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Section Ecoinformatics
Long Database Report

Database of halophytic and littoral vegetation of Ukraine

Tetiana P. Dziuba* & Dmytro V. Dubyna

Abstract

The halophytic and littoral vegetation database of Ukraine (EU-UA-005) contains 6515 geobotanical relevés. It uses TURBOVEG software and is located at the M.G. Kholodny Institute of Botany, NAS of Ukraine (Kyiv). Prior to the 1980s the relevés were made using mainly the method of dominant classification. After this period, the Braun-Blanquet method was applied. Most of the research was conducted in 1990–2009 (49%). The database includes communities of halophytic vegetation classes, littoral vegetation of the Black and Azov Seas of Ukraine, including the estuaries of the Danube, Dnieper, and Dniester rivers, psammophytic vegetation, etc. This database became the basis for a critical revision of the relevant syntaxons and the book "Prodrome of the vegetation of Ukraine" (2019). The information is also used for the analysis of coenoflora, and studies of vegetation dynamics. The tasks of assessing the ecosystem and species diversity of vegetation, identifying sociological groups of species, ordination and phytoindication of habitats of plant communities are tackled.

Keywords: Ukraine, halophytic and littoral vegetation, Database, TURBOVEG, vegetation plot, vegetation survey

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The GIVD Database fact sheet for ID EU-UA-005 is published on
https://www.givd.info; https://www.givd.info/api/givd/EU-UA-005/factsheet

Introduction

Halophytic and littoral vegetation on the territory of Ukraine is distributed in fragments, covering mainly the southern regions of the Black and the Azov Seas, where the impact of sea water in combination with the climatic conditions of the steppe zone is most significant. Halophytic vegetation also occurs on the lower terraces of rivers and lakes (the left bank of the middle Dnieper), areas of excessive pasture digression and areas deprived of leaching regime (in particular, in the Danube valley due to reclamation works). On the right bank of the Dnieper, halophytic communities are observed less frequently, in particular in the Carpathians, in areas of salt production.

Halophytic vegetation of the plain part of Ukraine is intrazonal, edaphically determined and is marked by coenotic diversity, which is due to regional climatic specificity and hyperspace of ecological conditions. The two largest provinces of salt accumulation on the territory of Ukraine are: sulfate-soda (Left bank terraces of the Dnieper and its tributaries and the Seversky Donets basin) and sulfate chloride (the Northern Black Sea Region, Sivash Region and Dniester-Bug watershed). Halophytic vegetation is formed mainly in the steppe zone under conditions of significant evaporation, about twice the amount of precipitation. It is common on saline soils, mainly in places of direct sea influence, in depressions, in low areas near permanent or seasonal water bodies, along coastlines, in local deep depressions of coastal ridges, in depressions (the coasts of the Black and Azov Seas, the Sivash Region), as well as in areas of continental climate on accumulative types of surface (Fig. 1). The distribution and the composition of vegetation are largely determined by the relief, as well as by tidal impact close to the sea.

These types of vegetation are of biospheric importance as they ensure the prevention of desertification, provide environmental protection, and preservation of biotic and landscape diversity. The adaptation of halophytic and littoral coastal vegetation to extreme conditions of high salt

*Corresponding author's address: Tetiana P. Dziuba, Department of Geobotany and Ecology, M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine, tdziuba2014@gmail.com. Complete addresses of all authors can be found at the bottom of the paper.

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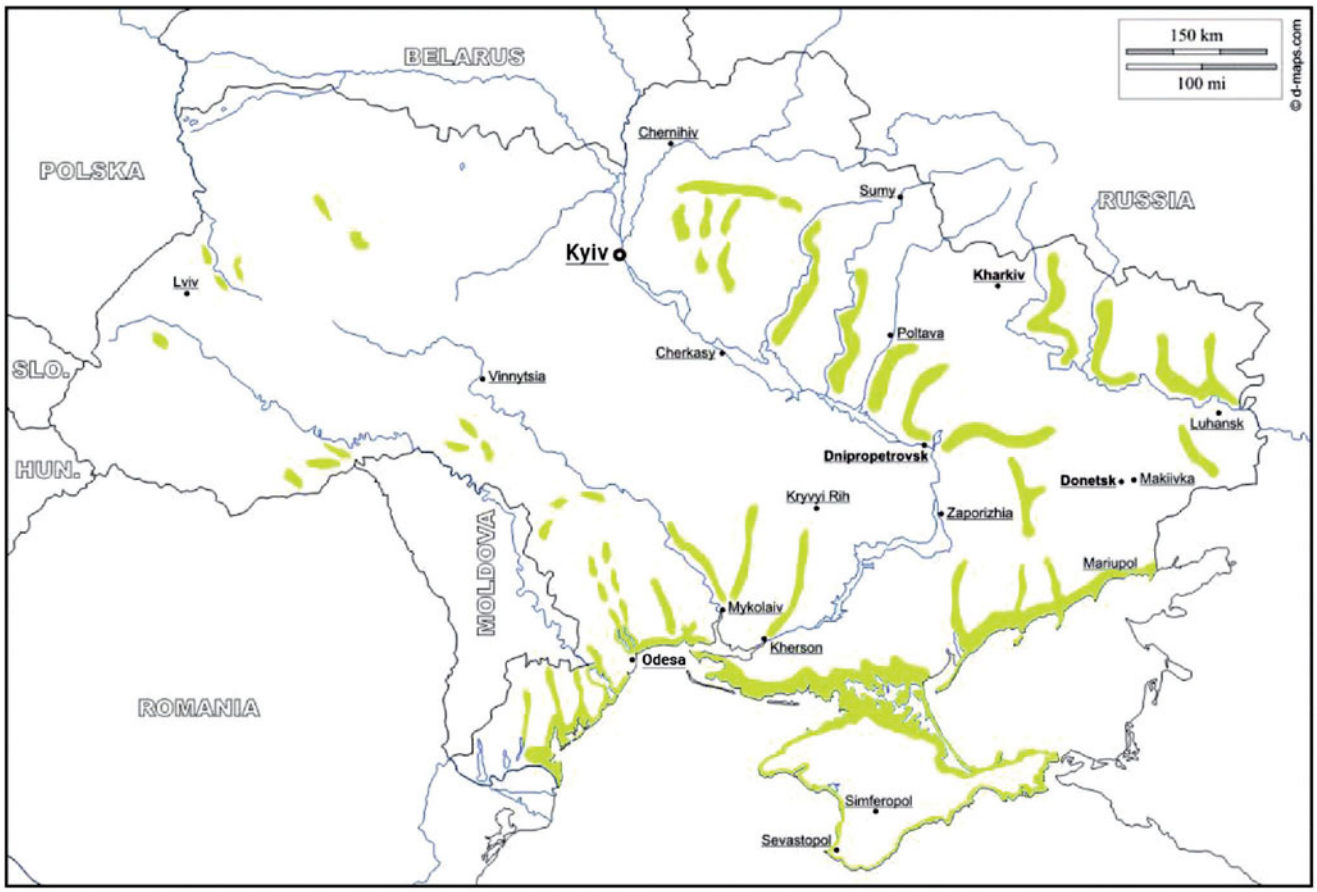

Fig. 1. Map of the study area. The distribution of halophytic and littoral vegetation of Ukraine is indicated by color.

concentration in the soil can be considered as a highly specific evolutionary acquisition of planetary biota (Hasanuzzaman et al. 2019). At the same time such features determine their vulnerability to anthropogenic impact, which has been growing in recent years. In order to preserve these unique types of vegetation it is necessary to carry out a complete inventory, systematization and classification of plant communities. An important and necessary first step towards conserving these vulnerable ecosystems is the creation of international databases of geobotanical relevés. They make it possible to carry out various comparisons and time series analyses to obtain primary information on the taxonomic and syntaxonomic richness as well as diversity patterns at the landscape scale.

Methods

For a long time, Ukrainian phytocoenologists used the national method for converting phytocoenotic tables (FICEN software package), developed in the early 90s, to store and process geobotanical data (Kosman et al. 1991; Sirenko 1996). In recent years, new international methods of processing and interpretation of geobotanical data were tested, in particular, the creation of databases of geobotanical relevés in the TURBOVEG program (Hennekens & Schaminée 2001) and their processing using the JUICE software package with the TWINSPAN algorithm as well as other statistical software such as PC-ORD, R, D-Map etc.

At the M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine, within the framework of the project "Vegetation syntaxonomy of Ukraine", the authors created a database of geobotanical relevés of halophytic vegetation in Ukraine using the TURBOVEG program. The communities of the salty habitats from classes *Thero-Salicornietea, Kalidietea foliati, Juncetea maritimi, Festuco-Puccinellietea, Crypsietea aculeatae, Bolboschoenetea maritimi* (*Phragmito-Magnocaricetea*) and littoral vegetation of seashores of the Black and Azov Seas of Ukraine including delta regions of large rivers (the Danube, Dnipro, Dniester) (*Cakiletea maritimae, Ammophiletea, Crithmo-Staticetea, Koelerio-Corynephoretea, Festucetea vaginatae, Salicetea purpureae, Alnetea glutinosae, Ruppietea maritimae, Zosteretea,* etc.) were digitized and entered in the database. The database was registered with the code EU-UA-005 in the Global Index of Vegetation-Plot Databases in 2013.

Current database content

To date, the database contains 6515 published and unpublished relevés. It contains information about sampling date, plot size, vegetation cover (total and by layer), location (usually the administrative unit, less often geographic coordinates are indicated), relevé authors, and bibliographic references (Table 1). Usually, detailed ecological characteristics of habitats, the degree and nature of anthropogenic impact (grazing, mowing, etc.), soil type and geomorphological data are given. Less often aspect and inclination, altitude, trunk diameter, etc. are reported (Table 1). Most of the relevés were made according to the Braun-Blanquet method (86.3%), a smaller part sampled before 1984 according to the method of eco-phytocoenotic (dominant) classification of vegetation (13.7%). They cover a variety of habitats, primarily on saline soils or in littoral settings, but also aquatic and steppe habitats. Relevé areas vary from 0.5–4 (aquatic communities) to 400 m² (forest) (Table 2). About 33% of the relevés lack information on the plot size. The projective cover of species is given according to the modified scale of B.M. Mirkin (Mirkin et al. 1989), namely: 5 – ≥50%, 4 – 26–49%, 3 – 16–25%, 2 – 6–15%, 1 – 1–5%, + – <1%.

The relevés contain a list of vascular plant species, mosses, lichens and algae (if any) (excluding soil-dwelling taxa). For a more correct comparison of Ukrainian syntaxons with European ones during their further processing, the nomenclature of taxa is given according to the "Flora Europaea" (1964–1980). This has led to some complications due to the absence of a number of narrow endemic taxa in the general flora list. For example, three

Table 1. Database structure.

Turboveg codes	No. of relevés	% of total relevés
Country code	6515	100.0
Biblioreference	2604	40.0
Nr. table in publ.	3935	60.4
Nr. relevé in table	4327	66.4
Cover abundance scale	6515	100.0
Date (year)	1315	20.2
Date (year/month)	657	10.1
Date (year/month/day)	3634	55.8
Relevé area	4370	67.1
Altitude	102	1.6
Aspect (degrees)	490	7.5
Slope (degrees)	231	3.5
Cover total	6143	94.3
Cover tree layer	165	2.5
Cover shrub layer	280	4.3
Cover herb layer	5869	90.1
Cover moss layer	210	3.2
Cover lichen layer	251	3.9
Height (highest) trees	3	0.0
Height (highest) shrubs	22	0.3
Aver. height (high) herbs	509	7.8
Aver. height lowest herbs	258	4.0
Maximum height herbs	93	1.4
Mosses identified	193	3.0
Lichens identified	190	2.9
Remarks	6318	97.0
Longitude	664	10.2
Latitude	664	10.2

Table 2. Relevé areas in database.

Relevé area m²	No. of relevés	% of total relevés
0.5–4.0	87	1.34
5.0–10.0	174	2.67
12.0–20.0	690	10.59
25.0–40.0	1251	19.20
45.0–70.0	528	8.10
75.0–100.0	1491	22.89
120.0–400.0	154	2.36
not indicated	2140	32.85
Sum	6515	100.00

Table 3. The spectrum of leading families.

Rank	Family	No. of species	% of total species
1	*Asteraceae*	217	14.77
2	*Poaceae*	147	10.01
3	*Fabaceae*	96	6.54
4	*Brassicaceae*	76	5.17
5	*Caryophyllaceae*	85	5.79
6	*Apiaceae*	59	4.02
	Lamiaceae	59	4.02
7	*Scrophulariaceae*	57	3.88
8	*Chenopodiaceae*	56	3.81
9	*Cyperaceae*	44	3.00
10	*Rosaceae*	41	2.79
Sum		937	63.78

Table 4. The spectrum of leading genera.

Rank	Genus	No. of species	% of total species
1	*Carex*	25	1.70
2	*Centaurea*	23	1.57
3	*Veronica*	20	1.36
4	*Silene*	19	1.29
5	*Trifolium*	19	1.29
6	*Polygonum*	17	1.16
7	*Astragalus*	16	1.09
8	*Euphorbia*	15	1.02
	Rumex	15	1.02
9	*Artemisia*	14	0.95
	Bromus	14	0.95
	Galium	14	0.95
	Potentilla	14	0.95
	Verbascum	14	0.95
	Vicia	14	0.95
10	*Atriplex*	13	0.88
	Dianthus	13	0.88
Sum		279	18.99

South-Ukrainian subendemic species: *Puccinellia fominii* Bilyk, *P. bilykiana* Klokov i *P. syvaschica* Bilyk (Mosyakin & Fedoronchuk 1999) are synonymous with one subspecies *Puccinellia festuciformis ssp. convoluta* (Hornem.) W.E. Hughes or the subendemic species *Medicago kotovii* Wissjul., *M. romanica* Prodán, *M. tenderiensis* Opperman ex Klokov are synonymous with one subspecies *Medicago sativa ssp. falcata,* etc. The general list of species and subspecies listed in the relevés of the database, contains 1469 species, of which 1442 are vascular plants and 27 are mosses, lichens and algae. All species from the list belong to 3 divisions, 4 classes, 112 families and 485 genera. The spectrum of the 10 leading families comprises *Asteraceae*, *Poaceae*, *Brassicaceae*, *Fabaceae*, *Caryophyllaceae*, *Chenopodiaceae*, *Lamiaceae*, *Apiaceae*, *Boraginaceae* and *Scrophulariaceae* (Table 3). They comprise about 64% of the species. The leading genera comprise 279 species, which is about 20 % of the species in the database (Table 4).

Data collection

The database includes relevés collected in the period from 1934 to 2017 (Fig. 2). The authors' own relevés were executed mostly at the territory of steppe zone of Ukraine. They constitute the largest data set (2802 plots). Others are drawn from literary sources (Table 5).

In order to compare the herbaceous vegetation types of sandy steppes of the class *Festucetea vaginatae* and to separate these groups from the closely related *Koelerio-Corynephoretea* and *Helichryso-Crucianelletea maritimae*, their descriptions from Ukrainian published sources (Vicherek 1972, etc.) were added to the database. At present, the issue of combining the two classes (*Festucetea vaginatae* and *Koelerio-Corynephoretea)* is debatable and requires further research. Also, as a result of comprehensive studies of the vegetation of the Kuyalnitsky estuary, the authors' original relevés of saline-steppe, true steppe (*Festuco-Brometea*), shrubs (*Crataego-Prunetea*) and synanthropic vegetation (*Robinietea*, *Stellarietea mediae* s.l., *Artemisietea vulgaris*, *Polygono-Poetea annuae*) were included in the database.

Based on the processing and an analysis of the relevés of the database, the authors published the following works: monograph from the series "Vegetation of Ukraine": "Halophytic vegetation" (Dubyna et al. 2007), a series of articles "Syntaxonomic diversity of the Dnieper estuary area" (Dubyna & Dziuba 2007, 2008, 2009, 2010, 2011, 2014), "Syntaxonomy of the *Festuco-Puccinellietea* class Soó ex Vicherek 1973 in Ukraine" (Dubyna et al. 2013), "Syntaxonomy of halophytic vegetation of the coastal sector of the Kiliya estuary of the Danube" (Dubyna et al. 2014), series of articles on vegetation of the Liman Kuyalnik (Odesa Oblast) (Dubyna et al. 2017, 2018, 2019a, b), "Syntaxonomy and ecological differentiation of the pioneer vegetation of Ukraine" (Dubyna et al. 2020) and others. A number of abstracts were published in conference proceedings. A revision of the syntaxonomic diversity of halophytic and psammophytic vegetation of Ukraine using the database was carried out in the work "Prodrome of the vegetation of Ukraine" (Dubyna et al. 2019).

The mentioned database is briefly described in the publication by T. Dziuba (2015) and is included in the European Vegetation Review based on the integrated European Vegetation Archive (EVA) (Chytrý et al. 2016).

Future perspectives

In recent years, the International Association for Vegetation Science (IAVS) and the European Vegetation Working Group (EVS) have made significant efforts to develop a centralized database of European vegetation plots and have created mechanisms for using this data for large-scale analyses of the biodiversity of the European flora as well as for biodiversity research in general (Chytrý et al. 2016). In this respect, the creation and addition of databases of Ukraine's vegetation is relevant and in demand at the European scale.

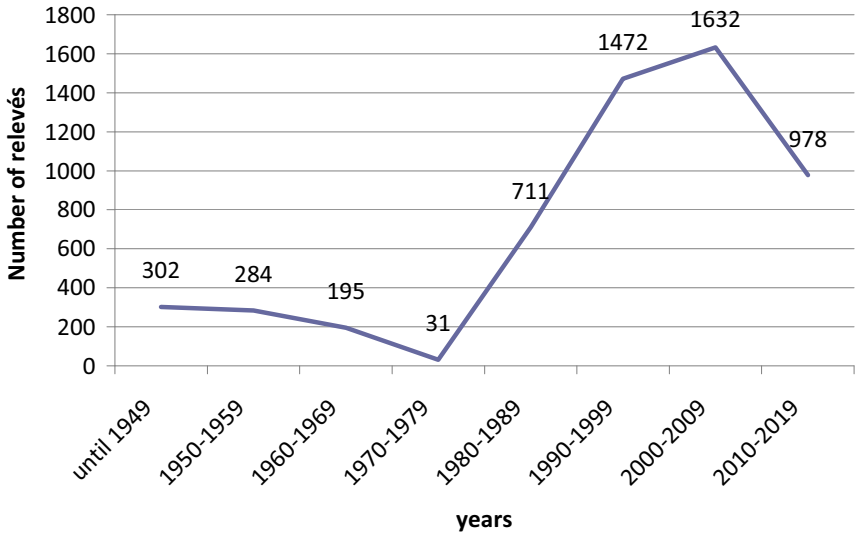

Fig. 2. Relevé sampling activity.

Information from the database of halophytic and littoral vegetation of Ukraine is mostly used for classification of plant cover of Ukraine, coenoflora analysis, as well as the study of vegetation dynamics. The tasks of assessing the ecosystem and species diversity and of identifying sociological groups of species (COCTAIL-method) based on the analysis of geobotanical data arrays using modern methods of multivariate statistics are also being solved. The database is used by the authors for the purpose of ordination and phytoindication of plant com-

Table 5. Original sources of the database.

Source	No. of relevés	% of total relevés	Classes to which the relevés belong
Authors' relevés	2802	43.0	*Thero-Salicornietea, Kalidietea foliati, Juncetea maritimi, Festuco-Puccinellietea, Crypsietea aculeatae, Bolboschoenetea maritimi, Phragmito-Magnocaricetea, Cakiletea maritimae, Ammophiletea, Crithmo-Staticetea, Koelerio-Corynephoretea, Festucetea vaginatae, Salicetea purpureae, Alnetea glutinosae, Ruppietea maritimae, Zosteretea, Festuco-Brometea, Artemisietea vulgaris, Stellarietea mediae, Polygono-Poetea annuae*
Bilyk, 1938	275	4.2	In original: *Agrostideta stolonizantis, Junceta gerardii, Festuceta orientalis, Puccinellieta palustris, Festuceta sulcatae, Artemisieta salinae, Suaedeta prostratae, Bolboschoeneta maritimi, Scirpeta tabernaemontani, Phragmiteta, Camphorosmateta annui, Agropyreta repentis, Scorzonereta parviflorae, Tripolieta vulgaris, Plantagineta cornuti, Festuceta orientalis, Plantagineta maritimae, Agropyreta elongati, Salicornieta*
Bilyk, 1956	280	4.3	In original: *Festuceta sulcatae salsuginosae, Artemisieta tauricae, Elytrigieta repentis, Tripolieta vulgaris, Artemisieta salinae, Elytrigieta pseudocaesii, Galatelleta rossicae, Heleocharideta euuniglumis, Puccinellieta fominii, Aeluropeta littoralis, Plantagineta asiaticae, Festuceta orientalis, Agrostideta praticolae, Trifolieta fragiferi, Bolboschoeneta maritimi, Triglochineta maritimae, Plantagineta salsae, Puccinellieta brachylepis, Junceta maritimi, Cariceta extensae, Salicornieta, Salsoleta sodae, Suaedeta prostratae, Halocnemeta, Ofaistoneta monandri, Staticeta caspiae, Staticeta suffruticosae, Staticeta meyeri, Obioneta verruciferae, Obioneta pedunculatae, Frankenieta hirsutae, Petrosimonieta oppositifoliae, Petrosimonieta triandrae, Echinopsiloneta hirsutae, Camphorosmateta monspeliaci*

Table 5. cont.

Source	No. of relevés	% of total relevés	Classes to which the relevés belong
Bilyk, 1963	342	5.2	In original: *Festuceta sulcatae salsuginosae, Artemisieta tauricae, Elytrigieta repentis, Tripolieta vulgaris, Artemisieta salinae, Elytrigieta pseudocaesii, Galatelleta rossicae, Heleocharideta euuniglumis, Puccinellieta fominii, Aeluropeta littoralis, Plantagineta asiaticae, Festuceta orientalis, Agrostideta praticolae, Trifolieta fragiferi, Bolboschoeneta maritimi, Triglochineta maritimae, Plantagineta salsae, Puccinellieta brachylepis, Junceta maritimi, Cariceta extensae, Salicornieta, Salsoleta sodae, Suaedeta prostratae, Halocnemeta, Ofaistoneta monandri, Staticeta caspiae, Staticeta suffruticosae, Staticeta meyeri, Obioneta verruciferae, Obioneta pedunculatae, Frankenieta hirsutae, Petrosimonieta oppositifoliae, Petrosimonieta triandrae, Echinopsiloneta hirsutae, Camphorosmateta monspeliaci*
Solomakha, Shelyag-Sosonko, 1984	155	2.4	*Festuco-Puccinellietea, Bolboschoenetea,Thero-Salicornietea*
Shelyag-Sosonko, Solomakha, 1987	29	0.4	*Asteretea tripolium, Bolboschoenetea maritimi, Thero-Salicornietea, Juncetea maritimi*
Shelyag-Sosonko, Golub, Solomakha, 1989	38	0.6	*Salicornietea fruticosae*
Korzhenevskij, Volkova, Kljukin, 1984	22	0.3	*Cakiletea maritimae, Ammophiletea*
Korzhenevskij, 1986	10	0.2	*Ammophiletea*
Korzhenevskij, Kljukin, 1987	15	0.2	*Crithmo-Limonietea*
Korzhenevskij, Kljukin, 1988	20	0.3	*Thero-Suaedetea*
Korzhenevskij, Kljukin, 1990a	65	1.0	*Crypsidetea aculeatae, Thero-Salicornietea, Festuco-Puccinellietea, Festuco-Brometea*
Korzhenevskij, Kljukin, 1990b	241	3.7	*Zosteretea, Salicornietea fruticosae, Thero-Salicornietea, Asteretea tripolii, Cakiletea maritimae, Crithmo-Limonietea, Crypsidetea aculeatae, Ammophiletea, Juncetea maritimi, Festucetea vaginatae, Festuco-Brometea, Festuco-Puccinellietea, Agropyretea repentis, Urtico-Sambucetea*
Korzhenevskiy, Kliukin, 1991	55	0.8	*Thero-Suaedetea, Festuco-Puccinellietea, Festuco-Brometea*
Korzhenevskij, Kljukin, Korzhenevskaja, 1997	10	0.2	*Crypsietea aculeatae*
Korzhenevskij, 2000	20	0.3	*Salicornietea fruticosae*
Korzhenevskij, Kljukin, Korzhenevskaja, 2000	20	0.3	*Asteretea tripolium*
Dubyna, Neuhäuslová, Shelyag-Sosonko, 1994	55	0.8	*Cakiletea maritimae, Honkenyo peploidis-Elymetea arenarii, Agropyretea pungentis*
Dubyna, Neuhäuslová, Shelyag-Sosonko, 1995	62	1.0	*Festucetea vaginatae, Chenopodietea*
Dubyna, Neuhäuslová, 2000a	44	0.7	*Juncetea maritimi, Bolboschoenetea maritimi*
Dubyna, Neuhäuslová, 2000b	71	1.1	*Festuco-Puccinellietea*
Dubyna, Neuhäuslová, 2003	77	1.2	*Thero-Salicornietea*

Table 5. cont.

Source	No. of relevés	% of total relevés	Classes to which the relevés belong
Androsova, Solomakha, 1996	30	0.5	*Cakiletea maritimae, Crypsietea aculeatae, Ammophiletea, Festucetea vaginatae, Agropyretea repentis*
Bayrak, 1997	37	0.6	*Phragmito-Magnocaricetea, Asteretea tripolium, Festuco-Limonietea, Thero-Salicornietea, Bolboschoenetea maritimi*
Umanets, Solomakha, 1998	57	0.9	*Thero-Salicornietea, Bolboschoenetea maritimi, Thero-Suaedetea maritimae, Salicornietea fruticosae, Festuco-Limonietea, Crypsietea aculeatae, Asteretea tripolium*
Umanets, Solomakha, 1999a	76	1.2	Asteretea tripolium, Thero-Salicornietea, Juncetea maritimi, Cakiletea maritimae, Festucetea vaginatae
Umanets, Solomakha, 1999 б	109	1.7	*Salicetea purpureae, Robinietea, Asteretea tripolium, Phragmito-Magnocaricetea, Festucetea vaginatae*
Umanets, Vojtjuk, Solomakha, 2001	9	0.1	*Ammophiletea, Asteretea tripolium, Festuco-Limonietea, Phragmito-Magnocaricetea, Juncetea maritimi, Salicornietea fruticosae, Thero-Salicornietea,*
Karnatovskaja, Derevjanko, 2004	55	0.8	*Scorzonero-Juncetea gerardii, Festuco-Puccinellietea*
Vojtjuk, 2005	367	5.6	*Salicornietea fruticosae, Thero-Salicornietea, Crithmo-Staticetea, Caciletea maritimae, Crypsietea aculeatae, Bolboschoenetea maritimi, Juncetea maritimi, Asteretea tripolium, Festuco-Puccinellietea, Festuco-Limonietea, Molinio-Juncetea*
Tyshchenko, 2006	517	7.9	*Potametea, Zosteretea, Bolboschoenetea maritimi, Phragmito-Magnocaricetea, Crypsietea aculeatae, Asteretea tripolium, Salicornietea fruticosae, Thero-Salicornietea, Juncetea maritimi, Agropyretea repentis, Artemisietea vulgaris, Secalietea, Ammophiletea, Molinio-Arrhenatheretea, Festucetea vaginatae, Festuco-Limonietea, Festuco-Brometea, Glycyrrhizetea glabrae*
Gomlya, 2005	54	0.8	*Scorzonero-Juncetea gerardii, Festucetea vaginatae, Bolboschoenetea maritimi*
Shapoval, 2006	139	2.1	*Isoeto-Nanojuncetea, Molinio-Arrhenatheretea, Festuco-Brometea*
Solomakha et al., 2005	34	0.5	*Festuco-Limonietea*
Vicherek, 1971	50	0.8	*Crithmo-Staticetea, Cakiletea maritimae, Ammophiletea*
Vicherek, 1972	128	2.0	*Festucetea vaginatae, Koelerio-Corynephoretea*
Iakushenko et al., 2011	12	0.2	*Asteretea tripolium*
Shevchyk et al., 1996	28	0.4	*Festucetea vaginatae*
Didukh, Korotchenko, 1996	15	0.2	*Festucetea vaginatae*
Konograj, V. (dissertation manuscript)	18	0.3	*Bolboschoenetea maritimi, Koelerio-Corynephoretea*
Kazarinova, A. (dissertation manuscript)	10	0.2	*Bolboschoenetea maritimi*
Woch, Trzcinska-Tacik, 2014	20	0.3	*Thero-Salicornietea, Phragmito-Magnocaricetea*
Solomakha et al., 2015	22	0.3	*Nerio-Tamaricetea*
Kolomiychuk, Vynokurov, 2016	20	0.3	*Festuco-Brometea*
Sum	6515	100	

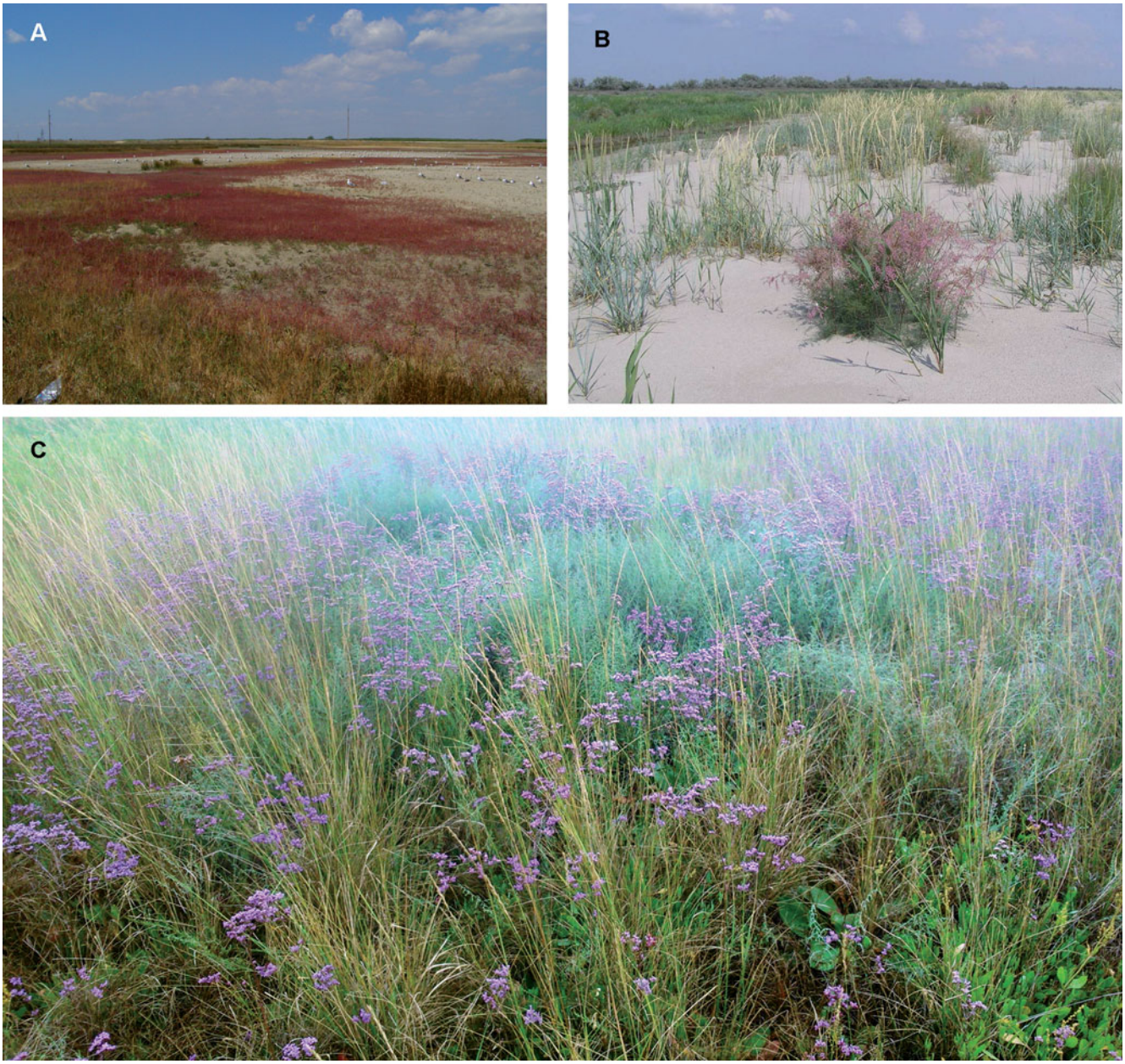

Plate 1. Vegetation types featured by the vegetation-plot database GIVD EU-UA-005. A: Salt marshes with *Salicornia perennans* in the Odessa region (Photo: D. Dubyna). B: Littoral dune vegetation at the Black Sea (Kherson region) (Photo: D. Dubyna). C: Saline meadows in the Poltava region (Photo: T. Dziuba).

munities, in particular rare ones. Their processing with help of the PC-ORD and R software integrated into JUICE using the ecological scales of Ya. Didukh makes it possible to assess ecotopes by soil moisture gradients, ombre regime, cryoclimate, carbonate content of the soil, continentality, thermal regime, light regime, soil acidity, salinity regime, moisture shift, soil aeration, and nitrogen content of the soil (Didukh 2011).

The last addition to the existing database was the original relevés of halophytic vegetation of the Black Sea Region and the terraces of the Left Bank of the Dnieper in 2014–2015, relevés of vegetation of the Liman Kuyalnik (2016–2017), as well as relevés of G. Bilyk from his monographs "Vegetation of the Lower Dnieper Region" (Bilyk 1956) and "Vegetation of saline soils of Ukraine" (Bilyk 1963). These relevés represent the characteristics of plant communities classified by the author, as already noted, based on the ecologic-phytocoenotic (dominant) approach. Accordingly, their floristic lists are not complete. These lists of dominant plant species can be used to iden-

tify catastrophic changes in vegetation cover, to analyze successional changes in floristic composition of dominant plant species and for phytoindication of the ecological conditions of halophytic ecosystems. Work has also begun to screen each relevé: its belonging to a certain class, order, union, association, subassociation and variant (if any) to which it was attributed by the authors, as well as the determination of their geographical coordinates.

The M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine is planning to create a country-scale database of the vegetation of Ukraine (UkrVeg), and the current database will be a part of that database.

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Note: A complete bibliography of references is given on the website https://www.givd.info

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Author addresses

Dziuba, T.P. (Corresponding author, tdziuba2014@gmail.com)[1], **Dubyna, D.V.** (ddub@ukr.net)[1]

[1] Department of Geobotany and Ecology, M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine, Tereshchenkivska St., Kyiv 01601, Ukraine