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PLANTS FROM THE INTERNATIONAL RED LISTS IN THE COLLECTION OF HERBACEOUS PERENNIALS OF THE NATIONAL DENDROLOGICAL PARK “SOFIYIVKA” NAS OF UKRAINE

The paper presents information about 19 species Ukrainian flora listed in the international lists of protected plants — IUCN Red List, European Red List, Annexes of Bern Convention and CITES which are protected ex situ in the National dendrological park "Sofiyivka", NAS of Ukraine. The species were analyzed by the time of introduction and origin of planting material. The present state of introductive populations of the species and prospects of their further use in scientific research and environmental education has been considered.

Key words: *ex situ conservation, IUCN Red List of Threatened Species, European Red List, Bern Convention, CITES, plant introduction.*

Collection of rare and endangered plants is one of the main objectives for botanical gardens and institutions equated with gardens in their functions (arboretums, experimental stations etc.). This problem was defined by the Convention on Biological Diversity, adopted in 1992 at the UN summit on the environment in Rio-de-Janeiro. The Article 9 of this document regulates *ex situ* conservation, i.e. outside natural habitats [3]. In the Global strategy for plant conservation [4] and in the European Strategy for Plant Conservation 2008-2014 [1] also clearly stated the tasks for botanic gardens regarding *ex situ* conservation by 2010 and 2014 respectively: 60% of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10% of them included in recovery and restoration programme. During long time of rare and endangered plant species conservation in botanical gardens and arboretums of Ukraine made a significant contribution to the area of phytodiversity preservation. Nowadays these institutions are actively working on implementation of the Global and European strategies for Plant Conservation. However, the most important issue in their implementation is currently the absence or limitations of information resources [6]. In the national literature has repeatedly emphasized the need for generalization of the data on cultivation of rare and endangered plants in botanical gardens and arboretums, as well as the use of these plants in projects on reintroduction for restoration of their natural localities.

The most complete information on this topic presented in the publication "Catalogue of rare plants of botanical gardens and arboretums of Ukraine [2]. Information about presence of rare and endangered species of plants in collection of botanical institution can be found in the catalogs of collection fund and catalogs of seeds (Index Seminum) that regularly produced by many botanical gardens and arboretums. However, these publications are mainly for reference purposes and they do not provide information about the peculiarities of cultivation, breeding, abundance of introductive populations of the plants.

Considering this, we felt it necessary to summarize in this paper information about rare and endangered species of herbaceous perennial plants in collection of the National dendrological park "Sofiyivka", NAS of Ukraine, which are included in the international lists of protected plants — IUCN Red List of Threatened Species, European Red List of Vascular plants, Annex of the Convention on the conservation of European wildlife and natural habitats (Bern Convention) and Annex of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Table 1.

Annotated list of species of herbaceous perennial plants included in the lists of international protection of the collection of the National Dendrological Park "Sofiyivka" NAS of Ukraine

№	Latin name	Status*	Year of introduction	Origin of planting material	Locality**	state of introductive populations (number of individuals, or occupied area
1.	*Adonis vernalis L.*	CITES, RBU (indeterminate)	1969	natural habitats (Khmelnytskyi region)	1	~1 м^2, self-seeding with low intensity
2.	*Androsace villosa* subsp. *koso-poljanskii* (Ovcz.) Fed.	as *Androsace koso-poljanskii* Ovcz. — ERL (rare), RBU (endangered)	2009	Belgorod (Russian Federation)	1	~1 m^2, intensive vegetative propagation
3.	*Anemone patens* L.	as *Pulsatilla patens* (L.) — BERN, RBU (indeterminate)	2000, 2011	Kharkiv (Ukraine); natural habitats (Cherkasy region)	1	5 individuals, self-seeding
4. .	*Anemone pulsatilla* L.	as *Pulsatilla grandis* Wender. — BERN, RBU (vulnerable)	2000	L'viv (Ukraine)	1	2 individuals, self-seeding
5.	*Centaurea taliewii* Kleopov	IUCN (indeterminate), RBU (vulnerable)	2009	Belgorod (Russian Federation)	1, 2	15 individuals, self-seeding
6.	*Cerastium biebersteinii* DC.	ERL (indeterminate), RBU (indeterminate)	1979	Yalta (Ukraine)	1, 2, 5	~10 m^2, intensive vegetative propagation
7.	*Colchicum arenarium* Waldst. & Kit	as *Colchicum fominii* Bordz. — IUCN (indeterminate), ERL (vulnerable), BERN, RBU (vulnerable).	1996	Kyiv (Ukraine)	1	12 individuals
8.	*Dianthus gratianopolitanus* Vill.	ERL (indeterminate), RBU (extinct in nature)	1996	Sankt-Petersburg (Russian Federation)	1	~3 m^2, self-seeding.
9.	*Dianthus hypanicus* Andrz.	BERN, RBU (vulnerable)	2011	natural habitats (Mykolaiv region)	1, 2, 5	~ 20 individuals
10.	*Fritillaria montana* Hoppe.	BERN, RBU (endangered)	2003, 2005	natural habitats (Khmelnytskyi region)	1, 5	~15 individuals, low intensity vegetative propagation

11.	*Galanthus elwesii* Hoff.	IUCN (indeterminate), CITES, RBU (vulnerable).	2006	Kyiv (Ukraine)	1	~30 individuals, low intensity vegetative propagation
12.	*Galanthus nivalis* L.	CITES, RBU (indeterminate).	1966	natural habitats (Cherkasy region)	1, 2, 6	~150 individuals
13.	*Galanthus plicatus* M. Bieb.	ERL (vulnerable), CITES, RBU (vulnerable)	1979	Yalta (Ukraine)	1	~50 individuals
14.	*Marsilea quadrifolia* L.	BERN RBU (vulnerable)	2013	Bolestraszyce (Poland)	3	~ 2 m^2, for the year area increased to more than 100 times
15.	*Paeonia tenuifolia* L.	BERN RBU (vulnerable)	1968	North Caucasus	1, 2	~ 50 individuals
16.	*Silene compacta* Fisch.	as *Silene hypanica* Klokov — ERL (rare) RBU (vulnerable)	2011	natural habitats (Mykolaiv region)	1, 2, 5	17 individuals, self-seeding
17.	*Stipa dasyphylla* Czern.	IUCN (rare), RBU (vulnerable)	1989	Donetsk (Ukraine)	4	3 bunches
18.	*Stipa zalesskii* Wilensky	IUCN (rare), ERL (indeterminate), RBU (indeterminate)	1994	Berlin (Germany)	4	1 bunch
19.	*Trapa rossica* V.N.Vassil.	as *Trapa natans* L. s.l. — BERN, RBU (indeterminate)	1996	natural habitats (Vinnytsia region)	6	~ 300 individuals, self-seeding

** Note: IUCN — IUCN Red List of Threatened Species, European Red List of Vascular plants, ERL — European Red List of Vascular plants, BERN — Convention on the conservation of European wildlife and natural habitats, CITES —* Convention *on International Trade in Endangered Species of Wild Fauna and Flora, RBU — Red Book of Ukraine. In brackets are noted the categories of protection (if present).*

*** Note: 1 — collection of herbaceous perennials; 2 — collection of rare and endangered species; 3 — collection of aquatic plants; 4 — collection of grasses; 5 — exposition areas; 6 — spontaneous flora.*

The paper provides information about herbaceous perennial plants of Ukrainian flora which should be protected at the international level and are presented in the collection and exhibition areas of the park, but in some cases are elements of its spontaneous flora. Species that have omitted from the collection or spontaneous flora for various reasons, or species that have not yet formed introductive populations in this study are not considered.

Information about the conservation status of the species is provided in accordance with the «Vascular Plants of Ukraine. A Nomenclatural Checklist» [5] and Red Book of Ukraine [7]. We provide information about 19 species included in the lists of international protection. Latin names of the species listed in accordance with «The Plant List — a working list of all plant species» [8]. The characteristic of each species indicate the number of the quarter, where the species is cultivated or growing spontaneously in the park, the year of introduction and the

place of origin of planting material. Also provides information on the state of introductive populations of the species in the park.

Analysis of the collection representatives by origin of plant material indicated that 7 species were mobilized from natural phytocenoses of Ukraine, mainly in the form of seeds, which, in our opinion, is the best way to replenish the collection, since it allows maintaining the diversity of exactly Ukrainian flora, including genetic level. 6 species brought from other botanical institutions of Ukraine, or obtained by seed catalogs (Index Seminum). This way also allows providing conservation of plants with Ukrainian genotypes, but in many cases the exact information about the source of plant material in such exchanges is lost. Also, 6 species were introduced from foreign botanical institutions. In our opinion, this option of mobilization of plant material is not very reasonable, because we maintain *ex situ* the genetic diversity of non-Ukrainian populations of these species, from parts of their range, which are outside of Ukraine, with its inherent genotype which may differ significantly from the Ukrainian genotype. For these species need to look for sources of plant material in natural phytocenoses of Ukraine.

Distribution of species by the time of introduction revealed that the majority of them (9 species) introduced after 2000, reflecting the activation of the *ex situ* conservation in our institution during the last decade. In 6 species have been introduced in the "Sofiyivka" before 1980 and during 1980-1999. Thus, some introductive populations exist in our collection more than 30 years, proving a high degree of adaptation to the culture conditions.

The vast majority of species (17) are representatives of flora of the plain part of Ukraine, only one species each represents the flora of Ukrainian Carpathians and Crimea. On the territory of Cherkasy region five species occur, in neighboring Vinnitsa and Kirovograd — respectively five and four species.

Thus, for successful implementation of the tasks of a number of international instruments, including the Convention on Biological Diversity and the European Global Strategy for Plant Conservation need a further work to mobilize plant material of rare plant species from different region of the Right-Bank Forest-Steppe of Ukraine, especially Podillya and Prydniprov'ia, requiring protection at the international level.

Nowadays we started the reintroduction projects for *Silene compacta* і *Dianthus hypanicus* in order to restore their natural populations, but our collection opens much more possibilities in this way. The collection widely used not only for purely scientific purposes, but also with the environmental and educational purpose at carrying out environmental excursions for school and university students, at workshops with students of the Summer School of nature conservation and biotechnology of the Minor Academy of Sciences of Ukraine.

In the future we plan to focus on investigation of reproduction peculiarities of rare and endangered species, their wider implementation in different areas of the park and use during the tour for the formation of respectful regard for nature among visitors of the park.

References

1. A Sustainable Future for Europe; the European Strategy for Plant Conservation 2008-2014 / Developed by the Planta Europa and the Counsil of Europe. — Salisbury, UK–Strasbourg, France, 2008. — 63 p.
2. Catalogue of rare plants of botanical gardens and arboretums of Ukraine: A Reference Guide / A.P. Lebeda (ed.). — Kyiv: Academperiodica, 2011. — 184 p. (in Ukrainian)
3. Convention on Biological Diversity. United Nations. — Rio-de-Janeiro, 1992.
4. Global strategy for plant conservation. — Montreal: Secretariat of the Convention on Biological Diversity, 2002. — 13 p.
5. Mosyakin S.L., Fedoronchuk M.M. Vascular plants of Ukraine. A nomenclatural checklist. — Kiev, 1999. — 346 p.

6. Peregrym M.M. Ex situ conservation of rare and endangered species of the Ukrainian flora in the context of implementation of the Global and European Strategies for Plant Conservation // Ukr. Bot. J. — 2010. — 67, №4. — C. 577–586. (in Ukrainian)
7. Red Book of Ukraine. Plant World. / Ya.P. Didukh (ed.) — Kyiv: Globalconsulting, 2009.– 900 p.
8. The Plant List. A working list of all plant species. Version 1.1, released in September 2013 — http://www.theplantlist.org.

Анотація. Куземко А.А., Діденко І.П., Швець Т.А., Гончарук Л.Л., Чіков І.В., Чеканов М.М. Рослини, занесені до міжнародних охоронних списків, у колекції трав'янистих багаторічників Національного дендрологічного парку «Софіївка» НАН України. *В статті представлено інформацію про 19 видів флори України, які занесені до міжнародних охоронних списків — Червоного списку МСОП, Європейського червоного списку, Додатків Бернської конвенції та CITES і охороняються ex situ в умовах Національного дендрологічного парку «Софіївка» НАН України. Здійснено аналіз видів за часом інтродукції, походженням садивного матеріалу, розглянуто стан інтродукційних популяцій та перспективи подальшого використання представників колекції у науковій та еколого-просвітницькій роботі.*

Ключові слова: *охорона ex situ, червоний список МСОП, Європейський червоний список, Бернська конвенція, CITES, інтродукція рослин*

Аннотация. Куземко А.А., Диденко И.П., Швец Т.А., Гончарук Л.Л., Чиков И.В., Чеканов М.М. Растения, занесенные в международные охранные списки, в коллекции травянистых многолетников Национального дендрологического парка «Софиевка» НАН Украины. *В статье представлена информация о 19 видах флоры Украины, занесенных в международные охранные списки — Красный список МСОП, Европейский красный список, Приложения Бернской конвенции и CITES и охраняются ex situ в условиях Национального дендрологического парка «Софиевка» НАН Украины. Проведен анализ видов по времени интродукции, происхождению посадочного материала, рассмотрено состояние интродукционных популяций и перспективы дальнейшего использования представителей коллекции в научной и эколого-просветительской работе.*

Ключевые слова: *охрана ex situ, красный список МСОП, Европейский красный список, Бернская конвенция, CITES, интродукция растений.*

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