

Orchid species distribution in rangelands of Epirus, Greece

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Abstract

The orchid family (*Orchidaceae* L.) is one of the richest plant families in the world, including at least 24,000 species and subspecies. In Greece the number exceeds 200 taxa, while the endemics are 50 or more. These numbers often change, as new species are described or others considered until recently as endemics in Greece, are recorded in neighbouring countries. This research carried out at various rangeland types of Epirus region. A total of 58 species and subspecies were identified. The majority of taxa belong to the genera *Ophrys* and *Orchis*. The results revealed that the highest number of taxa (37) exists in forest openings and silvopastoral systems especially of oak trees, followed by 25 taxa in grasslands and 22 taxa in open shrublands (evergreen broadleaved species). The lower orchid richness, 17 taxa, was found in the phryganic ecosystems. As a conclusion, rangeland ecosystems of Epirus are significantly rich in orchids and their conservation, especially in oak silvopastoral systems, seems to be of particular importance for the maintenance of orchid diversity.

Key words: Epirus, orchids, rangeland types, oak silvopastoral systems.

Introduction

The various rangeland types in Greece, namely grasslands, phryganic ecosystems, shrublands, and silvopastoral systems including forest openings, are rich in herbaceous plant species and orchids (Papanastasis and Noitsakis 1992). The orchid family (*Orchidaceae* L.) is one of the richest plant families in the world, including at least 24,000 species and subspecies (Chase and Fay 2009). According to Delforge (2006), in Greece the number exceeds 200 taxa, while the endemics are 50 or more. These numbers often change, as new species are described or others considered until recently as endemics in Greece, are recorded in neighbouring countries (Antonopoulos 2009). The research referring to the orchids in Epirus is limited and few data

are available mainly from general floristic studies of orchids in Greece (Antonopoulos 2009, Petrou et al. 2011).

The aim of the study is to record the orchid flora in different rangeland types of Epirus and to estimate their orchid species richness, assessing in that way their importance as possible orchid habitat.

Materials and methods

Epirus occupies the northwestern part of Greece (Fig.1). It is one of the most mountainous regions, with intense and complex geomorphology, extending from the Ionian Sea to the ridges of the mountain range of Pindos. These features, combined with abundance of water resources, create a variety of habitats of particular importance.

The study area was extended all over the area of Epirus, including the high mountains as well as the Ionian coast (Fig.1). Each site, where one or more orchid taxa were recorded, defines a specific collecting locality. At each collecting locality, the following data were recorded: the site, the geographical coordinates, the altitude and the type of rangeland. The data were sampled during the years 2009-2011 with excursions mostly in spring and summer.



Fig 1. Map of Greece with the study area.

The identification of the orchid species and subspecies based mainly on photography and was made according to Buttler (1991), Baumann et al. (2006), Delforge (2006). The nomenclature is largely followed Delforge (2006), Kretz (2004) and Kretzschmar et al. (2007).

Results and Discussion

A total of 58 species and subspecies were identified (Table 1).

Table 1. List of orchid species in different rangeland types in Epirus.

	Species/Subspecies	Altitude (m)	Grasslands	Phryganic	Shrublands	Silvopastoral
1	<i>Anacamptis coriophora</i> (L.) R.M. Bateman, Pridgeon & Chase	300-400	✓			
2	<i>Anacamptis coriophora</i> (L.) R.M. Bateman, Pridgeon & Chase subsp. <i>fragrans</i> (Pollini) R.M. Bateman, Pridgeon & Chase	200-300	✓			✓
3	<i>Anacamptis laxiflora</i> (Lamarck) R.M. Bateman, Pridgeon & Chase	0-1000	✓	✓	✓	
4	<i>Anacamptis morio</i> (L.) R.M. Bateman, Pridgeon & Chase	250-1350	✓	✓	✓	✓
5	<i>Anacamptis papilionacea</i> (L.) R.M. Bateman, Pridgeon & Chase	200-900	✓		✓	
6	<i>Anacamptis picta</i> (Loiseleur) R.M. Bateman	400-900	✓			
7	<i>Anacamptis pyramidalis</i> (L.) Richard	400-900	✓	✓	✓	
8	<i>Cephalanthera longifolia</i> (L.) Fritsch	700-1250				✓
9	<i>Cephalanthera rubra</i> (L.) Richard	250-1300				✓
10	<i>Dactylorhiza incarnata</i> (L.) Soó	1350	✓			
11	<i>Dactylorhiza kalopissii</i> E.Nelson	1250-1350	✓			✓
12	<i>Dactylorhiza saccifera</i> (Brongniart) Soó	750-1300	✓			✓
13	<i>Dactylorhiza sambucina</i> (L.) Soó	900-1500	✓	✓	✓	✓
14	<i>Dactylorhiza smolikana</i> B.&E.Willing	1350	✓			
15	<i>Epipactis atrorubens</i> (Hoffm.) Besser subsp. <i>spiridonovii</i> (J.Devillers-Terschuren & P.Devillers) Kreutz	1400				✓
16	<i>Epipactis atrorubens</i> (Hoffm.) Besser subsp. <i>subglausa</i> (Robatsch) Kreutz	950-1200				✓

1 7	<i>Epipactis helleborine</i> (L.) Crantz	900- 1300				✓
1 8	<i>Epipactis leptochila</i> (Godfery) Godfery subsp. <i>neglecta</i> Kümpel	1350				✓
1 9	<i>Epipactis microphylla</i> (Ehrhardt) Swartz	1100				✓
2 0	<i>Epipactis palustris</i> (L.) Crantz	1300				✓
2 1	<i>Epipactis placentina</i> Bongiorno & P.Grünanger ?(*)	1300				✓
2 2	<i>Gymnadenia conopsea</i> (L.) R.Brown	1100- 1400				✓
2 3	<i>Himantoglossum caprinum</i> (F.A.M. von Bieberstein) Sprengel	250- 1300				✓
2 4	<i>Himantoglossum robertianum</i> (Loiseleur) Delforge	150-900	✓	✓	✓	✓
2 5	<i>Limodorum abortivum</i> (L.) Swartz	700- 1400				✓
2 6	<i>Neotinea lactea</i> (Poiret) R.M.Bateman, Pridgeon & Chase	200	✓			
2 7	<i>Neotinea maculata</i> (Desfontaines) Stearn	900				✓
2 8	<i>Neotinea tridentata</i> (Scopoli) R.M.Bateman, Pridgeon & Chase	750-900	✓	✓		
2 9	<i>Neottia nidus-avis</i> (L.) Richard	450- 1000				✓
3 0	<i>Neottia ovata</i> (L.) Bluff & Fingerhuth	400- 1400	✓			✓
3 1	<i>Ophrys apifera</i> Hudson	400-750	✓	✓	✓	
3 2	<i>Ophrys epirotica</i> (Renz) J.Devillers-Terschuren & P.Devillers	250- 1000	✓	✓	✓	✓
3 3	<i>Ophrys grammica</i> (B.&E.Willing) J.Devillers-Terschuren & P.Devillers	400				✓
3 4	<i>Ophrys helenae</i> Renz	200-900	✓	✓	✓	✓
3 5	<i>Ophrys herae</i> Hirth & Spaeth	400-500		✓		
3 6	<i>Ophrys hystera</i> C.A.J. Kreuz & R.Peter	900				✓

3	<i>Ophrys leucophthalma</i>	500	✓		
7	J.Devillers-Terschuren & P.Devillers				
3	<i>Ophrys mammosa</i> Desfontaines	500-900	✓	✓	✓
8					
3	<i>Ophrys oestifera</i> Steven in M.- Bieberstein	250-900	✓	✓	✓
9					
4	<i>Ophrys oestifera</i> M.Bieb. subsp. <i>bicornis</i> (Sadler ex Nendt.) Kreutz	600		✓	
0					
4	<i>Ophrys phryganae</i> J.Devillers-Terschuren & P.Devillers	350-600		✓	✓
1					✓
4	<i>Ophrys reinholdii</i> Spruner ex Fleischm.	50-100		✓	
2					
4	<i>Ophrys sicula</i> Tineo	200-600	✓	✓	
3					
4	<i>Ophrys spruneri</i> Nyman	50-100		✓	
4					
4	<i>Ophrys zeusii</i> M.Hirth	300			✓
5					
4	<i>Orchis italica</i> Poiret	250-450	✓	✓	✓
6					
4	<i>Orchis mascula</i> (L.) L.	900-1400	✓	✓	✓
7					
4	<i>Orchis mascula</i> (L.) L. subsp. <i>pinetorum</i> (Boissier & Kotschy) E.G. Camus, Bergon & A.Camus	900-1350			✓
8					
4	<i>Orchis pauciflora</i> Tenore	900-1250	✓	✓	✓
9					
5	<i>Orchis provincialis</i> Balb. ex Lam. & DC.	250-1000		✓	✓
0					
5	<i>Orchis purpurea</i> Hudson	500-1000		✓	✓
1					
5	<i>Orchis quantripunctata</i> Cyrillo ex Ten.	600-1250		✓	✓
2					✓
5	<i>Orchis simia</i> Lamarck	400-1000		✓	
3					
5	<i>Orchis spitzelii</i> Sauter ex W.D.J.Koch	900-1000			✓
4					
5	<i>Platanthera chlorantha</i> (Custer) Reichenbach	250-900			✓
5					
5	<i>Serapias bergonii</i> E.G.Camus	0-50	✓		
6					
5	<i>Serapias vomeracea</i> (Burm.f.)	800			✓

7	Briq.		
5	<i>Spiranthes spiralis</i> (L.) Chevallier	100-	✓
8		1000	

(*) Reported for the first time in Greece, needs further research

The majority of taxa belong to the genera *Ophrys* (15 taxa) and *Orchis* (9 taxa). The results revealed that the highest number of taxa (37) exists in forest openings and silvopastoral systems especially of oak trees, followed by 25 taxa in grasslands and 22 taxa in open shrublands, mainly of evergreen broadleaved species. The lower orchid richness, 17 taxa, was found in phryganic ecosystems. Regarding the silvopastoral types according the tree species, oaks had the higher number of orchid taxa followed by coniferous and other broadleaved species (Table 2).

Table 2. Number of orchid taxa in different silvopastoral types in region of Epirus.

Silvopastoral types according to tree species	Number of orchid taxa
Oak	25
Pines	20
Firs	15
Other broadleaved species	3

Conclusions

1. Rangeland ecosystems of Epirus are significantly rich in orchids with 58 recorded taxa.
2. Silvopastoral systems play a major role in orchid diversity. Depending on that, their conservation seems to be of particular importance for the maintenance of orchid diversity (Tsiftsis et al. 2005, Tsiftsis et al. 2008, Tsiftsis 2009).

References

- Antonopoulos Z. 2009.** The Bee Orchids of Greece. Mediterraneo Editions, Rethymno. 320 pp.
- Baumann H., S. Künkele and R. Lorenz. 2006.** Die Orchideen Europas mit angrenzenden Gebieten. Ulmer Verlag, Stuttgart. 333 pp.
- Butler K.P. 1991.** Field guide to the orchids of Britain and Europe. English edition, The Crowood Press, Swindon. 288 pp.
- Chase M.W. and M.F. Fay. 2009.** Orchid biology: from Linnaeus via Darwin to the 21st century. *Annals of Botany*, 104:359–364.

Delforge P. 2006. Orchids of Europe, North Africa and the Middle East. English Edition, A and C Black Publishers, London. 640 pp.

Kretzschmar H., W. Eccarius and H. Dietrich. 2007. The Orchid Genera *Anacamptis*, *Orchis*, *Neotinea*. EchinoMedia Verlag. 544 pp.

Kreutz C.A.J. 2004. Kompendium der Europäischen Orchideen. Kreutz Publishers, Landgraaf. 239 pp.

Papanastasis V.P. and V.I. Noitsakis. 1992. Rangeland Ecology. Giahoudi-Giapouli Editions, Thessaloniki. 256 pp.

Petrou N., M. Petrou and M. Giannakoulas. 2011. Orchids of Greece, Koan Publishing House, Athens. 320 pp.

Tsiftsis S., V. Karagiannakidou and I. Tsiripidis. 2005. Orchid species richness in the mountains and the habitat types of east Macedonia (NE Greece). Proceedings of the 10th Panhellenic Scientific Conference of the Hellenic Botanical Society, Ioannina. pp. 1-9.

Tsiftsis, S., I. Tsiripidis, V. Karagiannakidou and D. Alifragis. 2008. Niche analysis and conservation of the orchids of east Macedonia (NE Greece). *Acta Oecologia* 33:27-35.

Tsiftsis S. 2009. The Orchids (Orchidaceae) of E. Macedonia: Distribution, Ecology and High Conservation Value Areas. Ph D Thesis, Aristotle University of Thessaloniki. 270 pp. (in Greek with English Summary)