

Original Article

Received: 25 June 2018

Revised: 28 September 2018

Accepted: 18 November 2018*

The orchid flora of the Muntele Mic (Caraş – Severin County, Romania)

*Sretco Milanovici**Natural Science Section, Banat National Museum, Huniade Square no. 1, Timișoara City, Timiș County, Romania** *E-mail: milanovici.sretco@wildcarpathiangarden.com***Abstract:****Milanovici, S.: *The orchid flora of the Muntele Mic (Caraş – Severin County, Romania)*. *Biologica Nyssana*, 7 (2), December 2016: 107-112.**

Muntele Mic Mountain is located in the southwestern part of Romania and belongs to the Southern Carpathians. Although relatively small, Muntele Mic contains most of typical mountain and high-mountain habitats. The field research regarding the orchid's family in the Muntele Mic area, have started in the summer of 2009. Owing to easy access (asphalt road that goes to the tourist center of Muntele Mic), although it is classified as part of the European Natura 2000 network (ROSCI0126 Munții Țarcu), the area is influenced by negative anthropogenic factors. Although considered to be a very anthropized area, the field research concluded that there are 10 species of orchids growing in this location, of which three: *Gymnadenia frivaldii* Hampe ex Griseb., *Dactylorhiza fuchsii* (Druce) Soó and *Dactylorhiza saccifera* (Brongn.) Soó, were not mentioned in the literature data.

Key words: orchids, conservation, threats, Muntele Mic, Romania**Apstrakt:****Milanovici, S.: *Flora orhideja planine Muntele Mic (Caraş – Severin County, Romania)*. *Biologica Nyssana*, 7 (2), Decembar 2016: 107-112.**

Planina Muntele Mic nalazi se u jugozapadnom delu Rumunije i pripada južnim Karpatima. Iako relativno male površine, Muntele Mic sadrži većinu karakterističnih planinskih i visokoplaninskih staništa. Sistematska terenska istraživanja porodice orhideja planine Muntele Mic, započeta su u proleće 2009 godine. Zahvaljujući lakom pristupu (asfaltni put koji ide do turističkog centra Muntele Mic), iako svrstan kao deo mreže Natura 2000 - ROSCI0126 Munții Țarcu, pod snažnim je udarom negativnih faktora antropogenog porekla. Iako se smatra veoma antropizovanim, terenskim istraživanjem konstatovano je da ovde raste 10 vrsta orhideja, od čega se tri: *Gymnadenia frivaldii* Hampe ex Griseb., *Dactylorhiza fuchsii* (Druce) Soó i *Dactylorhiza saccifera* (Brongn.) Soó, ne pominju u stručnoj literaturi.

Ključne reči: orhideje, problemi zaštite, Muntele Mic, Rumunija

Introduction

According to "Flora României" (vol. VII, Paucal et al., in Savulescu, 1972) there are 56 orchid

species growing in Romania. In the last decades, some taxa, formerly classified as subspecies, became species *per se* (a typical example is several species of the *Epipactis* genus). In 2009 Ciocârlan mentioned

58 orchid species recorded for the Romanian flora (Ciocârlan, 2009), while according to Sârbu this number reaches 60 (Sârbu et al., 2013). Three more species are to be added to the last figure mentioned: *Epipactis guegelii* Robatsch (Robatsch, 1996), *Epipactis persica* (Soó) Hausskn. ex Nannf. (Wucherpfennig, 2008) and *Epipactis greuteri* H. Baumann et Künkele (Ardelean, 2011). So far, the total amount of orchid species recorded in Romania is 62. We do not regard this figure as final.

In his reference work Boşcaiu (1971) mentions 16 orchid species for the Muntele Mic area.

The geographical unity of Țarcu Mountains, whose part is the Muntele Mic, cover the North-Western Region of Meridional Carpathian Mountains.

Material and methods

The field studies on the *Orchidaceae* L. family in the Muntele Mic Mountain area, regarding the species

Boşcaiu (1971) and Pauca et al., in Savulescu – “Flora R. S. România”, Vol. XII, (1972). To understand the biology and ecology of terrestrial orchid species, literature data of Dressler (1981, 1983) and Rasmussen (1995) were used.

The determination of taxa up to the species level has been done based on the data provided by “Flora of The S. R. Romania” Vol. XII (Pauca et al., in Savulescu, 1972) and the nomenclature of used taxa has been harmonized to World Checklist of Monocotyledons Database (2003). Also, other relevant literary sources used (Soó, 1973; Moore, 1980; Delforge, 2006; Ciocârlan, 2009) and related websites have been used.

The area where the field studies were conducted covers only the zone of the alpine meadows, spruce and beech forests, along the mixed ones, mesophilic mountain meadows (especially those located in the upper part of the Craiu Valley) to the lowest altitude of 600 m.

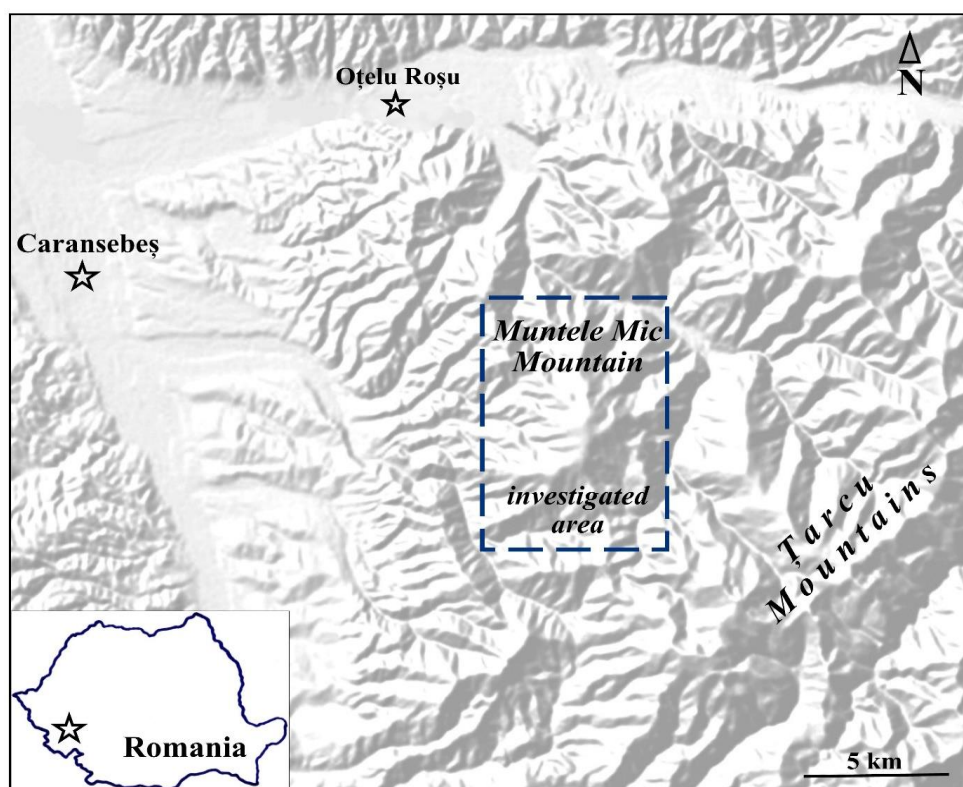


Fig. 1. Geographical position of the Muntele Mic investigated area.

richness, distribution, size and dynamics of populations as well as the acknowledgment of the threats with (direct and indirect) impact upon the orchid species and populations have started in 2009 and ended in 2015 (Fig. 1, 2b).

The main bibliography related to the Muntele Mic Mountain, started with the basic studies:

Results and discussion

The herein presented studies on the orchid species comprised the area of Muntele Mic, from an altitude of 600 m to the top of the mountain. Although in his reference work Boşcaiu (1971) mentioned 16 orchid species for the Muntele Mic zone, we have no

field confirmation (in the researched zone above 600 m) for seven species, namely: *Listera ovata* (L.) R.Br., *Platanthera chlorantha* (Custer) Rchb., *Anacamptis palustris* subsp. *elegans* (Heuff.) R.M.Bateman, Pridgeon & M.W.Chase, *Anacamptis coriophora* (L.) R.M.Bateman, Pridgeon & M.W.Chase, *Orchis mascula* subsp. *signifera* (Vest) Soó and *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase, *Neotinea ustulata* (L.) R.M.Bateman, Pridgeon & M.W.Chase. Instead, in the lower meadows area (Borlova zone) and beech forests, below 600 m, one can notice the presence of most of the species mentioned above.

The fieldwork recorded the presence of three orchid species, not mentioned in the relevant literature (esp Boşcaiu, 1971) for the Muntele Mic zone, specifically *Leucorchis friwaldskiana* (Hampe) Fuss, *Dactylorhiza fuchsii* (Druce) Soó and *Dactylorhiza saccifera* (Brongn.) Soó.

In the following text, a description is given for each species confirmed in the fieldwork of the present study (Muntele Mic zone, above 600 m elevation):

The genus *Dactylorhiza* Neck. ex Nevski.

Dactylorhiza cordigera (Fr.) Soó

Habitat: it sprouts individually or in groups of up to dozens of specimen on the eastern slope of the mountain, on wet meadows, on the banks of the torrents coming down from the mountain or in bogs, at an altitude between 1450 and 1600 m (**Fig. 2a**);

Status of population: population is relatively large and stabile. Following the multiannual countering, one can find at least 500 blooming specimens (mostly on the eastern slope of Muntele Mic);

Threats: over pasturing, leveling of the meadows for skiing tracks, off road motorcycling.

Dactylorhiza fuchsii (Druce) Soó

Habitat: sporadic and very rare; it had been found in a small number of specimens on the upper part of Valea Craiu, at the confluence of Craiu and Cuntu streams, at the edge of the forest, 610 m in altitude;

Status of population: population comprises around 20 specimens;

Threats: deforestation along removal of timber logs and their storage along the road;

Observation: newly found species for the Muntele Mic zone.

Dactylorhiza maculata (L.) Soó

Habitat: sporadic and very rare; it had been found in a small number of specimens in the mesophilic

meadow at the confluence of Craiu and Cuntu streams, 610 m in altitude (**Fig. 2c**);

Status of population: population comprises around 20 specimens;

Threats: deforestation along removal of timber logs and their storage along the road.

Dactylorhiza viridis (L.) R.M.Bateman, Pridgeon & M.W.Chase (syn. *Coeloglossum viride* (L.) Hartm.)

Habitat: very rare; a number of 5 specimens had been found, on shadowy rocks (northern exposure), on the eastern slope of the mountain; altitude: 1600 m;

Status of population: population comprises maximum 10 specimens;

Threats: intensive pasture.

Dactylorhiza saccifera (Brongn.) Soó

Habitat: found individually or in groups of up to ten specimens at the forest edge (near the paved road that climbs toward Muntele Mic resort), from Valea Sebeşului (600 m) along wet meadows from climbing road and the bottom of meadows on the eastern slope of the mountain, on an altitude between 600 and 1.400 m (**Fig. 2g**);

Status of population: a fairly numerous population, comprising around 200 specimens;

Threats: intensive pasture, deforestation along removal of timber logs and their storage along the road, off road motorcycling;

Observation: newly found species for the Muntele Mic zone.

The genus *Neottia* Guett.

Neottia nidus-avis (L.) Rich.

Habitat: found individually or in groups of up to ten specimens in beech or mixed beech – spruce forests, preponderantly below 600 m altitude. As the altitude grows, the specimen became increasingly rare. Some rare specimen have been detected on the eastern slope of Muntele Mic, about 800 m altitude, in the mixed beech – spruce forest;

Status of population: a very numerous population, comprising around 300 specimens (above 600 m);

Threats: deforestation along removal of timber logs, pasture on forest ground.

The genus *Gymnadenia* Rich.

Gymnadenia conopsea (L.) R.Br.

Habitat: very rare; a few specimens were found on the alpine meadows on the eastern slope, at an altitude between 1.300 and 1.500 m;

Status of population: given the reduced number of found specimen, one cannot correctly assess the size

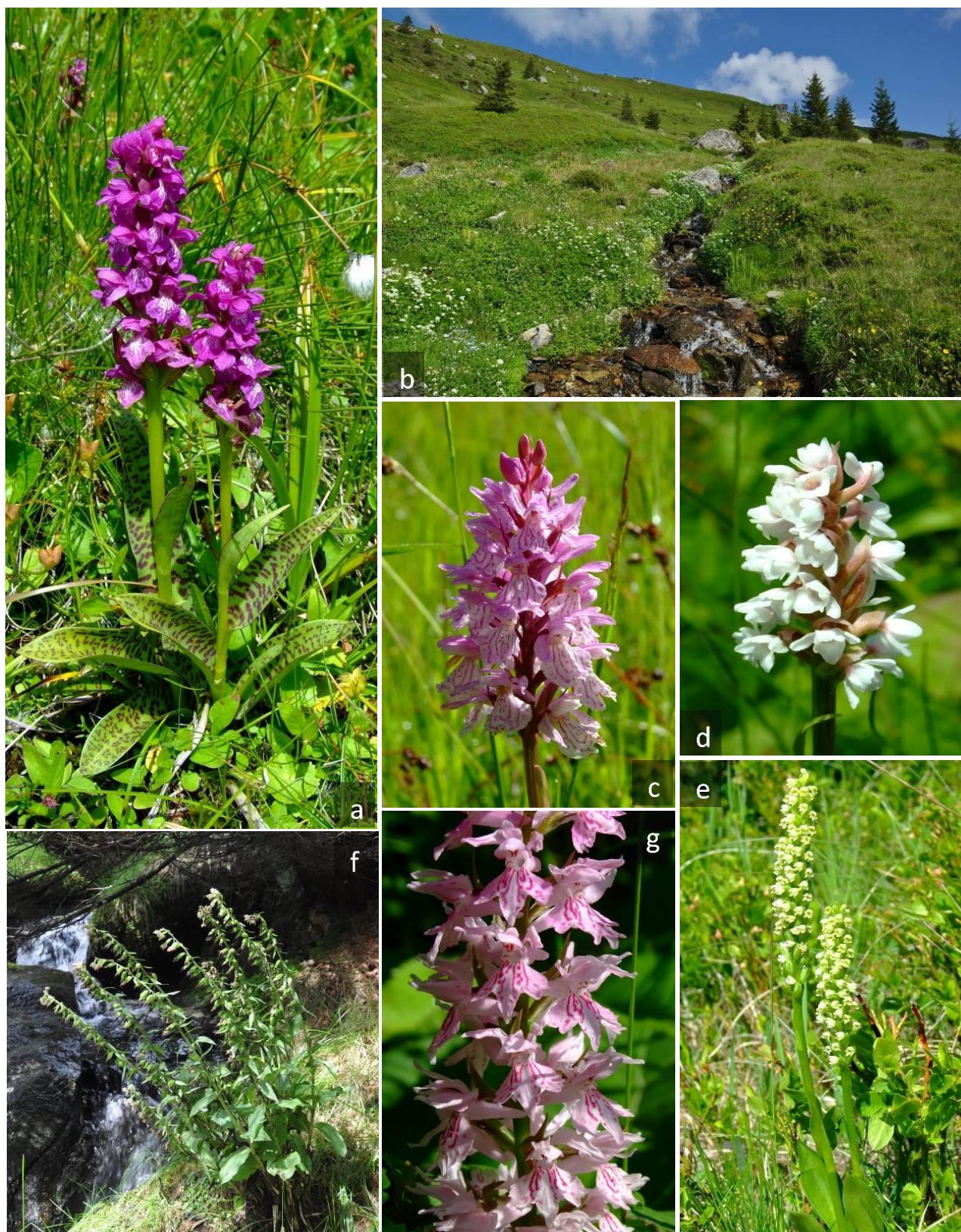


Fig. 2: a) *Dactylorhiza cordigera* (Fr.) Soó (photo: 18.06.2009); b) Muntele Mic – general view (photo: 05.06.2015); c) *Dactylorhiza maculata* (L.) Soó (photo: 18.06.2009); d) *Gymnadenia frivaldii* Hampe ex Griseb. (photo: 18.06.2009); e) *Pseudorchis albida* (L.) Á. Löve & D. Löve (photo: 18.06.2009); f) *Epipactis helleborine* (L.) Crantz (photo: 20.08.2015); g) *Dactylorhiza saccifera* (Brongn.) Soó (photo: 18.06.2009).

of the population (taking also into account the dormancy, frequently met with the terrestrial orchid species);

Threats: over pasturing, leveling of meadows for skiing tracks, off road motorcycling.

Gymnadenia frivaldii Hampe ex Griseb.

Habitat: a relatively large population was identified in a single area on Muntele Mic (on a surface of about 50 sq m), on the eastern slope, in a mesophyllic alpine meadow, 1.460 m altitude (**Fig. 2d**);

Status of population: the population is relatively numerous, concentrated on a very small surface and comprises some 200 bloomy specimens;

Threats: extremely threatened by over pasture; not far from the habitat of this species, a farm was built two years ago; the species is also threatened by off road motorcycling.

Observation: newly found species for the Muntele Mic zone.

The genus *Pseudorchis* Ség.

Pseudorchis albida (L.) Á. Löve & D. Löve

Habitat: a very small number of specimens were found on the eastern slope, 1400 m altitude (**Fig. 2e**);

Status of population: very rare; a total of six bloomy specimens, in different locations and different years;

Threats: extremely threatened by over pasture, the more so as closely to its habitat a sheepfold was installed 2 years ago; the species is also threatened by off road motorcycling.

The genus *Epipactis* Zinn

Epipactis helleborine (L.) Crantz

Habitat: a relatively large population of some 200 specimens was found in a small spruce forest, near a torrent, on the border of the alpine meadows. It is interesting that in the lower areas, although the habitat is friendlier to this species, not a single specimen had been identified (**Fig. 2f**);

Status of population: relative large population, comprising some 200 specimens (around 1200 m altitude); the entire population is concentrated on some 100 sq m;

Threats: pasturing on forest ground (closely to its habitat a sheepfold was installed 2 years ago) and technical improvements for a skiing track.

Conclusion

Although relatively isolated from Tarcu Mt range (to which it belongs to), Muntele Mic Mt contains most of the typical high-mountain habitats.

Field studies on the orchid species and their populations started in 2009 and ended in 2015. Since the investigated area comprised area above 600 m a.s.l. up to the highest peak of the Muntele Mic Mt (1802 m a.s.l.), the number of recorded species was 10, which was lower than number recorded by Boşcaiu (1971). However, the herein presented results revealed the existence of three new species for Muntele Mic Mt, namely *Gymnadenia frivaldii*, *Dactylorhiza fuchsii* and *Dactylorhiza saccifera*.

The *Dactylorhiza cordigera* species, according to multiannual monitoring, presents the largest population (at least 500 bloomy specimens, most of them on the east slope of Muntele Mic). The rarest species are: *Pseudorchis albida*, *Gymnadenia conopsea* (!?), *Dactylorhiza viridis*, *Dactylorhiza fuchsii* and *Dactylorhiza maculata*, as the number of specimens for each of these species is up to 20.

Considering the easy access up the mountain (asphalted road to Muntele Mic resort), the existing habitats are subject to an extremely severe negative anthropogenic impact. The greatest threats to the species and their habitats come from leveling of the meadows for skiing tracks and adjacent infrastructure, unfortunately highly aggressive and irreversible (including the south western part). It is followed by the over pasturing, due to existence of at least three sheepfolds on Muntele Mic. Another threat comes from the illegal off-road motorcycling races.

References

- Ardelean, Corina, 2011: *Epipactis greuteri* (Orchidaceae) a new species for Romanian flora. *Journal Europäischer Orchideen*, 43 (3): 527-534.
- Boşcaiu, N. 1971: Flora și Vegetația Munților Țarcu, Godeanu și Cernei. Edit. Academiei Republicii Socialiste România, București. 494 p.
- Chase, M. W., Cameron, K. M., Barrett, R. L., Freudenstein, J. V. 2003: DNA data and Orchidaceae systematics: a new phylogenetic classification. In: Dixon K.W., Kell, S.P., Barrett, R.L., Cribb, P.J., eds. *Orchid conservation*. Kota Kinabalu, Sabah: Natural History Publications, 69-90.
- Ciocârlan, V. 2009: Flora ilustrată a României. *Pteridophyta et spermatophyte*, Ed. Ceres, București. 1141 p.
- Cribb, P.J., Kell, S.P., Dixon, K.W., Barrett, R.L. 2003: *Orchid conservation: a global perspective*. In: Dixon K. W., Kell, S. P., Barrett, R. L., Cribb, P.J., eds. *Orchid conservation*. Kota Kinabalu, Sabah, Natural History Publications, 1-24.

- Delforge, P. 2006: Orchids of Europe, North Africa and the Middle East. A&C Black, London. 640 p..
- Dressler, R. L. 1981: The orchids, natural history and classification. Cambridge, MA: Harvard University Press. 332 p..
- Dressler, R. L. 1993: Phylogeny and classification of the orchid family, Dioscorides Press. 314 p..
- Govaerts, R. 2003: World Checklist of Monocotyledons Database in ACCESS: 1-71827. The Board of Trustees of the Royal Botanic Gardens, Kew.
- Nyárády, E. I. 1958: Flora și vegetația munților Retezat. Edit. Acad. R.P.R. București. 195 p..
- Oltean, M., Negrean, G., Popescu, A., Roman, N., Dihoru, G., Sanda, V., Mihăilescu, S. 1994: Lista Roșie a plantelor superioare din România, St. Sin. Doc. Ec., 1/1994, București.
- Pócs, T. 1957: Contributions á la flore des Carpathes orientaux et meridionaux. *Annales historico-naturales Musei nationalis hungarici*, 8: 205-217.
- Robatsch, K. 1996: *Epipactis guegelii* K. Robatsch spec. nov., eine neue Epipactis-Art aus Rumänien. *Journal Europäischer Orchideen*, 28 (4):765-772.
- Rogobete, Gh., Grozav, Adia, Beutură, D., Nemeș I. 2007: Soil acidification by ferrollysis in a pedological sequence of Muntele Mic, Caraș-Severin County. *Factori și Procese Pedogenetice din Zona Temperată 6 S. nouă*, 67-74.
- Sanda, V., Öllerer, Kinga, Burescu, P. 2008: Fitocenozele din România. Sintaxonomie, structură, dinamică și evoluție. Ed. Ars Docendi, Universitatea din București. 570 p..
- Sârbu, I., Ștefan, N., Oprea, A. 2013: Plante vasculare din România. Determinator ilustrat de teren. Ed. Victor B Victor, București. 1320 p..
- Savulescu, T., (ed) 1972: Flora Republicii Socialiste România, Vol. XII. Editura Academiei Republicii Socialiste România, București.
- Soó, R. 1973: A magyar flóra és vegetáció rendszertani – növényföldrajzi kézikönyve v. Akadémiai Kiadó, Budapest. 723 p..
- Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., eds. 1980: Flora Europaea, Vol. V. Cambridge University Press, Cambridge.
- Urdea, P., Török-Oance, M., Ardelean, M., Vuia, F., Voiculescu, M. 2009: Geomorphological Aspects of the Human Impact in the Alpine Area of Southern Carpathians (Romania). *Hrvatski Geografski Glasnik*, 71 (1): 19-32.
- Wucherpfennig, W. 2008: *Epipactis persica* and andere Orchideen des Donaudeltas (Rumänien). – Ber. Arbeitskrs. *Heimische Orchideen*, 25 (1):85-110.
- <http://www.theplantlist.org>
<http://apps.kew.org/wcsp/home.do>
<http://rbg-web2.rbge.org.uk/FE/fe.html>

* **Note:** This article has been retracted due to technical and grammar errors and plagiarisms in Introduction, which were not influenced by the originality and importance of research results in 23 April 2018. In agreement with the reviewers, the editor decided to approve resubmission of the manuscript and publication in the same issue of the journal.