



**OPHRYS APIFERA (ORCHIDACEAE)
IN TRANSYLVANIAN FLORA, ROMANIA**

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Abstract: This article presents new floristics data regarding the distribution of *Ophrys apifera* in Transylvania, Romania. This new data is the result of floristics studies of Sălaj County flora in northwest Romania. The newly found populations of this species of orchid in Sălaj County are at the known north limit of the species in Romania, and potentially the only present populations of this species in Transylvania, as the present existence of the other two populations previously mentioned in southern Transylvania is doubtful. The paper also considers the general distribution of *Ophrys apifera* in Romania.

Key words: *Ophrys apifera*, rare species, Transylvania, Romania, distribution.

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Introduction

Ophrys apifera Huds. is a rare species of orchids with flowers that mimic the shape of a bee in order to attract pollinators, through pollination by deception. The species belongs to *Ophrys fuciflora* complex, section *Euophrys*, family Orchidaceae, order Asparagales (Delforge 2005).

Ophrys apifera Huds. is a perennial species, having spherical tubercles. Stem is straight, cylindrical, reaching 15-50 cm (occasionally 70). It has 2-4 lower leaves oblong-lanceolate, green, and 2-3 upper leaves that surround the stem. The elongated inflorescence has 2-7 (11) many-colored flowers, pinkish, pinkish-violet, or greenish. The lateral, inner tepals are velvety-hairy, and the labellum is clearly three-lobed. The median lobe of the labellum presenting a glabrous appendix. The lateral labellum lobes are without conical appendices. The labellum is reddish-brown with diverse yellow patterns. Floral bracts are linear-lanceolate. Sepals are wide ovate lanceolate, the dorsal sepal is concave with a forward bent tip. Fruits are capsules. Flowering time is May-June (Soó 1959, Nyárádi & Beldie 1972, Ciocârlan 2009, Negrean & Dihoru 2009). As most orchids, *Ophrys apifera* Huds. does not spread easily considering their minute seeds and the endotrophic mycorrhizae symbiosis necessary for seed germination, orchids being depended of specific fungi species for seed germination (Negrean & Dihoru 2009).

Ophrys apifera Huds. is critically endangered in Romania, its populations being drastically affected by habitat loss due to human activities (Panțu 1915, Dihoru & Negrean 2009). It is listed on all the red lists, and labelled as rare (R) (Oltean et al.

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1994: 34), critically endangered (CR) (Negrean & Dihoru 2009) and endangered (E) (Boşcaiu et al. 1994, Dihoru & Dihoru 1994, Negrean 2001).

The discovery of new populations of this species in an area where they were not previously known to inhabit is an important step in the species conservation. Until this inventory *Ophrys* species were not known to inhabit Sălaj County. The nearest populations are *Ophrys sphegodes* Mill. on Plopiş Mountains (Şes Mountain) in Bihor County, at the border with Sălaj County (Rákosy 2009) where this species was recorded for the first time in Romanian flora (Coldea 1968). Recently, Şes Mountain area was thoroughly examined on Bihor County side (Hurdu et al. 2015), as well as Sălaj County side, these studies led to the discovery of the new populations presented here. The thorough examination of the Bihor side of Şes Mountain led to discovering important populations of 27 species of orchids, amongst which two populations in the *Ophrys* genus: *O. sphegodes* Mill. and *O. scolopax* subsp. *cornuta* (Steven) E.G.Camus. Throughout Central Europe, Romania represents an important location regarding the number of orchid species, new species having been discovered recently in Transylvania and Banat regions – *Epipactis albensis* Nováková & Rydlo in Turda River Gorge - Cheile Turzii (Molnár & Sramkó 2012) and *Epipactis greuteri* H.Baumann & Künkele in National Park Semenic-Cheile Caraşului (Ardelean 2011).

The general distribution of *Ophrys apifera* Huds. is relatively wide, ranging throughout the southern, central and western Europe, Asia Minor, Caucasus, and North Africa (Tutin et al. 1964-1980, Nyárádi & Beldie 1972, Govaerts et al. 2016). An Atlantic-mediterranean species (Sanda et al. 1983, Ciocârlan 2009), it was recently discovered in Poland (Osiadacz & Kręciała 2014) and western Ukraine, in Ivano-Frankivsk region (Danylyk & Borsukevych 2011). In Romania it is mostly present in the southern foothills of the Southern Carpathians in Dâmboviţa and Prahova counties, as well as in the southwest area of Banat region, in Mehedinţi County and Danube River Gorge. Recently two individuals were also discovered in Buzău County (Anastasiu 2015).

The authors of the Red List in Romania mention the necessity of establishing special reservations for all *Ophrys* species, in particular the ones with large, strong populations that would include the ones in Sălaj County. Throughout Central and West Europe efforts are made to protect these orchid species (Dihoru & Negrean 2009). Throughout Carpathians area *Ophrys apifera* Huds. is considered endangered (Witkowski et al. 2003). It is protected in the Czech Republic, Slovakia, Hungary (Witkowski et al. 2003, Molnár 2011) and listed on the red lists in Ukraine (Didukh 2009), Bulgaria (Tashev et al. 2006), Czech Republic & Slovakia (Čeřovský et al. 1999), and it is proposed to be protected in Poland. At the same time it is intended to expand the reserve to include newly discovered individuals of this species in Poland (Osiadacz & Kręciała 2014), as well as for the new populations in Bulgaria (Tashev et al. 2006). Worldwide, according to the IUCN the species is not endangered ("least concern") (Bilz et al. 2011). At "Vasile Fati" Botanical Garden in Jibou (Sălaj County) efforts are underway to cultivate this species in the habitats specially designed in the "Romanian Flora" sector, just as it was cultured another rare species of the same genus (*Ophrys scolopax* subsp. *cornuta* (Steven) E.G.Camus) in „Dimitrie Brândză" Botanical Garden in Bucharest (Panţu & Procopianu-Procopovici 1901).

Material and methods

Species identification was accomplished with the use of Romanian Flora taxonomic keys (Ciocârlan 2009, Sârbu et al. 2013). The majority of the nearby species were identified on site, the few that could not be identified in the field, were collected, preserved and the species identification was determined in the lab. The scientific nomenclature followed “The Plant List” site (2013). One specimen from each site was collected and preserved for each of the herbaria in Bucharest, Cluj-Napoca in Cluj County and Carei in Satu Mare County.

Results and discussion

The new *Ophrys apifera* Huds. populations (Fig. 1) were discovered on May 20th, 2014, northwest of Ugruțiu village, located in southeast Sălaj County, by the neighbouring Cluj County. At this location *Ophrys apifera* Huds. plants inhabit steep hills with xerophytic vegetation in Ugruțiu Valley heading towards Hida village, at about 329 m elevation. Main coordinates of this new population are 47°01'09.20"N and 23°21'42.15"E. On May 23rd, 2014, a second population was discovered about 200 m up from the bottom of the hill, at about 309 m elevation, located at 47°01'08.83"N and 23°21'35.76"E. On June 9th, 2015, another population was located at about 300 m from the previous two populations, at 338 m elevation, at 47°01'08.54"N and 23°21'49.88"E (all coordinates from GoogleEarth). We conclude that the species is well established at this location and the populations are stable. All three above mentioned populations were represented by 20-25 individuals in full bloom at the time they were located. Most of the individuals had about 5-7 flowers (Fig. 1).



Fig. 1. *Ophrys apifera* Huds. in Sălaj County, Romania.

Ophrys apifera Huds. is a heliophile species, inhabiting hilly areas, on dry, sandy and nitrogen poor soils (Negrean & Dihoru 2009), occasionally in several areas of Europe it can be found up to 1800 m altitude, probably being one of the best adapted species of the genus *Ophrys* to higher elevations. Being adapted to high altitude could be due to their high concentration of flavonoids in the sepals and labellum, which would indicate the need of stronger protection against UV-B radiation (Karioti et al. 2008). The Ugruțiu habitat fits perfectly with the description given by Nyárádi & Beldie (1972): “sunny slopes, scrub, in the hilly regions on limestone soils”. All the steppe slopes in the Ugruțiu area are mainly on chalky, calcareous limestone, sometimes with gypsum patches that accomodate a specific flora. *Ophrys apifera* Huds. populations were exclusively found on grassy pastures, with short grasses, sunny exposure to partial shade, sometimes at the edge of shrubby areas.

From a floristic point of view the steep slopes in Ugruțiu area are amongst the most species rich throughout Sălaj County, the majority of species found here are of great phytogeographical importance with numerous steppe microelements that make the transition with the steppe pastures in Cluj County. The number of species on these slopes reach more than 200 taxa. The dominant species are: *Festuca rupicola* Heuff., *Festuca valesiaca* Schleich. ex Gaudin, *Bothriochloa ischaemum* (L.) Keng, *Brachypodium pinnatum* (L.) P. Beauv. and *Stipa pennata* L., similar to the other associations where *Ophrys apifera* Huds. was found before: *Festucion rupicolae* (Sanda et al. 1983); *Festuco-Brometalia* (Tashev et al. 2006). Amongst the species of great importance found in Ugruțiu area, we include: *Adonis vernalis* L., *Allium albidum* Fisch. ex M.Bieb., *Astragalus austriacus* Jacq., *Astragalus monspessulanus* L., *Astragalus onobrychis* L., *Cleistogenes serotina* (L.) Keng, *Jurinea tennsilvanica* (Spreng.) Simonk., *Jurinea mollis* (L.) Rchb., *Linum flavum* L., *Linum tenuifolium* L., *Onosma pseudoarenaria* Schur, *Plantago argentea* Chaix, *Pulsatilla montana* (Hoppe) Rchb. subsp. *dacica* Rummelsp., *Salvia nutans* L., *Klasea radiata* (Waldst. & Kit.) Á.Löve & D.Löve, *Stipa pennata* L., *Stipa pulcherrima* K.Koch, *Stipa capillata* L., *Stipa tirma* Steven, *Anacamptis coriophora* subsp. *fragrans* (Pollini) R.M. Bateman, Pridgeon & M.W. Chase, *Cephalaria radiata* Griseb. & Schenk, *Carex humilis* Leyss., *Dictamnus albus* L. etc. Some of these species are present in Sălaj County only in Ugruțiu area, or neighbouring hills within 5 km proximity. Some of these species include: *Ajuga laxmannii* (Murray) Benth., *Carduus hamulosus* Ehrh., *Oxytropis pilosa* (L.) DC., *Phlomis tuberosa* (L.) Moench, *Allium fuscum* Waldst. & Kit.

On June 1th, 2016 we found other four populations of *Ophrys apifera* Huds. at the northernmost latitude, which is a remarkable aspect of concerning the spread of the species in Romania. All populations were found in Sălaj County. The northernmost populations are near Jibou city, where these populations also grow on limestone (47°15'16.38"N and 23°14'11.62"E, 221 m altitude), accompanied by large populations of other orchid species like: *Orchis purpurea* Huds. and *Neotinea ustulata* (L.) R.M.Bateman, Pridgeon & M.W.Chase. A second larger population (30 individuals) is at the edge of the forest in the southern part of the city (47°15'12.81"N and 23°13'48.81"E, 271 m altitude).

A third population was discovered in an area extremely rich in terms of flora – the Ortelec limestone hills in the immediate vicinity of the city Zalău (47°12'39.17"N and 23°07'57.01"E, 289 m altitude). These limestone slopes are bordered by a forest of

downy oak (*Quercus pubescens* Willd.), a species that is found here also at the northern limit of his area. In addition to numerous rare species of the typical thermophilic limestone areas, we can also find other species of orchids, of which stands out: *Anacamptis pyramidalis* (L.) Rich., *Orchis militaris* L., *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase, *Neotinea ustulata* (L.) R.M.Bateman, Pridgeon & M.W.Chase, *Cephalanthera damasonium* (Mill.) Druce, *Epipactis microphylla* (Ehrh.) Sw., *Neottia nidus-avis* (L.) Rich..

The fourth population is at the Meseş Mountains foothills in the village Ciumărna. The few individuals were encountered at the edge of the woods, also together with other orchid species that are typical for grasslands (*Anacamptis coriophora* subsp. *fragrans* (Pollini) R.M.Bateman, Pridgeon & M.W.Chase, *Anacamptis pyramidalis* (L.) Rich.) or forests (*Neottia nidus-avis* (L.) Rich., *Epipactis helleborine* (L.) Crantz, *Platanthera bifolia* (L.) Rich., *Cephalanthera damasonium* (Mill.) Druce), and coming into contact in this place. A few individuals of Lady's Slipper Orchid (*Cypripedium calceolus* L.) were also found at the same place with *Ophrys apifera* Huds..

The chorologie of *Ophrys apifera* Huds. according to some new publications, the Red Book (Dihoru & Negrean 2009) and Flora Republicii Socialiste România (Nyárádi & Beldie 1972) includes the following locations:

- Dâmbovița County: Mănăstirea Viforâta on Valea lui Enache, 10.VI.1910, G. Grințescu [BUCA 39.857 etc.], Valea Cocoșatului, 5.VI.1909, alt. 300 m, G. Grințescu [BUCA 39.856 etc.] (Negrean & Dihoru 2009); Doicești on Coasta Dealului, alt. 350 m, 12.VI.1916, G. Grințescu [BUCA 39.855 etc.]; the lakes at the quarry, 400 m, 12.VI.1916, G. Grințescu [BUCA 39.855 etc.]; Ocnîța (Negrean & Dihoru 2009); Târgoviște (Nyárádi & Beldie 1972); Dâmbovița County, on grassy slopes on southern foothills of Southern Carpathians (Dumitru 1980, Dumitru & Săvescu 2011). Recently mybiosis.info site added new pictures of a new population in Vârfuri area, at 500 m altitudine (Stoichiță 2014).
- Prahova County: Ocnîța-Filipești, on Coasta Dealului, 350 m, 15.VI.1916, G. Grințescu [BUCA 124.585 etc.]; Hârșa and Plopu, 350 m, 15.VI.1916, G. Grințescu [BUCA 39.853 etc.] (Negrean & Dihoru 2009); West Tinosu, Lunca Prahovei, 6.VI.1971, G. Negrean [HGN] (Negrean & Dihoru 2009); Breaza, Scăieni (Nyárádi & Beldie 1972).
- Buzău County: Cocârceni (hayfields), 45.363671°N, 26.486291°E, cca. 440 m alt., June, 1, 2014 (Anastasiu 2015).
- Mehedinți County: Svinița-Tricule (Ștefureac 1971); Bala (Comănești, on the Pietricica Hill), at grove edges, 350 m, FQ-47, 13.06.2003, coll. I. Costache (CRA 18929) (Vladimirov et al. 2006). Mybiosis.info site published pictures from Banat region of Mehedinți County on Danube River Gorge area, the species being confirmed to exist in this region as well (Ardelean 2009).
- Gorj County: Slivilești (pers. comm.).
- Hunedoara County: Geoagiu-Băi, cca. 500 m northwes from the spa resort, alt. 430 m, 12.VI. 1966, G. Pap [CLA] (Pázmány 1966, Pázmány & Pap 1966).
- Sibiu County: Poplaca (Schur 1866), this presence being contested by other authors (Simonkai 1886, Panțu 1934, Rösler 2003). In *Cormoflora județului Sibiu* (Drăgulescu 2010) the presence of this species in Sibiu County is also doubted.

- Sălaj County: Ugruțiu, 47°01'09.20" N, 23°21'42.15" E, ca 329 m, 20.V.2014; 47°01'08.83" N, 23°21'35.76" E, ca 309 m, 23.V.2014; 47°01'08.54" N, 23°21'49.88" E, ca 338 m, 9.VI.2015; Jibou, 47°15'16.38" N, 23°14'11.62" E, ca 221 m; 1.VI.2016; 47°15'12.81" N, 23°13'48.81" E, ca 271 m, 1.VI.2016; Ortelec near Zalău, 47°12'39.17" N, 23°07'57.01" E, ca 289 m, 1.VI.2016; Ciumărna, Meseș Mountains, 1.VI.2016.

The map in Fig. 2 shows *Ophrys apifera* Huds. populations mainly on the foothills of the Southern Carpathians and in the Danube River Gorge area, while in Transylvania the populations are isolated at great distances in Hunedoara County, Sibiu County and now Sălaj County.

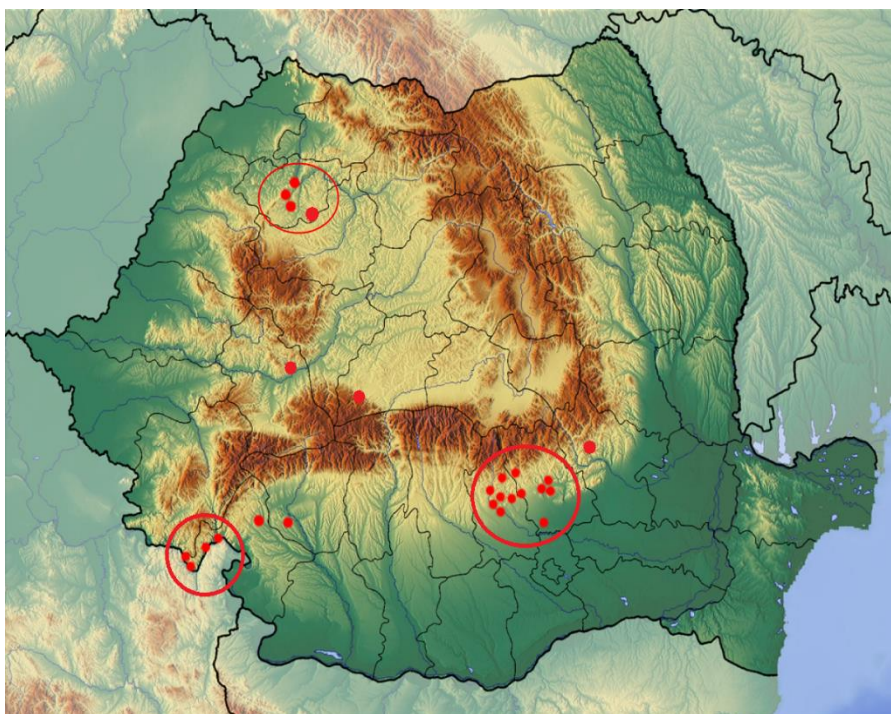


Fig. 2. *Ophrys apifera* Huds. distribution in Romania

Conclusions

As mentioned above data regarding *Ophrys apifera* Huds. distribution in Romania is old, and it is possible that some of the previously mentioned populations to have disappeared. Also, the presence of this species in Transylvania was contested by older studies (Nyárádi & Beldie 1972), to be discovered recently in Sălaj County, at a considerable distance from other populations in Romania, which would suggest that additional populations might exist in other areas with similar habitat.

The newly discovered populations must be protected as soon as possible, especially from the ever increasing sheep populations in the region, sheep herds are

occasionally allowed to graze on the above mentioned locations. We have observed numerous *Ophrys apifera* Huds. individuals that were trampled and destroyed by the passing sheep herds through the Ugruțiu Valley area.

The Sălaj region was one of the least studied areas in Romania, but after the recent researches it is observed that possesses a remarkable biodiversity, being a contact area between species coming from all four cardinal points. The most remarkable is that here seems to be the northern limit for most thermophilic species that come from the south, the vast limestone areas creating a favorable microclimate for the northernmost outpost of these species in Transylvania.

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References

- Anastasiu, P. (2015). New chorological data for rare vascular plants from Romania. *Acta Horti Bot. Bucurest.*, 42, 57-62.
- Ardelean, C. (2009). *Ophrys apifera* in mybiosis.info. 2016 Nature Object Digital Repository [2009MAY06]. <http://mybiosis.org>.
- Ardelean, C. (2011). *Epipactis greuteri* (Orchidaceae) a new species for Romanian flora. *Journal Europaischer Orchideen*, 43 (3), 527-534.
- Bilz, M., Kell, S.P., Maxted, N. & Lansdown, R.V. (2011). *European Red List of Vascular Plants*. Luxembourg: Publications Office of the European Union.
- Boșcaiu, N., Coldea, G. & Horeanu, C. (1994). Lista Roșie a plantelor vasculare dispărute, periclitare, vulnerabile și rare din flora României. *Ocrot. Nat.*, 38 (1), 45-56.
- Čeřovský, J., Feráková, V., Holub, J., Maglocký, Š. & Procházka, F. (1999). *Červená kniha ohrožených a vzácných druhů rostlin a živočichů ČR a SR*. Bratislava, 5: 453 pp. Vyšší rostliny. Příroda a s.
- Ciocârlan, V. (2009). *Flora ilustrată a României*. București: Edit. Ceres.
- Coldea, G. (1968). *Ophrys sphegodes* Mill. în flora României. *Studii și cercetări biologice. Seria Botanică*. București, 20(2), 137-140.
- Danylyk, I.M. & Borsukevych, L.M. (2011). A new find of *Ophrys apifera* Huds. (Orchidaceae) in Ukraine. *Ukr. Botan. Journ.*, 68(1), 58-63.
- Delforge, P. (2005). *Guide des Orchidées d'Europe, d'Afrique du Nord et du Proche-Orient*. Paris: Delachaux et Niestlé. 640 pp.
- Didukh, Y.P. (ed.) (2009). *Červona knyha Ukrainy*. Roslynniyi svit. Kyiv: Globalkonsalting. 912 pp.
- Dihoru, G. & Dihoru, A. (1994). Plante rare, periclitare și endemice în Flora României - Lista roșie • Red list of rare, threatened and endemic plants from Flora of Romania. *Acta Bot. Horti Bucurest.*, /1993-1994/, 173-197.
- Dihoru, G. & Negrean, G. (2009). *Cartea roșie a plantelor vasculare din România*. București: Edit. Academiei Române.

- Drăgulescu, C. (2010). *Cormoflora județului Sibiu*. Ediția a doua revizuită. Sibiu: Edit. Universității „Lucian Blaga” Sibiu. 831 pp.
- Dumitru, M.D. (1980). *Cercetări asupra florei și vegetației Subcarpaților dintre Ialomița și Dâmbovița*. Unpublished doctoral dissertation. București: Universitatea din București, Facultatea de Biologie.
- Dumitru, M. & Săvescu, C.M. (2011). *Flora și vegetația județului Dâmbovița* (Conspectul speciilor din flora spontană și al asociațiilor vegetale). Târgoviște: Edit. Transversal.
- Govaerts, R., Bernet, P., Kratochvil, K., Gerlach, G., Carr, G., Alrich, P., Pridgeon, A.M., Pfahl, J., Campacci, M.A., Holland Baptista, D., Tigges, H., Shaw, J., Cribb, P., George, A., Kreuz, K. & Wood, J. (2016). World Checklist of Orchidaceae. Facilitated by the Royal Botanic Gardens, Kew. Retrieved October 5, 2016, from: <http://apps.kew.org/wcsp/>.
- Hurdu, B.-I., Roman, A., Turtureanu, P.D., Ursu, T.M., Pușcaș, M., Fărcaș, S., Stoica, I.A., Coldea, G. (2015). Orhidaceele din Munții Plopișului (Munții Apuseni). Diversitate floristică, importanță fitogeografică și valoare conservativă. Sesiunea de comunicări științifice a Grădinii Botanice ”D. Brândză” București, Ediția a XXI-a. 7 Noiembrie 2015.
- Karioti, A., Kitsaki, C.K., Zygouraki, S., Ziobora, M., Djeddi, S., Skaltsa, H. & Liakopoulos, G. (2008). Occurrence of flavonoids in *Ophrys* (Orchidaceae) flower parts. *Flora*, 203 (7), 602-609.
- Molnár, V.A. (Ed.). (2011). *Magyarország orchideáinak atlasza • Atlas der Orchideen Ungarns*. Budapest: Kossuth Kiadó.
- Molnár, A. & Sramkó, G. (2012). *Epipactis albensis* (Orchidaceae): a new species in the flora of Romania. *Biologia, Sect. Bot.*, 67(5), 883-888.
- Negrean, G. (2001). Lista roșie a plantelor din România existente în pajiști (inclusiv endemite și subendemite). Pp. 30-58. In G.Coldea, G. Negrean, I. Sârbu & A. Sârbu (2001). *Ghid pentru identificarea și inventarierea pajiiștilor seminaturale din România*. București: Edit. Alo, București!.
- Negrean, G. & Dihoru, G. (2009). *Ophrys apifera* Huds. subsp. *apifera*. pp. 368-369. In Dihoru, G. & Negrean, G. (2009). *Cartea roșie a plantelor vasculare din România*. București: Edit. Acad. Române.
- Nyárády, A. & Beldie, A. (1972). *Ophrys* L.. In T. Săvulescu (ed.), *Flora României*, Vol. 12. (Pp. 655-662). București: Edit. Academiei Române.
- Oltean, M., Negrean, G., Popescu, A., Roman, N., Dihoru, G., Sanda, V. & Mihăilescu, S. (1994). *Lista roșie a plantelor superioare din România*. In M. Oltean (coord.), *Studii, sinteze, documentații de ecologie*, Acad. Română, Institutul de Biologie, 1, 1-52.
- Osiadacz, B. & Kręciała, M. (2014). *Ophrys apifera* Huds. (Orchidaceae), a new orchid species to the flora of Poland. *Biodiv. Res. Conserv.*, 36, 11-16.
- Panțu, Z.C. & Procopianu-Procopovici, A. (1901). *Ophrys cornuta* Stev. forma *Banatica* Rchb. Monografia unei plante indigene foarte rare. *Bul. Soc. Naturaliștilor România*, 2, 14-19.
- Panțu, Z.C. (1915). Orhidaceele din România. București: *Libr. Soc. & Comp.*, 1-12, 1-228.

- Panțu, Z.C. (1934). Contribuțiuni nouă la Orchidaceele din România. *Mem. Secț. Ști. Academia Română*, 2 (3), 15-46.
- Pázmány, D. (1966). Însemnări floristice. II. *Notulae Bot. Horti Agrobot. Clujensis*, 53-55.
- Pázmány, D. & Pap, G. (1966). Răspândirea speciei *Ophrys apifera* Huds. în România. *Notulae Bot. Horti Agrobot. Clujensis*, 67-69.
- Rákossy, D. (2009). Observations on a population of *Ophrys sphegodes* Mill. in Romania • Observații asupra unei populații de *Ophrys sphegodes* Mill. din România. *Contr. Bot.*, Cluj-Napoca, 44, 31-36.
- Rösler, R. (2003). Zur Chorologie der Orchideen Rumäniens. *Journal Eiuropäischer Orchideen (Stuttgart)*, 35 (2), 241-306.
- Sanda, V., Popescu, A., Doltu, M.I. & Doniță N. (1983). Caracterizarea ecologică și fitocenologică a speciilor spontane din flora României, *Stud. Comunic., Șt. Nat.*, Muz. Brukenthal Sibiu, Suplim., 25, 1-126.
- Sârbu, I., Ștefan, N. & Oprea, A. (2013). *Plante vasculare din România*. București: Edit. VictorBVictor.
- Schur, P.J.F. (1866). *Enumeratio Plantarum Transsilvaniae, exhibens: stirpes phanerogamas sponte crescentes atque frequentius cultas, cryptogamas vasculares, Characeas etiam muscos hepaticasque*. Vindobonae: G. Braumüller, 1-8, 984.
- Simonkai, L. (1887 /“1886”). *Erdély edényes Flórájának helyesbített Foglatala. (Enumeratio Florae transsilvanicae vesculosae critica)*. Ex mandato Societas Scientiarum Naturalium Regiæ hungaricæ. Budapest: Kiadja a Magyar Természettudományi Társulat. Franklin-Társulat könyvsajtója, 1-49, 1-678.
- Soó, R. (1959). *Ophrys*-Studien. *Acta Bot. Hung.*, 5 (3-4), 437-471.
- Soó, R. (1971). Species and subspecies of the Genus *Ophrys*. *Acta Bot. Acad. Sci. Hung.*, 1970, 16(3-4), 373-392.
- Soó, R. de (1980). *Ophrys* L. Pp. 344-349. In Tutin, T.G. & al. (eds). *Flora Europaea*. Vol. 5. Alismataceae to Orchidaceae (Monocotyledones). Cambridge: Cambridge University Press.
- Stoichiță, H. (2014). *Ophrys apifera* in mybiosis.info. 2016 Nature Object Digital Repository [2014JUN06]. <http://mybiosis.org>.
- Ștefureac, T. (1971). Considerații generale asupra caracterului florei din ținutul Maramureșului. *Comun. Bot. A VII-a Conf. Națion. Geobot.* (Satu Mare, Maramureș, 17-26 VII 1969), 95-123. Soc. Ști. Biol. Rom.
- Tashev, A., Vitkova, A. & Russakova, V. (2006). Distribution of *Ophrys apifera* Huds. (*Orchidaceae*) in Bulgaria. *Fl. Medit.*, 16, 247-252.
- The Plant List (2013). Version 1.1. Published on the Internet. Retrieved October 5, 2016, from: <http://www.theplantlist.org/>.
- Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb D.A. (eds.) (1964-1980). *Flora Europaea*. Vols. 1-5. Cambridge: Cambridge University Press.
- Vladimirov, V., Dihoru, G. & Tan, K. (2006). New floristic records in the Balkans. *Phytologia Balcanica*, 12(3), 422-423.
- Witkowski, Z. J., Król, W., Solarz, W., Kukuła, K., Okarma, H., Pawłowski, J., Perzanowski, K., Ruzicka, T., Sandor, J., Stanova, V., Tassenkevich, L. & Vlasin, M. (2003). *Carpathian List of Endangered Species*. WWF and Institute of Nature Conservation, Vienna-Krakow: Polish Academy of Sciences.

