

Threatened vascular plants in the Ukrainian Carpathians: current status, distribution and conservation

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Abstract: To preserve threatened vascular plants in the Ukrainian Carpathians the regional Red List is presented. It is completed on the basis of field research data of authors, numerous Ukrainian and foreign herbarium collections, critical review of literary data which include information on the regional flora. The Red List totals 425 taxa belonging to 238 genera and 71 families. Their place in Red Data Books of different levels and International legislative documents are shown. Analysis of distribution of threatened plant species within the systematic, chorology and administrative units as well as within the categories of protection is given. Data on the structure and distribution of endemic phytogene pool are given. List of new and forgotten taxa and taxa whose occurrence in the flora of the region needs to be confirmed are given.

Keywords: threatened plants, distribution, conservation, Ukrainian Carpathians

Introduction

The problem of conservation of biological diversity remains one of the most actually among global problems of our civilization with which humanity entered into the new millenium. Because of wide launching an offensive of man against the nature, the larger number of plants and animals become incapable to

withstand this pressure and find themselves in danger of extinction. Unfortunately we must note that at the present time species become extinct more quickly than the new begin. It is known that every taxon is a unique nature object and a result of long evolution process. That is why the priority task for all conscious citizens and first of all researchers is to conserve nature in all its diversity and do not allow any species of plants or animals to vanish.

This problem is fairly actual for the Ukrainian Carpathians where floristic diversity is very rich. The region occupies only about 5% of territory of Ukraine, but almost 50% of all species of vascular plants are concentrated here. Last decades intensive impoverishment of natural ecosystems and reduction of their stability is noted in the Ukrainian Carpathians as well as loss of gene pool of plant and animal kingdom. In this connection importance of study of phytogene pool in general and its rare share in particular as well as working out and implementation of effective measures of its protection is increased. The first step in this direction is to make thorough inventory and registration of distribution of threatened plant species, in particular of their local populations.

Many generations of researchers paid attention to the problem of protection of the Ukrainian Carpathians rare phytogene pool, but the most valuable results were given for the last 25-30 years. Ones of the first lists of rare plants of Ukraine that included also the species of flora of the Ukrainian Carpathians were compiled by CHOPYK (1970, 1978) and CHOPYK & al. (1988). FODOR (1973) prepared the list of rare species of flora of Transcarpathia for the first time. Later, STOJKO (1977) suggests 271 plant species for protection in the Ukrainian Carpathians; KOMENDAR, FODOR, VAJNAGY (1987) give 213 rare species for Transcarpathia. More new data as to only the numerical composition of the rare phytogene pool in the Ukrainian Carpathians are given in the works of KOMENDAR (1988) where 370 plant species are suggested for protection, and MALYNOVSKI, TSARYK (1991) where 378 taxa are proposed.

A number of scientific publications contain red lists for some floristic areas, natural protected or other objects in the Ukrainian Carpathians. Thus, KOMENDAR, KRICSFALUSY (1986) inserted 44 species into the list of threatened plants of the forest ecosystems of Transcarpathia. Later KRICSFALUSY (1997) extends the register to 141 plant species. STOJKO, TASENKEVICH, MILKINA (1982) give 118 threatened plants for the flora of the Carpathian Biosphere Reserve. General characteristic of the flora of the Uzhansky National Nature Park, including threatened plants can be found in the works of KRICSFALUSY & al. (2001) and KRICSFALUSY, LESJO (2004). Information on the distribution of threatened species in Precarpathian (Lviv and Ivano-Frankivsk regions) we can find in TKACHYK (2000), and in the Chernivtsi region – CHORNEJ with co-authors (1999, 2001), that to a considerable extent add chorological data, compared with ones, given in the last edition of the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996).

Recently KRICSFALUSY, BUDNIKOV, MIHALY (1999) published the "Red List of Transcarpathia". List of 485 threatened plant species of the Transcarpathian region (south-west macroslopes of the Ukrainian Carpathians and

Transcarpathian Plain) is given in this work and complex bioecological characteristic of these plants is elucidated too.

Materials and methods

The presented Red List in this article contains information on threatened plants of all territory of the Ukrainian Carpathians – as south-west (Transcarpathian region) as north-east (Lviv, Ivano-Frankivsk and Chernivtsi regions) macroslopes. It is compiled on the base of 25-years field researches of authors, analysis of numerous Ukrainian (*CHER, KW, LW, LWS, UU*) and foreign herbarium collections (*BP, DEB, BRNU, PRC, BRA, SAV, SLO, L, W, BUC, CL, SB, KRAM*) and literary sources as well as valuable advices of many colleagues-botanists.

The zoological status of species in the Ukrainian Carpathians is evaluated on the basis of categories, approved by IUCN (2001).

Results

The Red List of flora of the Ukrainian Carpathians includes 425 taxa belonging to 238 genera and 71 families (Tab. 1). The share of threatened species is 21.0% in the flora of the region. It should be noted that only 141 plant species (or 7.0%), growing in the Ukrainian Carpathians are included into the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996). Among the above mentioned numerical data we reckon also 7 species (*Carex bohémica* SCHREB., *C. davalliana* SMITH, *Dictamnus albus* L., *Ligularia glauca* (L.) O. HOFFM., *Nymphoides peltata* (S.G. GMEL.) O. Kuntze, *Orchis mascula* (L.) L. subsp. *mascula*, *O. pallens* L.), which have not been given for the Ukrainian Carpathians in the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996), but however, they are distributed there. At the same time we exclude *Cardamine graeca* L., as this species, respectively our researches (KRICSFALUSY & al., 1999), has been noted for the region erroneously.

Among the taxa that were critically analyzed should be singled out particularly the following groups.

New and forgotten taxa in the flora of the region

- *Botrychium virginianum* (L.) SW. – CHOPYK (1978)
- *Bruckenthalia spiculifolia* (SALISB.) RCHB. – TKACHYK (1997)
- *Callianthemum coriandrifolium* RCHB. – SZUCKI (KOBIV, NESTERUK, 1996)
- *Carex demissa* HORNEM. – KONTNY & HANASH (HYNDA, DANYLYK, 1994)
- *C. disticha* HUDS. – KARDASH (1991)
- *C. rhizina* BLYTT ex LINDBL. – IGOSHYNA (1955)
- *C. vaginata* TAUSCH – MRÁZ (2002)
- *Dactylorhiza fuchsii* (DRUCE) SOÓ subsp. *sooana* (BORSOS) BORSOS – HAYEK (KRICSFALUSY & al., 1999)
- *D. maculata* (L.) SOÓ subsp. *schurii* (KLINGE) SOÓ – KRICSFALUSY (KRICSFALUSY & al., 1999)

- *D. maculata* (L.) SOÓ subsp. *transsilvanica* (SCHUR) SOÓ – SOBKO (1989), KRICSFALUSY (KRICSFALUSY & al., 1999)
- *Delphinium elatum* L. subsp. *elatum* – MALYNOVSKI (1962)
- *Dictamnus albus* L. – FODOR (1974)
- *Erythronium dens-canis* L. subsp. *albiflorum* KRICSFALUSY – KRICSFALUSY (KRICSFALUSY & al., 1995)
- *Gentiana nivalis* L. – KARDASH (1991)
- *Hieracium deylii* MRÁZ – MRÁZ (2003)
- *Melica ciliata* L. – FODOR & KRYS (FODOR, 1974), KRICSFALUSY (KRICSFALUSY & al., 1999)
- *Muscari botryoides* (L.) MILL. subsp. *transsilvanicum* (SCHUR) SOÓ – KRICSFALUSY (KRICSFALUSY, MIHALY, 1993)
- *Orchis pallens* L. – SHUSHMAN (1996)
- *Ornithogalum umbellatum* L. subsp. *divergens* (BOREAU) A. LÖVE & D. LÖVE – MEZO-KRICSFALUSY, KRICSFALUSY (1994)
- *Potentilla patula* WALDST. & KIT. – FODOR (1974)
- *Salix rosmarinifolia* L. – DOMIN (1929), KRICSFALUSY (1982)
- *Waldsteinia geoides* WILLD. – KRICSFALUSY (KRICSFALUSY & al., 1999)

Taxa whose occurrence in the flora of the region needs to be confirmed

- *Aconitum pseudanthora* BŁOCKI ex PACZ.
- *Betula humilis* SCHRANK
- *Chamaecytisus albus* (HACQ.) ROTHM. (*C. leucanthus* WALDST. & KIT.)
- *Crepis lodomeriensis* BESS.
- *Draba fladnizensis* WULF.
- *Gymnocarpium * intermedium* SARVELA (*G. heterosporum* auct., *G. hybridum* ROTHM.)
- *Helianthemum alpestre* (JACQ.) DC. (*Rhodax italicus* (L.) HOLUB subsp. *alpestris* (JACQ.) A. LÖVE & D. LÖVE)
- *H. rupifragum* A. KERN. (*R. rupifragus* (A. KERN.) HOLUB)
- *Hesperis nivea* BAUMG.
- *Inula aspera* POIR.
- *Koeleria transsilvanica* SCHUR (*K. macrantha* (LEDEB.) SCHULT. subsp. *transsilvanica* (SCHUR) A. NYÁRÁDY)
- *Leucanthemopsis alpina* (L.) HEYWOOD (*Pyrethrum alpinum* (L.) SCHRANK)
- *Onosma borysthenica* KLOKOV (*O. arenaria* auct.)
- *Pietrosia levitomentosa* NYÁRÁDY (*Hieracium levitomentosum* SOY)
- *Polygala podolica* DC.
- *Polypodium interjectum* SHIVAS (*P. vulgare* L. subsp. *prionodes* (ASCH.) Rothm.)
- *Potentilla rupestris* L.
- *Salix reticulata* L. (*S. orbicularis* ANDERSS.)
- *Thalictrum uncinatum* REHM.

The analysis of systematic structure of flora of the Ukrainian Carpathians showed that the largest number of threatened species belongs to *Orchidaceae*, *Asteraceae*, and *Poaceae* families, in which 117 taxa (27.5%) are concentrated (Tab. 2). The first 10

families together include 236 species, that is 55.5% of their general number, and 108 genera – 45.4%. *Carex*, *Alchemilla*, *Dactylorhiza* and *Hieracium* genera take the leading place of taxa diversity, but they include only 10.1% of general number of threatened plants. Totally the first 10 genera include only 20.2% of all species diversity.

Tab. 1. List of threatened plant species in the Ukrainian Carpathians

Name of taxa	Category	Red Data Book of Ukraine, 1996	List of rare..., 1991	IUCN Red List..., 1997	Convention on the Conserv..., 1979	Interpretation Manual..., 1999
<i>Achillea lingulata</i> WALDST. & KIT.	EN	+				
<i>A. millefolium</i> L. subsp. <i>sudetica</i> (OPIZ) OBORNY	VU					
<i>A. ptarmica</i> L.	VU					
<i>A. schurii</i> SCH. BIP.	EN	+		+		
<i>Acinos alpinus</i> (L.) MOENCH subsp. <i>baumgartenii</i> (SIMONK.) PAWŁ.	EN					
<i>Aconitum anthora</i> L.	CR	+				
<i>A. bucovinense</i> ZAPAŁ.	EN					
<i>A. degenii</i> GÄYER	VU					
<i>A. firmum</i> RCHB. subsp. <i>firmum</i>	LRnt			+		
<i>A. firmum</i> RCHB. subsp. <i>fissuræ</i> NYÁRÁDY	CR					
<i>A. lasiocarpum</i> (RCHB.) GÄYER	EN					
<i>A. moldavicum</i> HACQ. subsp. <i>hosteanum</i> (SCHUR) BELDIE	EN					
<i>A. variegatum</i> L.	VU					
<i>Agrostis rupestris</i> ALL.	EN					
<i>Alchemilla babiogorensis</i> PAWŁ.	EN					
<i>A. braun-blanquetii</i> PAWŁ.	EN					
<i>A. czywczynensis</i> PAWŁ.	EN					
<i>A. kornasiana</i> PAWŁ.	EN					
<i>A. ladislai</i> PAWŁ.	EN					
<i>A. pseudincisa</i> PAWŁ.	EN					
<i>A. smytniensis</i> PAWŁ.	EN					
<i>A. szaferi</i> PAWŁ.	VU					
<i>A. turkulensis</i> PAWŁ.	VU					
<i>A. walasii</i> PAWŁ.	EN					
<i>A. zapalowiczii</i> PAWŁ.	EN					
<i>Allium angulosum</i> L.	EN					
<i>A. sphaerocephalon</i> L.	VU					

<i>A. ursinum</i> L.	LRnt	+			
<i>Alopecurus laguriformis</i> SCHUR	EN				
<i>Anchusa azurea</i> MILL.	EN				
<i>A. barrelieri</i> (ALL.) VITM.	VU				
<i>A. ochroleuca</i> BIEB.	VU				
<i>Andromeda polifolia</i> L.	CR				
<i>Anemone narcissiflora</i> L.	VU				
<i>Antennaria carpatica</i> (WAHLENB.) BLUFF & FINGERH.	EN	+			
<i>Anthemis carpatica</i> WALDST. & KIT.	EN				
<i>Anthyllis vulneraria</i> L. subsp. <i>alpestris</i> (KIT. ex SCHULT.) ASCH. & GRAEBN.	VU				
<i>Aquilegia nigricans</i> BAUMG.	CR	+			
<i>A. transsilvanica</i> SCHUR	CR	+			
<i>Arabis hornungiana</i> SCHUR	CR				
<i>Arenaria leptoclados</i> (RCHB.) GUSS.	VU				
<i>Armeria pocutica</i> PAWL.	CR	+	+	+	
<i>Arnica montana</i> L.	VU	+			+
<i>Artemisia pontica</i> L.	EN				
<i>Arum alpinum</i> SCHOTT & KOTSCHY	VU				
<i>Asplenium adiantum-nigrum</i> L.	CR	+			+
<i>Aster alpinus</i> L. subsp. <i>subvillosus</i> (SCHUR) DOSTÁL	CR	+			+
<i>Aster linosyris</i> (L.) BERNH.	EN				
<i>Astragalus australis</i> (L.) LAM. subsp. <i>krajinae</i> DOMIN	CR	+	+		
<i>Astrantia major</i> L.	LRlc	+			+
<i>Atropa bella-donna</i> L.	LRnt	+			
<i>Bartsia alpina</i> L.	EN				
<i>Beckmannia eruciformis</i> (L.) HOST	EN				
<i>Bellardiochloa variegata</i> (LAM.) KERGDÉN	VU				+
<i>Betula pubescens</i> EHRH.	CR				+
<i>Biscutella laevigata</i> L. subsp. <i>hungarica</i> SOÓ	CR				+
<i>Blechnum spicant</i> (L.) ROTH	LRnt				
<i>Bothriochloa ischaemum</i> (L.) KENG	VU				
<i>Botrychium lunaria</i> (L.) SW.	VU	+			
<i>B. matricariifolium</i> (A. BRAUN ex DÖLL) W. D. J. KOCH	EN				+
<i>B. multifidum</i> (S.G. GMEL.) RUPR.	CR				+
<i>B. virginianum</i> (L.) SW.	CR				
<i>Bruckenthalia spiculifolia</i> (SALISB.) RCHB.	CR				
<i>Bupleurum falcatum</i> L. subsp. <i>cernuum</i> (TEN.) ARCANGELI	CR				
<i>B. longifolium</i> L. subsp. <i>vapincence</i> (VILL.) TODOR	EN				
<i>Calla palustris</i> L.	CR				
<i>Callianthemum coriandrifolium</i> RCHB.	CR				
<i>Callitriche stagnalis</i> SCOP.	VU				
<i>Calluna vulgaris</i> (L.) HULL	CR				+
<i>Campanula carpatica</i> JACQ.	EN	+			
<i>C. glomerata</i> L. subsp. <i>elliptica</i> (KIT. ex SCHULT.) O. SCHWARZ	EN				
<i>C. glomerata</i> L. subsp. <i>Subcapitata</i> (M. POP.) FED.	CR				
<i>C. rotundifolia</i> L. subsp. <i>polymorpha</i> (WITASEK) TACIK	VU				
<i>C. serrata</i> (KIT. ex SCHULT.) HENDRYCH	EN				
<i>Cardamine trifolia</i> L.	EX				

<i>Cardaminopsis halleri</i> (L.) HAYEK subsp. <i>ovirensis</i> (WULF.) HEGI & E. SCHMID	EN			
<i>C. neglecta</i> (SCHULT.) HAYEK	EN			
<i>Carduus collinus</i> WALDST. & KIT.	EN			
<i>C. glaucinus</i> HOLUB	EN			
<i>Carex bicolor</i> ALL.	EX			
<i>C. buxbaumii</i> WAHLENB.	CR	+		
<i>C. davalliana</i> SM.	CR	+		
<i>C. demissa</i> HORNEM.	CR			
<i>C. disticha</i> HUDS.	CR			
<i>C. fuliginosa</i> SCHKUHR	CR			
<i>C. hartmanii</i> CAJAND.	CR			
<i>C. humilis</i> LEYSS.	EN			
<i>C. limosa</i> L.	EN			
<i>C. pauciflora</i> LIGHTF.	VU	+		+
<i>C. rhizina</i> BLYTT ex LINDBL.	CR			
<i>C. rupestris</i> ALL.	CR	+		
<i>C. umbrosa</i> HOST	LRnt	+		
<i>C. vaginata</i> TAUSCH	CR			
<i>Catabrosa aquatica</i> (L.) P. BEAUV.	EN			
<i>Centaurea maramorosensis</i> (JÁV.) CZEREP.	LRnt			
<i>C. phrygia</i> L. subsp. <i>carpatica</i> (PORC.) DOSTÁL	LRlc	+		
<i>Cephalanthera damasonium</i> (MILL.) DRUCE	EN	+		+
<i>C. longifolia</i> (L.) FRITSCH	LRnt	+		+
<i>C. rubra</i> (L.) RICH.	VU	+		
<i>Cerastium alpinum</i> L. subsp. <i>lanatum</i> (LAM.) ASCH. & GRAEBN.	VU			
<i>C. cerastoides</i> (L.) BRITT.	EN			
<i>Cerintho glabra</i> MILL.	CR			
<i>Chamaecytisus hirsutus</i> (L.) LINK subsp. <i>leucotrichus</i> (SCHUR) ASCH. & GRAEBN.	CR			
<i>C. podolicus</i> (BŁOCKI) KLÁSKOVÁ	CR	+	+	+
<i>Chamaespartium sagittale</i> (L.) P. GIBBS	EN	+		
<i>Chimaphila umbellata</i> (L.) W. P. C. BARTON	CR			
<i>Chrysosplenium alpinum</i> SCHUR	VU			
<i>Cicuta virosa</i> L.	EN			
<i>Cimicifuga europaea</i> SCHIPEZ.	VU			
<i>Coeloglossum viride</i> (L.) HARTM.	VU	+		
<i>Colchicum autumnale</i> L.	LRcd	+		+
<i>Comarum palustre</i> L.	CR			
<i>Corallorhiza trifida</i> CHÂTEL.	EN	+		
<i>Coronilla legans</i> PANČ.	CR	+		
<i>Cortusa matthioli</i> L.	EN			
<i>Cotoneaster integerrimus</i> MEDIK.	VU			
<i>Crocus banaticus</i> GAY	VU	+		
<i>C. heuffelianus</i> HERB.	LRlc	+		
<i>Cypripedium calceolus</i> L.	CR	+		+
<i>Cystopteris alpina</i> (LAM.) DESV.	EX			
<i>C. montana</i> (LAM.) DESV.	EN			
<i>Dactylorhiza cordigera</i> (FRIES) SOÓ	VU	+		

<i>D. fuchsii</i> (DRUCE) Soó subsp. <i>fuchsii</i>	LRnt	+	
<i>D. fuchsii</i> (DRUCE) Soó subsp. <i>sooana</i> (BORSOS) BORSOS	EN		
<i>D. incarnata</i> (L.) Soó	LRlc	+	
<i>D. maculata</i> (L.) Soó subsp. <i>maculata</i>	VU	+	
<i>D. maculata</i> (L.) Soó subsp. <i>schurii</i> (KLINGE) Soó	EN		
<i>D. maculata</i> (L.) Soó subsp. <i>transsilvanica</i> (SCHUR) Soó	VU		
<i>D. majalis</i> (RCHB.) P.F. HUNT & SUMMERH.	LRlc	+	
<i>D. sambucina</i> (L.) Soó	LRlc	+	
<i>Delphinium elatum</i> L. subsp. <i>elatum</i>	CR	+	
<i>D. elatum</i> L. subsp. <i>nacladenze</i> (ZAPŁ.) HOLUB	CR		
<i>Dianthus carthusianorum</i> L. subsp. <i>saxigenus</i> (SCHUR) JÁV. & Soó	VU		
<i>D. polonicus</i> ZAPŁ.	EN		
<i>D. tenuifolius</i> SCHUR	CR		
<i>D. trifasciculatus</i> KIT. subsp. <i>pseudobarbatus</i> (SCHMALH.) JALAS	VU		
<i>Dictamnus albus</i> L.	CR	+	
<i>Diphasiastrum alpinum</i> (L.) HOLUB	EN		
<i>D. complanatum</i> (L.) HOLUB	CR	+	
<i>Doronicum carpaticum</i> (GRISEB. & SCHENK) NYM.	VU		
<i>D. clusii</i> (ALL.) TAUSCH subsp. <i>villosum</i> (TAUSCH) VIERH.	EN	+	
<i>D. hungaricum</i> (SADL.) RCHB. FIL.	CR	+	
<i>Draba aizoides</i> L.	EN		+
<i>D. carinthiaca</i> HOPPE	VU		
<i>Drosera rotundifolia</i> L.	VU		+
<i>Dryas octopetala</i> L.	CR	+	+
<i>Echinops sphaerocephalus</i> L.	EN		
<i>Elatine alsinastrum</i> L.	LRnt		
<i>E. hungarica</i> MOESZ	EN		
<i>Eleocharis austriaca</i> HAYEK	EN		
<i>E. carniolica</i> KOCH	VU		+
<i>E. multicaulis</i> (SM.) DESV.	CR		
<i>E. quinqueflora</i> (F.X. HARTM.) O. SCHWARZ	CR		
<i>Epipactis atrorubens</i> (HOFFM.) BESS.	EN	+	
<i>E. helleborine</i> (L.) CRANTZ	LRnt	+	+
<i>E. microphylla</i> (EHRH.) SW.	CR	+	+
<i>E. palustris</i> (L.) CRANTZ	VU	+	
<i>E. purpurata</i> SM.	CR	+	
<i>Epipogium aphyllum</i> Sw.	CR	+	
<i>Equisetum hyemale</i> L.	EN		
<i>E. telmateia</i> EHRH.	VU		
<i>Erigeron alpinus</i> L.	VU		
<i>Erysimum odoratum</i> EHRH.	EX		
<i>E. witmannii</i> ZAWADZKI subsp. <i>transsilvanicum</i> (SCHUR) P.W. BALL	CR		
<i>Erythronium dens-canis</i> L. subsp. <i>dens-canis</i>	EN	+	
<i>E. dens-canis</i> L. subsp. <i>albiflorum</i> KRICSFALUSY	EN		
<i>Euphorbia austriaca</i> A. KERNER	VU		
<i>E. carpatica</i> WOŁ.	LRlc		
<i>E. lingulata</i> HEUFF.	EN		

<i>Euphrasia micrantha</i> RCHB.	EN			
<i>E. salisburgensis</i> FUNCK	CR			
<i>Festuca amethystina</i> subsp. <i>orientalis</i> KRAJINA	VU			
<i>F. carpatica</i> F. DIETR.	VU			
<i>F. drymeja</i> MERT. & KOCH	VU			
<i>F. porcii</i> HACK.	CR	+		
<i>F. pseudodalmatica</i> KRAJINA	EN			
<i>F. rupicola</i> HEUFF. subsp. <i>saxatilis</i> (SCHUR) RICHT.	CR			
<i>F. tatrae</i> (CSAKÓ) DEGEN	EN			
<i>F. tenuifolia</i> SIBTH.	EN			
<i>Filago minima</i> (SM.) PERS.	VU			
<i>Fraxinus angustifolia</i> VAHL subsp. <i>oxycarpa</i> (BIEB.) FRANCO & ROCHA AFONSO	VU			
<i>F. ornus</i> L.	EN	+		
<i>Gagea arvensis</i> (PERS.) DUMORT.	VU			
<i>G. fistulosa</i> (RAM.) KER.-GAWL.	EN			
<i>G. minima</i> (L.) KER.-GAWL.	VU			
<i>Galanthus nivalis</i> L.	LRlc	+		
<i>Galium anisophyllum</i> VILL.	EN			
<i>G. transcarpaticum</i> STOJKO & TASENKEVICH	VU			
<i>Genista tinctoria</i> L. subsp. <i>oligosperma</i> (ANDRAE) PRODAN	CR			
<i>Gentiana acaulis</i> L.	VU	+		
<i>G. laciniata</i> KIT. ex KANITZ	VU	+		
<i>G. lutea</i> L.	CR	+		
<i>G. nivalis</i> L.	CR			+
<i>G. punctata</i> L.	EN	+		
<i>G. verna</i> L.	EN	+		
<i>Gladiolus imbricatus</i> L.	VU			
<i>Glyceria nemoralis</i> (UECHTR.) UECHTR. & KOERN.	VU			
<i>Goodyera repens</i> (L.) R.BR.	EN	+		
<i>Gymnadenia conopsea</i> (L.) R.BR. subsp. <i>conopsea</i>	LRlc	+		
<i>G. conopsea</i> (L.) R.BR. subsp. <i>densiflora</i> (WAHLENB.) E.G. CAMUS	CR			
<i>G. odoratissima</i> (L.) RICH.	CR	+		
<i>Hedysarum hedysaroides</i> (L.) SCHINZ & THELL.	EN	+		
<i>Helianthemum grandiflorum</i> (SCOP.) DC. subsp. <i>glabrum</i> (KOCH) HOLUB	CR			
<i>H. grandiflorum</i> (SCOP.) DC. subsp. <i>grandiflorum</i>	VU			+
<i>Helleborus purpurascens</i> WALDST. & KIT.	LRlc			
<i>Heracleum carpaticum</i> PORC.	EN		+	+
<i>H. palmatum</i> BAUMG.	EN			
<i>Herminium monorchis</i> (L.) R.BR.	CR	+		
<i>Hesperis matronalis</i> L. subsp. <i>candida</i> (KIT.) HEGI & E. SCHMID	VU			
<i>Hieracium catenatum</i> SENNIKOV	EN			
<i>H. czeremoszense</i> WOŁ. & ZAHN	EN			
<i>H. deylii</i> MRÁZ	CR			
<i>H. grofae</i> WOŁ. & ZAHN	EN			
<i>H. krasanii</i> WOŁ.	EN			
<i>H. lomnicense</i> WOŁ.	EN			

<i>H. mukaczewense</i> JUXIP	EN			
<i>H. paxianum</i> NYÁR. & ZAHN	EN			
<i>H. rapunculoidiforme</i> WOL. & ZAHN	EN			
<i>Huperzia selago</i> (L.) BERNH. ex SCHRANK & MART.	LRlc	+		
<i>Hyacinthella leucophaea</i> (C. KOCH) SCHUR	EN			
<i>Inula conyza</i> DC.	EN			
<i>Iris aphylla</i> L. subsp. <i>hungarica</i> (WALDST. & KIT.) ASCH. & GRAEBN.	CR			
<i>I. germanica</i> L.	CR			
<i>I. graminea</i> L. subsp. <i>graminea</i>	CR			
<i>I. graminea</i> L. subsp. <i>pseudocyperus</i> (SCHUR) Soó	CR	+		
<i>I. sibirica</i> L.	EN			
<i>Jovibarba globifera</i> (L.) J. PARN. subsp. <i>preissiana</i> (DOMIN) HOLUB	EN			
<i>Juncus triglumis</i> L.	VU			+
<i>Juniperus sabina</i> L.	CR			
<i>Knautia kitaibelii</i> (SCHULT.) BORB.	EN			
<i>Larix decidua</i> MILL. subsp. <i>polonica</i> (RACIB.) DOMIN	CR	+	+	
<i>Ledum palustre</i> L.	EN			+
<i>Leersia orysoides</i> (L.) SW.	VU			
<i>Leontodon montanus</i> LAM. subsp. <i>pseudotaraxaci</i> (SCHUR) FINCH & P.D. SELL	EN			
<i>L. repens</i> SCHUR	VU			
<i>Leontopodium alpinum</i> CASS.	CR	+		
<i>Leucojum vernum</i> L.	LRlc	+		
<i>Ligularia glauca</i> (L.) O. HOFFM.	CR	+		
<i>Lilium bulbiferum</i> L.	CR			+
<i>L. martagon</i> L.	VU	+		
<i>Linnaea borealis</i> L.	CR	+		
<i>Linum extraaxillare</i> KIT.	EN			
<i>L. flavum</i> L.	VU			
<i>Liparis loeselii</i> (L.) RICH.	CR	+		+
<i>Listera cordata</i> (L.) R.BR.	EN	+		
<i>L. ovata</i> (L.) R.BR.	LRlc	+		
<i>Lithospermum purpureo-caeruleum</i> L.	VU			
<i>Lloydia serotina</i> (L.) RCHB.	EN			
<i>Loiseleuria procumbens</i> (L.) DESV.	EN			
<i>Lonicera caerulea</i> L.	CR			
<i>Lotus tenuis</i> Waldst. & KIT. ex WILLD.	EN			
<i>Lunaria rediviva</i> L.	LRlc	+		+
<i>Luzula alpinopilosa</i> (CHAIX) BREISTR. subsp. <i>obscura</i> S. E. FRÖHNER	EN			
<i>Lycopodiella inundata</i> (L.) HOLUB	CR	+		+
<i>Lycopodium annotinum</i> L.	LRlc	+		
<i>Malaxis monophyllos</i> (L.) SW.	VU	+		
<i>Matteuccia struthiopteris</i> (L.) TOD.	VU			
<i>Melampyrum saxosum</i> BAUMG.	LRlc			
<i>Melica ciliata</i> L.	EN			
<i>M. picta</i> C. KOCH	VU			
<i>M. transsilvanica</i> SCHUR	VU			

<i>Menyanthes trifoliata</i> L.	VU			
<i>Minuartia verna</i> (L.) HIERN subsp. <i>gerardii</i> (WILLD.) FENZL	EN			
<i>M. verna</i> (L.) HIERN subsp. <i>oxypetala</i> (WOŁ.) HALLIDAY	EN			
<i>Muscari botryoides</i> (L.) MILL. subsp. <i>transsilvanicum</i> (SCHUR) SOÓ	CR			+
<i>M. comosum</i> (L.) MILL.	VU			
<i>Narcissus poeticus</i> L. subsp. <i>angustifolius</i> (CURT.) ASCH. & GRAEBN.	LRcd	+	+	+
<i>Neottia nidus-avis</i> (L.) RICH.	LRlc	+		+
<i>Nepeta cataria</i> L.	EN			
<i>Nigritella carpatica</i> (ZAPAL.) TEPPNER, KLEIN & ZAGULSKI	CR	+		
<i>Nuphar lutea</i> (L.) Sm.	EN			+
<i>Omphalodes scorpioides</i> (HAENKE) SCHRANK	EN			
<i>Ophioglossum vulgatum</i> L.	EN			+
<i>Ophrys insectifera</i> L.	CR	+		+
<i>Orchis coriophora</i> L.	VU	+		
<i>O. laxiflora</i> LAM. subsp. <i>palustris</i> (JACQ.) BONNIER & LAYENS	LRlc	+		
<i>O. mascula</i> (L.) L. subsp. <i>mascula</i>	LRlc	+		+
<i>O. mascula</i> (L.) L. subsp. <i>signifera</i> (VEST) SOÓ	EN	+		
<i>O. militaris</i> L.	EN	+		+
<i>O. morio</i> L.	LRlc	+		+
<i>O. pallens</i> L.	CR	+		
<i>O. ustulata</i> L.	VU	+		+
<i>Oreochloa disticha</i> (WULF.) LINK	CR	+		
<i>Ornithogalum orthophyllum</i> TEN. subsp. <i>kochii</i> (PARL.) MAIRE & WEILLER	EN			
<i>O. umbellatum</i> L. subsp. <i>divergens</i> (BOREAU) Á. LÖVE & D. LÖVE	VU			
<i>O. umbellatum</i> L. subsp. <i>umbellatum</i>	VU			
<i>Orobanche caryophyllacea</i> SM..	VU			
<i>O. reticulata</i> WALLR.	VU			
<i>Oxyria digyna</i> (L.) HILL	VU			
<i>Oxytropis carpatica</i> UECHTR.	CR	+		
<i>Padus avium</i> MILL. subsp. <i>petraea</i> (TAUSCH.) PAWŁ. EX HOLUB	EN			
<i>Pedicularis oederi</i> VAHL	EN	+		
<i>P. palustris</i> L.	EN			
<i>P. sylvatica</i> L.	EN			
<i>Petrorhagia prolifera</i> (L.) P.W. BALL & HEYWOOD	VU			
<i>Peucedanum cervaria</i> (L.) CUSSON	EN			
<i>P. palustre</i> (L.) MOENCH	EN			
<i>Phyllitis scolopendrium</i> (L.) NEWM.	VU			
<i>Physalis alkekengi</i> L.	EN			
<i>Phyteuma tetramerum</i> SCHUR	LRlc			
<i>P. vagneri</i> A. KERNER	LRlc			
<i>Pinguicula alpina</i> L.	EN	+		
<i>P. vulgaris</i> L.	VU	+		+
<i>Pinus cembra</i> L.	CR	+		
<i>P. sylvestris</i> L.	CR			+
<i>Plantago altissima</i> L.	VU			

<i>P. atrata</i> HOPPE subsp. <i>carpatica</i> (Soó) Soó	EN		+	
<i>Platanthera bifolia</i> (L.) RICH.	LRlc	+		+
<i>P. chlorantha</i> (CUSTER) RCHB.	EN	+		
<i>Poa deylii</i> CHRTEK & V. JIRÁSEK	EN	+		+
<i>P. media</i> SCHUR	CR			
<i>P. nemoralis</i> L. subsp. <i>carpatica</i> V. JIRÁSEK	EN			
<i>P. rehmannii</i> (ASCH. & GRAEBN.) WOŁ.	EN		+	
<i>P. remota</i> FORSELLES	EN			
<i>Polygala amara</i> L. subsp. <i>brachyptera</i> (CHODAT) HAYEK	EN			
<i>P. amarella</i> CRANTZ	EN			
<i>Polygonum viviparum</i> L.	VU			
<i>Potamogeton alpinus</i> BALB.	CR			
<i>Potentilla alba</i> L.	EN			
<i>P. crantzii</i> (CRANTZ) G. BECK ex FRITSCH	CR			
<i>P. patula</i> WALDST. & KIT.	CR			
<i>Primula elatior</i> (L.) HILL subsp. <i>poloninensis</i> (DOMIN) DOSTÁL	VU		+	
<i>P. farinosa</i> L.	EX	+		
<i>P. halleri</i> J.F. GMEL.	EN			
<i>P. minima</i> L.	EN	+		
<i>Pseudorchis albida</i> (L.) Á. LÖVE & D. LÖVE	VU	+		+
<i>Pulmonaria filarszkyana</i> JÁV.	LRlc		+	
<i>Pulsatilla alba</i> RCHB.	LRlc	+		
<i>Pyrola carpatica</i> HOLUB & KŘISA	EN			
<i>P. media</i> SW.	CR			
<i>Quercus cerris</i> L.	EN	+		
<i>Ranunculus carpaticus</i> HERBICH	VU			
<i>R. breyninus</i> CRANTZ	CR			
<i>R. malinovskii</i> A. JELEN. & DERV.-SOKOL.	EN		+	
<i>R. pseudomontanus</i> SCHUR	EN			
<i>R. thora</i> L.	VU	+		
<i>Rhamnus catharticus</i> L.	CR			
<i>Rhodiola rosea</i> L.	EN	+		
<i>Rhododendron myrtifolium</i> SCHOTT & KOTSCHY	VU	+		
<i>Rhynchospora alba</i> (L.) VAHL	CR			+
<i>Rosa heterostyla</i> CHRSHAN.	EN			
<i>R. prutensis</i> CHRCHAN.	VU			
<i>Rumex alpestris</i> JACQ. subsp. <i>carpaticus</i> (ZAPAL.) DOSTÁL	LRlc			
<i>R. scutatus</i> L.	EN			
<i>Salix alpina</i> SCOP.	CR			
<i>S. bicolor</i> WILLD.	VU			
<i>S. herbacea</i> L.	EN	+		
<i>S. retusa</i> L. subsp. <i>kitaibeliana</i> WILLD.	EN			
<i>S. retusa</i> L. subsp. <i>retusa</i>	VU	+		
<i>S. rosmarinifolia</i> L.	VU			
<i>Saussurea alpina</i> (L.) DC.	EN	+		
<i>S. discolor</i> (WILLD.) DC.	CR	+		
<i>S. porcii</i> DEGEN	CR	+	+	
<i>Saxifraga adscendens</i> L.	VU			
<i>S. aizoides</i> L.	CR	+		+

<i>S. androsacea</i> L.	EN	+			
<i>S. bryoides</i> L.	EN				+
<i>S. bulbifera</i> L.	CR				
<i>S. luteo-viridis</i> SCHOTT & KOTSCHY	CR	+			
<i>S. oppositifolia</i> L.	CR	+			
<i>Scabiosa lucida</i> VILL. subsp. <i>barbata</i> NYÁRÁDY	VU				
<i>S. lucida</i> VILL. subsp. <i>pseudobanatica</i> (SCHUR) CHRTEK	VU				
<i>Scheuchzeria palustris</i> L.	EN	+			+
<i>Schoenus ferrugineus</i> L.	CR	+			+
<i>Scilla bifolia</i> L. subsp. <i>subtriphylla</i> (SCHUR) DOMIN	LRlc				
<i>Scopolia carniolica</i> JACQ.	LRlc	+			
<i>Scorzonera humilis</i> L.	VU				
<i>Sedum album</i> L.	EN				
<i>S. alpestre</i> Vill.	EN				
<i>S. annuum</i> L.	EN				
<i>S. antiquum</i> OMELCZ. & ZAWERUCHA	CR	+	+		
<i>S. atratum</i> L.	EN				
<i>S. hispanicum</i> L.	CR				
<i>Selaginella helvetica</i> (L.) SPRING	CR				
<i>S. selaginoides</i> (L.) LINK	CR	+			
<i>Sempervivum montanum</i> L.	CR	+			
<i>Senecio carniolicus</i> WILLD.	VU				
<i>S. carpaticus</i> HERBICH	VU				
<i>Seseli pallasii</i> BESS.	VU				
<i>Sesleria heuflerana</i> SCHUR	VU				
<i>Sideritis montana</i> L. subsp. <i>comosa</i> (ROCHEL EX BENTH.) Soó	EN				
<i>Silene nutans</i> L. subsp. <i>dubia</i> (HERBICH) ZAPĄŁ.	VU		+		
<i>S. viridiflora</i> L.	EN	+			
<i>S. zawadzki</i> HERBICH	CR	+	+	+	
<i>Sorbus austriaca</i> (G. BECK.) HEDL. subsp. <i>hazslinszkyana</i> Soó	CR				
<i>S. torminalis</i> (L.) CRANTZ	VU				
<i>Sparganium angustifolium</i> MICHX.	CR				
<i>Staphylea pinnata</i> L.	CR	+			
<i>Stipa transcarpatica</i> KLOKOV	CR	+			
<i>Swertia alpestris</i> BAUMG.	EN	+			
<i>S. perennis</i> L.	CR	+			
<i>S. punctata</i> BAUMG.	CR				
<i>Symphytum microcalyx</i> OPYZ	EN				
<i>S. officinale</i> L. subsp. <i>uliginosum</i> (A. KERN.) NYMAN	EN				
<i>Syringa josikaea</i> J. JACQ. ex RCHB.	EN	+		+	+
<i>Taxus baccata</i> L.	EN	+			+
<i>Thelypteris palustris</i> SCHOTT	VU				
<i>Thlaspi dacicum</i> HEUFF.	CR				
<i>T. kovatsii</i> HEUFF.	CR				
<i>Thymus alternans</i> KLOKOV	LRlc				
<i>Tilia tomentosa</i> MOENCH	EN				
<i>Tozzia alpina</i> L. subsp. <i>carpatica</i> (WOŁ.) HAYEK	VU				
<i>Traunsteinera globosa</i> (L.) RCHB.	LRlc	+			

<i>Trifolium badium</i> SCHREB.	VU		
<i>T. lupinaster</i> L.	EN		
<i>T. pratense</i> L. subsp. <i>kotulae</i> (PAWL.) SOJÁK	EN		
<i>Trisetum alpestre</i> (HOST) P. BEAUV.	EN		
<i>T. fuscum</i> (KIT. ex SCHULT.) SCHULT.	VU		
<i>Typha schuttletworthii</i> W. D. J. KOCH & SOND.	EN		+
<i>Vaccinium microcarpum</i> (TURCZ. ex RUPR.) SCHMALH.	CR	+	
<i>Valeriana dioica</i> L.	CR	+	
<i>Verbascum lanatum</i> SCHRAD.	EN		
<i>Veronica alpina</i> L. subsp. <i>pumila</i> (JACQ.) DOSTÁL	VU		
<i>V. aphylla</i> L.	VU		
<i>V. baumgartenii</i> ROEM. & SCHULT.	VU		
<i>V. bellidioides</i> L.	EX		
<i>V. fruticans</i> JACQ.	EN		
<i>V. spicata</i> L.	EN		
<i>Viola alba</i> BESS.	EX	+	
<i>V. dacica</i> BORBÁS	EN		
<i>V. tricolor</i> L. subsp. <i>polychroma</i> (A. KERN.) KIRCHNER & SKALICKÝ	EN		+
<i>V. uliginosa</i> BESS.	EN		
<i>Vitis sylvestris</i> C.C. GMEL.	CR		
<i>Waldsteinia geoides</i> WILLD.	CR		
<i>Woodsia alpina</i> (BOLTON) GRAY	EX	+	
<i>W. ilvensis</i> (L.) R.BR.	CR	+	

Tab. 2. Statistic of threatened taxa in flora of the Ukrainian Carpathians

№	Family	Genera		Taxa		Genera		Taxa	
		Number	%	Number	%	Number	%	Number	%
I	<i>Orchidaceae</i>	21	8.8	48	11.3	<i>Carex</i>	14	3.3	
II	<i>Asteraceae</i>	20	8.4	40	9.4	<i>Alchemilla</i>	11	2.6	
III	<i>Poaceae</i>	15	6.3	29	6.8	<i>Dactylorhiza</i>	9	2.1	
IV	<i>Rosaceae</i>	9	3.8	23	5.4	<i>Hieracium</i>	9	2.1	
V	<i>Cyperaceae</i>	4	1.7	23	5.4	<i>Aconitum</i>	8	1.9	
VI	<i>Ranunculaceae</i>	8	3.4	21	4.9	<i>Festuca</i>	8	1.9	
VII	<i>Scrophulariaceae</i>	7	2.9	15	3.5	<i>Orchis</i>	8	1.9	
VII	<i>Fabaceae</i>	10	4.3	13	3.1	<i>Saxifraga</i>	7	1.6	
IX	<i>Caryophyllaceae</i>	6	2.5	13	3.1	<i>Gentiana</i>	6	1.4	
X	<i>Brassicaceae</i>	8	3.4	11	2.6	<i>Salix</i>	6	1.4	

Analyzing the systematic position the only Red-Data-Book species, we shall have quite different results (Tab. 3). Thus, comparing with data, shown above (Tab. 2), only two families from the leading 10 ones remained on its place, 4 families changed their positions and once more next 4 families fell out at all. Evaluating the genera diversity, more difference was found – no one of 10 genera remained on previous place and 5 of them fell out from 10 leading genera at all. It should take into account these peculiarities to work out practical measures on conservation of plant diversity of the region.

Tab. 3. Statistic of the Red-Data-Book taxa in flora of the Ukrainian Carpathians

№	Family	Genera		Taxa		Genera	Taxa	
		Number	%	Number	%		Number	%
I	<i>Orchidaceae</i>	21	21.9	42	29.8	<i>Orchis</i>	8	5.7
II	<i>Asteraceae</i>	9	9.4	13	9.2	<i>Dactylorhiza</i>	6	4.2
III	<i>Fabaceae</i>	6	6.2	6	4.2	<i>Carex</i>	5	3.5
III	<i>Ranunculaceae</i>	5	5.2	6	4.2	<i>Epipactis</i>	5	3.5
IV	<i>Poaceae</i>	4	4.2	4	2.8	<i>Gentiana</i>	5	3.5
VI	<i>Amaryllidaceae</i>	3	3.1	3	2.1	<i>Saxifraga</i>	4	2.8
VII	<i>Crassulaceae</i>	3	3.1	3	2.1	<i>Cephalanthera</i>	3	2.1
VIII	<i>Lycopodiaceae</i>	3	3.1	3	2.1	<i>Saussurea</i>	3	2.1
IX	<i>Cyperaceae</i>	2	2.1	6	4.2	<i>Achillea</i>	2	1.4
X	<i>Gentianaceae</i>	2	2.1	7	5.0	<i>Aquilegia</i>	2	1.4

Small families and genera including only one species are of great interest for biodiversity conservation. We counted that 10 such families and 80 genera are in threatened flora of the Ukrainian Carpathians and 6 families and 44 genera of them are among the Red-Data-Book flora. So, 4 (40.0%) families (*Blechnaceae*, *Droseraceae*, *Onocleaceae*, *Vitaceae*) and 36 (45.0%) genera (*Bartsia*, *Comarum*, *Jovibarba*, *Ledum*, *Lloydia* & al.) are out of the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996). Loss of these plants is impermissible, that is why they need thorough protection and due representing in the next edition of the Red Data Book of Ukraine.

The analysis of distribution of threatened plants within the floristic areas of the Ukrainian Carpathians shows that their greatest number is concentrated in the Chornohora and Svydovets – 200 and 199 species respectively; somewhat less are in the Chyvychny Mts. – 165 and Maramorosh Mts. – 158. The intermediate group in the species diversity is formed in the Volcanic Carpathians – 130, East Beskydy – 127 and Horhany – 105. The lowest number of threatened plants occurs in the Krasna – 56 species. Distribution of the Red-Data-Book species within the floristic areas is characterized by the same features (Fig. 1).

The topic of distribution of the Red-Data-Book species on the administrative units (regions) of the Ukrainian Carpathians is important too, because their immediate protection must be provided on the base of the according resolutions of the Regional Councils. Unfortunately, lists of plant species that are subject to protection on the territory of these regions were not touched up for more than 15-20 years; up to the day they became obsolete and need urgent revision. Analysis showed that the more reach of the administrative units as to the Red-Data-Book species is the Transcarpathia region, on the territory of which 144 species grow (Fig. 2). The next are: the Lviv region – 123 species (MALYNOVSKI, 2001), the Ivano-Frankivsk region – about 120 (by our evaluation) and the Chernivtsi region – 104 species (CHORNEJ & al., 2001). Taking into consideration that the mentioned above administrative units have a different share of the mountain territory in their composition, it is reasonably to consider the distribution of the Red-Data-Book species on this feature. As it was found out the greatest number of such species is concentrated in the mountain part of the Transcarpathia and Ivano-Frankivsk regions – 141 (97.9%) and approximately 100 (83.3%) species respectively. These indices are in far less number for the Chernivtsi and specially for the Lviv regions – 60 (57.7%) and approximately 30 (24.4%) respectively.

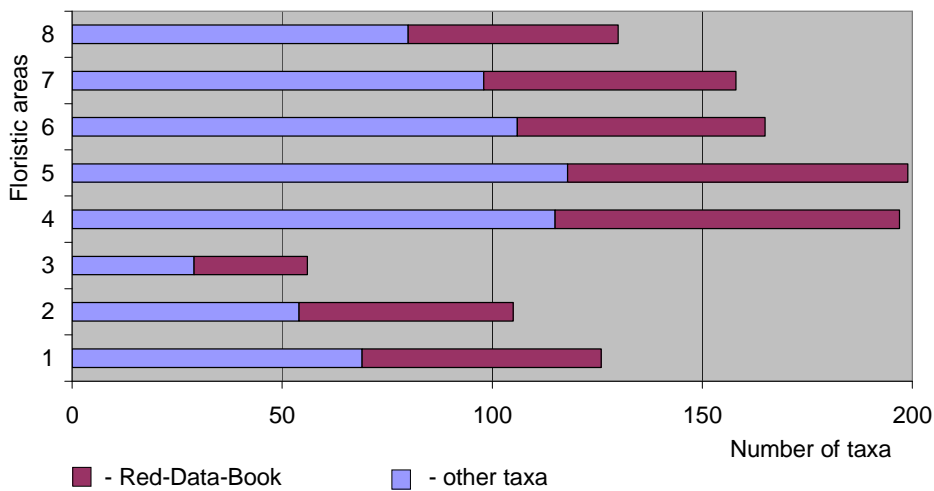


Fig. 1. Distribution of threatened plant species within the floristic areas in the Ukrainian Carpathians:
 1 – East Beskydy, 2 – Horhany, 3 – Krasna, 4 – Svydovets, 5 – Chornohora, 6 – Chyvychny Mts., 7 – Maramorosh Mts., 8 – Volcanic Carpathians.

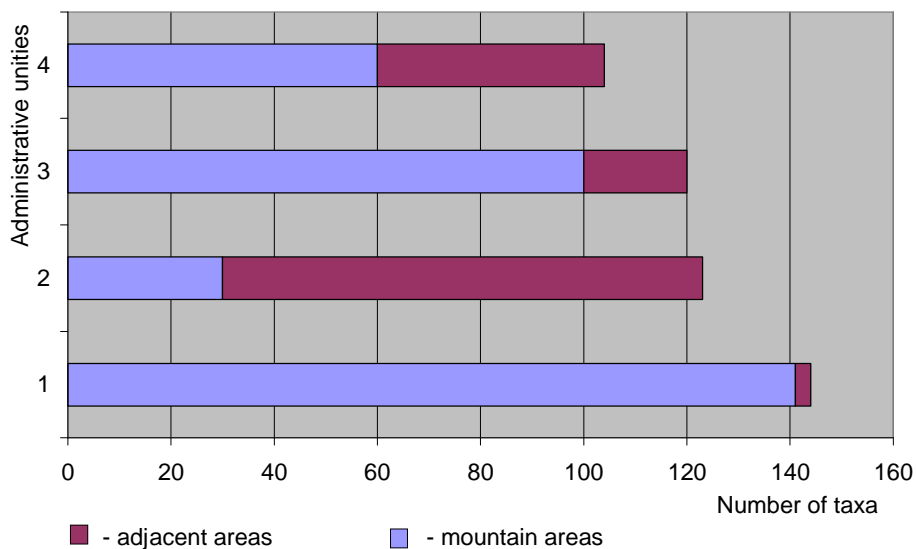


Fig. 2. Distribution of the Red-Data-Book plant taxa within the administrative regions in the Ukrainian Carpathians:
 1 – Transcarpathia region, 2 – Lviv region, 3 – Ivano-Frankivsk region, 4 – Chernivtsi region.

The Conception of biodiversity conservation that endemic species and very local species are of great interest and their dying out is great loss for science. According to our data (KRICSFALUSY, BUDNIKOV, 2002) altogether 89 endemic plants grow in the Ukrainian Carpathians, 23 of them are Pancarpathian, 7 – West-East Carpathian, 29 – East Carpathian, 30 – South-East Carpathian. Subendemics (25 species) are not included to this list. The greatest number of endemic plants is concentrated in the Chornohora (53 species), Chyvchyny Mts. (48), Svydovets (43) and Marmorosh Mts. (41). In far less number of endemics grows in the East Beskyds (24 species) and Horhany (17). The least number occurs in the Volcanic Carpathians and in the Krasna – 9 and 7 species respectively (Fig. 2). It will be interesting to note that the greatest number of endemic plants, including into the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996) occurs in the Chyvchyny Mts. (13 species) and in the East Beskydy (6). 4, 3 and 2 species grow in the Chornohora, Volcanic Carpathians and Krasna respectively. Finally, only in one endemic plant grows in the Marmorosh Mts., Svydovets and Krasna (Fig. 3).

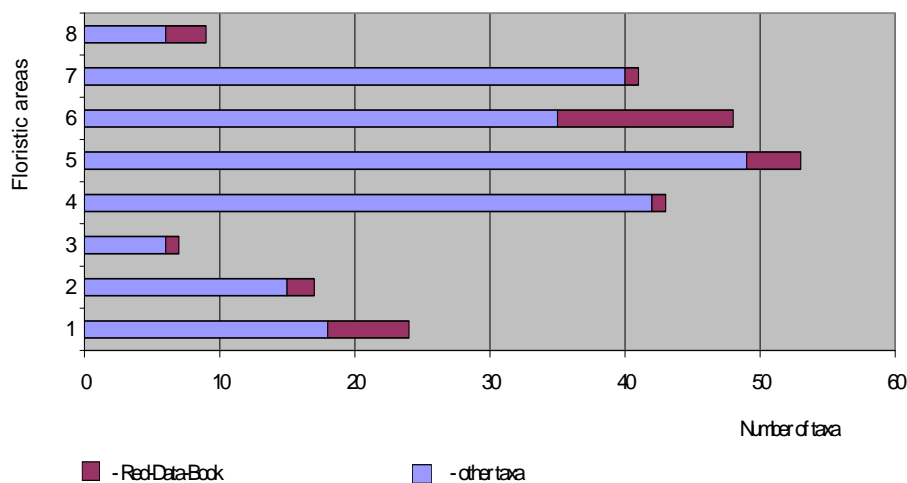


Fig. 3. Distribution of endemic plant taxa within the floristic areas of the Ukrainian Carpathians:
1 – East Beskydy, 2 – Horhany, 3 – Krasna, 4 – Svydovets, 5 – Chornohora, 6 – Chyvchyny Mts., 7 – Marmorosh Mts., 8 – Volcanic Carpathians.

The analysis of spatial distribution of threatened very local species, that is plants, distributed only on the territory of some one floristic area, showed that their greatest number is concentrated in the Chyvchyny Mts. and Volcanic Carpathians (28 and 20 taxa respectively). Somewhat less species of local areas are in the Chornohora (18) and Svydovets (15). 10, 7 and 5 species grow in the East Beskydy, Marmorosh Mts. and Horhany respectively. Only two species are noted in the Krasna (Fig. 4). The distribution of threatened very local species,

included into the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996) is characterized by the same features in generally, but it is surprising that no one such species is noted in the Marmorosh Mts. (Fig. 4). This data testify to necessity of improving of protected areas representation in the Volcanic Carpathians.

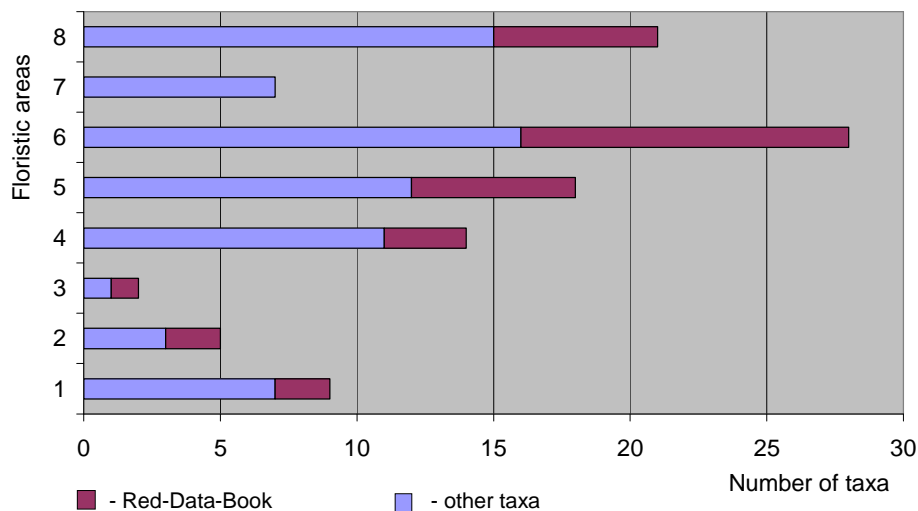


Fig. 4. Distribution of threatened very local plant taxa within the floristic areas in the Ukrainian Carpathians:
 1 – East Beskydy, 2 – Horhany, 3 – Krasna, 4 – Svydovets, 5 – Chornohora, 6 – Chyvychny Mts., 7 – Marmorosh Mts., 8 – Volcanic Carpathians.

The analysis of presence of threatened plants in the flora of protected areas of the Ukrainian Carpathians showed that it includes less than half of the species – 208 (47.3%). It is not very good index and the majority of plants can be considered as species, protected not well enough. If to analyze only Red-Data-Book plants, their providing with protection looks as follow: Red Data_Book of Ukraine (CHERVONA KNYHA..., 1996) – 101 species (71.6%), European Red List (LIST OF RARE..., 1991) – 8 (66.7%), IUCN RED LIST (1998) – 6 (75.0%). As you can see, the Red-Data-Book species are provided with protection much better.

The zoological status of threatened species of the Ukrainian Carpathians is evaluated on the basis of rarity categories, approved by IUCN (2001). According to it the plants are divided as follows: EX (Extinct) – 7 species, CR (Critically Endangered) – 116, EN (Endangered) – 156, VU (Vulnerable) – 104, LRcd (Lower Risk, Conservation Dependent) – 2, LRnt (Lower Risk, Near Threatened) – 10 LRlc (Lower Risk, Least Concern) – 30. It is reasonably to point out the species that died out in the Ukrainian Carpathians for the last 50 years: *Cardamine trifolia* L., *Carex bicolor* All., *Cystopteris alpina* (Lam.) Desv., *Primula farinosa* L., *Saxifraga cymosa* Waldst. & Kit., *Veronica bellidioides* L., *Woodsia alpina* (Bolton) Gray.

As to the position of the Red-Data-Book species, growing in the Ukrainian Carpathians, in the international and national legislative documents the follow results were found out. The suggested Red List of vascular plants consists of 141 species included into the Red Data Book of Ukraine (CHERVONA KNYHA..., 1996), 12 – into the European Red List (LIST OF RARE..., 1991), 8 – into the IUCN RED LIST (1998). It will be interesting to notice that only three species (*Armeria pocutica* Pavi., *Chamaecytisus podolicus* (Biocki) Klásková, *Silene zawadzki* Herlich) are included into all three editions at the same time. In generally 151 species are included into the Red Books and lists of international, european and national level, the other 272 species are under the regional protected status. 10 plants belong to list of species that are under protection according to the Bern Convention (CONVENTION ON THE CONSERVATION..., 1979) and 45 plants – under protection of Directive of European Union on biotopes protection, known as “Natura 2000” (INTERPRETATION MANUAL..., 1999).

Thus, summing up the above it should be stated that the problem of conservation of the rare phytogene pool of the Ukrainian Carpathians must be improved. Naturally, that it is impossibly to take all threatened plants under the strong nature conservation measure, so it is necessary to solve the problem of their protection by forming the nature protected areas of lower categories and if necessity to resort to revitalization of the lost biotopes and populations of plants. The priority task is further founding out the places of threatened plants, first of all the Red-Data-Book species, organization of monitoring of these plants and working out of effective measures as to their conservation.

References

- CHERVONA KNYHA UKRAINY. ROSLYNNYJ SVIT. (1996). – Kyiv. [RED DATA BOOK OF UKRAINE. PLANT KINGDOM. (1996). – Kyiv.]
- CHOPYK V. (1970): Ridkisini roslyny Ukrainy. – Kyiv. [CHOPYK V. (1970): Rare plants of Ukraine. – Kyiv.]
- CHOPYK V. (1978): Redkije i ischezajushchije rastenija Ukrainy. – Kyiv. [CHOPYK V. (1978): Rare and disappearing plants of Ukraine. – Kyiv.]
- CHOPYK V., SHCHERBAK N., ARDAMATSKAJA T. & al. (1988): Redkije i ischezajushchije rastenija i zhyvotnyje Ukrainy. – Kyiv. [CHOPYK V., SHCHERBAK N., ARDAMATSKAJA T. & al. (1988): Rare and disappearing plants and animals of Ukraine. – Kyiv.]
- CHORNEJ I., BUDZHAK V., TERMENA B. & al. (1999): Sudynni roslyny flory Chernivetskoj oblasti, jaki pidljagajut okhoroni. Atlas-dovidnyk. – Chernivtsi. [CHORNEJ I., BUDZHAK V., TERMENA B. & al. (1999): Vascular plants of Chernivtsi region flora which need protection. Atlas-reference book. – Chernivtsi.]
- CHORNEJ I., BUDZHAK V., TERMENA B. & al. (2001): Novi vidomosti pro poshyrennja na Chernivechchyni sudynnykh roslyn z “Chervonoi knyhy Ukrainy” ta ikh okhorona. – Ukr. Botan. Zhurn. 58(1): 78-83. [CHORNEJ I., BUDZHAK V., TERMENA B. & al. (2001): New data on distribution of Red-Data-Book vascular plants in Chernivtsi region and their protection. – Ukr. Botan. Zhurn. 58(1): 78-83.]
- CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS. (1979). – Bern.
- DOMIN K. (1929): Additamenta ad cognitionem florum Rossiae Subcarpathicae. IV. – Acta Bot. Bohem. 8: 26-43.

- FODOR S. (1973): Dopovnennja do flory Zakarpattja, shcho pidljagaje okhoroni.- In: – Pro okhoronu pryrodu Karpat. – Uzhgorod, p. 98-114. [FODOR S. (1973): Supplements to Transcarpathian flora which needs protection. – In: On nature protection of the Carpathians. – Uzhgorod, p. 98-114.]
- FODOR S. (1974): Flora Zakarpattja.- Lviv. [FODOR S. (1974): Flora of Transcarpathia. – Lviv.]
- HYNDA L., DANYLYK I. (1994): *Carex demissa* Hornem (*Cyperaceae*) – novy vyd flory Ukrainy. – Ukr. Botan. Zhurn. 51(6): 134-137. [HYNDA L., DANYLYK I. (1994): *Carex demissa* Hornem (*Cyperaceae*) – a new species of Ukrainian flora. – Ukr. Botan. Zhurn. 51(6): 134-137.]
- IGOSHYNA K. (1955): Dopolnenija k flore Zakarpatskoj oblasti UkrSSR. – Botanicheskije materialy gerbarija AN SSSR. Botan. In-t im. V.L. Komarova. 17: 461-517. [IGOSHYNA K. (1955): Supplements to flora of Transcarpathia region of the UkrSSR. – Botanical materials of Herbarium of the Acad. Sci. of the USSR. V.L. Komarov Botan. Inst. 17: 461-517.]
- INTERPRETATION MANUAL OF EUROPEAN UNION HABITATS. (1999). – European Commission DG XI Environment. – Brussels.
- IUCN RED LIST CATEGORIES. (1994). – Gland.
- 1997 IUCN RED LIST OF THREATENED PLANTS. (1998). – Gland, Cambridge.
- KARDASH V. (1991): Pro ochoronu ridkisnych ta endemichnykh vydiv flory vysokogirja Svydovtsja v Ukrainykykh Karpatakh. – In: Biotychni resursy Roztochchja i Zovnishnikh Karpat ta ikhni antropogenni zminy. Visn. Lviv. Universytetu. Ser. Biol. 21: 37-41. [KARDASH V. (1991): On protection of rare and endemic species of Svydovets highlands flora in the Ukrainian Carpathians. – In: Biotical resources of Roztochchja and Zovnishni Karpaty and their anthropogenic changes. Sci. Bull. Lviv Univ. Ser. Biol. 21: 37-41.]
- KOBIV YU., NESTERUK YU. (1996): Unikalna populatsija *Callianthemum coriandrifolium* Reichenb. (*Ranunculaceae*) u Chornogori (Ukrainski Karpaty). – Ukr. Botan. Zhurn. 53(3): 218-223. [KOBIV YU., NESTERUK YU. (1996): A unique population of *Callianthemum coriandrifolium* Reichenb. (*Ranunculaceae*) in the Chornohora (Ukrainian Carpathians). – Ukr. Botan. Zhurn. 53(3): 218-223.]
- KOMENDAR V. (1988): Problemy okhorony fitogenofondu Karpat. – Ukr. Botan. Zhurn. 45(1): 1-6. [KOMENDAR V. (1988): Problems of phytogene pool conservation in the Carpathians. – Ukr. Botan. Zhurn. 45(1): 1-6.]
- KOMENDAR V., FODOR S., VAJNAGY I. (1987): Roslyny, shcho okhoronjajutsja. – In: Pryrodni bahatstva Zakarpattja. – Uzhgorod, s. 279-283. [KOMENDAR V., FODOR S., VAJNAGY I. (1987): Protected plants. – In: Natural riches of Transcarpathia. – Uzhgorod, p. 279-283.]
- KOMENDAR V., KRICSFALUSY V. (1986): Redkije i ischezajushchije rastenija lesnykh ekosistem i ikh okhrana (na primere Ukrainykykh Karpat). – In: Okhrana lesnykh ekosistem. Tez. dokl. resp. nauch.-tekh. konf. – Lvov: 106-109. [KOMENDAR V., KRICSFALUSY V. (1986): Rare and vanishing plants of forest ecosystems and their protection (on the basis of studies in the Ukrainian Carpathians). – In: Forest ecosystems protection. Abstr. Ukrain. Sci. Technic. Conf. Lvov: 106-109.]
- KRICSFALUSY V. (1982): Vydy rodu *Salix* L. v Ukrainykykh Karpatakh. – Ukr. Botan. Zhurn. 39(2): 52-56. [KRICSFALUSY V. (1982): Species of the *Salix* L. genus in the Ukrainian Carpathians. – Ukr. Botan. Zhurn. 39(2): 52-56.]
- KRICSFALUSY V. (1995): Neobkhdnist zberezhennja tseno- i genofondu lisovykh ekosystem zakarpatskoj nyzovyny. – Nauk. visn. Uzhgorod. Un-tu. Ser. Biol. 2: 35-36. [KRICSFALUSY V. (1995): The necessity of conservation of cenotic and gene pool of the forest ecosystems in the Transcarpathian Plain. – Sci. Bull. Uzhgorod. Univ. Ser. Biol. 2: 35-36.]

- KRICSFALUSY V. (1997): Ridkisni roslyny lisiv, sposoby ikh obliku ta okhorony. – In: KRICSFALUSY V. (Red.). Lisy Zakarpattja. Suchasnyj stan, vykorystannja ta okhorona. – Uzhgorod, s. 27-33. [KRICSFALUSY V. (1997): Rare forest plants, methods of stock-taking and protection. – In: KRICSFALUSY V. (Ed.). Forests of Transcarpathia. Modern state, management and protection. – Uzhgorod, p. 27-33.]
- KRICSFALUSY V., BUDNIKOV G. (2002): Endemic vascular plants of the Ukrainian Carpathians. – In: Mountains and people (in the context of sustainable development). Proceed. Intern. Conf. – Rakhiv, p. 356-360.
- KRICSFALUSY V., BUDNIKOV G., MEZO-KRICSFALUSY G., LESJO I. (2001): Florystychna riznomanitnist. – In: KRICSFALUSY V. (Red.). Uzhanskyj Natsionalnyj Pryrodnyj Park. – Uzhgorod, p. 22-37. [KRICSFALUSY V., BUDNIKOV G., MEZO-KRICSFALUSY G., LESJO I. (2001): Floristic diversity. – In: KRICSFALUSY V. (Ed.). Uzhansky National Nature Park. – Uzhgorod, p. 22-37.]
- KRICSFALUSY V., BUDNIKOV G., MIHALY A. (1999): Chervonyj spysok Zakarpattja: vydy roslyn ta roslynni uhrupovannja, shcho znakhodjatsja pid zahrozoju znyknennja. – Uzhgorod. [KRICSFALUSY V., BUDNIKOV G., MIHALY A. (1999): Red List of Transcarpathia: threatened plant species and plant communities. – Uzhgorod.]
- KRICSFALUSY V., LESJO I. (2004): Rarytetni vydy flory Uzhanskoho Natsionalnoho Pryrodnogo Parku. – Ukr. Botan. Zhurn. (in press). [KRICSFALUSY V., LESJO I. (2004): Rare plant species of the Uzhansky National Nature Park. – Ukr. Botan. Zhurn. (in press).]
- KRICSFALUSY V., MIHALY A. (1993): Khorologichni ta ekologo-fitotsenotychni osoblyvosti efemeroidnykh geofitiv Ukrainiskikh Karpat. – Ukr. Botan. Zhurn. 50(6): 13-22. [KRICSFALUSY V., MIHALY A. (1993): Chorologic and ecological-phytocenotic peculiarities of ephemeroide geophytes of the Ukrainian Carpathians. – Ukr. Botan. Zhurn. 50(6): 13-22.]
- KRICSFALUSY V., SHUSHMAN V., SAROZ O. (1995): Biomorfologicheskaja i ekologo-tsenoticheskaja kharakteristika *Erythronium des-canis* (*Liliaceae*) v Karpatakh. – Botan. Zhurn. 80(9): 35-52. [KRICSFALUSY V., SHUSHMAN V., SAROZ O. (1995): Biomorphological and ecocenotic characteristics of *Erythronium des-canis* (*Liliaceae*) in Carpathians. – Botan. Zhurn. 80(9): 35-52.]
- LIST OF RARE, THREATENED AND ENDEMIC PLANTS IN EUROPE. (1991). – Council of Europe, Strasbourg.
- MALYNOVSKI K. (1962): Novi mistseznakhodzhennja delfinija serednjoho (*Delphinium intermedium* Sol.) i drochka krylatoho (*Genistella sagittalis* (L.) Gams) u Karpatakh. – Ukr. Botan. Zhurn. 19(6): 100-102. [MALYNOVSKI K. (1962): New habitats of *Delphinium intermedium* Sol. and *Genistella sagittalis* (L.) Gams in the Carpathians. – Ukr. Botan. Zhurn. 19(6): 100-102.]
- MALYNOVSKI K. (2001): Florystychny rozmaittja Lvivshchyny. – Pratsi naukovo tovarystva im. Shevchenka. Ekologichni problemy pryrodokorystuvannja ta biorozmaittja Lvivshchyny. VII: 135-142. [MALYNOVSKI K. (2001): Floristic diversity of the Lviv region. – Transactions of Shevchenko Sci. Society. Ecological problems of nature employment and biodiversity of the Lviv region. VII. 135-142.]
- MALYNOVSKI K., TSARYK J. (1991): Problema vyvchennja i okhorony populjatsij ridkisnykh vydiv flory Ukrainiskikh Karpat. – Ukr. Botan. Zhurn. 48(3): 13-21. [MALYNOVSKI K., TSARYK J. (1991): Problem of study and conservation of rare flora species populations of the Ukrainian Carpathians. – Ukr. Botan. Zhurn. 48(3): 13-21.]
- MEZO-KRICSFALUSY G., KRICSFALUSY V. (1994): *Ornithogalum divergens* Bor. (*Hyacinthaceae*) – novyj vyd dlja flory Ukrainy i Zakarpattja. – Nauk. visn. Uzhgorod. Un-tu. Ser. Biol. 1: 28-32. [MEZO-KRICSFALUSY G., KRICSFALUSY V. (1994): *Ornithogalum divergens* Bor. (*Hyacinthaceae*) – a new species in Ukrainian and Transcarpathian flora. – Sci. Bull. Uzhgorod. Univ. Ser. Biol. 1: 28-32.]

- MRÁZ P. (2002): *Carex vaginata* Tausch – a wrongly reported species from Slovakia. – *Thaiszia – J. Bot.*, Košice, 12: 185-189.
- MRÁZ P. (2003): Mentor effects in the genus *Hieracium* s.str. (Compositae, Lactuceae). – *Folia Geobot.*, 38(3): 345-350.
- SHUSHMAN V. (1996): Pro dejaki pryrodni objekty Zakarpattja, jakym neobkhidna okhorona. – In: KRICSFALUSY V. (Red.). *Stijkyj rozvytok silskogo hospodarstva ta zberezhennja bioriznomanittja*. – Uzhgorod, p.35-37. [SHUSHMAN V. (1996): On some natural objects of Transcarpathia that need protection. – In: KRICSFALUSY V. (Ed.). *Sustainable agricultural development and biodiversity conservation*. – Uzhgorod, p. 35-37.]
- SOBKO V. (1989): *Orkhidei Ukrainy*. – Kyiv. [SOBKO V. (1989): *Orchids of Ukraine*. – Kyiv.]
- STOJKO S. (1977): *Karpatam zelenity vichno*. – Uzhgorod. [STOJKO S. (1977): *Let the Carpathians be green forever*. – Uzhgorod.]
- STOJKO S., TASENKEVICH L., MILKINA L & al. (1982): *Flora i roslynnist Karpatskoho zapovidnyka*. – Kyiv. [STOJKO S., TASENKEVICH L., MILKINA L. & al. (1982): *Flora and vegetation of the Carpathian Reserve*. – Kyiv.]
- TKACHYK V. (2000): *Flora Prykarpattja*. – Lviv. [TKACHYK V. (2000): *Flora of Precarpathian*. – Lviv.]
- TKACHYK V. (1997): *Mistseznakhodzhennya i umovy zrostannya novogo dlya Ukrainy vyda *Bruckenthalia spiculifolia* (Salisb.) Rchb. (Ericaceae)*. – *Ukr. Botan. Zhurn.* 54(2): 184-186. [TKACHYK V. (1997): *Locality and growing conditions of *Bruckenthalia spiculifolia* (Salisb.) Rchb. (Ericaceae) of new species for Ukraine*. – *Ukr. Botan. Zhurn.* 54(2): 184-186.]

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