tzvelev, 2002; Ciocârlan, 2009). The pappus can be very short (Ciocârlan, 2009), shorter than achene or in some cases even absent (Nyárády, 1964; Sârbu et al., 2013).

Ligularia bucovinensis (L.) Nakai
Various botanical specialists from both Romania and from countries such as Ukraine, Slovakia, Czech Republic and Poland have tried to get the most conclusive results on the dichotomy between *L. sibirica* and *L. bucovinensis* species. Thus, from the results obtained through extensive taxonomic studies carried out in recent years, it can be mentioned that *L. bucovinensis* was accepted in taxonomic bases as *The Plant List* or *Global Compositae Checklist*. However, many specialists claim that those slightly variable characters of *L. bucovinensis* such as plant height of 70-75 cm, thin stems and small inflorescences with a maximum of 15 capitulas (Komarov, 1961), would be better suited in order to determinate a subspecies or variety. (Nyárády, 1964; Ciocârlan, 2009; Sârbu et al., 2013)

***Ligularia* carpathica** (Schott, Nyman et Kotschy) Pojark.

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The main morphological characters that differentiate *L. carpathica* species from *L. glauca* species include: the sinuated-toothed edges of all the leaves or just for the lower ones, the narrower limb of the tubular flowers and the peripheral flowers ligules crossed by about 6-10 ribs (Pojarkova, 1961). Currently *L. carpathica* is accepted as a species by taxonomic bases such as: *The Plant List* and *Euro+Med Plantbase*, the species being recognized by the field vascular plant check list "*Plantele vasculare din România. Determinator ilustrat de teren*" (Sârbu et al., 2013). However, Nyárády (1964), Sanda (2004) and Ciocârlan (2009) and considers *L. carpathica* species as a synonym of the *L. glauca species*.

History of worldwide research (Table 2.)

First in-depth studies on the *Ligularia* genus begin in France in 1816, where the botanist and naturalist Alexandre Henri Gabriel de Cassini (1781-1832), specialized in the *Asteraceae* family, names and frames *Ligularia* genus. Swedish botanist, physicist and zoologist Carl Linnaeus (1707 – 1778), considered being the "father of the modern taxonomy" that has developed the binomial nomenclature system, which is now used internationally by the *International Code of Nomenclature for algae, fungi, and plants* (ICN), described for the first time *Ligularia sibirica* species, which Cassini in 1823 has reclassified it in the botanical system used today. Later on, through the development of botanical research at European level, the relict species was mentioned in several Flora volumes from 11 countries: Russia, Estonia, Latvia, Poland, Slovakia, Croatia, Austria, Romania, Bulgaria, France and Ukraine.

Due to climate threats, decrease of nutrients and soil eutrophication, maintaining biodiversity and preserving flora and vegetation, it is a current problem at European level. *L. sibirica* is considered to be a species of Community importance, and the Habitats Directive seeks to preserve it through various monitoring projects. In Poland, besides adopting the necessary conservation measures, the species was included in the endangered plant seed bank.

From the genetic point of view, the specialized literature provides information regarding the uniformity of the karyotype, the genetic diversity at the population level and the endopolyploidy of the *L. sibirica* species. Thus, in 2004 Liu JQ. et al. carried out a comprehensive study on the uniformity of *Ligularia* genotypes, concluding that the variation of the karyotype structure at diploid level may be characteristic of chromosome evolution.

Genetic research continued with the study realised by Šmídová A. et al. in 2012, a paper that reveals that the studied populations of *L. sibirica* from the Czech Republic and Slovakia, maintain a high level of genetic diversity, not yet threatened by genetic factors. Krasņevska N. et al. have studied in 2017 the endopolyploidy of *Ligularia sibirica* species in several distinct populations from Poland, with the aim of developing the necessary measures for the protection of endangered species. The study concluded that the type of nutrient contamination is not the only factor that affects endopolyploidy in young *L. sibirica* leaves.

Two PhD theses from Europe were studying the *L. sibirica* relict from different points of view. The first work carried out by Heinken-Šmídová A. in 2012, "Study of factors influencing population dynamics of the plant species *Ligularia sibirica* (L.) Cass." has followed objectives such as: genetic diversity estimation and of the main habitat conditions requirements in the studied localities, as well as the identification of the optimum population size needed for the *L.* sibirica dynamics in the Czech Republic and Slovakia.

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Table 2. Ligularia sibirica (L.) Cass. – History of worldwide research

Nr. Crt.	Year	Author	Title	Journal / Book / Publication
1	1823	Cuvier F.	*Ligularia sibirica* (Linnaeus) Cassini	Dict. Sci. Nat.
2	1878	Timbal-Lagrave E. et al.	Du *Ligularia sibirica* Cass. Dans Les Pyrénées, Bulletin de la Société Botanique de France	Bull. Soc. bot. Fr.
3	1892	Franchet M. A.	Les Genres *Ligularia*, *Senecillis*, Cremanthodium, Et Leurs Espèces Dans L'asie Centrale Et Orientale	Bulletin de la Société Botanique de France
4	1936	Mattauch F.	Über die *Ligularia sibirica* (L.) Cass.	Natur Heimat
5	1950	Kneblová V.	Reservace u Rečkova a *Ligularia sibirica* (L.) Cass.	Čes. Bot. Listy
6	1953 - 1957	Ohwi J.	Flora of Japan (in Engleza)	National Science Museum
7	1965	Ishii H. et al.	Studies on sesquiterpenoids. Structure of ligularol and ligularone from *Ligularia sibirica* Cass.	Tetrahedon
8	1968	Tanahashi Y. et al.	Ligularenolide. A new sesquiterpene lactone of eremophilane type	Tetrahedron Letters
9	1976	Baudiere A. & Serve L.	Les groupements à *Ligularia sibirica* Cass. du Capcir (haute vallée de l'Aude, Pyrénées-Orientales)	Bulletin de la Société Botanique de France
10	1976	Chater A.O.	*Plantaginaceae* to *Compositae* (and *Rubiaceae*) Flora Europaea	-
11	1984	Jeffrey C. & Chen YL.	Taxonomic studies on the tribe *Senecioneae* (*Compositae*) of eastern Asia,	Kew Bulletin
12	1988	Broz E & Przemyski A.	Stanowisko *Ligularia sibirica* (L.) Cass. na obszarze Niecki Wloszczowskiej. (The locality of *Ligularia sibirica* (L.) Cass. in the Wloszczowska Trough (Central Poland))	Flor. Geobot
13	1989	Liu SW.	Compositae-Senecioneae. Flora Reipublicae Popularis Sinicae	-
14	1990	Šegulja N. & Krga M.	*Ligularia sibirica* (L.) Cass. – Eine neue art der Jugoslawischen flora	Acta. Bot. Croat., Zagreb
15	1991	Vane-Wright R.I. et al.	What to protect? Systematics and the agony of choice	Biol. Conserv.,
16	1994	Liu SW. et al.	Origin, evolution and distribution of *Ligularia* Cass. (Compositae)	Acta Phytotaxonomica Sinica
17	1998	Huang T-C.	Flora of Taiwan 2nd edition, Angiosperms – Dicotyledons,	Editorial Committee of the Flora of Taiwan
18	1999	Kukk Ü.	Eesti kaitstavad taimeliigid / Protected plants of Estonia	-
19	1999	Procházka F. & Pivničková M.	*Ligularia sibirica* (L.) Cass., Červená kniha ohrozených a vzácnych druhov rastlín a živočíchov SR a ČR	-
20	2000	Mühlenberg M. et al.	The conservation value of West-Khentei, North Mongolia: Evaluation of plant and butterfly communities	Fragm. Flor. Geobot.,
21	2000	Poiarkova A.I.	*Ligularia* Cass. în Flora of the U.S.S.R.,	Smthsonian Insitution Libraries, Whasington D.C.

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22	2001	Sammul M.	Harilik kobarpea. Kaitsekorralduskava	-
23	2001	Ocakverdi H.	The Flora of the Mount Kisir (Kars and Ardahan) and Nearest Environs	Turk. J. Bot.
24	2002	Bensettiti F. et al.	«Cahiers d'habitats» Natura 2000. Connaissance et gestion des habitats et des espèces d'intérêt communautaire	-
25	2002	Gaudillat V. & Haury J. (eds.)	Habitats humides, Cahiers d'habitats	
26	2002	Tzvelev N.N. & Andrej A. Fedorov	Flora of Rusia. The European part and bordering regions	-
27	2002	Uniyal V.P.	Nanda Devi Expedition (Report).	Wildlife Institute of India
28	2003	Kukk Ü.	The distribution of *Ligularia sibirica* (L.) Cass. in Estonia and changes in its population	Biul Ogrodów Bot
29	2003	Ryttäri T. et al.	Monitoring of threatened vascular plants in Estonia and Finland–methods and experiences,	The Finnish Environment
30	2003	Wiedenfeld H. et al.	Pyrrolizidine Alkaloids from *Ligularia sibirica* Cass. and *Tephroseris integrifolia* L.	Sci. Pharm.
31	2003	Hendrych R.	Poznatky o druhu *Ligularia sibirica* v Čechách (On the occurrence of *Ligularia sibirica* in Bohemia)	Preslia
32	2003	Witkowski Z. J. et al.	Carpathian List of Endangered Species	-
33	2004	Slavík B.	*Ligularia* Cass.	Slavík B, Štěpánková J (eds) Květena České republiky, 7 (Flora of the Czech Republic, 7)
34	2004	Kļaviņa D. et al.	Tissue culture technology in conservation of threatened plant species of Latvia	Acta Universitatis Latviensis,
35	2004	Liu JQ.	Uniformity of karyotypes in *Ligularia (Asteraceae: Senecioneae*), a highly diversified genus of the eastern Qinghai–Tibet Plateau highlands and adjacent areas	Botanical Journal of the Linnean Society
36	2005	Kobiv Y.	*Ligularia sibirica* (L.) Cass. (*Asteraceae*) in the Chornohora mountains (Ukrainian Carpathians): population-ontogenetic parameters, morphology, taxonomy and conservation.	Ukrainian Bot. Jour.
37	2005	Pakalne M. & Kalnina L.	Mire ecosystems in Latvia, Stapfia 85, zugleich Kataloge der OÖ	Landesuseen Neue Serie 35, Biologiezentrum Linz
38	2005	Minayeva T. et al.	Mongolian Mires: from taiga to desert	Stapfia 85, zugleich Kataloge der OO¨
39	2006	Mirek Z. & Piękoś-Mirkowa H.	Występowanie języczki syberyjskiej *Ligularia sibirica* (L.) Cass. w Polsce–zagrożenia i problemy ochrony	Chrońmy Przyrodę Ojczystą
40	2008	Kull T. et al.	Necessity and reality of monitoring threatened European vascular plants	Biodiversity and Conservation
41	2009	Petrova A. & Vladimirov V. (eds)	Red List of Bulgarian vascular plants,	Phytologia Balcanica
42	2011	Bilz M. et al.	European Red List of Vascular Plants	-
43	2011	Šmídová A. et al.	Genetic diversity of a relict plant species,	Flora

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			Ligularia sibirica (L.) Cass. (*Asteraceae),*	
44	2011	Wang Y. et al.	Growth and Physiologic characteristics of *Ligularia sibirica* under livestock wastewater treatment	Journal of Nuclear Agricultural Sciences
45	2011	Wu Z. Y. et al.	Flora of China	Science Press (Beijing) & Missouri Botanical Garden Press
46	2011	Yang JL et al.	Phytochemicals and bioogical activity of *Ligularia* species	Nat Prod Bioprospect
47	2011	Zhang J. et al.	Purification Effect of *Ligularia sibirica* on Livestock Wastewater	Journal of Sichuan Agricultural University
48	2012	Wróblewska A. & Stawiarz E.	Flowering abundance and páollen productivity of *Ligularia clivorum* Maxim. and *Ligularia przewalskii* Maxim.	Acta Sci. Pol
49	2012	Heinken-Šmídová A.	Study of factors influencing population dynamics of the plant species *Ligularia sibirica* (L.) Cass., PhD. thesis	-
50	2012	Heinken-Šmídová A. & Münzbergová Z.	Population dynamics of the endangered, long-lived perennial species, *Ligularia sibirica,*	Folia Geobotanica
51	2012	Joosten H. et al.	Peatlands - Guidance for Climate Change Mitigation Through Conservation, Rehabilitation and Sustainable Use.	-
52	2014	Kadlečík J.	Carpathian Red List of Forest Habitats and Species, Carpathian List of Invasive Alien Species (draft).	The State Nature Conservancy of Slovak Republic
53	2014	Lanno K. & Sammul M.	The survival of transplants of rare *Ligularia sibirica* is enhanced by neighbouring plants	Folia Geobotanica
54	2014	Puchalski J. et al.	Seed banking of Polish endangered plants – the FlorNatur Project	Biodiversity Research and Conservation
55	2015	Horsák M. et al.	European glacial relict snails and plants: environmental context of their modern refugial occurrence in southern Siberia,	Boreas
56	2016	Zahariev D.	Biodiversity of relict vascular plants in Bulgaria	Int. Jour. of Res. St. in Biosc.
57	2017	Chytrý M. et al.	Flora and vegetation of the Czech Republic	-
58	2017	Krasņevska N. et al.	Endopolyploidy of Endangered Plant Species *Ligularia sibirica* in Different Environments	Proceedings of the 11th International Scientific and Practical Conference
59			Flora of Pakistan	http://www.tropicos.org/Name/2701004

The second paper, written by Kaire Lanno in 2014, *"Long-term changes in the Estonian flora and measures for conservation"*, wishes to find answers to some questions regarding the conservation of the studied species: what is the persistence of the studied species in different types of habitats in Estonia, to what extent the species is dependent on habitat characteristics and whether the decline of species in alluvial meadows is related to site quality.

The genus *Ligularia*, due to its intense biological activity and numerous biochemical compounds, has attracted the interest of scientists from China, Japan and Mongolia over the years. The *L. sibirica* species has beeing part of studies such as: *"Phytochemicals and biological activity of Ligularia species*", *"Ligularenolide. A new sesquiterpene lactone of eremophilane type*", *"Studies*

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on sesquiterpenoids. Structure of ligularol and ligularone from Ligularia sibirica Cass." and „*Pyrrolizidine Alkaloids from Ligularia sibirica Cass. and Tephroseris integrifolia L.*".
Due to their habitus, *Ligularia* species are also suitable for landscape architectural services in cultivars such as: "*Britt Marie Crawford*", "*Gregynog Gold*", "*The Rocket*", "*Zepter*". These cultivars were included in the list of species with optimum growth performance in the United Kingdom in 2017, being awarded by *The Award of Garden Merit* (AGM), contest organized annually by *British Royal Horticultural Society* (RHS).
Due to the presence of *Ligularia* species in wet habitats, it is important to know the diseases that can affect the conservation of relict species. In 2010 in China, You C-J. et al., have conducted studies on the *Coleosporium ligulariae* Thüm. species, identified in a first step on a *Ligularia sibirica* specimen and subsequently on another 10 species of *Ligularia*. Wang Y. et al. and Zhang J. et al., have demonstrated in 2011 that *L. sibirica* can be used in different applications of the modern biotechnology, both because of its excellent adaptation capacity and resistance to waste water pollution as well as its ability to purify wastewater from the livestock sector.

History of research in Romania (Table 3.)
In Romania research on *L. sibirica* species begins in 1796, when the naturalist Franz von Waldstein and the botanist Pál Kitaibel quotes the species for the first time as *Cineraria sibirica* identified in the Gutâi Mountains, Tăul lui Dumitru and Cavnic. Subsequently, the research continued in 1802, when Johann Christian Baumgarten mentioned the relict species to which he added other localities in Harghita County.
The botanist Philipp Johann Ferdinand Schur mentions the species in 1865: *Senecillis glauca* Gaertn. and *Senecillis carpathica* Schott, which have been found in Corongiș Mountain - Rodna Mountains and Piatra Secuiului - Rimetea, being mentioned the next locations with *L. sibirica* from Puturosu Mountain, Turia (Covasna) and Borsec. Michael Fuss in 1866 describes for the first time in a Romanian publication, *Transsilvaniae excursoria*, *L. sibirica* and *L. carpathica* taxa.
Florian Porcius in 1881, criticizes the few characters that Schur utilized to distinguish the species *Senecillis (Ligularia) glauca* and *Senecillis (Ligularia) carpathica*. At the same time, Porcius fits *L. sibirica* species in Hoppea genus.
The academician Nyárády E.I. brought in 1964 a very large contribution to the description of the *Ligularia* genus and also of the *L. sibirica* species in the *Flora Republicii Socialiste Române*.
Contributions to the study of *L. sibirica* species in Romanian peat bogs are also brought by academician Emil Pop through numerous publications, but also through the synthesis of the researches conducted in the country, in *Mlaştinile de Turbă din Republica Populară Romînă*, published in 1960.
Botanical research has continued to nowadays, to which had contributed reference names in the field as: Grecescu D., Resmeriță I., Morariu I., Beldie Al., Boșcaiu N., Drăghici Bibica, Coldea Gh., Kovács J. A., Stoicovici Lucia, Gergely I., Rațiu Flavia, Alexiu V., Drăgulescu C., Stancu Daniela Ileana, Neblea Monica, Cristea V., Răduțoiu D., etc.
The Convention on Biological Diversity (CBD) is today the most important international instrument in coordinating global policies and strategies on biodiversity conservation. Romania ratified the CBD through the Law nr. 58/1994. *L. sibirica* is one of the community important species in Romania, being mentioned in the Habitats Directive through the Annexes IIb, IVb and in OUG 57/2007 - Annexes 3, 4A. Nowadays, the size of the population is unrated, holding the conservation status as Data Deficient (DD). Three reference papers present the status of the species in Romania: "*Lista roşie a plantelor superioare din România*", "*Arii speciale pentru protecția şi conservarea*

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plantelor în România" and "*Ghidul de monitorizare a speciilor de plante de interes comunitar din România*".

Table 3. Ligularia sibirica (L.) Cass. – History of research in Romania

Nr. Crt.	Year	Author	Title	Journal / Book / Publication
1	1796	Pál Kitaibel şi Franz von Waldstein	*Cineraria sibirica*	Mlaştinile de turba din R.P.R. (Pop. E.)
2	1802	Johann Christian Gottlob Baumgarten	-	Enumeratio stirpium in Magno Transsilvaniae principatui
3	1857	Raţiu Flavia & Gergely I.	O nouă asociaţie vegetală pentru ţara noastră: *Calamagrostetum neglectae* Tengwal 20	Studia Univ. "Babeş-Bolyai" Seria Biologie
4	1865	Philipp Johann Ferdinand Schur	-	Enumeratio plantarum Transsilcaniae
5	1866	Michael Fuss	-	Flora Transsilvaniae excursoria
6	1881	Florian Porcius	Flora phanerogama din fostulu Districtu alu Naseudului	Transilvania
7	1886	Lajos Simonkai	-	Enumeratio florae transsilvanicae vesculosae critica
8	1898	Dimitrie Grecescu	-	Conspectul Florei României
9	1932	Papp C.	O dare de samă asupra excursiei a 6-a fitogeografică internaţională (I.P.E.) în munţii Moldovei	Rev. St. "V. Adamachi"
10	1939	Chirilei H.	Consideraţii fitosociologice şi biologice asupra unei noi turbării din jud. Câmpulung	Rev. Şt. "V. Adamachi"
11	1948	Burduja C.	Contribution floristique et chorologique relative a la Moldovie	Bull, de l'Ecole Polytechnique de Jassy,
12	1954	Pop E.	Studii botanice in mlaştinile noastre de turbă	Bul. St., Acad. R.P.R., Secţ. Şt. Biol., Agron., Geol., Geogr.
13	1958	Papp C.	Contribuţiuni la cunoaşterea florei şi vegetaţiei şi în special Archegoniatele dintre văile râurilor Oituz şi Uz, din reg. Bacău	An. Şt. Univ. " Al. I. Cuza" Iaşi, Ser. Nouă
14	1958	Pop E.	Regiunea de mlaştini eutrofe Drăgoiasa-Bilbor-Borsec şi importanţa ei fitogeografică	Ocr. nat.
15	1958	Kristó A.	Plante rare şi relicte ce trebuie ocrotite în mlaştinile de la Sâncrăieni „Borsáros"	Ocr. nat.
16	1960	Pop E.	Mlaştinile de turba din R.P.R.	Ed. Acad. Rep. Pop. Ro.
17	1960	Resmeriţă I. et al.	Contribuţii la cunoaşterea florei din Regiunea Baia – Mare	Com. Acad. R.P.R.
18	1961	Prodan I. & Buia Al.	Flora mică ilustrată a Republicii Populare Romîne	Ed. Agro-silvică
19	1962	Pop I. et al.	Vegetaţia din Valea Morii – Cluj, conservatoare de relicte glaciare	Contrib. Bot. Cluj,
20	1963	Şerbănescu M.	Contribuţii la studiul florei şi vegetaţiei algelor din mlaştinile eutrofe Hărman-Prejmer (Reg. Braşov)	St. cerc. Biol., Ser. Bot.
21	1964	Nyárády E.I.	Flora R. S. România,	Flora Republicii Populare Române

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22	1964	Borza Al.	Contribuţii la cunoaşterea moliinietelor din Regiunea Oaş-Maramureş	Contrib. Bot. Cluj
23	1964	Boşcaiu N., colab.	Contribuţii la cunoaşterea moliinietelor din Regiunea Oaş-Maramureş	Contrib. Bot. Cluj, pp. 241–248.
24	1964	Morariu I.	Aspecte din vegetaţia rezervaţiei de mlaştină de la Hărman	Ocr. nat.
25	1965	Pop E.	Problema relictelor glaciare in mlaştinile de turbă din România	St. şi Cerc. Biol. seria Botanică
26	1966	Morariu I. et al.	Sfatul popular al regiunii. Braşov	Consiliul regional pentru ocrotirea naturii
27	1966	Morariu I.	Mlaştinile de la Prejmer conservatoare de relicte floristice	Ocr. nat.
28	1967	Beldie Al.	Flora şi vegetaţia Munţiilor Bucegi	Ed. Acad. R.S.R.
29	1968	Drăghici Bibica	Flora şi vegetaţia Văii Dâmbovicioara şi a versantului estic al Pietrii Craiului	Teză de doctorat
30	1969	Coldea Gh. & Kovács J. A.	Ceretări fitocenologice în Munţii Nemirei	St. şi Cerc. Biol. Seria Botanică
31	1970	Ştefureac Tr.	Relicte şi endemisme în flora rezervaţiilor naturale din Bucovina	St. Com. Ocr. Nat.
32	1970	Morariu I. & Hortensia N.	*Saxifraga mutata* L. şi *Virga strigosa* (Willd.) Holub noi în flora României	St. Cerc. Biol., Ser. Bot.
33	1971	Păun M.M. & Popescu G.	*Ligularia sibirica* (L.) Cass. in Oltenia. (*Ligularia sibirica* (L.) Cass. en Oltenie).	Comun. Bot.
34	1971	Ularu P.	Specii relicte din mlaştina eutrofă de la Dumbrăviţa (jud. Braşov)	Ocr. nat. med. înconj.
35	1972	Danciu M.	Asociaţiile de rogoz din Mlaştina de la Ozunca	St. Şi Cerc. Biol. Seria Botanică
36	1972	Lungu L.	Importanţa fitogeogrfică a mlaştinii turboase din lunca Negrei Brostenilor de la Cristişor (Judeţul Suceava)	St. Com. Ocr. Nat.
37	1972	Raţiu Flavia	Asociaţii de rogozuri înalte din mlaştinile eutrofe ale Depresiunii Giurgeului	Contrib. Bot., Cluj-Napoca
38	1973	Heltmann H.	Contribuţii la studiul florei Ţării Bârsei	St. Com., Muz. Şt. Nat. Brukenthal
39	1974	Raţiu Flavia	Consideraţii generale asupra florei relictare a mlaştinilor eutrofe din Depresiunea Giurgeului	Ocr. Nat.,
40	1977	Stoicovici Lucia	Staţiuni cu *Ligularia sibirica* (L.) Cass. f. *araneosa* DC. În bazinele Dornei şi Bilborului, consideraţii fitocenologice şi ecologice	St. Cerc. Biol., Ser. Biol. Veget.
41	1979	Danciu M. & Kovács S.	Flora şi vegetaţia mlaştinilor de la Comandău (Jud. Covasna)	Contrib. Bot.
42	1980	Morariu I. & Drăghici B.	Contribuţii la flora Masivului Piatra Craiului	Studii si Cercet. De Biologie, seria Biologie Vegetală
43	1981	Raţiu Flavia & Gergely I.	Fitocenoze caracteristice mlastinilor eutrofe din bazinul inferior al Ciucului	Contrib. bot. Univ. Babes-Bolyai
44	1981	Seghedin G. et al.	Fânaţele cu *Ligularia glauca* (L.) O. Hoffm. de la Calafindeşti (Jud. Suceava)	St. Com. Ocr. Nat.
45	1982	Stoicovici Lucia	Raspidirea populatiilor relictare de *Ligularia sibirica* (L.) Cass. in R.S. Romania	Stud. Cerc. Biol., Biol. Veg.
46	1984	Moldovan I. et al.	List of rare, endemic and threathened plants in Romania, Notulae Botanicae	Horti Agrobotanici,
47	1986	Mititelu D. et al.	Flora Munţilor Călimani	An. St. Univ. ”Al. I. Cuza”

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48	1986	Buz Zoe	Semnificația fitogeografică și fitoistorică a complexului mlăștinos de la Fântâna Brazilor (Jud. Harghita)	Ocr. nat. med. Înconj.
49	1989	Gergely I. et al.	Flora și vegetația mlaștinii ”Răbufnitoarea” (Munții Turiei – Județul Covasna	Contrib. Bot. Cluj,
50	1992	Rațiu Flavia	Mlaștina eutrofă ”Dumbrava Harghitei”	Oct. nat. med. înconj.
51	1993	Mititelu D. et al.	Contribuții noi la cunoașterea florei și vegetației județului Bacău	St. Com. Muz. Șt. Nat. Bacău
52	1994	Oltean M. et al.	Lista roșie a plantelor superioare din România	St., Sint., Doc. Ecol., Acad. Română - Inst. de Biologie
53	1995	Alexiu V. et al.	Propunere de rezervație pe baza unui studiu fitocenologic în complexul de chei al Dâmboviței	Naturalia, St. Cerc. Muz. Jud.
54	1996	Seghedin T. G.	Cercetări privind flora și vegetația Carpaților din Bucovina Istorică	-
55	1997	Țibu Dominica	Rezervația naturală de la Rezervația naturală de la Stejari – Horaiț	Analele Bucovinei
56	1997	Beres I. et al.	Propuneri pentru înființarea unor noi rezervații naturale în județul Maramureș	Ocr. Nat. Med. Inconj.
57	1998	Jakab G.	Contributions to the knowledge of the bryophyte flora of the SE Carpathians (Romania)	Studia bot. Hung
58	1999	Drăgulescu C.	The hydrophilous and hygrophilous flora and vegetation from the upper and middle Olt river valley	Transylv. Rev. Syst. Ecol. Res.
59	2001	Mihăilescu S.	Flora și vegetația Masivului Piatra Craiului, PhD thesis	-
60	2002	Csergő A.- M.	The problem of the refugia of certain preglacial and glacial relict populations from the calciphilous flora of the Apuseni Mountains (Romania)	Contr. Bot. Cluj
61	2003	Alexiu V. & Stancu D.I.	*Carici remotae-Calthetum laetae* Coldea (1972) 1978 *ligularietosum sibiricae* nova subass. in the Brusturet Gorges (Piatra Craiului)	Research in Piatra Craiului National Park, I,
62	2003	Neblea Monica. & Alexiu V.	Aspects of vegetation from Zănoaga and Tătaru Gorges (The Bucegi Mountains)	Rev. Roum. Biol. – Biol Végét.
63	2003	Alexiu V.	Characterisation of the flora and vegetation of the upper stream of Dambovita	Research in Piatra Craiului National Park I,
64	2004	Alexiu V.	La végétation des gorges du bassin supérieur de Dambovitsa. Étude comparative	Colloques Phytosociologiques Végétation postglaciaire... E. Schweizerbart’sche verlagsbruchhandlung Stuttgart, Gebrüder Borntraeger Verlagsbuch-handlung Berlin-Stuttgart
65	2004	Dumitru M.	Contribuții la studiul florei și vegetației munților Parâng (Județul Gorj)	An. Univ. Din Craiova, Fac. Hort.
66	2004	Sanda V., Biță D.C., Barabaș N	Flora cormofitelor spontane și cultivate din România	Ed. Ion Borcea,
67	2005	Drăgulescu C.	The Hydrophilous and Hygrophilous flora and vegetation of Târnave rivers (Transylvania, Romania)	Transylv. Rev. Syst. Ecol. Res

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68	2006	Mardari C.	The istorical of botanical researches realized in Neagra Broştenilor river basin	Buletinul Grădinii Botanice
69	2007	Neblea Monica	Vegetația megaforbietelor din Valea Ialomiței (Munții Bucegi)	Ecos, 19
70	2007	Sârbu Anca et al.	Arii speciale pentru protecția şi conservarea plantelor în România	-
71	2008	Alexiu V.	Fitotaxoni amenintati la nivel global, european si national, identificati in judetul Argeş	ECOS
72	2008	Alexiu V.	The main sozological categories of the Argeş county	Contribuții Botanice,, Grădina Botanică ”Alexandru Borza”
73	2008	Chorney I. et al.	Rare, Endangered and endemic species of plants of the Chyvchyny/Civcin Mountains (Carpathians)	Transylvanian Review of Systematical and Ecological Research
74	2008	Ionescu D. et al.	Data about the designation of Dumbrăvița (Romania) complex as RAMSAR site	Transylv. Rev. Syst. Ecol. Res.
75	2009	Cicârlan V.	Flora ilustrată a României Pteridophyta et Spermatophyta	-
76	2009	Kapás A. et al.	Obtaining and identification of bioactive compounds from *Ligularia sibirica* (L.) Cass.	Studia Universitatis Babeş-Bolyai Chemia
77	2009	Neblea Monica	Phytosociological researches concerning habitats with *Ligularia sibirica* (L.) Cass From Meridional Carpathians	Analele Stiintifice ale Universitatii "Al. I. Cuza" din Iasi: Biologie Vegetală
78	2009	Speta F.	Betrachtungen zu den Floren Siebenbürgens aus Anlass der Neuerscheinung des Bildbandes „Wildpflanzen Siebenbürgens“ von E. Speta & L. Rákosy im Jänner 2010	Schriften Verein zur Verbreitung naturwissenschaftlicher Kenntnisse
79	2009	Tomescu C.V. & Chifu T.	The Vascular Flora from the Suceava River Basin (Suceava County)	Analele Univ. “Ştefan cel Mare” Suceava, Secțiunea Silvicultură
80	2010	Oprea A. & Sîrbu C.	Phytocoenotic surveys on some mesotrophic–eutrophic marshes in Eastern Romania	J. Plant Develop
81	2010	Burnaz S. & Balazs M.	Vascular plants and butterflies (*Lepidoptera: rhopalocera*), rare and protected species in Hunedoara county (Romania),	Brukenthal. Acta Musei
82	2010	Constantin M.	Associations of *Molinietalis* Koch 1926 (*Molinioarrhenatheretea* R. Tx. 1937) identified in Neagra Broştenilor Basin (Eastern Carpathians)	J. Plant. Develop
83	2011	Alexiu V. et al.	Studiul corologic al categoriilor sozologice din flora Judetului Arges pentru refacerea fitopopulatiilor periclitate prin metode conventionale si biotehnologice de inmultire	-
84	2012	Stancu Daniela Ileana	Red List of the threatened plants from Râiosu and Buda Mountains, Făgăraş Massif	Studii şi Comunicări, Seria Ştiințele Naturii, Muzeul Județean Argeş
85	2013	Kovács J. A. & Pálfalvi Pál	Adatok Székelyföld edényes flórájának es növényfölddrajzának ismeretéhez (Kelet-Erdély, Romania) 2	Kanitzia, Journal of Botany
86	2013	Brînzan T. et al.	Catalogul habitatelor, speciilor şi siturilor Natura 2000 în România	-
87	2013	Matei Andreea Natalia	The importance of conservation of Bilbor swamps	Argesis Studii şi Comunicări Seria Ştiintele Naturii
88	2013	Sârbu I. et al.	Plante vasculare din România. Determinator	Victor B Victor

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89	2013	Mânzu C. et al.	Current and future potential distribution of glacial relict *Ligularia sibirica* (Asteraceae) in Romania and temporal contribution of Natura 2000 to protect the species in light of global change	Carpathian Journal of Earth and Environmental Sciences
90	2013	Neblea Monica et al.	Data concerning forestry habitats from Buila-Vânturarița National Park	Journal of Horticulture, Forestry and Biotechnology
91	2014	Andreea Natalia Matei	Phytosociological study study concerning associations with *Ligularia sibirica* (L.) Cass. in Romania	Curent Trends in Natural Sciences
92	2014	Andreea Natalia Matei	Vulnerable flora species in Natural Park Bucegi	Marisia. Studii şi Materiale. Ştiinţele Naturii
93	2014	Răduțoiu D. & Ștefănescu D.	Site of vascular flora Târnovu Mare – Latoriția Vâlcea – Romania	Annals of the University of Craiova
94	2014	Stratulat Ghe. L.	Conservation measures for saxicole species in Grădiștea Muncelului Cioclovina Nature Park	Marisia. Studii şi Materiale. Ştiinţele Naturii
95	2014	Cristea V.	Phytodiversity hotspots for the city of Cluj-Napoca	Contrib. Bot.
96	2014	Andreea Natalia Matei	Phytosociological study concerning habitats with *Ligularia sibirica* (L.) Cass. from Harman Marsh	Annals of the University of Craiova
97	2014	Andreea Natalia Matei	Florist relicts from Harman Marsh, Argesis.	Studii şi Comunicari Seria Ştiinţele Naturii
98	2015	Andreea Natalia Matei	Phytosociological study concerning habitats with *Ligularia sibirica* (L.) Cass. and *Cladium mariscus* (L.) Pohl from Hărman Marsh	Contribuții Botanice vol. L, Grădina Botanică "Alexandru Borza"
99	2015	Andreea Natalia Matei	*Ligularia sibirica* (L.) Cass. chorology in Romania and Europe, along with worldwide chorology of genus *Ligularia*.	Marisia. Studii şi materiale, Ştiinţele Naturii
100	2015	Andreea Natalia Matei	Studies on *Ligularia sibirica* (L.) Cass. in to its southern point in Romania, Brusturetului Gorges, Argeş County	Curent Trends in Natural Sciences
101	2015	Andreea Natalia Matei	Floristic study of Dobreanului Stream Marsh, Harghita county	Drobeta seria Ştiintele Naturii
102	2015	Andreea Natalia Matei	Studies on *Ligularia sibirica* (L.) Cass. in its southern point in Romania, Brusturetului Gorges, Arges county	Current Trends in Natural Sciences
103	2015	Mihăilescu S.	Ghidul de monitorizare a speciilor de plante de interes comunitar din România	Institutul de Biologie Bucureşti – Academia Română
104	2016	Andreea Natalia Matei	Phytosociological study of *Ligularia sibirica* (L.) Cass. Habitats from Zănoagei Gorges (Bucegi Mountains) Romania	Marisia. Studii şi Materiale, Ştiinţele Naturii,
105	2016	Matei Andreea Natalia et al.	Responses to Drought and Salinity in the Endangered Species *Ligularia sibirica* (L.) Cass.	Bulletin of University of Agricultural Sciences and Veterinary Medicine
106	2017	Ursu T. M. et al.	Review of Habitat distribution, conservation status and human impact: the case of one Natura 2000 site in the Eastern Carpathians (Romania)	Contribuții Botanice, Grădina Botanică "Alexandru Borza" LII, Cluj Napoca
107	2017	Marelena & Radu Pușcarciuc	*Ligularia sibirica* & *glauca*	Munte şi flori http://www.muntesiflori.ro/ligularia-sibirica-glauca/

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Conservation measures have been taken since 1995, when Alexiu V. et al. come with a reservation proposal on the basis of a phytocenologycal study in the Dâmboviței Gorges Complex, where the *L. sibirica* species was found.

Kapás A. et al. conducted in 2009, the first study in Romania aimed to identify the bioactive compounds of the *L. sibirica* species, *"Obtaining and identification of bioactive compounds from Ligularia sibirica (L.) Cass.*".

In 2013 Ciprian Mânzu et al., presents a potential distribution of the *L. sibirica* species correlated with the possible climatic changes in the *"Current and future potential distribution of glacial relict Ligularia sibirica (Asteraceae) in Romania and temporal contribution of Natura 2000 to protect the species in light of global change*". The authors concluded that following climate changes will not affect the distribution of the species in the coming years. At the same time, they mentioned that the effectiveness of Natura 2000 system in Romania is below the optimum level.

Climate changes and the anthropic activities affect the conservation and distribution of numerous plant species, especially relict ones year by year. In order to find the response to abiotic stress caused by lack of water or soil salinization on *L. sibirica* species, Matei A.N. et al. have achieved the study in 2016, *"Responses to Drought and Salinity in the Endangered Species Ligularia sibirica (L.) Cass.*". The authors concluded that both water stress and salt stress have negative effects on the studied species.

4. CONCLUSIONS

The *Ligularia* genus includes species adapted to different climatic and environmental conditions on the European and Asian continent. Following the collected scientific material containing data of *L. sibirica*, the author found a total of 166 bibliographic sources, of which 107 belong to Romania. The number of scientific materials found in Romania is closely correlated with the distribution of the *L. sibirica* species in the country.

At the European and Asian level, studies of phytosociology, genetics, biochemistry, biotechnology and phytopathology were conducted on the studied species. In our country predominant taxonomic studies have been effectuated, being part of some floral works, monographs, etc., which need to be updated.

Up to now there are just few ecological studies of *L. sibirica* species populations in addition the species has not been studied much either from biochemically or cytotoxically point of view.

5. REFERENCES

Alexiu, V., Stancu, D.I. (1995). Propunere de rezervație pe baza unui studiu fitocenologic în complexul de chei al Dâmboviței [Reservation proposal based on a phytocenological study in Dambovita's gorges complex]. *Naturalia*,1, St. Cerc. Muz. Jud., Pitești, 119-127.

Alexiu, V. (2003). Characterisation of the flora and vegetation of the upper stream of Dambovita. *Research in Piatra Craiului National Park* (Vol. 1, pp. 100-118). Brasov: Ed. Phoenix, Brasov.

Alexiu, V., Stancu, D.I. (2003). *Carici remotae-Calthetum laetae Coldea (1972) 1978 ligularietosum sibiricae nova subass. in the Brusturet Gorges (Piatra Craiului)*, Research in Piatra Craiului National Park, I, Ed. Phoenix, Braşov, pp. 94-97.

Alexiu, V. (2004) *La végétation des gorges du bassin supérieur de Dambovitsa. Étude comparative [The vegetation of the gorges of the upper basin of Dambovita. Comparative analysis]*. Vol. Colloques Phytosociologiques XXVIII, Végétation postglaciaire. E. Schweizerbart'sche verlagsbruchhandlung Stuttgart, Gebrüder Borntraeger Verlagsbuch-handlung Berlin-Stuttgart, pp. 321-331.

Alexiu, V. (2008). *Fitotaxoni amenintati la nivel global, european si national, identificati in judetul Arges [Threatened phytotaxons at the global, European and national level, identified in Arges County]*, ECOS, 20, Ed. Cultura Pitești, Pitești, pp. 23-29.

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Alexiu, V. (2008). The main sozological categories of the Argeş county. *Contribuţii Botanice, XLIII, Grădina Botanică "Alexandru Borza", Cluj-Napoca*, 11-16.

Alexiu, V. (coord), Popescu, C., Neblea, M., Duta, M., Motounu, M., Teodorescu, Al., Stancu, D., Chiritoiu, M., Mestecaneanu, A., Murariu, R., Richiteanu, A., Oprea, M., Rusea, I. (2011). Studiul corologic al categoriilor sozologice din flora Judeţului Argeş pentru refacerea fitopopulaţiilor periclitate prin metode convenţionale şi biotehnologice de înmulţire [The corological study of the sozological categories in the argeş county Flora for the restoration of endangered phytopopulations by conventional and biotechnological methods of propagation]. *Ed. Universităţii din Piteşti*, 17-25.

Andrersson-Kottö, I., Gairdner, A.E. (1931). Interspecific crosses in the Genus Dianthus. *Genetica, 13 (1-2)*, 77-112.

Bănărescu, P., Boşcaiu, N., (1973). Biogeografie perspectivă genetică şi istorică [Genetic and historical biogeographical perspective] . *Ed. Ştiinţifică*, 146-147.

Baudiere, A., Serve, L. (1976). Les groupements à Ligularia sibirica Cass. du Capcir (haute vallée de l'Aude, Pyrénées-Orientales) [Groups at Ligularia sibirica Cass. Capcir (high valley of Aude, Pyrénées-Orientales)]. *Bulletin de la Société Botanique de France, 123 (3-4)*, 167-174.

Beldie, Al. (1967). *Flora şi vegetaţia Munţiilor Bucegi* [The flora and vegetation of Bucegi Mountains] (pp. 280). Bucureşti: Ed. Acad. R.S.R., Bucureşti.

Bensettiti, F., Gaudillat, V., Malengreau, D., Quéré, E. (coord.) (2002). « Cahiers d'habitats » Natura 2000. Connaissance et gestion des habitats et des espèces d'intérêt communautaire. *Espèces végétales [Natura 2000. Knowledge and management of habitats and species of community interest. Plant species]* (T. 6, pp. 191-193). Paris: Éd. La Documentation française, Paris.

Beres, I., colab. (1997). Propuneri pentru înfiinţarea unor noi rezervaţii natural în judeţul Maramureş [Proposals for the establishment of new natural reserves in Maramureş County]. *Ocr. Nat. Med. Inconj.* (41, (1-2), pp. 53-56), Ed. Acad. R.P.R..

Bilz, M., Kell, S.P., Maxted, N., Lansdown, R.V. (2011). *European Red List of Vascular Plants* (pp. 101). Luxembourg: Publications Office of the European Union, Luxembourg.

Borza, Al. (1958). Contribuţii la flora şi vegetaţia din răsăritul României [Contributions to flora and vegetation of the eastern Romania]. *Contrib. Bot. Cluj*, 127-158.

Boşcaiu, N., Soran, V., Diaconeasa, B. (1964). Contribuţii la cunoaşterea moliinietelor din Regiunea Oaş-Maramureş [Knowledge contributions of molinietes in the Oas-Maramures Region]. *Contrib. Bot. Cluj*, 241–248.

Brînzan, T.(eds.), Bădărău, A.S., Murariu, D., Staicu, C., Patriche, N., Ciubuc, C., Hulea, D. (2013). *Catalogul habitatelor, speciilor şi siturilor Natura 2000 în România [Catalog of habitats, species and Natura 2000 sites in Romania]* (pp. 143-601). Bucureşti: Ed. Fundaţia Centrul Naţional pentru Dezvoltare Durabilă, Bucureşti.

Broz, E., Przemyski, A. (1988). Stanowisko Ligularia sibirica (L.) Cass. na obszarze Niecki Wloszczowskiej. (The locality of Ligularia sibirica (L.) Cass. in the Wloszczowska Trough (Central Poland)). *Fragm. Flor. Geobot, 31-32 (3-4)*, 295-299.

Burduja, C. (1948). Contribution floristique et chorologique relative a la Moldovie [Floristical and corological contributions of Moldova]. *Bull, de l'Ecole Polytechnique de Jassy, 3*, 474-488.

Burnaz, S., Balazs, M. (2010). Vascular plants and butterflies (Lepidoptera: rhopalocera), rare and protected species in Hunedoara county (Romania). *Brukenthal. Acta Musei, V(3)*, Sibiu, 613-626.

Buz, Z. (1986). Semnificaţia fitogeografică şi fitoistorică a complexului mlăştinos de la Fântâna Brazilor (Jud. Harghita) [Phytogeographical and phyto-historical significance of the marsh complex at Fântâna Brazilor (Harghita County)]. *Ocr. nat. med. înconj., 30 (1)*, 42-47.

Carnaval, A.C., Hickerson, M.J., Haddad, C.F.B., Rodrigues, M.T., Moritz, C. (2009). Stability predicts genetic diversity in the Brazilian Atlantic Forest hotspot. *Science, 323*, 785–789.

Chater, A.O. (1976). Ligularia Cass. In T.G. Tutin, V.H. Heywood, N.A. Burges, D.H. Valentine, eds., *Flora Europaea - Plantaginaceae to Compositae (and Rubiaceae)* (4, pp. 205). Cambridge: Cambridge University Press, UK

Chirilei, H. (1939). Consideraţii fitosociologice şi biologice asupra unei noi turbării din jud. Câmpulung [Phytosociological and biological considerations on a new peat bog in Câmpulung County]. *Bucovina, Rev. Şt. "V. Adamachi", XXV (2)*, 103-104.

Chorney, I., Budzhak, V., Tokaryuk, A. (2008). Rare, Endangered and endemic species of plants of the Chyvchyny/Civcin Mountains (Carpathians). *Transylvanian Review of Systematical and Ecological Research, Sibiu Iss. 5*, 37-44.

Chytrý, M., Danihelka, J., Kaplan, Z., Pyšek, P. (eds.) (2017). Flora and vegetation of the Czech Republic. *Springer International Publiishing AG*, Switzerland.

*Corresponding author, E-mail address: mateiandreeanatalia@gmail.com

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Current Trends in Natural Sciences (CD-Rom)
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Ciocârlan, V., (2009). *Flora ilustrată a României Pteridophyta et Spermatophyta [Iillustrated flora of Romania Pteridophyta et Spermatophyta]* (2, pp. 817). Bucureşti: Ed. Ceres, Bucureşti.

Coldea, Gh., Kovács, A. (1969). Cercetări fitocenologice în Munţii Nemirei [Phytosociological researches in the Nemira Mountains]. *St. Şi Cerc. Biol. Seria Botanică, T. 21, Nr. 2*, Bucureşti, 95-104.

Constantin, M. (2010). Associations of Molinietalis Koch 1926 (Molinioarrhenatheretea R. Tx. 1937) identified in Neagra Broştenilor Basin (Eastern Carpathians). *J. Plant. Develop., 17*, 109-125.

Cristea, V. (2014). Phytodiversity hotspots for the city of Cluj-Napoca. *Contrib. Bot.*, XLIX, Cluj Napoca, 191-200.

Csergő, A.- M. (2002). The problem of the refugia of certain preglacial and glacial relict populations from the calciphilous flora of the Apuseni Mountains (Romania). *Contr. Bot. Cluj, XXXVII*, 251-262.

Cuvier, F. (1823). IPNI / The International Plant Names Index. *Dict. Sci. Nat., 26*, 402.

Danciu, M. (1972). Asociaţiile de rogoz din Mlaştina de la Ozunca [Marsh associations in Ozunca Marsh]. *St. Şi Cerc. Biol. Seria Botanică, T. 24, Nr. 2*, Bucureşti, 83-94.

Danciu, M., Kovács, S. (1979). Flora şi vegetaţia mlaştinilor de la Comandău [Flora and vegetation of Comandau Marshes] (Jud. Covasna). *Contrib. Bot., 19*, Cluj, 155-161.

Drăghici, B. (1968). Flora şi vegetaţia Văii Dâmbovicioara şi a versantului estic al Pietrii Craiului [Flora and vegetation in the Dâmbovicioara Valley and the eastern slope of Piatra Craiului]. PhD Thesis. Buchaest.

Drăgulescu, C. (1999). The hydrophilous and hygrophilous flora and vegetation from the upper and middle Olt river valley. *Transylv. Rev. Syst. Ecol. Res., 1*, 13-30.

Drăgulescu, C. (2005). The Hydrophilous and Hygrophilous flora and vegetation of Târnave rivers (Transylvania, Romania), "The Târnava River Basin". *Transylv. Rev. Syst. Ecol. Res., 2*, 13-30.

Dumitru, M. (2004). Contribuţii la studiul florei şi vegetaţiei munţilor Parâng (Judeţul Gorj) [Contributions to the flora and vegetation study of Parâng Mountain (Gorj County)]. *An. Univ. Din Craiova, Fac. Hort. /Vol. Omagial, VII (XLIII)*, 101-104.

Fischer, M., Matthies, D. (1998). Effects of population size on performance in the rare plant Gentianella germanica. *J.Ecol., 86*, 195-204.

Franchet, M.A. (1892). Les Genres Ligularia, Senecillis, Cremanthodium, Et Leurs Espèces Dans L'asie Centrale Et Orientale [The Genres Ligularia, Senecillis, Cremanthodium, and their species in central and eastern Asia]. *Bulletin de la Société Botanique de France, 39 (7)*, 279-307.

Gaudillat, V., Haury, J. (eds.), Barbier, B., Peschadour, F. (2002). Habitats humides [Wet habitats]. In Bensetiti F. eds. Cahiers d'habitats, T.3. *Ed. La Documentation Fran□aise*, Paris, 191-193.

Gergely, I., Groza, Gh., Kisgyörgy, B. (1989). Flora şi vegetaţia mlaştinii "Răbufnitoarea" [The flora and the vegetation of "Răbufnitoarea" marsh.] (Munţii Turiei – Judeţul Covasna). *Contrib. Bot. Cluj*, 25-36.

Graham, C.H., Moritz, C., Williams, S.E. (2006). Habitat history improves prediction of biodiversity in rainforest fauna. *Proc. Natl. Acad. Sci. U.S.A., 103*, 632–636.

Grandcolas, P., Mattier, R., Legendre, F., Pellens, R. (2011). Mapping extrinsic traits such as extinction risks or modelled bioclimatic niches on phylogenies: does it make sense at all?. *Cladistics, 27*, 181-185.

Grandcolas, P., Nattier, R., Trewick, S. (2014). Relict species: a relict concept. *Trends in Ecology & Evolution, 29 (12)*, 655–663.

Grecescu, D. (1898). *Conspectul Florei României* [Summary of Romanian flora] (pp.: 320, 722, 723). Bucureşti: Tipografiea Dreptatea, Bucureşti.

Heinken-Šmídová, A. (2012). Study of factors influencing population dynamics of the plant species Ligularia sibirica (L.) Cass.. PhD. thesis. Olomouc: Palacký Univerzity Olomouc, Faculty of Science, Department of Botany.

Heinken-Šmídová, A., Münzbergová, Z. (2012). Population dynamics of the endangered, long-lived perennial species, Ligularia sibirica. *Folia Geobotanica*, 1-22.

Heltmann, H. (1973). Contribuţii la studiul florei Ţării Bârsei [Contributions to the study of the Bârsa Land flora]. *St. Com., Muz. Şt. Nat. Brukenthal*, Sibiu, 81-93.

Hendrych, R. (2003). Poznatky o druhu Ligularia sibirica v Čechách (On the occurrence of Ligularia sibirica in Bohemia). *Preslia, 75*, 39–69.

Horsák, M., Chytrý, M., Hájková, P., Hájek, M., Danihelka, J., Horsáková, V., Ermakov, N., German, D.A., Kočí, M., Lustyk, P., Nekola, J.C., Preislerová, Z., Valachovič, M. (2015 October). European glacial relict snails and plants: environmental context of their modern refugial occurrence in southern Siberia. *Boreas, 44*, 638–657.

Huang, T.-C. (1998). *Flora of Taiwan 2nd edition, Angiosperms – Dicotyledons* (4, pp. 1012-1014). Taipei: Ed. by the Editorial Committee of the Flora of Taiwan, Department of Botany, National Taiwan University, Taipei, Taiwan,.

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Ionescu, D., Popescu, V., Iordache, D. (2008). Data about the designation of Dumbrăvița (Romania) complex as RAMSAR site, "The Wetlands Diversity". *Transylv. Rev. Syst. Ecol. Res*, *6*, 185-190.

Ishii, H., Tozyo, T., Minato, H. (1965). Studies on sesquiterpenoids - IX: Structure of ligularol and ligularone from Ligularia sibirica Cass. *Tetrahedon*, *21 (9)*, Pergamon Press Ltd., Japan, 2605-2610.

Jakab, G. (1998). Contributions to the knowledge of the bryophyte flora of the se Carpathians (Romania). *Studia bot. Hung*., *29*, 49-57.

Jeffrey, C., Chen, Y.L. (1984). Taxonomic studies on the tribe Senecioneae (Compositae) of eastern Asia. *Kew Bulletin*, *39*, 205–446.

Joosten, H., Tapio-Biström, M.L., Tol, S. (2012). Peatlands - Guidance for Climate Change Mitigation Through Conservation, Rehabilitation and Sustainable Use. *FAO and Wetlands International*

Kadlečík, J. (2014). Carpathian Red List of Forest Habitats and Species, Carpathian List of Invasive Alien Species (draft). The State Nature Conservancy of Slovak Republic. *Banská Bystrica*, 234.

Kapás, A., Ábrahám, B., András, C.D., Lányi, S., Dobre, T.Gh. (2009). Obtaining and identification of bioactive compounds from Ligularia sibirica (L.) Cass.. *Studia Universitatis Babeş-Bolyai Chemia*, LIV, *Sp. Iss. (2)*, 21-26.

Kļaviņa, D., Gailīte, A., Jakobsone, G., Ņečajeva, J., Gavrilova, G. (2004). Tissue culture technology in conservation of threatened plant species of Latvia. *Acta Universitatis Latviensis, Biology*, *676*, 183-188.

Kneblová, V. (1950). Reservace u Rečkova a Ligularia sibirica (L.) Cass.. *Čes. Bot. Listy*, *3*, Praha, 17-21.

Kobiv, Y. (2005). Ligularia sibirica (L.) Cass. (Asteraceae) in the Chornohora mountains (Ukrainian Carpathians): population-ontogenetic parameters, morphology, taxonomy and conservation. *Ukrainian Bot. Jour.*, *62 (3)*, 383–395.

Komarov, V.L. (coord), Schischkin, B. K., Bobrov, E.G., Shetler, S.G., Unumb, E. (1961). *Flora of the URSS*, Ed. Akademiya Nauk SSSR, Translated from Russian Smithsonian Institution Libraries Washington, D.C., 2000, *XXVI*, Moscow-Leningrad, 752-815. http://www.biodiversitylibrary.org/page/30006425#page/8/mode/1up

Kovács, J.A., Pálfalvi, P. (2013). Adatok Székelyföld edényes flórájának es növényfölddrajzának ismeretéhez [Data on the study of Székelyföld flora and vegetation] (Kelet-Erdély, Romania) 2. *Kanitzia 20, Journal of Botany*, Szombathely/Ungaria, 119-182.

Krasņevska, N., Grauda, D., Kļaviņa, D., Rashal, I. (2017). Endopolyploidy of Endangered Plant Species Ligularia Sibirica in Different Environments. *Proceedings of the 11th International Scientific and Practical Conference. Volume I*, 161-164.

Kristó, A. (1958). Plante rare şi relicte ce trebuie ocrotite în mlaştinile de la Sâncrăieni „Borsáros" [Rare plants and relicts needed to be protected in the "Borsáros" Sâncrăieni marshes]. *Ocr. nat.*, *3*, 154-157.

Kukk, Ü. (1999). Eesti kaitstavad taimeliigid [Protected plants of Estonia]. *Huma*, Tartu, 1-79.

Kukk, Ü. (2003). The distribution of Ligularia sibirica (L.) Cass. in Estonia and changes in its population. *Biul Ogrodów Bot*, *12*, 11-22.

Kull, T., Sammul, M., Kull, K., Lanno, K., Tali, K., Gruber, B., Schmeller, D., Henle, K. (2008). Necessity and reality of monitoring threatened European vascular plants. *Biodiversity and Conservation*, *17 (14)*, 3383.

Lanno, K., Sammul, M. (2014). The survival of transplants of rare Ligularia sibirica is enhanced by neighbouring plants. *Folia Geobotanica*, *49 (2)*, 163-173.

Lanno, K. (2014). Long-term changes in the Estonian flora and measures for conservatioin. PhD Thesis. Tartu, Estonia.

Li, P.L., Zhang, Z.X., Jia, Z.J. (2008). Four New Eremophilane Derivatives from Ligularia sagitta, *Chem. Letters*, *37*, 308–309.

Liao, J.C., Zhu, Q.X., Yang, X.P., Jia, X.J. (2002). Sesquiterpenes from Ligularia Hodgsonii. *J. Chin. Chem. Soc*, *49*, 129-132.

Lienert, J. (2004). Habitat fragmentation effects on fitness of plant population – a review. *J. Nat. Conserv*., *12*, 53-72.

Liu, J.Q. (2004). Uniformity of karyotypes in Ligularia (Asteraceae: Senecioneae), a highly diversified genus of the eastern Qinghai–Tibet Plateau highlands and adjacent areas. *Botanical Journal of the Linnean Society*, *144 (3)*, 329–342.

Liu, S.W. (1989). Compositae-Senecioneae. Flora Reipublicae Popularis Sinicae [The People's Republic of China, Flora]. Beijing: *Science Press.* Vol. 77 (2).

Liu, S.W., Deng, D.S., Liu, J.Q. (1994). Origin, evolution and distribution of Ligularia Cass. (Compositae). *Acta Phytotaxonomica Sinica*, *32*, 514–525.

Lungu, L. (1972). Importanța fitogeogrfică a mlaștinii turboase din lunca Negrei Brostenilor de la Cristișor [The phytogeographical significance of the marsh from Negre Brostenilor meadow, Cristișor] (Județul Suceava). *St. Com. Ocr. Nat.*, Suceava, *3*, 159-166.

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Mânzu, C., Gherghel, I., Zamfirescu, Ş., Zamfirescu, O., Roşca, I., Strugariu, A. (2013). Current and future potential distribution of glacial relict Ligularia sibirica (Asteraceae) in Romania and temporal contribution of Natura 2000 to protect the species in light of global change. *Carpathian Journal of Earth and Environmental Sciences, 8 (2)*, 77–87.

Mardari, C. (2006). The istorical of botanical researches realized in Neagra Broştenilor river basin. *Buletinul Grădinii Botanice Iaşi*, *13*, 113-118.

Matei, A.N. (2013). The importance of conservation of Bilbor swamps. *Argesis Studii şi Comunicări Seria Ştiinţele Naturii*, Arges County Museum, *XXI*, 35-41.

Matei, A.N. (2014). Phytosociological study concerning associations with Ligularia sibirica (L.) Cass. in Romania. *Current Trends in Natural Sciences*, University of Pitesti, Faculty of Science, *3 (6)*, 54-60.

Matei, A.N. (2014). Florist relicts from Harman Marsh. *Argesis. Studii şi Comunicări Seria Ştiinţele Naturii*, Arges County Museum, *XXII*, 7-19.

Matei, A.N. (2014). Vulnerable flora species in Natural Park Bucegi. *Marisia. Studii şi Materiale. Ştiinţele Naturii*, Mureş County Museum, *XXXIII-XXXIV*, 97-111.

Matei, A.N. (2014). Phytosociological study concerning habitats with Ligularia sibirica (L.) Cass. from Harman Marsh. *Annals of the University of Craiova*, Craiova, *XIX (LV)*, 511-516.

Matei, A.N. (2015). Floristic study of Dobreanului Stream Marsh, Harghita county. *Drobeta seria Ştiintele Naturii*, Muzeul Regiunii Portilor de Fier, *XXV*, 51-56.

Matei, A.N. (2015). Phytosociological study concerning habitats with Ligularia sibirica (L.) Cass. and Cladium mariscus (L.) Pohl from Harman Marsh. *Contributii Botanice* 50, Grădina Botanica "Alexandru Borza", Cluj-Napoca, 105-111.

Matei, A.N. (2015). Studies on Ligularia sibirica (L.) Cass. in its southern point in Romania, Brusturetului Gorges, Arges county. *Current Trends in Natural Sciences*, University of Pitesti, Faculty of Science, Pitesti, *4(8)*, 48-55.

Matei, A.N. (2015). Ligularia sibirica (L.) Cass. chorology in Romania and Europe, along with worldwide chorology of genus Ligularia. *Marisia. Studii şi Materiale, Ştiinţele Naturii*, Muzeul Judeţean Mureş, Târgu Mures, *XXXV*, 57-66.

Matei, A.N. (2016). Phytosociological study of Ligularia sibirica (L.) Cass. Habitats from Zănoagei Gorges (Bucegi Mountains), Romania. *Marisia. Studii şi Materiale, Ştiinţele Naturii*, Târgu Mureş, *XXXVI*, 51-64.

Matei, A.N., Al Hassan, M., Boscaiu Neagu, M.T., Alexiu, V., Vicente Meana, Ó. (2016). Responses to Drought and Salinity in the Endangered Species Ligularia sibirica (L.) Cass.. *Bulletin of University of Agricultural Sciences and Veterinary Medicine*, *73(2)*, 252-253.

Mattauch, F. (1936). Über die Ligularia sibirica (L.) Cass. [About Ligularia sibirica (L.) Cass.]. *Natur Heimat*, Aussig, *7*, 57–62.

Mettler, L., Gregg, T. (1974). *Genetica populaţiilor şi evoluţia* [Population genetics and evolution] (pp. 279). Bucureşti: Edit. Ştiinţifică, Bucureşti.

Mihăilescu, S. (2001). Flora şi vegetaţia Masivului Piatra Craiului [The flora and vegetation of the Piatra Craiului Massif]. PhD Thesis. Bucuresti: Ed. Vergiliu, 141.

Mihăilescu, S., Anastasia, P., Popescu, A., Alexiu, V.F., Negrean, G.A., Bodescu, F., Manole (Aiftimie), A., Ion, R.G., Goia, I.G., Holobiuc, I., Vicol, I., Neblea, M.A., Dobrescu, C., Mogîldea, D. E., Sanda, V., Biţă-Nicolae, C.D., Comănescu, P. (2015). *Ghidul de monitorizare a speciilor de plante de interes comunitar din România* [Monitoring guide for plant species of community interest in Romania] (pp. 66-67). Institutul de Biologie Bucureşti – Academia Română, Constanţa: Ed. Dobrogea, Constanţa.

Minayeva, T., Sirin, A., Dorofeyuk, N., Smagin, V., Bayasgalan, D., Gunin, P., Dugardjav, Ch., Bazha, S., Tsedendash, G., Zoyo, D. (2005). Mongolian Mires: from taiga to desert. *Stapfia 85, zugleich Kataloge der OO¨ (Landesmuseen Neue Serie), 35*, 335-352.

Mirek, Z., Piękoś-Mirkowa, H. (2006). Występowanie języczki syberyjskiej Ligularia sibirica (L.) Cass. w Polsce– zagrożenia i problemy ochrony [Occurrence of the Siberian tongue Ligularia sibirica (L.) Cass. in Poland, threats and protection problems]. *Chrońmy Przyrodę Ojczystą, 62 (4)*, 71–77.

Mititelu, D., Viţalariu, Gh., Chifu, T., Ştefan, N., Dăscălescu, D., Horeanu, Cl. (1986). Flora Munţilor Călimani. [Calimani Mountains Flora] *An. St. Univ. "Al. I. Cuza", Iaşi, a. Biol., XXXII (2)*, 28-30.

Mititelu, D., Baraba□, N., Bărcâ, C., Costică, M. (1993). Contribuţii noi la cunoaşterea florei şi vegetaţiei judeţului Bacău [New contributions to knowledge of the flora and vegetation of Bacău county]. *St. Com. Muz. Şt. Nat. Bacău*, 1980-1993, 81-108.

Moldovan, I., Pázmány, D., Szabö, A., Chirca, E., Leon, Ch. (1984). List of rare, endemic and threathened plants in Romania. *Notulae Botanicae Horti Agrobotanici*, Cluj-Napoca, *XIV*, 5-16.

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Current Trends in Natural Sciences (on-line)
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Current Trends in Natural Sciences (CD-Rom)
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ISSN-L: 2284-9521

Morariu, I. (1964). Aspecte din vegetația rezervației de mlaștină de la Hărman [Aspects from the vegetation of the marsh reserve in Harman]. *Ocr. nat., 8 (1)*, 9-20.

Morariu, I. (1966). Mlaştinile de la Prejmer conservatoare de relicte floristice [Swamps from Prejmer conservatory of floral relict species]. *Ocr. nat., 10 (1)*, 49-58.

Morariu, I., Hortensia, N. (1970). Saxifraga mutata L. şi Virga strigosa (Willd.) Holub noi în flora României [Saxifraga mutata L. and Virga strigosa (Willd.) Holub new in Romanian flora]. *St. cerc. Biol., Ser. Bot., 22 (4)*, 291-296.

Morariu, I., Drăghici, B. (1980). Contribuții la flora Masivului Piatra Craiului [Contributions of Piatra Craiului Massif flora]. *Studii si Cercet. De Biologie, seria Biologie Vegetală*, București, *T. 32 (1)*, 1-6.

Morariu, I., Giochia, V., Ularu, P. (1966). *Sfatul popular al regiunii. Braşov [The popular advice of the Braşov region]* (pp. 52). Braşov: Consiliul regional pentru ocrotirea naturii, Braşov.

Mühlenberg, M., Slowik, J., Samja, R., Dulamsuren, Ch., Gantigmaa, Ch., Woyciechowski, M. (2000). The conservation value of West-Khentei, North Mongolia: Evaluation of plant and butterfly communities. *Fragm. Flor. Geobot., 45*, 63-90.

Murienne, J., Guilbert, E., Grandcolas, P. (2009). Species diversity in the New Caledonian endemic genera Cephalidiosus and Nobarnus (Insecta: Heteroptera: Tingidae), an approach using phylogeny and species distribution modelling. *Biol. J. Linn. Soc., 97*, 177–184.

Neblea, M., Alexiu, V. (2003). Aspects of vegetation from Zănoaga and Tătaru Gorges (The Bucegi Mountains). *Rev. Roum. Biol. – Biol Végét.*, T. *48 (1-2)*, 63-75.

Neblea, M. (2007). Vegetația megaforbietelor din Valea Ialomiței (Munții Bucegi) [The vegetation of megaforbits from Ialomiței Valley (Bucegi Mountains)]. *Ecos, 19*, 21-24.

Neblea, M. (2009). Phytosociological researches concerning habitats with Ligularia sibirica (L.) Cass From Meridional Carpathians. *Analele Stiintifice ale Universitatii "Al. I. Cuza" din Iasi: Biologie Vegetală, Sectiunea II A*, Iaşi, *LV (2)*, 145-154.

Neblea, M., Comănescu-Paucă, M., Bodescu, F. (2013). Data concerning forestry habitats from Buila-Vânturarița. *Journal of Horticulture, Forestry and Biotechnology, 17(2)*, 158-165.

Nyárády, E.I. (1964). Genul Ligularia Cass. [Ligularia Cass. genus]. In T. Săvulescu (red.), *Flora R. S. România (1952-1976)* (IX, pp. 587-590). București: Ed. Acad. Române, București.

Ocakverdi, H. (2001). The Flora of the Mount Kisir (Kars and Ardahan) and Nearest Environs. *Turk. J. Bot.*, Turkey, *25*, 311-334.

Ohwi, J. (1953-1957). *Flora of Japan* (pp. 879-882). Tokyo: National Science Museum, Tokyo, Japan.

Oltean, M., Negrean, G., Popescu, A., Roman, N., Dihoru, G., Sanda, V., Mihăilescu, S. (1994). Lista roşie a plantelor superioare din România [Red list of superior plants in Romania]. *St., Sint., Doc. Ecol.*, Acad. Română - Inst. de Biologie, *I*, 1-52.

Onete, M. (2008). Studiul ecologic al unor populații de Dianthus callizonus şi Dianthus gelidus [Ecological study of some populations of Dianthus callizonus and Dianthus gelidus]. PhD Thesis. București: Academia Română, Institutul de Biologie.

Oostermeijer, J.G.B., Luijten, S.H., Křenová, Z.V., den Nijs, J.C.M. (1998). Relationship between population and habitat characteristics and reproduction of the rare Gentiana pneumonanthe L.. *Conser. Biol., 12*, 1042-1053.

Oprea, A., Sîrbu, C. (2010). Phytocoenotic surveys on some mesotrophic–eutrophic marshes in Eastern Romania. *J. Plant Develop., 17*, 75-108.

Pakalne, M., Kalnina, L. (2005). Mire ecosystems in Latvia. *Stapfia 85, zugleich Kataloge der OÖ. Landesuseen Neue Serie, Biologiezentrum Linz/Austria, 35*, 147-174.

Papp, C. (1932). O dare de samă asupra excursiei a 6-a fitogeografică internațională (I.P.E.) în munții Moldovei [A report on the 6th International Phytogeographical Excursion (I.P.E.) in the Moldova mountains]. *Rev. St. "V. Adamachi", XVIII (1)*, 34-35.

Papp, C. (1958). Contribuțiuni la cunoaşterea florei şi vegetației şi în special Archegoniatele dintre văile râurilor Oituz şi Uz, din reg. Bacău [Contributions to the knowledge of flora and vegetation, and in particular Archaegonites between the valleys of the Oituz and Uz river, Bacău]. II. *Vegetația, An. Şt. Univ. " Al. I. Cuza" Iaşi, Ser. Nouă, III*, 387-422.

Păun, M.M., Popescu, G. (1971). Ligularia sibirica (L.) Cass. in Oltenia. (Ligularia sibirica (L.) Cass. en Oltenie). *Comun. Bot., XII*, 253-257.

Petrova, A., Vladimirov, V. (eds) (2009). Red List of Bulgarian vascular plants. *Phytologia Balcanica*, Sofia, *15 (1)*, 63-94.

Pojarkova, A.I. (1961). Buzul'nik – Ligularia. In B.K. Šiškin & E.G. Bobrov, eds., *Flora SSSR* (26, pp. 788–857). Moscova: Izdatel'stvo Akademii nauk SSSR, Moscova.

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Current Trends in Natural Sciences (on-line)
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Current Trends in Natural Sciences (CD-Rom)
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ISSN-L: 2284-9521

Poiarkova, A.I. (2000). Ligularia Cass., *Flora of the U.S.S.R.*, Smthsonian Insitution Libraries, Whasington D.C., vol. XXVI.

Pop, E. (1954). Studii botanice in mlaştinile noastre de turbă [Botanical studies in our peat marshes]. *Bul. St., Acad. R.P.R., Secţ. Şt. Biol., Agron., Geol., Geogr., VI (1)*, 347-406.

Pop, E. (1958). Regiunea de mlaştini eutrofe Drăgoiasa-Bilbor-Borsec şi importanţa ei fitogeografică [Drăgoiasa-Bilbor-Borsec eutrophic marshes region and its phytogeographical importance]. *Ocr. nat., 3*, 11-42.

Pop, E. (1960). *Mlaştinile de turba din R.P.R [Peat bogs from R.P.R.].*, Bucureşti: Ed. Acad. Rep. Pop. Ro, Bucureşti.

Pop, E. (1965). Problema relictelor glaciare in mlaştinile de turbă din România [The problem of glacial relics in Romania peat marshes]. *St. şi Cerc. Biol. seria Botanică*, Bucureşti, T. *17 (4-5)*, 427-444.

Pop, I., Csűrö-Káptalan, M., Rațiu, O., Hodişan, I. (1962). Vegetația din Valea Morii – Cluj, conservatoare de relicte glaciare [The vegetation in Valea Morii - Cluj, conserved of glacial relics]. *Contrib. Bot. Cluj*, 183-204.

Primack, R.B., Pătroescu, M., Rozylowicz, L., Lojă, C. (2008). Fundamentele conservării diversității biologice [Fundamentals of biological diversity conservation]. Ed. A.G.I.R., 668.

Procházka, F., Pivničková, M. (1999). *Ligularia sibirica (*L.) Cass., Čeřovský, J., Feráková, V., Holub, J., Maglocký, Š., Procházka, F. (Eds.), *Červená kniha ohrozených a vzácnych druhov rastlín a živočíchov SR a ČR*, 5, Vyššie rostliny, Príroda a.s., Bratislava, pp. 219.

Prodan, I., Buia, Al. (1961). *Flora mică ilustrată a Republicii Populare Romîne [Small Illustrated Flora of the Romanian People's Republic]*. Bucureşti: Ed. Agro-silvică, Bucureşti.

Puchalski, J., Niemczyk, M., Walerowski, P., Podyma, W., Kapler, A. (2014). Seed banking of Polish endangered plants – the FlorNatur Project. *Biodiversity Research and Conservation*, *34*, 65–72.

Răduțoiu, D., Ştefănescu, D. (2014). Site of vascular flora Târnovu Mare – Latorița Vâlcea – Romania. *Annals of the University of Craiova, Vol XIX (LV)*, 563-570.

Rațiu, F., Gergely, I. (1857). O nouă asociație vegetală pentru țara noastră: Calamagrostetum neglectae Tengwal 20 [A new plant association for our country: Calamagrostetum neglectae Tengwal 20]. *Univ Babes bolyai Stud. Ser. Biol.*, Cluj, 5-10.

Rațiu, F. (1972). Asociații de rogozuri înalte din mlaştinile eutrofe ale Depresiunii Giurgeului [Associations of high sedges in the eutrophic marshes of the Giurge Depression]. *Contrib. Bot.*, Cluj-Napoca, 263-293.

Rațiu, F. (1974). Considerații generale asupra florei relictare a mlaştinilor eutrofe din Depresiunea Giurgeului [General considerations on the relict flora of the eutrophic marshes from Giurgiu Depression]. *Ocr. Nat., 18 (1)*, 23-27.

Rațiu, F. (1992). Mlaştina eutrofă ”Dumbrava Harghitei” [Eutrophic marsh "Dumbrava Harghitei"]. *Oct. nat. med. înconj., 36, (1)*, 47-49.

Rațiu, F., Gergely, I. (1981). Fitocenoze caracteristice mlastinilor eutrofe din bazinul inferior al Ciucului [Characteristic phytocoenoses of the eutrophic marshes in the lower basin of Ciuc]. *Contrib. bot. Univ. Babes-Bolyai*, Gradina bot., Cluj, 59-83.

Resmeriță, I., Sparchez, Z. (1960). Contribuții la cunoaşterea florei din Regiunea Baia – Mare [Contributions to Baia - Mare region flora]. *Com. Acad. R.P.R., X (4)*, 309-313.

Ryttäri, T., Kukk, Ü., Kull, T., Jäkäläniemi, A., Reitalu, M. (eds) (2003). Monitoring of threatened vascular plants in Estonia and Finland–methods and experiences. *The Finnish Environment 659*, Helsinki, 54-63.

Sammul, M. (2001). *Harilik kobarpea. Kaitsekorralduskava 2002-2006* [Orbital cluster. Defense Management Plan 2002-2006] (pp.1-27). Tartu, lk.. (manuscript, in Estonian).

Sanda, V., Biță, D.C., Barabaş, N. (2004). *Flora cormofitelor spontane şi cultivate din România [Flora of spontaneous and cultivated cormophytes in Romania]* (pp. 202). Bacău: Ed. Ion Borcea, Bacău.

Sârbu, A., Sârbu, I., Oprea, A., Negrean, G., Cristea, V., Coldea, G., Cristurean, I., Popescu, G., Oroian, S., Baz, A., Tănase, C., Bartok, K., Gafta, D., Anastasiu, P., Crişan, F., Costache, I., Goia, I., Maruşca, Th., Oțel, V., Sămărghițan, M., Henţea, S., Pascale, G., Răduțoiu, D., Boruz, V., Puşcaş, M., Hirțiu, M., Stan, I., Frink, J. (2007). *Arii speciale pentru protecția şi conservarea plantelor în România* [Special areas for plant protection and conservation in Romania] (pp. 397). Bucureşti: Ed. Victor B Victor, Bucureşti.

Sârbu, I., Ştefan, N., Oprea, A. (2013). *Plante vasculare din România. Determinator ilustrat de teren [Vascular Plants in Romania. Land illustrator]* (pp. 830). Bucureşti: Ed. Victor B Victor, Bucureşti.

Seghedin, T.G., Bo□caiu, N. . (1981). Fânaţele cu Ligularia glauca (L.) O. Hoffm. de la Calafindeşti (Jud. Suceava) [Meadows with Ligularia glauca (L.) O. Hoffm. from Calafindeşti (Suceava County)]. *St. Com. Ocr. Nat.*, Suceava, *5*, 396-403.

Seghedin, T.G. (1996). Cercetări privind flora şi vegetația Carpaților din Bucovina Istorică [Research on flora and vegetation of the Carpathians in Bucovina History]. *Acad. Română, Fil. Iaşi, Centr. Rădăuți, an III (2)*, 445-447.

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Current Trends in Natural Sciences (on-line)
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Current Trends in Natural Sciences (CD-Rom)
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ISSN-L: 2284-9521

Šegulja, N., Krga, M. (1990). Ligularia sibirica (L.) Cass. – Eine neue art der Jugoslawischen flora [Ligularia sibirica (L.) Cass. - A new kind of Yugoslav flora]. *Acta. Bot. Croat.*, Zagreb, Vol. *49*, 137-142.

Şerbănescu, M. (1963). Contribuţii la studiul florei şi vegetaţiei algelor din mlaştinile eutrofe Hărman-Prejmer (Reg. Braşov) [Contributions to the study of flora and algae vegetation in the Hărman-Prejmer eutrophic marshes (Reg. Braşov)]. *St. cerc. Biol., Ser. Bot., 15 (4)*, 453-468.

Slavík, B. (2004). Ligularia Cass. In B. Slavík, J. Štěpánková, eds, *Květena České republiky / Flora of the Czech Republic* (7, pp 306-309). Praha: Academia, Praha.

Šmídová, A., Münzbergová, Z., Plačková, I. (2011). Genetic diversity of a relict plant species, Ligularia sibirica (L.) Cass. (Asteraceae). *Flora*, *206*, 151-157.

Speta, F. (2009). *Betrachtungen zu den Floren Siebenbürgens aus Anlass der Neuerscheinung des Bildbandes „Wildpflanzen Siebenbürgens“ [Reflections on the Transylvania flora on the occasion of the new publication of the illustrated book "Wildpflanzen Transylvania"]* von E. Speta & L. Rákosy im Jänner 2010, Schriften Verein zur Verbreitung naturwissenschaftlicher Kenntnisse, 147, Viena.

Stancu, D.I. (2012). Red List of the threatened plants from Râiosu and Buda Mountains, Făgăraş Massif [Red List of the threatened plants from Râiosu and Buda Mountains, Făgăraş Massif]. *Argesis, Studii şi Comunicări, Seria Ştiinţele Naturii, Muzeul Judeţean Argeş*, Ed. Ordessos, Piteşti, *XX*, 29-34.

Ştefureac, Tr. (1970). Relicte şi endemisme în flora rezervaţiilor naturale din Bucovina [Relics and Endemisms in the Natural Reserve Flora of Bucovina]. *St. Com. Ocr. Nat.*, Suceava, *1*, 21-39.

Stoicovici, L. (1977). Staţiuni cu Ligularia sibirica (L.) Cass. f. araneosa DC. În bazinele Dornei şi Bilborului, consideraţii fitocenologice şi ecologice [Sites with Ligularia sibirica (L.) Cass. f. araneosa DC. In Dorna and Bilboru basins, phyto-ecological and ecological considerations]. *St. Cerc. Biol., Ser. Biol. Veget., 29 (I)*, 39-45.

Stoicovici, L. (1982). Răspândirea populaţiilor relictare de Ligularia sibirica (L.) Cass. în R.S. R. [Populations distribution of Ligularia sibirica (L.) Cass. in R.S. R.]. *Stud. Cerc. Biol., Ser. Biol. Veg., 34 (1)*, 14-19.

Stratulat, Ghe., L. (2014). Conservation measures for saxicole species in Grădiştea Muncelului Cioclovina Nature Park. *Marisia*, *XXXIII-XXXIV*, 89-96.

Ţibu, D. (1997). Rezervaţia naturală de la Rezervaţia naturală de la Stejari – Horaiţ [Natural Reservation of the Natural Reservation from Stejari - Horaiţ]. *Analele Bucovinei, IV(1)*, 165-170.

Timbal-Lagrave, E., Gautier, G., Jeanbernart, E. (1878). Du Ligularia Sibirica Cass. Dans Les Pyrénées, Bulletin de la Société Botanique de France [Ligularia Sibirica Cass. in the Pyrenees, Bulletin of the Botanical Society of France]. *Bull. Soc. bot. Fr., 25(1)*, 10-15.

Tomescu, C.V., Chifu, T. (2009). The vascular flora from the Suceava River Basin (Suceava county). *Analele Univ. „Stefan cel Mare” Suceava, Secţiunea Silvicultură*, Suceava, *1*, 67-75.

Tori, M., Tanio, Y., Okamoto, Y., Saito, Y., Gong, X., Kuroda, C., Hanai, R. (2008). Chemical Constituents of Ligularia franchetiana Collected in Yunnan Province of China. *Heterocycles*, *75*, 2029-2034.

Tanahashi, Y., Ishizoki, Y., Takahashi, T., Tori, K. (1968). Ligularenolide. A new sesquiterpene lactone of eremophilane type. *Tetrahedron Letters*, *9 (34)*, 3739-3742.

Tzvelev, N.N., Fedorov, A.A. (2002). *Flora of Rusia. The European part and bordering regions* (pp. 87-89). CRC Press.

Ularu, P. (1971). Specii relicte din mlaştina eutrofă de la Dumbrăviţa (jud. Braşov) [Relict species from the eutrophic marsh of Dumbrăviţa (Braşov county)]. *Ocr. nat. med. înconj., 15 (2)*, 165-169.

Uniyal, V.P. (2002). Nanda Devi Expedition (Report). *Wildlife Institute of India*, Dehradun, 10.

Ursu, T.M., Fărcaş, S., Coldea, Gh., Stoica, I.A., Proorocu, M. (2017). Review of Habitat distribution, conservation status and human impact: the case of one Natura 2000 site in the Eastern Carpathians (Romania). *Contribuţii Botanice*, Grădina Botanică ”Alexandru Borza” LII, Cluj Napoca, 105-118.

Vane-Wright, R.I., Humphries, C.J., Williams, P.H. (1991). What to protect? Systematics and the agony of choice. *Biol. Conserv.*, *55*, 235–254.

Vergeer, P.V., Rengelink, R., Copal, A., Ouborg, N.J. (2003). The interacting effects of genetic variation, habitat quality and population size in performance of Succisa pratensis. *J. Ecol.*, *91*, 18-26.

Wang, Y., Zhang, J., Deng, S. (2011). Growth and Physiologic characteristics of Ligularia sibirica under livestock wastewater treatment. *Journal of Nuclear Agricultural Sciences*, 4.

Wiedenfeld, H., Narantuya, S., Dumaa, M., Monhbaatar, A. (2003). Pyrrolizidine Alkaloids from Ligularia sibirica Cass. and Tephroseris integrifolia L.. *Sci. Pharm.*, *71*, 129-132.

Witkowski, Z.J. (coord), Król, W., Solarz, W., Kukuła, K., Okarma, H., Pawłowski, J., Perzanowski, K., Ruzicka, T., Sandor, J., Stanova, V., Tasenkevich, L., Vlasin, M. (2003). *Carpathian List of Endangered Species*. Ed. Carpathian Ecoregion Initiative, Vienna, Austria and Krakow, Poland, 29-33.

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Current Trends in Natural Sciences (on-line)
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Current Trends in Natural Sciences (CD-Rom)
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Wróblewska, A., Stawiarz, E. (2012). Flowering abundance and pollen productivity of Ligularia clivorum Maxim. and Ligularia przewalskii Maxim.. *Acta Sci. Pol., Hortorum Cultus*, University of Life Sciences in Lublin, *11(3)*, 57-67.

Wu, L., Liao, Z., Liu, C., Jia, H., Sun, J. (2016). Eremophilane Sesquiterpenes From the Genus Ligularia. *Chem Biodivers*, *13*, 645-671.

Wu, Z.Y., Raven, P.H., Hong, D.Y., (eds) (2011). *Flora of China – Asteraceae* (Vol. 20–21, pp. 3, 6, 371, 372, 376, 435, 459, 469, 508). Beijing and St. Louis: Ed. Science Press (Beijing) & Missouri Botanical Garden Press (St. Louis). Retrieved from http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=118542

Xie, W.D., Weng, C.W., Li, X., Row, K.H. (2010). Eremophilane Sesquiterpenoids from Ligularia fischeri. *Helv. Chim. Acta*, *93*, 1983 –1989.

Yang, J.L., Wang, R., Shi, Y.P. (2011). Phytochemicals and bioogical activity of Ligularia species. *Nat Prod Bioprospect*, *1*, 1-24.

You, C.-J., Liang, Y.-M., Li, J., Tian, C.-M. (2010). A new rust species of Cleosporium on Ligularia fischeri from China. *Mycotaxon*, Ed: Ithacha, New York, *111*, 233-239.

Yuan, Y.L., Fang, L.Z., Bai, S.P., Liang, H.J., Ye, D.D. (2013). A novel eremophilane sesquiterpenoid from Ligularia intermedia roots and rhizomes. *Chem. Nat. Comp*., *49*, 258-260.

Zahariev, D. (2016). Biodiversity of relict vascular plants in Bulgaria. *Int. Jour. of Res. St. in Biosc., 4 (1)*, 38–51.

Zhang, J., Wang, Y., Deng, S. (2011). Purification Effect of Ligularia sibirica on Livestock Wastewater. *Journal of Sichuan Agricultural University*, 3.

Flora of Pakistan, Tropicos.org. Missouri Botanical Garden. Retrieved March 23, 2018, from http://www.tropicos.org/Name/2701004

List of RHS Award of Garden Merit Plants July 2017: Ornamentals.

Convention on Biological Diversity. Retrieved March 23, 2018, from https://www.cbd.int/intro/default.shtml

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