

“Red Data Book of Ukraine. Vegetable Kingdom” Afterword

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Abstract: The results of the third edition of the Red Data Book of Ukraine (2009) are summed up. This edition includes 826 species (611 vascular plants, 46 bryophytes, 60 algae, 52 lichens, 57 mosses). The approaches to species selection and category comparing assessment, which are accepted by Ukraine and IUCN, are highlighted as well as species distribution according to phytocoenological and political regions. Approaches to the selection of species for inclusion in the lists of the Red Data Books of Ukraine and Poland are analyzed.

Key words: Red Data Book of Ukraine, flora, quantitative analysis, comparative assessment

1. Introduction – a new edition of the Red Data Book of Ukraine against the background of neighbouring countries

At the end of 2009, the third edition of the “Red Data Book of Ukraine” (RDBU) was published (Fig. 1). It includes 826 species of plants and fungi so, in comparison with the previous edition (Sheliag-Sosonko 1996), the list has increased by 35%. It is dominated by vascular plants (611 species), although increase in their number is the lowest (28%). Mosses are represented by 46 species (39% more than in the previous edition), algae – 60 (72%), lichens – 52 (48%), fungi – 57 (47%). In general, the new edition of the RDBU includes about 13.5% of the spontaneous flora of vascular plants of Ukraine, which consists of about 4500 species. This percentage is close to that of neighboring states, ranging from 10 to 17%: Belarus – 10.5%, Lithuania – 17.6%, Latvia – 16%, Poland – 15%, Bulgaria – 15.1% etc. However, we have a much bigger total species list than neighboring countries: Poland has 296 species of vascular plants, Belarus – 173, Lithuania – 238, Moldova – 117 and the closest to us is Bulgaria – 589 species (Belavicius & Ladyga 1992; Kaźmierczakowa & Zarzycki 2001; Andrušaitis 2003; Khoruzhyk *et al.* 2005; Tashev 2008). This could be explained by several reasons.

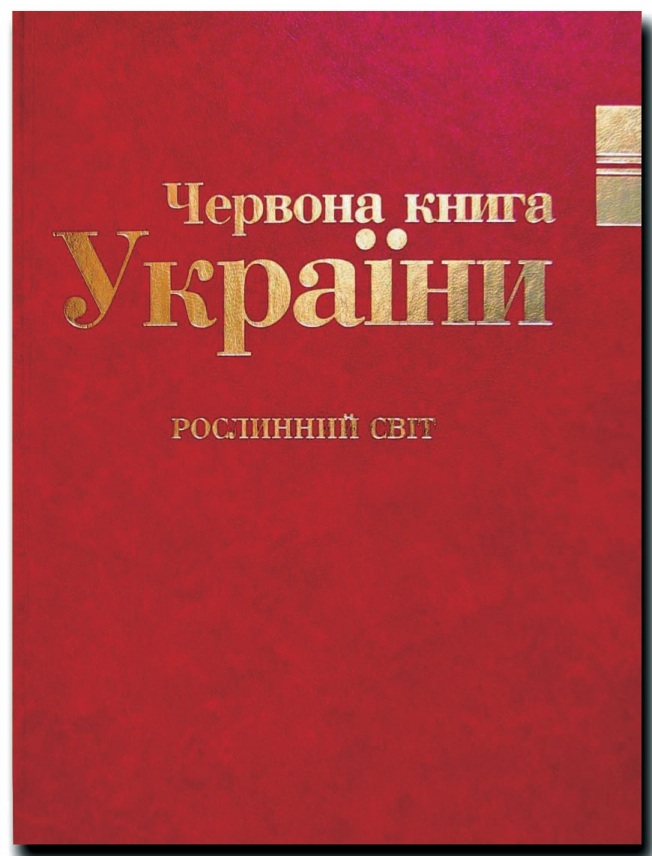


Fig. 1. The cover of the Red Data Book of Ukraine

Firstly, the territory of Ukraine is situated in three botanical and geographical zones (Forest, Forest-steppe, and Steppe) and includes two diverse mountain ranges (Carpathians and Crimean Mountains). Thus, many species are on the edge of their range and reduce it or decrease in the population number under the influence of various anthropogenic factors. A considerable percentage of species rare for the plain, are common in Carpathians (such as *Lunaria rediviva*, *Sorbus torminalis*, *Lycopodium annotinum*, *Succisella inflexa*) or do not occur outside the mountainous region. Based on this specific character of zoning, it would be appropriate to create separate regional Red Data Books.

Second, Ukraine has no official lists for other categories of species, equivalent to the exploited species list in Poland that "unloads" the RDBP.

Thirdly, Ukrainian botanists often employ a narrow understanding of a species that corresponds to subspecies or even to ecological races. Because many of them have a very narrow range and their numbers are catastrophically reduced under the influence of anthropogenic factors, it is natural to treat such species as those that need protection (e.g., species of genus *Stipa*, *Centaurea*, *Scrophularia cretacea*, *S. granitica*, *S. donetzica*, *Rosa donetzica*, etc.).

Fourthly, Ukraine lacks an approved official list of habitats (Habitat directive is a document of the European Union that was adopted in Brussels in 1992 (92/43/EWG), unlike many Western European countries. Adopting such list would ensure preservation of many species of mosses, lichens, algae and vascular plants that are not subject to the direct anthropogenic impact. Their conservation would be achieved through the habitat conservation. The "Green Book of Ukraine" does not solve this problem, because, in many cases, the evaluation of rarity of plant communities is based on the presence of species from the "Red Data Book". In addition, many rare species are coenophobs, and they occur outside of plant communities.

2. Comparison of red lists of Ukraine and Poland

It is interesting to compare species listed in the RDBU and RDBP (Kaźmierczakowa & Zarzycki 2001; Mirek & Piękoś-Mirkowa 2008). Out of 296 species listed in the RDBP, 89 species (30%) are included in the RDBU. In the largest extent, it relates to wetland species (e.g., *Aldrovanda vesiculosa*, *Betula humilis*, *Caldesia parnassifolia*, *Carex chordorrhiza*, *Chamaedaphne calyculata*, *Hammarbia paludosa*, *Ludvigia palustris*, *Saxifraga hirculus*, *Salix lapponum*, *S. myrtilloides*), the Carpathian mountainous plants (*Astragalus australis*, *Bellardiochloa violacea*, *Calianthemum coriandriifolium*, *Cartusa matthioli*, *Dianthus gratianopolitanus*, *Primula farinosa*, *Veronica bellidioides*,

Woodsia alpina, etc.), to a lesser extent to the Malopolska-Podilsky endemics (*Carlina onopordifolia* and *Chamaecytisus albus*).

Guided by the general principles of IUCN (1994, 2001), Ukrainian and Polish botanists have also used slightly different approaches to compile lists, which reflect regional peculiarities of each state and certain traditions.

This lies in the fact that the RDBU includes all representatives of Orchidaceae, while the RDBP includes only certain selected taxa. Given that the Tatra Mountains are much higher (the highest point is 2665 m a.s.l.) than Ukrainian Carpathians (the highest peak is 2061 m a.s.l.) and that alpine zone of the latter is fragmentary, many species common for the Tatra Mountains are rare for Ukrainian Carpathians (*Loiseleuria procumbens*, *Dichodon cerastioides*, *Minuartia verna*, *Sempervivum montanum*, *Jovibarba hirta*, *Primula minima*, *Saxifraga androsacea*, *S. bryoides*, *S. luteo-viridis*, *S. oppositifolia*, *Veronica aphylla*, etc.). For Ukraine, species of raised bogs are rare (*Andromeda polifolia*, *Drosera anglica*, *D. intermedia*, *Oxycoccus microcarpa*, *Scheuchzeria palustris*, *Cladium mariscus*, *Eleocharis mamillata*, *Schoenus ferrugineus*, *Hydrocotyle vulgaris*, *Tofieldia calyculata*, etc.), while in Poland they have a much wider distribution (Zając & Zając 2001).

However, in Poland, species of southern steppes (*Hypericum elegans*, *Allium rotundifolium*, *Iris aphylla*, *Silene borysthena*, *Prunus fruticosa*, *Lathyrus pannonicum*, *Linum austriacum*, *L. hirsutum*, etc.), Sub-Mediterranean (*Lithospermum purpureo-caeruleum*, *Dorycnium herbaceum*, *D. germanicum*) and halophytic and brackish species (*Halimione pedunculata*, *Atriplex littoralis*, *Plantago maritima*) are rare but they are common in Ukraine.

Not the least role play certain traditions of collecting medicinal plants, which result in critical reduction of Ukraine populations of *Rhodiola rosea*, *Gentiana lutea* and heavily decreasing populations of species of commercial interest: *Allium ursinum*, *Adonis vernalis*, *Galanthus nivalis* and *Sorbus torminalis*.

Besides the RDBP, some other documents regulate limits of collecting and sustainable use of plant resources in Poland. However, there are no such policies in Ukraine. Thus, the only effective measure of species protection is to include them in the RDBU. As a result, the RDBU is quite voluminous.

3. New quality of the third edition of the Red Data Book of Ukraine

The new edition of RDBU differs from the previous one not only in the number of species, but also in a fundamentally new quality (Figs. 2 and 3). The latter is expressed in the fact that, where possible, more detailed

ГОЛОНАСІННІ
Pterophyta (Gymnospermae)

ТИС ЯГДНИЙ (НЕГНИЙ-ДЕРЕВО)
Taxus baccata L.
Родина Тисові — Taxaceae

Природоохоронний статус виду
Вразливі

Наукове значення
Рідкісний реликтовий вид з дис'юнктивним ареалом.

Ареал виду та його поширення в Україні
Зс. Центральна та Пів.-С. Європа, Фронтальні масиви Середземномор'я, Кавказ, Близький Схід. На пд. до Азорських о-вів, Південної Африки та Франц. В Україні — Карпати (П. Передкарпаття, Закарпаття), Гірський Крим. Ареал регіони: Ль, Ж, Ч, Кр.

Чисельність та структура популяцій
У Карпатах з незнач. кількістю існують популяції з незнач. кількістю завданню (Велик. Дібр. (Біля 22 тис. екс.). Зрідка трапляється у інших місцях та Закарпатті — Карпатський БЗ, Велико-Буковинський, Мажарський, Усть-Чорнинський, Ялівський лісостепові. У Гірському Криму групи або поодинокі від Карабі-Яйла до Ай-Петри. Найкращі популяції у долині р. Бельбек (с. Вел. Садове) (2 тис. екс.), Великий Князь Криму (400 екс.), Тарпа (с. Покровське) (800 екс.). Найстаріші дерева мають вік понад 1000 р. і діаметр до 1,5 м (р. Уч-Кюй).

Причини зникання чисельності
Лінійні комплекси природних факторів: кліматичні, ґрунтові (кислотність карбонатів), центральні та господарська діяльність (вирубання заради цінної деревини).

Умови місцезростання
У Карпатах росте двома суцільними погізаннями з поширенням в букових лісах (південно-західний діл 400 до 800 м нрм, пд. — 600-900 м нрм в Гр-сискому Криму — у верхній частині пд. (700-1200 м нрм) та на пн. (500-1200 м нрм) макросхемі Головної та Другої гір. Прозорені до тисових незнач. лісів на бурій ерофитній ґрунті: на карбонаті, в ущелинах, на скелях, крутих схилах, в умовах специфічного мікроклімату (високої вологості повітря затінення). Росте в другому деревному ярусі в Карпатах — букові та ялицево-букові ліси (соц. *Serbalantho-Forstn.* кл. *Querc-Fagetet.* у Криму — степсько-букові та букові ліси (соц. *Dentario-quinquefolii-Forstn.* у півночі). Мезофітні умови.

Загальна біоморфологічна характеристика
Фанерофіт. Хвойне дерево або кущ 3-16 м заввишки, з пластичною або гнучкою корою. Тривалість життя до 1-3 тис. років. Деревина міцна, червонокольорова, хвойнопопудро-лінійна, зверху темно-зелена, блискуча, знизу — світло-зелена, матова. Нахилена оглобне со- складним червоно-жовтим ароматом. Залишається у квітній-трапній. Плодючість у вересні-жовтні. Розмножується насінням і вегетативно.

Резими збереження популяцій та заходи з охорони
Утрюповані занесені до Зеленої книги України, Охороняють в Карпатському БЗ, Кримському, Ялівському ірсько-Ялівському ГД та рідкі заказники, заказники «Князь-Дібр». Заборонено порушення місць зростання, рубки та обрізу окремих частин дерева, пересадка.

Розмноження та розведення у спеціально створених умовах
Культурно досить широко.

Господарське та комерційне значення
Декоративний (будівельний матеріал, народні обряди віночі, як будівельний матеріал для оздоблення, гірське, фотозахисне. Стружка розклада.

Основні джерела інформації
Бойфорова Україна, 2000. Определитель высших растений Украины, 1987; Соболев, 1966; Чок, 1996; Волыницький, Дідак, Лисак, 2001.

Автор: Я.П. Дідук
Фото: Н.М. Сичак



Fig. 2. The example – page from the Red Data Book of Ukraine – *Taxus baccata*

environmental and coenotic characteristics are presented. This required a large amount of material that was collected by botanists in various regions of Ukraine. Many specimens were collected for the first time. However, we did not manage to verify the presence of species in many localities and to assess the status of populations there, as did Polish scientists. Therefore, this task remains open for the future, because knowledge of ecology of species and the state of their populations makes possible to assess potential threats and develop protection measures.

Although we could not avoid such declarative proposals as “monitor the status of populations”, “cultivate in botanical gardens”, or “do not violate habitats”, an effort was made to clarify and outline proposals for each species. For example, pasturing, tree felling, changes to the hydrological regime, artificial tree planting, plant collection and, for certain small local populations, even herborization should be restricted. In our view, this approach makes it possible to offer effective measures to preserve certain species. It is known that the protection regime adopted in reserves led to a size reduction or disappearance of populations for which these reserves were created. However, it is illogical to ban the collection of *Pistacia mutica* in the Crimea, *Betula borysthena*, *Adonis vernalis* or *Trapa natans*,

ПОКРИТОНАСІННІ, ДВОЛІСНІ
Magnoliophyta (Angiospermae), Magnoliopsida

ВІДКАСНИК ТАТАРНИКОЛИСТИЙ, ДЕВ'ЯТИСИЛ ТАТАРНИКОЛИСТИЙ
Carlina onopordiifolia Besse ex Szafar, Kulcz. et Pavl. (*C. acanthifolia* All. subsp. *utziak* auct. non (Hacq.) Meusel et Kästner, *C. utziak* auct. non Hacq.)
Родина Айстрові (Складноцвіті) — Asteraceae (Compositae)

Природоохоронний статус виду
Вразливі

Наукове значення
Під-мацопольсько-подільський ендемік в ізолятивних локалітетах.

Ареал виду та його поширення в Україні
Полішся (Мацопольська височина). Україна (Поділля). В Україні — Голгорово-Кременецький криж, Опілля, Волинська височина. *Locus classicus* виду — окол. с. Опілля-Пілля, Виняцька обл. Визначені для Волинської, Одеської і Сумської обл. сумчанин. Ареал регіони: Жл, Р, (См, Ль, Іл, Тр, Вн, Ч, Д).

Чисельність та структура популяцій
Локальні популяції на Голгорово-Кременецькому крижі — по кілька тисяч особин різного віку, стабільні. За розвитку щільні деревни частіше особин зникаються. Самі популяції в *Locus classicus* зароджені, всі популяції нечисленні й належать до реліктових типу.

Причини зникання чисельності
Надмірне випасання худоби, заліснення схилів, часті весні випалювання травостою.

Умови місцезростання
Лучно-степові угруповання на схилах із сильно скелетними рендінами, місця з порушеною дервиною. Оптимум в асоціації *Inuletum ovifoliae* союзу *Cirsio-Brachypodium ruderat.* росте в угрупованні союзу *Festucetum valesiacae*. Кальцефіл, ксерофіт.

Загальна біоморфологічна характеристика
Гемікриптофіт. Багатривітний трав'янисто-лінійний квітучий з трав'янистими (3) 5-10 (15) роками, вегетативним розвитком. Мас популяції стрижневий корінь. Стебло нерозвинене, рослина виглядає як розростання розетки листків з великим кошиком у центрі. Листки еліптичні або довгасто-еліптичні, 6-35 см завдовжки, жорсткі, пірчастонадрізані, густопустиністі. Вони біліють, на верхівці з колоском, по краях нерівно-колючо-зубчасті. Кошик 15-20 (25) см діаметром; листочки обертки колосуючасти. Віночки 17-20 мм завдовжки, жовтуваті. Сім'янка довгаста, темно-сіра, густоволокниста. Ціле у лінійній-серпній, плодючості у вересні-жовтні. Розмножується насінням, але воно часто висихається зливом.

Резими збереження популяцій та заходи з охорони
Занесений до Червоного списку МСОП. Охороняється на території НПП «Галицький» та в заказниках «Поліський» (Перемішська обл.), «Червона гора» (Івано-Франківська обл.), «Ліса гора і гора Ситуха», «Ліса гора» (Львівська обл.). Необхідним є моніторинг популяцій. Заборонено збирання рослин, випалювання, висадження, заліснення.

Розмноження та розведення у спеціально створених умовах
Варіюються у ботсаду Львівського національного університету ім. І. Франка.

Господарське та комерційне значення
Декоративне, лікарське, пролітературне.

Основні джерела інформації
Земленко, 1985; 1986. Флора національної частини СРСР 1994; Флора УРСР 1962; Meusel, Kästner, 1994.

Автор: Я.П. Дідук, О.О. Кагалю, О.О. Орлов
Фото: О.О. Орлов



Fig. 3. The example – page from the Red Data Book of Ukraine – *Carlina onopordiifolia*

based on the sole fact that they are included in the “Red Data Book”. On the other hand, local populations of several species that comprise only a few dozens or a few hundreds of specimens, in the area of just a few square meters, suffer from herborization much more (e.g., *Silene jaiensis* – in the Crimea, *Linnaea borealis* – in Carpathians).

Another essential measure is the prohibition of artificial tree planting, especially of alien species, often pines or other introduced trees, in the areas where rare herbaceous plants grow. This situation is particularly critical in the Steppe and Forest-steppe zones, where people try to increase forest area by terracing virgin steppes, which are inhabited by rare plant species. Terracing of chalk slopes in the basin of the Siversky Donets or Ak-Kaya sanctuary, limestone slopes of the Dniester River and its tributaries, or reforestation of Crimean yaila led to the loss of many valuable biotopes. Even if these steps have resulted in forest restoration in some cases, habitats of rare species were destroyed, such as the last location of *Dianthus gratianopolitanus* on the slopes of the Dniester near Zalishchyky that, despite the exhaustive searches, is not found in Ukraine now.

Therefore, we should emphasize that placing species into the RDBU is not a “taboo”, as some zealous conservationists try to interpret, but it is information

Table 1. Comparison of categorization of species by their threatening status, used in RDBU and IUCN

Conservation status categories adopted for RDBU	Conservation status categories of IUCN (1994). Version 2.3
Extinct – species for which there is no information about their presence in natural or artificial conditions	EX (Extinct) – when there is no doubt that taxon is extinct
Extinct in the wild – species that have disappeared in the nature of Ukraine, but remained outside it or in specially created environments	EW (Extinct in the Wild) – this is a taxon, specimens of which have been preserved in the culture
Endangered – endangered species, which reduce area or decline in number; their preservation requires removal of negative factors	CR (Critically Endangered) – there is a high threat of extinction: population distribution is limited to 10-100 km ² , and observations over a period of 10 years or three generations, confirm that 80% of populations are vulnerable
Vulnerable – species that in the nearest future can be attributed to the endangered if the negative factors will remain	EN (Endangered) – determined by the following characteristics: distribution of populations is limited to 500-5000 km ² , and mentioned above observations confirm that 50% of the populations are vulnerable
Rare – species known from few locations, their populations are characterized by relatively stable, but low rates	VU (Vulnerable) – the spread is limited to 2000-20000 km ² , and observations confirms that 20% of populations are vulnerable
Unvalued – species identified as such that may belong to the category of endangered, vulnerable or rare, but not yet assigned to these categories, including more or less widely distributed	LR (Lower Risk) – lower risk, but require attention, conservation
Insufficiently known – species that require further research and cannot be attributed to any of these categories due to lack of the necessary factual information, including taxonomically critical species	DD (Data Deficient) – insufficiently investigated, the degree of threat is difficult to assess due to lack of relevant information

that should serve as a basis for further development of many effective systemic actions.

One should examine in detail the question of species categorization by their conservation status. According to Art 13 of Law of Ukraine "On the Red Data Book of Ukraine", species are divided into seven categories, which are similar but not identical to the IUCN categorization (IUCN, 1994; 2001) (Table 1).

The difference between these approaches is that the IUCN categorization is based mainly on the structure (dynamics, number) of populations and their overall condition within the whole species area. Although the Ukrainian approach considers this criteria, trends in area changes within Ukraine are a principal factor. Thus, in fact, in our categorization a situation when the species has disappeared from the territory of Ukraine, but oc-

curs in natural areas outside the country is not reflected. We have included such species in the second category, extinct in the wild (in Ukraine).

There is no clear direct dependence between other categories too. We have developed species categorization according to the IUCN criteria for vascular plants (which is not reflected in the RDBU) and carried the overall comparison between the abovementioned categories (Table 2). Categories EX and EW, in slightly changed interpretation, conform to categories 'extinct' and 'extinct in the Wild (in Ukraine)', although this issue is debatable. Critically endangered (CR) – 81 species – are put in the category of 'endangered', although the latter is a much broader category, including almost a half (63) of endangered (EN) species. A significant portion (50) of category EN is classified as the category

Table 2. Matrix of the quantitative distribution of species between categories of conservation status, taken in the "Red Data Book of Ukraine" (2009) (a) and IUCN (b)

a	b								Total	%
	EX	EW	CR	EN	VU	LR	DD			
Extinct in Ukraine	2	.	.	.	.	.	.	2	0.3
Extinct in the wild in Ukraine	.	12	.	.	.	.	.	12	2.0
Endangered	.	.	81	63	2	1	.	147	24.1	
Vulnerable	.	.	7	28	140	31	7	213	34.9	
Rare	.	.	14	50	63	13	4	144	23.6	
Unvalued	.	.	.	4	7	58	1	70	11.5	
Insufficiently known	.	.	.	.	.	.	23	23	3.8
Total	2	12	145	102	212	103	35	611		
%	0.3	2.0	23.7	16.7	34.7	16.9	5.7		100	

Table 3. Quantitative distribution of the highest taxonomic ranks within the categories of conservation status of the “Red Data Book of Ukraine” (2009)

	1	2	3	4	5	6	7	8
Vascular plants	2	12	145	215	145	69	23	611
Mosses	.	1	7	7	31	.	.	46
Algae	.	.	1	30	29	.	.	60
Lichens	.	.	5	26	21	.	.	52
Fungi	.	1	19	11	23	.	3	57
Total	2	14	177	289	249	.	.	826

Explanations: 1 – Extinct in Ukraine, 2 – Extinct in the wild in Ukraine, 3 – Endangered, 4 – Vulnerable, 5 – Rare, 6 – Unvalued, 7 – Insufficiently known, 8 – Total

‘rare’ and a small number (28) – as ‘vulnerable’ species. The latter category is mostly formed of species that reduce their number (area) (VU) – 140, a part consists of species (31) that are not threatened yet and have a wide range of distribution, and ‘endangered’ species (28). The core of LR group consists of ‘not evaluated’ (58) and a small number (31) of “vulnerable” species. Finally, in the group of ‘insufficiently known’ we have included species with a controversial taxonomic rank (DD). Despite the lack of direct correspondence between the categories, we have quite a logical direct dependence between these categories.

Assessing the distribution of taxonomic categories of the highest rank in relation to the conservation status categories, we have the following picture (Table 3).

Of the great interest is geographical distribution of the RDBU species in relation to the natural regions of Ukraine. At the level of geobotanical provinces and

subprovinces (Didukh & Sheliag-Sosonko 2003), there are 119 species in Polissya Subprovince of Coniferous-broadleaf Forests (East European Province of Broadleaf and Coniferous-broadleaf Forests), a majority of which (about 70 species) is typical for the whole Polissya, 41 – for the Right-bank, and only 6 – for the Left-bank Polissya. Central European Province of Broadleaf Forest, which includes the Volyn Highland, Male Polissya, Roztochya, Opillya, Pokuttya and Western Podillya to Tovtry Ridge, has 154 species. Forest-steppe Zone that refers to two provinces (three subprovinces) within the territory of Ukraine is characterized by the following indicators: Pannonian Province that occupies a small territory of the Transcarpathian region includes 73 species (12% of the total list), East European Forest-steppe Province – 156 species, the Ukrainian Forest-steppe Subprovince – 145 species (23.7%), and Central Russian Subprovince that occupies

Table 4. Distribution of plant species listed in the “Red Data Book of Ukraine” (2009), within regions of Ukraine

Regions	Threatening category							
	1	2	3	4	5	6	7	8
Vinnitsia	.	2	7	41	13	22	.	85
Volyn’	.	.	10	61	21	17	.	109
Dnipropetrovs’k	.	1	4	42	13	13	.	73
Donetsk	.	.	18	61	25	26	11	141
Zhytomyr	.	.	11	58	21	21	.	111
Transkarpathia	.	6	52	88	100	22	.	268
Zaporizzhia	.	.	4	36	12	12	.	64
Ivano-Frankivs’k	1	2	30	80	84	28	12	227
Kyiv	.	.	16	57	26	18	.	117
Kirovograd	.	.	.	35	8	12	.	55
AR of Crimea	.	3	58	135	96	33	9	334
Lviv	.	3	29	79	41	26	.	178
Luhans’k	.	.	16	45	20	28	7	116
Mykolaiv	.	.	7	41	23	14	2	87
Odesa	.	.	14	66	36	20	3	139
Poltava	.	.	7	41	10	24	.	82
Rivne	.	.	9	54	23	18	.	104
Sumy	.	.	9	41	13	21	1	85
Ternopil’	1	.	15	48	30	24	.	118
Kharkiv	.	.	9	57	15	28	2	111
Kherson	.	.	13	70	25	16	3	127
Khmelnysky	.	.	14	56	19	24	.	113
Cherkasy	.	.	8	42	20	18	.	88
Chernivtsi	1	1	19	57	37	25	1	141
Chernigiv	.	.	7	38	14	21	.	80
Total	2	14	177	289	249	69	26	826

Explanations: 1 – Extinct in Ukraine, 2 – Extinct in the wild in Ukraine, 3 – Endangered, 4 – Vulnerable, 5 – Rare, 6 – Unvalued, 7 – Insufficiently known, 8 – Total

part of Sumy and Kharkiv regions – 70 species (11.4%). Ukrainian Forest-steppe Subprovince is quite heterogeneous in species distribution: in its Right-bank part, 63 species of the RDBU are present, in the Left-bank – just 13, and 69 species are common. Steppe Zone, which occupies 40% of the territory of Ukraine, has the most species listed in the RDBU (total 246), among which 212 species are spread throughout the Pontic Province, 53 of them are characteristic only to the Right-bank, 69 – to Left-bank, 84 – to South (the Lower South Bug, Dnieper, Sivash and steppe region of Crimea), and 103 species for Central Don Subprovince, with 34 of them typical for this region.

Although mountain ranges cover small area, their flora is very rich. They are characterized by high endemism and the presence of species that have very local and disjunctive distribution, caused by altitudinal zoning. Among taxa listed in the RDBU, 207 species occur in the Carpathians and 179 in the Crimean Mountains.

However, quite a different picture emerges if we examine species distribution within the administrative regions of Ukraine (Table 4). The Crimean Autonomous Republic takes the first position (334 species), with the highest percentage of vulnerable species (135). The second place belongs to Transcarpathian (268 species), the third – to Ivano-Frankivsk region (227 species), both with the highest percentage of rare species (respectively,

100 and 84). At the same time, a majority of species that have disappeared from the territory of Ukraine are from the Transcarpathian region (6). In the Crimea, this figure is probably higher, but these species were not included in the list, because many of them are annual, oligoennial plants (*Cerastium stevenii*, etc).

Regions with more than 100 species in the RDBU include Lviv, Chernivtsi, Donetsk, Odesa, Kherson, Ternopil', Kyiv, Luhans'k, Khmelnytsky, Ternopil', Vinnytsia, Volyn' and Rivne. The lowest number is characteristic for Dnipropetrovs'k, Zaporizzhia and Kirovograd regions that do not have high habitat diversity, and their territory is so affected by anthropogenic impact that many species typical for this area are extinct. However, in this question, not the last role can play an insufficient level of investigations in the area.

4. Conclusion

Clearly, the RDBU is an important document that will play a significant role in environmental protection over the next decade. Its creation is a result of painstaking work of many teams of botanical institutions and individual enthusiasts from Kyiv, Lviv, Donetsk, Simferopol, Chernivtsi and other cities. This book reckons Ukrainian studies, reflecting the level of knowledge and thus defines the problems and prospects for future research.

References

- ANDRUŠAITIS G. (ed.). 2003. Red Data Book of Latvia. Vol. 3, 691 pp. Riga: LU Biologijas instituts.
- BELAVICIUS K. & LADYGA A. (eds.). 1992. Lietuvos raudonoji knyga. 364 pp. Vilnius: Lithuanian Department of Environmental Conservancy.
- DIDUKH YA. P. (ed.). 2009. Red data book of Ukraine. Vegetable kingdom. 912 pp. K.: Globalconsalting.
- DIDUKH YA. P. & SHELIAG-SOSONKO YU. R. 2003. Geobotanical zoning of Ukraine and adjacent territories. Ukr. Botan. Journ. 60(1): 6-17.
- IUCN Red list categories and Criteria. 1994. Version 2.3.
- IUCN Red list categories and Criteria. 2001. Version 3.1.
- KĄŻMIERCZAKOWA R. & ZARZYCKI K. (eds.). 2001. Polska czerwona ksiega roslin. Paprotniki i rosliny kwiatowe, wyd. 2, 664 pp. PAN, Instytut Botaniki im. W. Szafera, Instytut Ochrony Przyrody, Kraków.
- MIREK Z. & PIĘKOŚ-MIRKOWA H. 2008. Czerwona Księga Karpat Polskich. Rośliny naczyniowe. 615 pp. Instytut Botaniki im. W. Szafera, Kraków.
- KHORUZHYYK L. I., SUSHCHENIA L. M. & PARFIONOV V. I. 2005. Red Data Book of the Republic of Belarus: Rare and threatened plant of natives species. 456 pp. Pietras Brovka Belarussian encyclopaedia, Minsk.
- SHELIAG-SOSONKO YU. R. (ed.). 1996. Red data book of Ukraine. Vegetable kingdom. 608 pp. Ukr. encyclop. after M. P. Bazhan, Kiev.
- TASHEV A. N. 2008. Flora of higher plants of Bulgaria: history of exploration, structure and conservation problems. Ukr. Botan. Journ. 65(1): 41-57.
- VELCHEV V. 1984. Red data book of Bulgaria. Extinct, threatened, and rare plants and animals. Plants V. 1. 448 pp. SOPHIA, BAN.
- ZAJĄC A. & ZAJĄC M. (eds.). 2001. Distribution Atlas of Vascular Plants in Poland. xii+714 pp. Edited by Laboratory of Computer Chorology, Institute of Botany, Jagiellonian University, Cracow.