

Description of plant species of *Ornithogalum* genus present in Al. Beldie Herbarium from ``Marin Drăcea`` Bucharest N.I.R.D.F.

Enescu Raluca^{1*}, Dincă L.¹, Cântar I. C.¹

¹Marin Drăcea`` National Institute for Research and Development in Forestry

*Corresponding author. Email: raluk.enescu@yahoo.com

Abstract The aim of this paper is to present a short description of *Ornithogalum* genus from Al. Beldie Herbarium which is found at ``Marin Drăcea`` National Institute for Research and Development in Forestry (NIRDF) in Bucharest. From this genus in the Herbarium are found 70 plates that belong to 15 species. These 15 species of *Ornithogalum* genus was described from morphological and ecological point of view. Also, in this paper are presented other data about *Ornithogalum* species like place and the year of harvest, the name of the botanist which made the harvesting and the conservation degree. These species was harvested from different place of Romania and also from Europa. In Romania it was collected beginning from Black Sea, from hilly areas until the mountains areas like Bucegi Mountain.

Key words

Herbarium, *Ornithogalum* genus, bulbs, star of Bethlehem

``Marin Drăcea`` National Institute for Research and Development in Forestry Bucharest holds a very rich herbarium which amounts to approximately 60.000 plates. These plates are kept in their original maps and are organized in 30 modules, each module having 20 drawers [31]. The herbarium was recorded in INDEX HERBARIUM and contains an impressive number of pieces that come both from donated private collections as well as from plates resulted after exchanges with pieces from foreign collections. The aim of this paper is to realize a description of species from *Ornithogalum* genus found in Al. Beldie Herbarium. Other genus from this herbarium was described in different papers like *Arabis* genus with 78

plates [7], *Androsace* genus with 66 plates and 19 species [9] and *Hieracium* genus with 273 plates and 112 species [8].

Materials and Methods

The study material is composed of the 70 plates existent in the above mentioned herbarium, belonging to the *Ornithogalum* genus. These were systemized based on species, harvest year, place of gathering and the specialist that has gathered them. An excerpt of the *Ornithogalum* genus's inventory is rendered in Table number 1.

Table 1

Ornithogalum genus's inventory from ``Al. Beldie`` Herbarium from INCDS Bucharest (excerpt)

Drawer number	Plate number	Herbarium/ Botanic collection/ Institution	Species name	Harvest date	Harvest place	Collected/ Determined by:	Conservation Degree (1..4)
7	4	Elisse Reverion Plantes de L'Andalouse Wr.Botan Tauschverein Wien	<i>Ornithogalum baectium</i>	1889.05.06	Ronda	J.Dorfler	1
7	5	Flora sicula	<i>Ornithogalum arabicum</i> L.	1890.05	Caccamo Palermo	Nicasio Yuzzino	2
7	8	Association Pyreneenne Pour l'Echange	<i>Ornithogalum corsicum</i> Jord. & Fourr.	1894	Corsica Brifani		1
7	10	Herb.Charles Dupin Montpellier	<i>Ornithogalum divergens</i> Boreau	1892.05.01	Montpellier	Charles Dupin	2
7	12	Bucharest Polytechnic, Silviculture Faculty, Botanic Laboratory	<i>Ornithogalum boucheanum</i> Aschers.	1945.05.08	Murfatlar Constanta	C.C.George scu	1

7	16	Museum Botanicum Universitates Cluj	<i>Ornithogalum nutans</i> subs. <i>boucheanum</i> K. Richt.	1923.05.03	La Fudatura Cojocna Cluj	Gh.Bujorean	1
7	56	Herb.Mailho	<i>Ornithogalum paterfamilias</i>	1878.06	Coulon	Huet	1
7	40	Bucharest Polytechnic School Herbarium	<i>Ornithogalum pyramidale</i> L.	1913.05.29	Valea Calugareasca	M.Naut	2
7	18	Botanic Herbarium, Bucharest Polytechnic School	<i>Ornithogalum pyrenaicum</i>	1904.06.12	Mateias Muscel	Golescu	1
7	51	Herb.Universitates Cluj	<i>Ornithogalum refractum</i>	1924.04.20	Insula Serpilor	A.Borza	3
7	53	ICEF Casa Verde	<i>Ornithogalum sphaerocarpum</i> A. Kern.	1938.06.17	Pad.Casa Verde Timisoara	S.Pascovschi	2
7	26	Herb.Al.Beldie Buc.	<i>Ornithogalum tenuifolium</i>	1948.06.20	Coltii lui Borlos Bucegi	Al.Beldie	1
7	63	Herbar ICS	<i>Ornithogalum umbellatum</i>	1942.05.31	Padurea Comana	C.C.Georgescu	2

Results and Discussions

Ornithogalum genus belongs to the *Asparagales* Order, *Asparagaceae* Family, *Scilloideae* Subfamily. The plants belonging to this genus are perennial, with bulbs, a thin scape that grows up to 30 cm in height, linear leaves and star-shaped flowers usually with green lines [33]. As such, the genus's common name is Bethlehem Star, after the shape of their flowers [33].

The species belonging to this genus that are present in the above mentioned collection are the following:

Ornithogalum arabicum L. is a native European and African plant [33]. The flowers are grouped in large, white and strongly perfumed raceme. The flower's petals resemble stars, have yellow anthers and a large black ovary situated in the center [34]. The plant usually blooms from the end of spring until the beginning of summer, and it also endures lower temperatures, but require sunny expositions [35].

Ornithogalum boucheanum Aschers has a cylindrical light green scape, reaching a height of 35-50 cm and with an ovoid bulb. The leaves are grouped in numbers of 4-6, light green, linear and as long as the scape [5]. The leaves exterior side has white lines, parallel with the margins. The raceme has a cylindrical shape and is composed of 20-30 flowers. The anther have a dimension of 2-5 mm and are usually white or light yellow. The ovary has a conic-spherical shape, 5-9 mm and light green in color [5].

Ornithogalum comosum L. together with *O. montanum*, this species has kept an ancestral character in regard with its leaves, similar with the *Loncomelus* genus [24]. This species, together with others from *Ornithogalum* genus are used as vegetables in Turkey [15]. The plant has a height of approximately 15-30 cm, 3 up to 6 leaves with a width of 3-6 mm,

cylindrical and without the white-milky stripe [36]. The flowers are grouped in raceme of 30 or more flowers, white with yellow anthers, cylindrical up to obconic ovary, while the fruits are capsules [37]. The plant is spread through South-East Europe and Lower Asia, it grows on sunny meadows and pastures, on alkaline soils, from the plane area up to mountain areas [38].

Ornithogalum corsicum Jord. & Fourr. is an endemic species from Sardinia and Corsica, similar with *O. exscapum* (some studies are even considering them identical). The two species are separated by a geographical insular barrier, the last one being identified in Tuscany and Sicily [11]. The plant grows up to 5-15 cm in height, has an oval, elongated bulb with white exterior covers. It usually presents between 4 and 8 linear leaves, much longer than the scape. The flowers have a diameter of 1-5 cm, 2-5 oval-lanceolate petals of 1.5-2 cm length, white and impregnated by stripes in the exterior median area. The fruits are oval, black and shiny capsules [4]. The blooming period starts in February and lasts until June, based on altitude [4]. Zahariadi *et al.* (1982) have collected in Karpathos island (East Mediterranean part) plants that were identified as *O. sandalioticum*, considering them identical with the endemic exemplars from Sardinia and Corsica [32].

Ornithogalum divergens Boreau (synonym with *O. umbellatum* subsp. *divergens* (Boreau) Bonnier et Layens, *O. paterfamilias* Godr.). This is a little known species, strongly correlated with the *Ornithogalum umbellatum* native species. Its taxonomic statute was controversial for a long period of time being usually considered a subspecies of *O. umbellatum* [16,28]. In some studies it was considered as an independent species [12, 27]. Recent studies have confirmed the fact that it is better accepted as a distinct species [18, 20, 30]. Common exemplars were

regularly observed in 1919 Belgium [6]. The plant usually grows near gardens and churches, for example in Antwerp, Bruxelles and Kempen. Due to the fact that is not so well known, its exact distribution and degree of naturalization are also little known. However, nowadays it is very hard to cultivate in gardens so that the plants that are now found can probably be accepted as being more or less naturalized. Usually it appears in relatively small populations, although they appear to be very persistent. Due to its confusion with *Ornithogalum umbellatum* it might be possible that it has been omitted on a large scale. This taxon is commonly recognizable through a combination of some characteristics: the inferior pedicels are longer (up to 12 cm length), the bulb is surrounded by numerous bulbs, the inflorescence has more flowers (usually more than 12). However, *O. divergens* and *O. umbellatum* are identified only through the bulbs characteristics [30]. Plants with arial characteristics more or less intermediary can be observed even in a single population.

***Ornithogalum flavescens* Lam.** (synonym with *O. dubium*) has a height of 10-50 cm, with 3-8 linear leaves that can be erect. The flowers are yellow up to orange and rarely white, usually with a brown or green center [13]. The capsule is rounded, deep in 3 corners and with prominent nerves. The seeds are black and shiny. The flowers appear from August up to December. The plant begins to grow during autumn, when winter rains begin and dies after the spring bloom, when the hot summer weather begins [17].

***Ornithogalum nanum* Ten. nom. Illeg.** (synonym with *O. umbellatum* L.) is an herbaceous plant that grows from oval bulbs that are renewed every year. The leaves are narrow and linear, with a height of 10-30 cm and a width of 2-5 mm [22; 23]. The white star-shaped flowers can be found on the scape which can grow up to 30 cm in height. The inflorescence contains 3-10 flowers. Each flower has 6 petals and a diameter of 1.5-2 cm. The flower's exterior is green with white margins. The flowers bloom from May up to June. The capsules are sub globular and with 3 faces. Each loculus contains more black seeds [22, 23].

***Ornithogalum narbonense* L.** (synonym with *O. arcuatum* Steven) reaches an average of 40-50 cm in height, with a maximum of 70 (80) cm. The white star-shaped flowers have a green stripe on the back of each petal and are arranged in a narrow and long peak of up to 25 cm in length [25]. The bulbs are ovoid with a diameter of 2-2.5 cm. The leaves are pulpy, lance shaped, very long, narrow, 20-40 cm in length, gray-green, up to blue-green and are not drying when blooming. The inflorescence is a pyramidal raceme, elongated and with hermaphrodite flowers of up to 2.5 cm diameter that do not have a perfume [2, 10, 25]. The pedicel has a length of 1.5 cm. The 6 stamina have a white filament which contains the yellow anthers of 4 mm. The plant blooms during spring, from March up to

June. The fruits are green, ovate capsules, with 3 valves, long of 2.5 up to 5 mm, with 5-7 seeds in the compartment [2, 10, 25].

***Ornithogalum nutans* subs. *boucheanum* K. Richt.** has a height of 15-45 cm, with an erect, cylindrical and green scape. The bulb measures 20-25 mm, while the leaves are 2-3 linear, 15-35 cm in length and 0.2-0.4 cm in width, with a full margin and a white stripe on the superior part [1, 21]. The raceme is cylindrical, with 7-12 flowers, while the pedicel measures 4-7 mm. The petal's interior part is white, while the exterior side was a wide green stripe and an acute termination. The external stamina measure 7-8 mm, while the interior ones 10-11 mm. The fruit measures 10 mm in length and is ovoid, while the seeds measure 1,5-2 mm, are also ovoid, but black and curly [1, 21].

***Ornithogalum pyramidale* L.** synonym with *Loncomelos brevistylus* (Wolfner) Dostál, *Ornithogalum brevistylum* Wolfner) is a perennial plant, with a height of 50-80 cm, with a bulb ovoid bulb. The leaves are glabrous, 4-7 in number, linear or linear lanceolate, plane or concave canaliculated, glaucous, 20-40 cm in length and 6-15 mm in width. The scape is erect, 20-50 cm in length and glabrous. The inflorescence has a pyramidal shape, 20-50 cm in length, with 30-100 flowers and long pedicels of 15-30 mm. The flowers are inodorous with lanceolate or narrowly elliptical petals, white milky on the front and with a green stripe on the back. The exterior ones are longer and wider. The plant blooms between June-July. The capsule is ovoid or ellipsoid, with black and sharp seeds [40].

***Ornithogalum pyrenaicum* L.** is a perennial plant, green, with long, narrow and slightly glaucous, leaves. The bulb is white, ovoid, approximately 50 mm in diameter when it is mature, with brown covering slayers [14]. It produces small (2 ± 4 mm) fusiform bulbs at the basis. The leaves are basal, 5-8 linear, 1-1.5 cm wide, with a length of 40-75 cm. It can have between 20-40 flowers in raceme, while the 6 petals are of 1.1-1.3 cm and 0.6-1.3 cm wide [27], with a green stripe on the exterior and become yellow with aging. The capsules are ovoid, 0.8 cm in length, with 3 rooms that contain 5-10 black seeds [14].

***Ornithogalum refractum* Kit. ex Schldl.** is a perennial plant found in South and East Asia, Turkey and Elbrus [26]. It reaches a height of 10-15 cm and it has an ovoid bulb and numerous smaller bulbs. The leaves are linear in a number of 5-8(10), 0.4-0.5 cm wide with a white stripe in the median area. The raceme reaches 5-10 cm, has 5-12 white flowers of 2-4 cm with a narrow green stripe [29].

***Ornithogalum sphaerocarpum* A. Kern** is a perennial plant, reaching a height of 30-100 cm, erect, with a raceme that usually has 30-60 flowers. The seeds are of different shape, reaching 2.7-3.3 mm length and 1.9-2.3 mm wide. The plant is native in Central Europe and Balkans [3].

***Ornithogalum tenuifolium* Guss** (synonym with *Ornithogalum gussonei* Ten.). The plant can reach 10-20 cm in height, has simple basal lanceolate leaves with full margins. The corymb has 6 star-shaped flowers that bloom from March up to May [39].

***Ornithogalum unifolium* Gawl** (synonym with *O. broteroi* M. Lainz) reaches a height of 12-24 (30) cm, with a bulb of 1,5-2,1 cm, 1,1 cm wide, ovoid-spherical. The leaf is solitary, rarely in pairs of two, with a length of 13-30 cm and 0.4-0.9 width, linear-lanceolate, glaucous [19]. The raceme presents 4-7 flowers with a diameter of 2.5-3 cm, with white

lanceolate elliptical flowers that have narrow rare green stripes. The capsules measure 7-9 mm in length and 3-4 mm in width and have 12-15 black shiny seeds per capsule [19].

The plant's harvest year. The plants were gathered in a time period ranging from 1790 and up to 1965. The oldest plant from this genus are *Ornithogalum tenuifolium*, harvested in 1790 and *Ornithogalum umbellatum*, harvested in 1859. The periods in which the largest number of plants was gathered were 1930-1939 and 1940-1949 (Figure 1).

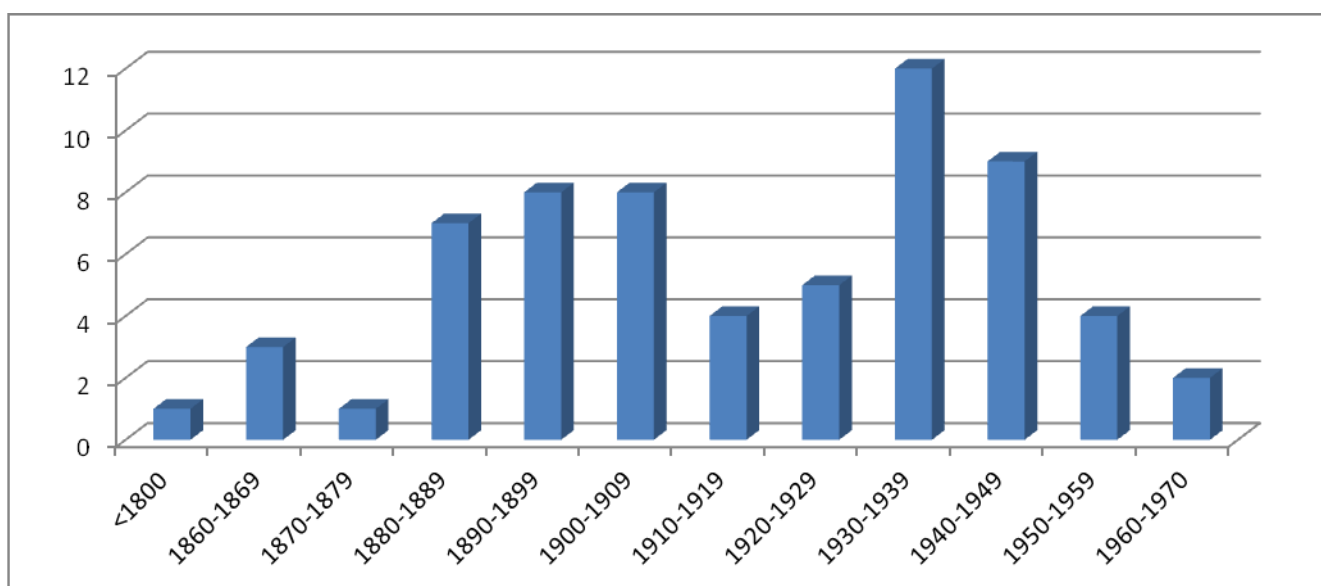


Fig. 1. Harvesting periods for *Ornithogalum* plants from Al. Beldie Herbarium

The harvesting place of these species is very varied. The plants were gathered from mountain areas such as Bucegi mountains (*O. tenuifolium*) up to plain area such as Murfatlar-Constanța (*O. boucheanum*)

(Figure 2). Numerous species were gathered also from outside the borders of Romania, such as from Spain, France or Italy (Figure 3).



Figure 2. Place of harvest for *Ornithogalum* genus in Romania

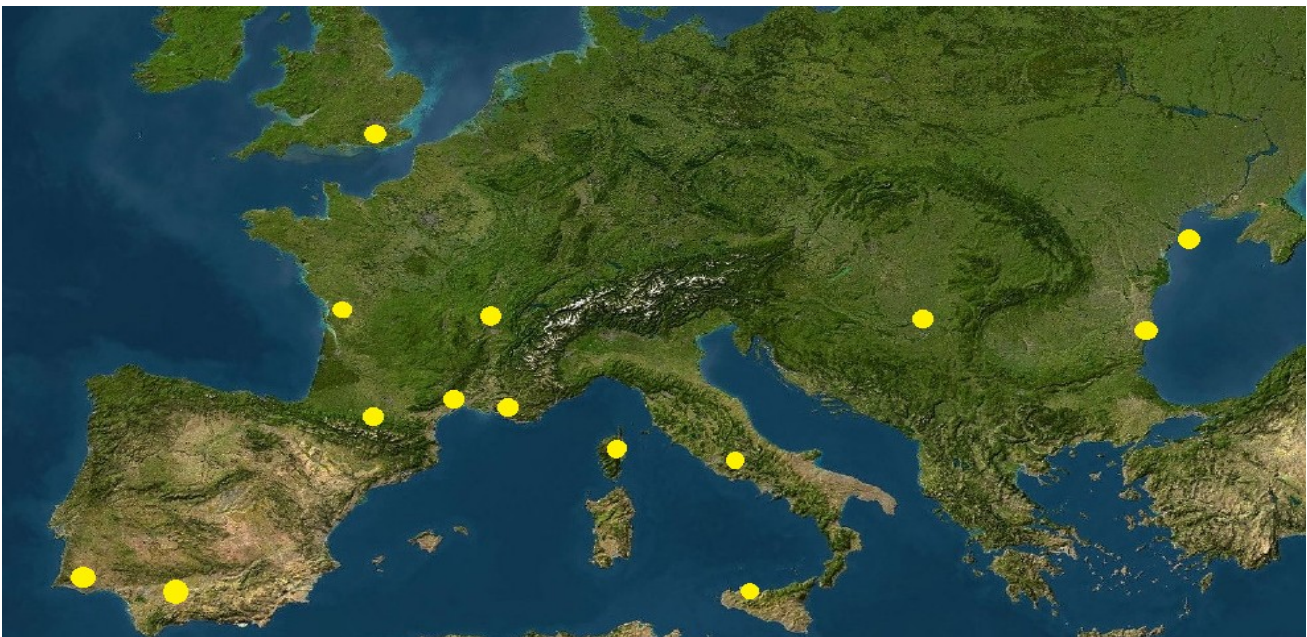


Figure 3. Place of harvest of *Ornithogalum* genus in Europa

The people that gathered the plants were Romanian specialist (Al. Beldie, C.C. Georgescu, Al. Borza, G. Grințescu, Gh. Bujorean, Golecu, I. Morar, M. Ciucă, M. Năut, M. Păun, M. Peterfi, P. Cretzoiu, Șt. Purcelean, S. Pașcovschi) or foreign ones (B. Kalnik, Huet, Hugmeini, J. Dorfler, K. Richter, Nicasio Yuzzino, O. Buchtien, V. Baranovschi, Wolff).

Conclusions

Species of *Ornithogalum* genus from Al. Beldie Herbarium counts 70 plates and were harvested between 1859 and 1965, and one of them is very old being harvested in year 1790. This species is *O. tenuifolium*. The last species (*O. flavescens*) was collected in 1965 from southern part of Romania, Dolj county.

Species of this genus have a large altitudinal amplitude, these being found in Romania from Black Sea (Murfatlar, Constanta county), in the plane areas, then in the hilly area until the mountains (Bucegi Mountain). Species found near the sea or in plane area are *O. bouchenaum*, *O. refractum*, *O. pyramidale* and species *O. tenuifolium*, *O. umbellatum* were harvested from mountain areas. In Europe, most of these species were harvested near to the sea.

All species of this genus found in Al. Beldie Herbarium are perennial plants with bulbs. The flowers have star-shaped petals and because of this have been called Star of Bethlehem. Usually, the flowers are white or yellow and bloom at the end of spring to beginning of summer. The leaves are linear and lanceolate and the fruits are capsules.

Bibliography

1. Bednorz, L., Czarna, Aneta – 2008 - SEM and stereoscope microscope observations on the seeds of some *Ornithogalum* (Hyacinthaceae) species. *Biologia*, 63: 642–646.
2. Blamey, Marjorie, Grey-Wilson, Chr. – 2008 - Flores Silvestres del Mediterráneo. Barcelona Omega Press, 704 p.
3. Bojnanský, V., Fargašová, Agata – 2007 - Atlas of seeds and fruits of central and east-european flora the Carpathian mountains region. Springer Press, Netherlands, 1046 p.
4. Corrias, B. - 1984 - Le Piantie endemiche della Sardegna: 149-150. Bollettino della Società sarda di scienze naturali, 23: 267- 278.
5. Dalgıç, Güler, Dane, F., Aksoy Dalgıç, Özlem – 2006 - A new record for the flora of Turkey: *Ornithogalum bouchenaum* (Hyacinthaceae). Plant, fungal and habitat diversity investigation and conservation, Proceedings of IV Balkan Botanical Congress, Sofia, 20-26 June, 2006.
6. De Langhe, J.E. - 1977 -. Notes floristiques. (Floristische Notizen.). Bulletin de la Société Royale Botanique de Belgique, 110(1-2): 37-38.
7. Dincă L., Cântar I.C., Dincă Maria – 2017 – The characteristics of plant species from *Arabis* type present in Al. Beldie Herbarium from I.N.C.D.S. Bucharest. Annals of West University of Timișoara, ser. Biology, 20 (2): 115-122.
8. Dincă L., Vasile Diana, Voiculescu I. – 2017 – The characteristics of plants from *Hieracium* genre present in Alexandru Beldie Herbarium from I.N.C.D.S. Bucharest, Lucrări științifice USAMV Iași, seria Horticultură, vol. 60;
9. Dincă Maria, Dincă L., Vasile Diana – 2017 – A short description of *Androsace* genre plants present in Alexandru Beldie Herbarium from I.N.C.D.S. Bucharest. Current Trends in Natural Sciences, 6(12).
10. Fletcher, N.- 2008 - Mediterranean Wildflowers. Dorling Kindersley Press, 224 p.
11. Garbari, F., Giordani, A., Marcucci, R., Tomadore, N. – 2003- The genus *Ornithogalum* L. (Hyacinthaceae) in Italy, XIV: towards a redefinition of infrageneric taxa, with new proposals. *Bocconea* 16(1): 269-281.
12. Garbari, F., Peruzzi L., Tornadore, N. – 2007 - *Ornithogalum* L. (Hyacinthaceae) Batsch) e generi correlati (Subfam. *Ornithogaloideae* Speta) in Italia. Atti della Società Toscana di Scienze Naturali de Pisa, Serie B 114: 35-44.
13. Goldblatt, P., Manning, J. – 2000 - Cape Plants. A conspectus of the Cape flora of South Africa. National Botanical Institute Press, Pretoria, 743 p.
14. Hill, D. J., Price, B. – 2000 - *Ornithogalum pyrenaicum* L. *Journal of Ecology*, 88(210): 354-365.
15. Karaguzel, Ozgul, Kaya, Ayse, Biner, Beyza, Aydinsakir, K. – 2012 - In vitro propagation of native *Ornithogalum* species in West Mediterranean region of Turkey. *African Journal of Agricultural Research*, 7(17): 2669-2673.
16. Lambinon, J., Delvosalle, L., Duvigneaud, J. – 2012 - Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des Régions voisines (Ptéridophytes et Spermatophytes). Sixième édition. Jardin botanique national de Belgique Press, 1195 p.
17. Manning, J. - 2001 - Eastern Cape. South African Wild Flower Guide 11. Botanical Society of South Africa Press, Cape Town, 307 p.
18. Martínez Azorín, M., Crespo, M.B., Juan, Ana – 2014 - *Ornithogalum*. *Flora Iberica*, vol. 20. Real Jardín Botánico Press, 188-207 p.
19. Martínez-Azorín, M., Crespo, M.B., Juan, Ana – 2007 - Taxonomic revision of *Ornithogalum* subgen. *Cathissa* (Salisb.) Baker (Hyacinthaceae). *Anales del Jardín Botánico de Madrid*, 64 (1): 7-25.
20. Martínez-Azorín, M., Crespo, M.B., Juan, Ana – 2009 - Nomenclature and taxonomy of *Ornithogalum divergens* Boreau (Hyacinthaceae) and related taxa of the polyploid complex of *Ornithogalum umbellatum* L. *Candollea*, 64: 163-169.
21. Meric, Çiler, Aksoy, Özlem, Dane, F. – 2011 - Morphological and anatomical contributions to the taxonomical identification of two *Ornithogalum* taxa (*O. nutans* and *O. bouchenaum*) from Flora of Turkey. *Biologia* 66(1): 68 -75.
22. Mezev-Krichfalishii, G.N., Krichfalushii, V.V., and Komendar, V.I. – 1989 - Studies on the population biology of *Ornithogalum umbellatum* L. (Liliaceae) for elaborating a strategy of species survival in Transcarpathia. *Tiscia*, 24: 3-10.
23. Moret, J. - 1992 - Numerical taxonomy applied to a study of some ploidy levels within the *Ornithogalum umbellatum* complex (Hyacinthaceae) in France. *Nordic Journal of Botany*, 12(2): 183-195.
24. Peruzzi, L., Caparelli, Katia Francesca, Cesca, G., - 2007 - Contribution to the systematic knowledge of the genus *Ornithogalum* L. (Hyacinthaceae): morpho-

anatomical variability of the leaves among different taxa. *Bocconea*, 21: 257-265.

25. Pignatti, S. – 1982 - Flora d'Italia. Edagricole Press, vol. III, 372 p.

26. Red Data Book of Ukraine – 1996 - Vegetable Kingdom. Kyiv, 606 p.

27. Stace, C. – 1997 - New flora of the British Isles. Cambridge University Press, 2nd ed. XXVII, 1130 p.

28. Stace, C. – 2010 - New flora of the British Isles. Cambridge University Press, 3th ed. XXXII, 1232 p.

29. Takhtajan, A. – 1981 - Rare and vanishing plants of the USSR. Leningrad, 264 p.

30. Tison J.-M., De Foucault, B. – 2014 - Flora Gallica. Flore de France. Editions Biotope Press, 1196 p.

31. Vasile Diana, Dincă L., Indreica A., Voiculescu I. – 2017 - Herbarul Alexandru Beldie - o colecție de

plante și o importantă bază de date pentru specialiști. *Revista de Silvicultură și Cinegetică*, (39): 114-119.

32. Zahariadi, C., Stamatiadou, E., Dima, A. – 1982 - Geographical distribution of species of *Ornithogalum* (*Liliaceae*) in Greece, including two new taxa. *Annales Musei Goulandris*, 5: 131-162.

33. <https://en.wikipedia.org/wiki/Ornithogalum>

34. <http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=a466>

35. <http://gradina.acasa.ro/>

36. <http://encyclopaedia.alpinegardensociety.net>

37. <http://e-monocot.org>

38. <http://botany.cz>

39. http://en.hortipedia.com/wiki/Ornithogalum_gusson_ei

40. <http://blog.botanicatalog.com>