

Drosera in Ukraine: Ecological, chorological specifics and phytosozonomical characteristics

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The paper presents a chorologically systematized description of all taxa of the *Drosera* L. genus in Ukraine. We performed an analysis of environmental conditions, phytocoenotic characteristics and found new locations of sundew. We generalized the morphometric parameters and proposed a concept – “leaf roundness index”; and recommended including *Drosera rotundifolia*, *Drosera x obovata* in the next edition of the Red Data Book of Ukraine due to the contraction of their habitat and their high degree of vulnerability to unfavourable environmental factors and anthropogenic impact; we recommend growing *Drosera* ex-situ on the example of Kremenets Botanical Garden with further repatriation in-situ; proved the efficiency of the proposed methods of farming cultivation. The paper substantiates the complex of phytosozonological criteria, measures for protection and reproduction of the endangered species of *Drosera* genus. We suggested a hypothesis about the independence of the taxon of *Drosera x obovata*. Despite the fact that *Drosera longifolia* x *D. rotundifolia* is generally considered to be sterile hybrid, individuals breed vegetatively, are fertile and retain germinability after germination, and have a clearly specific ecotype, sometimes loci are isolated from parent species. To isolate the *Drosera x obovata* as a single taxon, additional phylogenetic studies are needed, but as a rare, disappearing taxon it needs protection and background monitoring of populations. The area of greatest phytosozonological value for sundews in Ukraine is Western Polissia (Volyn, Rivne regions) (*D. longifolia* – 31, 20 sites, *D. intermedia* – 31 and 30 respectively). *Drosera longifolia* is on average distributed slightly further south in Ukraine than *D. intermedia*, although both taxa are confined to the humid, boreal zone. *D. rotundifolia* is most widespread in the humid zone (Polissia, the Carpathians). Despite the presence of *Drosera x obovata* in the Cheremskyi, Rivnenskyi Nature Reserve, Shatskyi National Nature Park, and several landscape reserves, the taxon is continuing to disappear due to succession, afforestation, water regime change etc.

Keywords: sundew; heterotrophic helophyte; carnivorous plants; The Red Data Book of Ukraine

Introduction

In the conditions of global changes of the environment, the priority task is theoretical and conceptual substantiation, methodological recommendations and practical measures for the protection of phytodiversity as a medium-critical basis of balanced development of the biosphere. In the conditions of intensified anthropogenic impact, transformation of biotopes, it is necessary to determine ecological-chorological peculiarities of rare, endangered species of plants and to recommend zoological criteria for their survival and reproduction. The abovementioned problems are very important for heterotrophic helophytes, which are among the most vulnerable to the effects of dessication of wetlands and peatlands, and in particular for species of the *Drosera* L. genus (the family – Droseraceae).

As is known, almost 50% of peatlands are degraded in Ukraine, the area of wetlands is 4.5 million hectares (1.6% of the state territory), drained lands – 3.3 million hectares (Konishchuk, 2015). That means that half of the potential ecotopes of helophytes are lost. In addition, even in the objects of the nature reserve fund, the condition of the populations of rare marsh plants, in particular sundews is deteriorating. This is due to the natural processes of succession, sylvatization, the mineralization of the substrate, change in the hydrological regime, the transformation of ecotopes, etc. Consequently, the problem of ecological assessment of the low frequency, disappearing helophytes on the example of sundews is highly topical and requires a priority solution in order to optimize the conservation of phytodiversity of rare species. The aim of the work is to optimize ecosozonomical conceptual approaches and practical monitoring measures for preservation of taxa of *Drosera* L. in Ukraine based on scientific substantiation. To achieve the goal of the

work the following tasks were to be performed: 1) to unify and systematize bibliographic information, data of the herbarium funds; 2) to conduct field expeditions with geobotanical descriptions, selection of herbarium and samples of substrate (peat), water; 3) to study the ecological conditions, chorology of habitat, to describe the composition of phytocoenoses, to determine the type of substrate; 4) to determine the morphometric parameters and carry out correlation analysis; 5) to prove experimentally the possibility of growing ex-situ and repatriation in-situ; 6) to develop criteria for protection of sundews and offer effective measures for the conservation and reproduction of populations.

The practical significance and prospects of the research – the obtained results can be used in preparing the next edition of the Red Data Book of Ukraine, in the implementation of the programme “Chronicle of Nature” by national natural parks, biosphere reserves, nature reserves, in the work of the relevant departments of the Ministry of Ecology and Natural Resources of Ukraine and regional state administrations, forestry and water management. It is advisable to create an electronic database of ecotopes with geographical coordinates for GPS. According to the developed methodological recommendations, it is worthwhile to start the programme for the restoration of weakened, and if possible disappeared, sundew populations.

Materials and methods

We analyzed bibliographic (Montezor, 1886–1891; Pachoskyi, 1897, 1913; Kholodnyi, 1938; Flora URSR, 1953; Andrienko, 1977, 2006, 2010; Denisova, 1981), actual data and herbarium collections of all known habitats of *Drosera* L. of the Ukrainian natural flora. We ana-

lyzed certain foreign publications (Cheek, 1998, 2001; Podbielkowski & Sudnik-Wojcikowska, 2003) which confirmed the similarity of conditions of habitats in Europe. Our work was also based on the materials of our own expeditionary field research conducted during 2012–2017. The performance of the work is associated with basic research “Methodological fundamentals of sustainable development of wetland landscapes and peat ecosystems” (2011–2015) degree thesis, No 0111U003228, “Implementation of an integrated Pan-European system of ecological management of agricultural landscapes and biodiversity conservation in Ukraine” (2016–2020) degree thesis No 0116U004064 (Project manager – V. V. Konishchuk) and the preparation of the dissertation “Ecological preconditions for reservation of heterotrophic helophytes of genus *Drosera* L., *Pinguicula* L. in Ukraine *ex-situ*” (O. I. Skakalska). The research was carried out by the route method with reconnaissance. Geobotanical descriptions were carried out according to generally accepted techniques (Hryhora & Yakubenko, 2005). In addition to the original research, for the chorological analysis of rare plant species we analysed the literary data and materials from the herbarium resources of the M. H. Kholodnyi Botanical Institute of NAS of Ukraine, Rivne Regional Museum, Volyn Regional Museum, Institute of Agroecology and Environmental Management of NAAS. The list of the habitats in accordance to the administrative principle includes the settlement, tract, the object of natural reserve fund, authors (Flora URSR, 1953; Andrienko, 1977, 2006, 2010), and the information about the herbarium. The water analysis was determined by a portable certified device: pH-OVP meter / conductivity meter / solimeter / thermometer Ezodo 7200. Peat ash content was determined using the standard method of burning in a muffle furnace Veb Elektro Bad Frankenhausen MLW Elektro LM 312.11 Typ L1, with weighing on analytical scales Nagema VEB Großwaagen Berlin IV S/3-3. For laboratory analysis of peat, a light monocular microscope Konus Research (max 1600 $\times$) with digital camera Ucmos 14 MPix was used.

Digital images were made by the Nikon D3200. Selected samples of plants in agreement with the objects of the natural reserve fund were transferred to the Herbarium of the M. H. Kholodnyi Institute of Botany of NAS of Ukraine (KW), Institute of Agroecology and Environmental Management of NAAS of Ukraine. Taxonomy is given according to generally accepted conventions (Mosiakin & Fedoronchuk, 1999) for the International Plant Names Index (IPNI). Latin transliteration for geographical names and surnames is provided in accordance with the requirements (Postanova KMu, 23.12.2015). Bioethical norms were not violated.

Results

Three species and one hybrid of sundew grow *in-situ* in Ukraine – *Drosera longifolia* L. (syn. *D. anglica* Huds.) (great or English sundew), *D. intermedia* Hayne (oblong-leaved or spoonleaf sundew), *D. rotundifolia* L. (common or round-leaved sundew), *D. x obovata* Mert. et W. D. J. Koch. The first two species are included in the Red Data Book of Ukraine (2009) with protected status as vulnerable, and were included in the two previous editions of the Red Book. *D. rotundifolia* has a regional conservation status in the vast majority of its natural range, in particular in Vinnytsia, Volyn, Dnipropetrovsk, Donetsk, Zakarpattia, Ivano-Frankivsk, Kyiv, Luhansk, Lviv, Poltava, Rivne, Sumy, Ternopil, Kharkiv, Khmelnytskyi, Cherkasy, Chernivtsi regions (Ofitsiyni pereliky..., 2012), except in Zhytomyr and Chernihiv regions. In Ukraine, there is no protection status for *D. x obovata*. Below there is a summary of the biological, ecological, and chorological characteristics of all taxa of *Drosera* in Ukraine in terms of bibliographic, herbarium and copyright data. In the legend, the drawings fix all known places of location of record according to the literary and herbarium information, some are considered lost or not confirmed.

***Drosera longifolia* L.** Heterotrophic, circumpolar plant on the southern boundary of its range. *D. longifolia* L. is a glacial relic (Andrienko, 2010). The species is common in northwestern parts of Eurasia (Northern Europe, Scandinavia and the taiga, Mongolia) and the mid-northern latitudes of North America, on the Kurile Islands, Hawaii, Kamchatka, Primorye and Sakhalin. In Ukraine, it occurs in Polissia, in Roztochia, Forest-Steppe, mainly Left-Bank. The populations are small, sometimes forming quite thick curtains. Many populations, primarily in the Dnipro

regions and Forest-Steppe, represented in the herbarium collections, are now lost. The main reasons for the change in abundance are drainage and development of swamps, peat extraction, extraction of amber, carbonate rocks, afforestation and formation of meadows in mires, and the narrow ecological amplitude of the species. Ecotope conditions: flooded, mesoeutrophic, flow, carbonate, glacial-karst marshes with pH 6.0–7.5 (less often 4–6), small-grained gypsum, sedge-sphagnum peat with a decomposition degree of 10–20% (less than 30%). The species is an associate in the groups. It grows in groups of class Scheichzerio-*Caricetea fuscae* Tüxen 1937, associations: *Caricetum lasiocarpae* Koch 1926, *Caricetum limosae* Braun-Blanquet 1921, *Rhynchosporietum albae* Osvald 1923, *Sphagno-Caricetum rostratae* Steffen 1931 etc. Light-loving hygrophyte. General biomorphological characteristics: hemicyptophyte; perennial plant with linear- or oblong and wedge-shaped laminae, the height of flowering stems of 10–25 (sometimes 35) cm; stalk upright; leaves in basal rosette directed obliquely upward, linear wedge-shaped, 15–40 mm long, 3–5 mm wide with membranous brown stipules, highly rooted to the petiole, split at the top on setaceous parts, the top covered with glandular hairs; flowers are white, collected in a raceme; fruit is an ovoid single-pore capsule; sepals at the base are increased, oblong, finely granular and serrate, 5–6 mm long, about 2 mm wide; lobes are spade-shaped, white, 5–7 mm long, +(-) 3 mm wide; ovary is obovate-ellipsoidal; 3 columns, from the base with 2 separate arising parts, clavate on top; the capsule is egg-shaped, longer than the calyx (Fig. 1). The seed is spindle-shaped, with a loose adjacent skin. Blossoms in July–August. Gives fruits in August–September. It is propagated by windborne seeds. It is perennial. The number of chromosomes $2n = 40$, hybridizes with *D. rotundifolia*, some cultivated hybrids are also known.

The species is included in the Red Book of Ukraine, the Czech Republic, Slovakia, Hungary, Romania, Briansk, Vologda, Kaluga Oblasts of the Russian Federation, the Red List of Plants and Mushrooms of Poland. According to official materials (Red Data Book of Ukraine, 2009), 25 sites are indicated according to herbarium collections and 22 according to the literary data. According to the literature, herbarium data, which we analyzed, and our own data, the chorological characteristic of *D. longifolia* L. is as follows (Fig. 2).

Locations of *D. longifolia* L. in Ukraine:

Volyn region: Volodymyr-Volynskyi district (d.) – Volodymyr-Volynskyi city (O. S. Rohovych); Kamin-Kashyrskyi d. – village (v.) Zhytnytsia (Zhytnivka) (T. L. Andrienko, 1971, KW); v. Zalissia (Y. K. Pachoskyi); v. Verkhy (E. M. Bradis, H. F. Bachurina, 1949, KW); Sviatobuzakivskyi Nature Reserve (v. Buzaky); Sirche Nature Reserve (v. Dobre) (PZF Volynskoi oblasti, 1999); Kivertsivskyi d. – v. Tsuman (K. Vandas); Kovelskyi d. – trembling bog, Lake (l.) Okhotyn, v. Liubche (V. P. Heliuta, 1998, KW); Nature Reserve of Nechymne (v. Skulyn) (T. L. Andrienko, 1981, KW); trembling bog, l. Okhotyn, l. Midiikivske, v. Liubche (Y. Batiura and others, 2005); Kovel city (O. S. Rohovych, Y. K. Pachoskyi); Liubeshivskyi d. – trembling bog, l. Chervyshchanske (Shyni); National Natural Park of Prypiat-Stokhid (V. V. Konishchuk, 2012); Liubomylskyi d. – Bilka Bog (T. L. Andrienko, 1976, KW); Bystriaky Nature Reserve (v. Vysotski) (PZF Volynskoi oblasti, 1999), the shore of Lake Orikhove, Zghoranski Lakes Nature Reserve (v. Zghorany, v. Sylne) (T. L. Andrienko and others, 2006); Manevtskyi d. – v. Zamostia (Y. K. Pachoskyi), Cheremskyi Nature Reserve, the shore of Lake Redychi (V. V. Konishchuk, 2002, KW); Cheremske Bog, the shore of the stream Lisovyi; Botanical nature monument Bolittse (V. V. Konishchuk, 2004); Ratnivskyi d. – Zabolottia town, the shore of Lake Tur (A. I. Barbarych, 1949, KW); v. Himyky (H. F. Bachurina, 1949, KW); Shatskyi district – Unychi Bog (v. Melnyky) (V. I. Honcharenko, 2004, KW); Lakes of Shatsk (Y. P. Didukh, 1991, KW); Shatskyi National Natural Park, to the west of Lake Pulemetske; to the south of Lake Luka; to the south from village of Melnyky, trembling bog, Lake Krasynets; trembling bog, l. Chorme (P. V. Yurchuk and others, 2014); Shatskyi National Natural Park, trembling bog, l. Buzhnia (V. V. Konishchuk, 2016); Nature Reserve of Vtenskyi (v. Rostan); Nature Reserves of Pishchanskyi and Pulemetskyi (PZF Volynskoi oblasti, 1999); Shatskyi National Natural Park, l. Luky (T. L. Andrienko and others, 2006, PZF Ukraine, 2009).

Zhytomyr region: Ovrutskyi d. – Ovruch city (O. S. Rohovych); bog of the stow Mizhymky (v. Chervonka) (H. K. Smyk, 1963);

v. Usove, stow of Yamne, on the shore of the drainage channel, on peatlands (I. I. Moroz, 1972), (Herbarium of the National Botanical Garden named after M. M. Hryshko of the NAS of Ukraine, KWHA); Olevskiy d. – v. Ozeriany (M. N. Kopachevskaya), between Rudnia Radovilska and Zamyslovychi (D. K. Zerov); the station of Post Drovianyi,

the stow of Shevtsova Nyva (M. I. Kotov, KW); the outskirts of Zamyslovychi village (O. O. Orlov, 1989, 1990, 2005); Nature Reserve of Plotnytsia (PZF Ukraine, 2009); Poliskyi Nature Reserve (T. L. Andrienko and others, 2006, PZF Ukraine, 2009), 2 km from v. Selezivka, swamp (S. Y. Didenko, O. A. Hnatiuk, 2007, KWHA).



Fig. 1. *Drosera longifolia*, Bolittse Bog; growing ex-situ (Photo: V. V. Konishchuk)

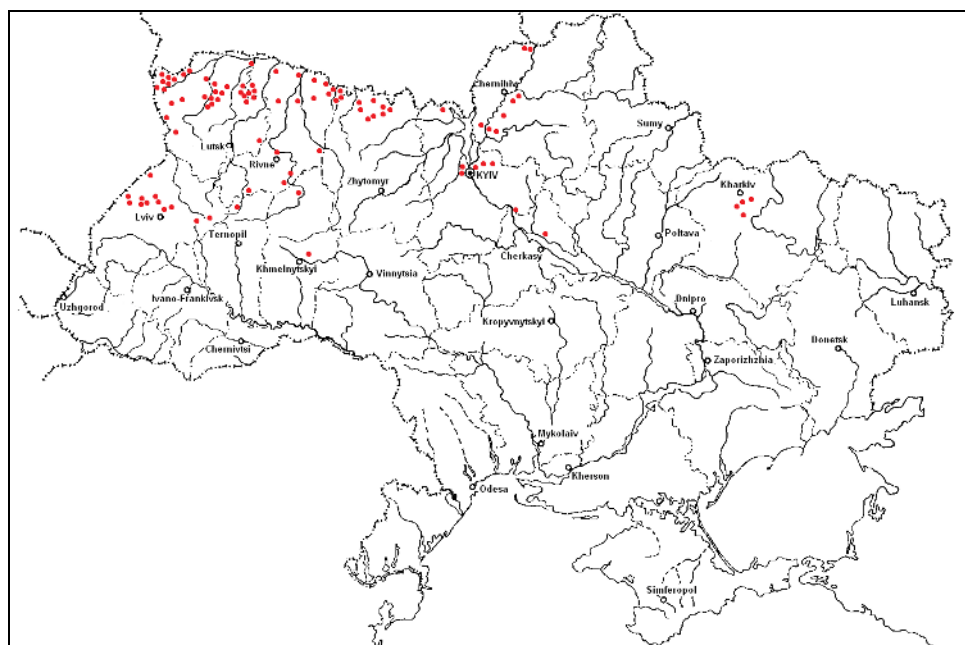


Fig. 2. Location of *Drosera longifolia* in Ukraine

Kyiv region: Chornobyl'skyi Radiation and Ecological Biosphere Reserve, the northern part of the Illia River Basin (V. V. Konishchuk, 2016); the outskirts of Kyiv, Petropavlivska Borschahivka, the valley of the Irpin River (O. S. Rohovych, V. V. Montezor); Mykilska Slobidka (O. S. Rohovych) (left-bank massif near the Rusanivka Strait, Kyiv, the location is lost); near Lake Rybne (I. F. Shmalhauzen, V. V. Mon-

trezor, Y. M. Semenkevych, D. K. Zerov, P. F. Oksiuk) (according to our data, in 2016 no location was identified, ecotopes are very disturbed, partially drained); v. Romanivka (valley of the Irpin River) (I. F. Shmalhauzen), between Kyiv and Brovary (Y. M. Semenkevych); Pereiaslav-Khmelnitskyi d. – v. Viunyshe (O. S. Rohovych) (a lost location, a village flooded by the Kaniv reservoir, near Tsybli village); sphagnum

bog, v. Korzhi, v. Baryshivka (Y. K. Pachoskyi, 1913), (according to our data, in 2016 no location was found, ecotopes are very disturbed, partially drained, sphagnum moss has disappeared).

Lviv region: Brodivskyi and Zolochivskyi d. – the basin of the River West Bug; Zhovkivskyi d. – Potelytskyi Nature Reserve; Sokalskyi d. – Volytskyi Nature Reserve, Yavorivskyi d. – the Nature Reserve of Roztochchia, Yavorivskyi National Natural Park, 10 in-situ locations in two botanical gardens (M. S. Khomiak, 2011); v. Zhomyrska (A. Tomashek), on a peat bog, Ivano-Frankove (B. Blotskyi); Briukhovetskyi d. – v. Dubliany (F. Tomashevskyi).

Rivne region: Volodymyrets'kyi d. – v. Ozerts' (Y. P. Didukh, 2000, KW), bod Koza-Berezyna (V. V. Konishchuk, 2000, 2002), the stow of Biloozerska Dacha, v. Ozerts' (T. L. Andrienko, O. I. Priadko, 2004, KW), Rivnenskyi Nature Reserve, l. Bile, Koza-Berezyna Bog (T. L. Andrienko and others, 2006); Dubrovyskyi d. – Perebrody Bog (to the east of the village of Perebrody) (M. Parakhonska, 1975, KW); v. Ozersk; Morochno Bog, v. Vysotsk (S. Kulczynski, 1939); Zarichnenskyi d. – v. Dibrivsk (I. M. Hryhora, 1955, KW); Zdobunivskyi d. – Bushchanske Bog (v. Bushcha, v. Batkivtsi) (T. L. Andrienko, 1983, KW); Nature monument Dermanska; Regional Landscape Park of Dermansko-Mostivskyi; Nature Reserve of Bushchanskyi (v. Bushcha) (PZF Rivnenskoj oblasti, 2008); Koretskyi d. – v. Ustia, Podzastavie Bog (H. Antonova, 1984, ROKM); Ostrozkyi d. – Dermansko-Ostrozkyi National Natural Park (PZF Rivnenskoj oblasti, 2008); v. Batkivtsi, sedge-hypnum swamp (T. L. Andrienko, H. Antonova, O. M. Saush, 1983, ROKM); Bushchanskyi Nature Reserve (T. L. Andrienko and others, 2006); Rivnenskyi d. – Rivne (I. F. Shmalhauzen, Y. K. Pachoskyi); Rokytnivskyi district – v. Berezove (L. Sipailova, 1958, KW), the outskirts of village Khmil (N. M. Shyian, O. O. Orlov, I. O. Bednarska, 2004, KW), around Lake Bile (L. L. Onuk, O. I. Skakalska, I. O. Skoropliash, 2013); Rivnenskyi Nature Reserve, the stow of Bile Ozero, Syra Pogonia (PZF Rivnenskoj oblasti, 2008), Cheretyno Bog, v. Stare Selo (S. Kulczynski, 1939); Samenskyi d. – Torfovyshe Mak Bog (v. Antonivka); the seepage of the River Chekva; Chemerne Bog; near Lake Somyno (S. Kulczynski, 1939) (probably lost location, in 2016 we did not confirm).

Teropil region: the outskirts of the city of Kremenets (I. F. Shmalhauzen) (probably lost location, in 2016 we did not confirm).

Khmelnitsk region: Slavutskyi d. – the valley of the Horyn River; Letychivskyi d. – Nature Reserve of Bashta to the south of Shchedrova, the meadows of the River Southern Bug (M. O. Burchak-Abramovych).

Kharkiv region: the outskirts of Kharkiv, the western part of the region (Red Data Book of Ukraine, 2009); near Vasyshech (V. M. Cherniaev), between v. Bezliudivka and Vasyshech (H. I. Shyriaev); Zmievskyi d. – v. Lyman; Pechenihivskyi d. – Pechenihy (V. M. Cherniaev).

Cherkasy region: Zolotonivskyi d. – hypno-sedge swamp, v. Snigurivka (O. Polanska, 1932, KW).

Chernihiv region: the valley of the lower reaches of the River Desna; the origins of the Snov River; Kozeletskyi d. – a monument of nature reserve Ozero Sviat, v. Koropie (V. V. Konishchuk, 2015); near v. Pyliatyn; near Oster city, Shakhove Bog (A. Rakochi); Nizhynskyi d. – Lava Bog (M. M. Pidoplichko); v. Zrub (A. Rakochi, A. Barbarych); Nosivskyi d. – v. Adamivka, Zhuravlynska Bog (H. H. Chornoholovko).

***Drosera intermedia* Hayne.** This is a heterotrophic and holarctic plant on the southeastern border of an isolated European part of its range. In Ukraine, it is a disjunctive range species. The easternmost boundary of the location is the basin of the Desna River; the southern is in the intersection of the rivers Udych and Southern Bug. The range of the genus covers the Atlantic, the Central and Eastern Europe, North America (USA, East Canada), Cuba, South America (Venezuela, Brazil), less often the Caucasus, Turkey. In Ukraine, it occurs mostly in Right-Bank Polissia, or less often – in the Forest-Steppe. The populations are small, in places the density is high, it has decreased in abundance, especially in Prydniprovya. The main reasons for decline are drainage and development of marshes, mining of minerals by quarrying, forestation and development of meadow formations in the peatlands. Location of records are flooded mesoeutrophic swamps, mainly sedge-sphagnum, pine-birch-sphagnum, belonging to the classes Scheuchzeria-Caricetea fuscae Tüxen 1937, Oxyccoco-Sphagnetea Braun-Blanquet et Tüxen ex Westhoff, Dijk et Paschier 1946, associations: *Rhynchosporium albae*

Osvald 1923, *Drosera intermediae-Rhynchosporium albae* (Allorge et Denis 1923) Allorge 1926, *Drosera rotundifoliae-Lycopodiellum* Pasarge 1999, *Drosera rotundifoliae-Sphagnetum* Konishchuk 2009, others. In the coenoses, it is an assectator, highly competitive, explant (plants of low cenotic capacity, but which can quickly cover new areas – Editor's note), stress-tolerant plant, in the pioneer phytogroups it is the dominant, the co-dominant. This perennial plant is 5–12 cm tall (Fig. 3). The stem at the base is arising, ankle-like. The leaves are positioned in pre-root rosette, orientated upward, with with ellipsoidal, wedge-shaped lamina with a petiole which is longer than it; the bases of the stipules grow into the petiole and are split almost to the basis into or lanceolate-bristle of spike parts.

The leaves on the top and on the edges are covered with glandular hairs. Flowers are pale white. Flower stalks are single or by 2–3, knee-like ascending on the lying base, 3–12 (15) cm tall, slightly exceeding the leaves. Inflorescences have 4–10 flowers. Sepals are oblong, 3–4 mm in length, 3 mm in width; The ovary is obovate, 3 columns, to the base with 2-split, integral, ascending, apex-enlarged and, sometimes, sinuate-cut parts. The plant blossoms in June – July. It fruits in August. Fruits are pear-shaped, single-pore, capsule with longitudinal furrows. The seed is obovate, reddish-brown, densely humped. The plant propagates by seeds. It is perennial.

Conditions of growth locations are mesorophic, flooded mesoeutrophic marshes (often of carbonate type) with pH 6.0–7.5 (less often 4–5), sedge-sphagnum peat, peat composed of different herbs with low ash content and a degree of decomposition of 10–20% (less often 30–40%) mostly with running mode. In addition to marsh ecotopes, it grows on quaking bogs of karst and proglacial aqueous-glacier types of lakes, on trodden marsh paths, on a sandy substrate with gley of periodically flooded ephemeral water bodies, channels and gaps in open lighted areas. Hygromenosophyte. This species is included in the Red Data Book of Ukraine, Belarus, Lithuania and the Red List of Plants and Mushrooms of Poland. According to the materials of the Red Book of Ukraine (2009), 36 places of records are indicated according to the herbarium collection and 13 according to the literary data. According to the literature and herbaric data we analyzed and data of our own, the chorological characteristic of *D. intermedia* is as follows (Fig. 4).

Locations of *D. intermedia* in Ukraine:

Vinnitsya region: Haisyn town (I. F. Schmalhauzen).

Volyn region: Zabolottivskyi (Ratnivskyi) d. – v. Kraska (E. M. Bradis, A. I. Barbarych, 1949, KW); v. Kraska (A. I. Barbarych); Kamin-Kashytskyi d. – the stow of Bludymok, v. Polytsi (V. L. Shevchyk, D. M. Yakushenko, E. O. Vorobiev, 1998, KW), v. Hryva (v. Konishchukivka, extinct, now does not exist, to the south of v. Toboly) (V. V. Montrezor); v. Toboly, Berezina II Bog (T. L. Andrienko, 1971, KW); Kivertsivskyi d. – v. Tsuman, v. Berestiany (J. Panek, 1935, 1938); Kovelskyi d. – Kovel city (O. S. Rohovych), trembling bog, l. Midikivske, v. Liubche (N. Romaniuk and others, 2005); trembling bog, l. Okhotyn, Liubche Nature Reserve (V. P. Heliuta, 2001); Liubeshivskyi d. – National Natural Park of Pripiat-Stokhid, v. Liubeshivska Volia (T. L. Andrienko, 2007, KW); v. Vetly (H. F. Bachurina, 1949, KW); trembling bog, l. Chervyshchanske (Shyni), v. Lobna, trembling bog, l. Rohizne, v. Vetly, trembling bog, l. Bile, v. Nevir (V. V. Konishchuk, 2012); Liuboml'skyi d. – Svitiazke Forestry (V. Terletskyi, V. Okhrimovych, 1982, KW); trembling bog, l. Orikhove, v. Zghorany; Zghorany Lakes Nature Reserve (v. Zghorany, v. Sylne); Manevitskyi d. – Cheremskyi Nature Reserve, the western shore of Lake Redychi (V. V. Konishchuk, 2004, KW); l. Sviat, v. Karasyn; Osnytskyi Nature Reserve (V. V. Konishchuk, 2000); trembling bog, l. Dovhe, l. Okhnych; the stow of Storonovycha; the stow of Piatykuna, v. Zamostia (V. V. Konishchuk, 2015); Ratnivskyi d. – Piddushne Bog (E. M. Bradis, 1949, KW); Shatskyi d. – v. Pulmo (D. M. Yakushenko, 2005, KW); v. Koshary, the shore of Lake Pulemetske (A. I. Barbarych, 1949, KW), Shatsk National Natural Park, Luky Bog, v. Zatyshshia (T. L. Andrienko, 1977); trembling bog, l. Buzhnia (V. V. Konishchuk, 2016); Vtenskyi Nature Reserve, v. Rostan (T. L. Andrienko and others, 2006); Shatsk National Natural Park, to the west of Lake Pulemetske near Lake Buzhnia; to the south of village of Melnyky, trembling bog, l. Krasinets; between l. Svitiaz and l. Liutsymer, v. Omelne (P. V. Yurchuk, V. I. Mateichyk, P. T. Yashchenko and others, 2014).



Fig. 3. *Drosera intermedia*, Mizhrichynskiy Regional Landscape Park, Poliskiy Nature Reserve (Photo: V. V. Konishchuk)

Zhytomyr region: Yemilchynskiy d. – Chasnykivskiy Nature Reserve, v. Kochychyne (PZF Ukraine, 2009); Zhytomyrskiy d. – the outskirts of Zhytomyr (A. S. Rohovych); Korostenskiy district – Korosten Forest Hunting Range, Behivske Forestry, Lozanove Bog (O. O. Orlov, 2008, KW); Korosten Forestry, Nature Reserve of Khvoshchove Boloto (O. O. Orlov, 2008, KW); Narodytskiy d. – Drevlianskiy Nature Reserve, Mertve Ozero (V. V. Konishchuk, 2017); Ovrutskiy d. – Ovruch (O. S. Rohovych); Poliskiy Nature Reserve, Selezivske Forestry (L. S. Balashov, 1972, A. Shumilov, 1972, S. Y. Popovych, 1981, T. L. Andrienko, S. Y. Popovych, 1983, KW); Slovechanskiy Forestry, Symytske Forestry, I. Hrybove; Velednyske Forestry, 12 quarter on the boggy shore of the forest lake (O. O. Orlov, 1993); Kovanske Forestry, Nature Reserve of Didove Ozero, on floating peat islands (O. O. Orlov, 1998); Borutynske Forestry, Nature Reserve of Kutne, on watered mesotrophic swamp in the hollows (O. O. Orlov, 2003); v. Kovanka (O. O. Orlov, 2010, KW); the floodplain of the Bolotnytsia River, in the waterfall, near the farmstead, the protection zone of the Selezivske Forestry (v. Selezivka) (O. O. Orlov,

2.07.2011, KW); Horodetske Forestry (T. L. Andrienko, O. I. Priadko, S. Y. Popovych, 1982, KW); v. Krasylivka, Velednyske Forestry (D. M. Yakushenko, 2002, KW); Olevskiy d. – Ozeryany, Rudnya-Zamyslovytska, Zhurzhevytske Forestry (D. K. Zerov); post Drovianiyi (M. I. Kotov); Zhurzhevytske Forestry (D. K. Zerov, 1929, KW); Perganske Forestry, Myroto Bog (L. S. Balashov, 1968, KW); Poliskiy Nature Reserve, Kopyshchenske Forestry, Myroshy Bog (L. S. Balashov, 1968, KW); v. Khochyno, Khomynske Bog (L. S. Balashov, 1968, KW); Poliskiy Nature Reserve, Perganske Forestry, Bilokorovytske Forestry Range, Zamyslovytske Forestry, Plotnytsia (O. O. Orlov, 1993); Landscape Reserve of national importance Plotnytsia (PZF Ukraine, 2009); Poliskiy Nature Reserve, Dobra Bog, the stow of Brid, v. Kovanka, v. Symytsia (V. V. Konishchuk, 2013).

Kyiv region: Chomobyl Radiation and Ecological Biosphere Reserve (T. L. Andrienko, 2010; V. V. Konishchuk, 2016); the outskirts of Kyiv, on the bog near I. Rybne (D. K. Zerov, 1921, 1925, KW); outskirts of Kyiv, I. Rybne (I. F. Shmalhauzen, D. K. Zerov), (according to our data, in 2016, no location was found, ecotopes are very disturbed, partially drained); v. Petrivtsi, a swamp near the stow of Imshane (Y. M. Semenkevych, 1914, 1926, KW); Kyievo-Mezhyhirske forestry, bog near the Shcherbyntsia stream (Y. M. Semenkevych); Boryspilskiy d. – v. Stare (O. M. Dubovyk); Zhukynske Forestry, 155–156 quarter (L. S. Balashov, 1965, KW); Chomobylskiy (Poliskiy) d. – v. Zoryn (M. M. Bortniak, 1957, KW); Ivankivskiy d. – v. Pyliava, Holovate Bog (A. Zapiatova, 1968, KW).

Rivne region: Berezniivskiy d. – bog Kalyna (H. F. Bachurina, 1951, KW); Nadsluchanskiy Regional Landscape Park; Nature Reserve of Boloto Halo, v. Sovpa; Nature Reserve of Urochyshe Bryshche, v. Kniazivka (PZF Rivnenskoï oblasti, 2008); Volodymyrskiy d. – v. Ozertsia (Y. P. Didukh, 2000, KW); Koza-Berezyna Bog, v. Rudka (V. V. Konishchuk, 2002); Batamy Bog (T. L. Andrienko, 1971, KW); Khynotskiy Nature Reserve, v. Stepanhorod (T. L. Andrienko and others 2006); Nature Reserves of Voronkivskiy and Oseretskiy; nature reserve stow of Ozero Voronky, v. Voronky (V. V. Konishchuk, 2002); Dubrovyskiy d. – Perebrodske Forestry, bog near the stow of Makhmerova Hirka (L. S. Balashov, 1975, KW); Pochaevskiy Nature Reserve, v. Verbivka (T. L. Andrienko, O. I. Priadko, 1980, KW); Perebrody Bog (T. L. Andrienko, 1975, N. Parakhonska, 1975, KW); Rivnenskiy Nature Reserve, the stow of Perebrody; Nature Reserves of Velyke Pochaevske Ozero, Zolotynskiy, Svarycevytskiy (T. L. Andrienko and others 2006); Zarichnenskiy d. – Morochno II Bog, v. Butove (Stepangorodskoe Forestry) (T. L. Andrienko, 1976, KW); bog near Lake Nobel, v. Kotyra (T. L. Andrienko, 1976, KW); v. Semyky (E. M. Bradis, 1950, KW); Regional Landscape Park of Prypiat-Stokhid; Dibrivskiy, Ostrivskiy, Vychivskiy Nature Reserves (T. L. Andrienko and others 2006); Ostrozkiy d. – Bushchanskiy Nature Reserve; National Nature Reserve of Dermansko-Ostrozkiy; Rokytnivskiy d. – v. Berezove (L. Sipailova, 1958, KW); around Lake Bile, v. Khmil (L. L. Onuk, O. I. Skakalska, I. O. Skoroplias, 2013); the stow of Kobyla (O. I. Skakalska, L. L. Onuk, I. O. Skoroplias, 2014); the outskirts of Khmil, I. Bile (N. M. Shyian, O. O. Orlov, I. O. Bednarska, 2004, KW); v. Stare Selo, roadside depressions (S. Kulczynski, 1939), (Y. P. Didukh, D. M. Yakushenko, 2007, KW); Rivnenskiy Nature Reserve, the stow of Syra Pohonya, Perebrody (T. L. Andrienko, and others, 2006); Samenskiy d. – Lyubonka Bog, v. Klesiv (T. L. Andrienko, O. I. Priadko, 1971, KW); Klesivske Bog (H. F. Bachurina, 1951, KW, H. Antonova, 1987); Rivnenskiy Nature Reserve, Somyno, the stow of Kreminne-Sekhivske (T. L. Andrienko, O. I. Priadko, 1978, 2004, KW); the outskirts of Stepan village (A. I. Barbarych, 1950, KW).

Khmelnyskiy region: Letychivskiy d. – the outskirts of Letychiv, to the north of the stow Ostriv, to the south of Shchedrova on the hills along the River Southern Bug (M. O. Burchak-Abramovych); on the border of Shepetivskiy and Polonskiy d. – the Regional Landscape Park of Maliovanka (L. S. Yuhlichek, 2010).

Chernihiv region: the outskirts of Oster city, Shakhove Bog (A. Rakochi); Borznianskiy d. – v. Berestovets (O. V. Lukash); Kozeletskiy d. – Mizhrichynskiy Regional Landscape Park district forestry, Vovche Bog, Zhuravlyne Bog; nature monument reserve Ozero Sviate, v. Koropie (V. V. Konishchuk, 2015).

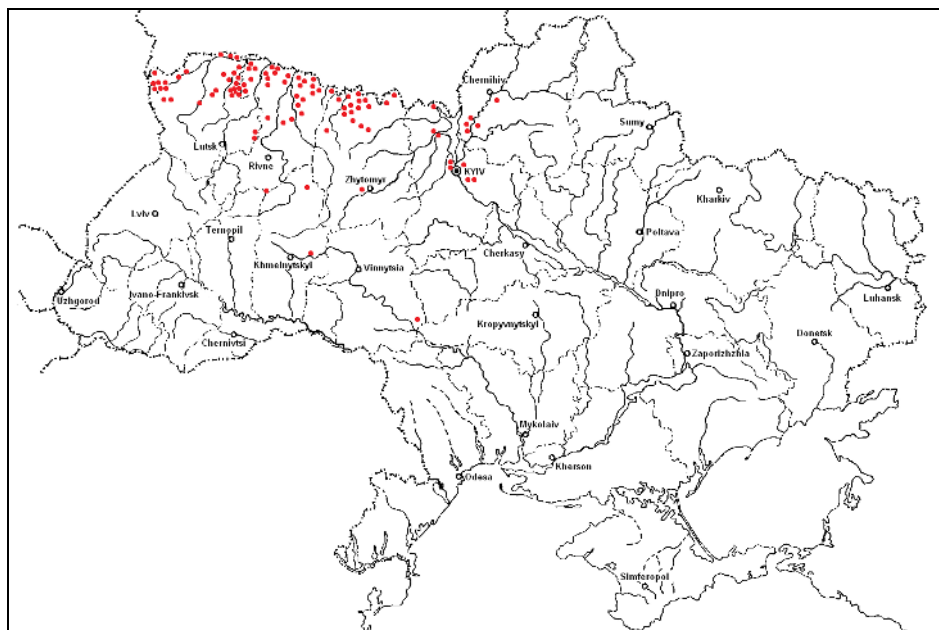


Fig. 4. Location of *Drosera intermedia* in Ukraine

***Drosera x obovata* Mert. et W. D. J. Koch.** The hybrid of parent species *D. rotundifolia* and *D. longifolia* grows in marshes and peatlands, common in Siberia, the Far East, Scandinavia, the Middle Atlantic, Europe, and the Mongolia, North America (Andrienko, 2010).

A stellar perennial plant, propagates vegetatively. The stalk is straight, two times longer than the rosette of the pre-root leaves. The laminae are obovate, in length 1.5–2.0 times greater than the width (Fig. 5). The surface is pubescent, glandular. Inflorescence is a tassel. Perianth is actinomorphic. Sterile hybrid, vegetative reproduction is more intense than among related species. Sometimes can be isolated from the mother species, gives fruits, but the capsules are likely to be underdeveloped. Flowers are white. Blossoms in July–August. It is perennial, hygrophite, and mesotroph.

The taxon is included in the Red Book of Kaluga Oblast of Russia as a very rare species on the verge of extinction. Has no nature-protection status in Ukraine. We suggest including this disappearing hybrid into the Red Book of Ukraine similarly to some unique taxa of algae (Osnovy algosozologii, 2008).

Conditions of growth locations are flooded mesoeutrophic marshes, mainly sedge-sphagnum quaking bogs of karst and proglacial types of lakes, belonging to the classes Scheuchzeria-Caricetea fuscae Tüxen 1937, Oxyccoco-Sphagnetia Braun-Blanquet et Tüxen ex Westhoff, Dijk et Paschier 1946, associations: *Rhynchosporium albae* Osvald 1923,

Drosera intermediae-Rhynchosporium albae (Allorge et Denis 1923) Allorge 1926, and other. Water pH 6.5–7.5 (rarer 4–5), flooded sedge-sphagnum, hypnum peat and peat composed of different herbs and with low ash content and a decomposition degree of 10–20% (less than 30%). According to the literature, herbarium data and data of our own, the chorological characteristic of *Drosera x obovata* Mert. et W. D. J. Koch is as follows (Fig. 6).

Kyiv region: the outskirts of Kyiv, v. Romanivka (O. Rohovych, I. Shmalhauzen); Baryshivskiy d. – between Baryshivka and v. Korzhi (in 2016 the location was not been confirmed by us); Brovarskiy d. – near the city of Brovary (D. Zerov, P. Oksiuk, 1923, KW); Vyshhorodskiy d. – v. Pyliava, Rohy Bog (A. Zapiatova, 1968, KW).

Lviv region: v. Ivano-Frankove, near the lake (B. Blotskiy).

Rivne region: Volodymyretskiy d. – Rivnenskiy Nature Reserve, Koza-Berezyna Bog (V. V. Konishchuk, 2002); Rokytnivskiy d. – the shore of Lake Bile, v. Khmil (L. L. Onuk, O. I. Skakalska, I. O. Skoropias, 2013); the stow of Syra Pohonia (v. Bilsk), Perebrody (v. Stare Selo), sedge-sphagnum floats (V. V. Konishchuk, 2002).

Kharkiv region: the outskirts of Kharkiv, between village of Vasyshcheve and village of Bezliudivka (H. I. Shyriaev) (probably the loss of location due to drainage).

Chernihiv region: Kozeletskiy d. – the nature monument reserve Ozero Sviate, v. Koropie (V. V. Konishchuk, 2015).



Fig. 5. *Drosera x obovata*, trembling bog, Lake Bile, Rivne region (Photo: O. I. Skakalska)



Fig. 6. Location of *Drosera x obovata* in Ukraine

Location of *D. x obovata* Mert et W. D. J. Koch in Ukraine:

Volyn region: Kamin-Kashyrskiy d. – v. Hryva (v. Konishchukivka, departed, to the south of Toboly) (V. V. Montrezor); Liubeshivskiy d. – trembling bog, l. Chervyshchanske (Shyni) (V. V. Konishchuk, 2012); Manevitskiy d. – Cheremskiy Nature Reserve, Cheremsk Bog, trembling bog, l. Redychi (V. V. Konishchuk, 2002); Ratnivskiy d. – in Kniazha Hora, near the city of Ratne (O. S. Rohovych); Shatskiy d. – Shatskiy National Nature Park, Luky Bog (T. L. Andrienko, 1983).

Zhytomyr region: Ovrutskiy d. – v. Selesivka, Poliskiy Nature Reserve, on the string bog (A. H. Olianytska, T. S. Bahatska, 2003, KWWA).

***Drosera rotundifolia* L.** This is a boreal, circumpolar species; distributed in Europe, the northern part of Asia, Siberia, Arctic and Temperate part of North America. In Ukraine, it grows in Polissia, Northern Forest-Steppe, in the Carpathians to the subalpine belt (Andrienko, 2010), in Zakarpattia Oblast, there are no places of record in the Crimea. Occasionally, small loci were found in the south of the Forest-Steppe and even in the Steppe (Umanets & Moisienko, 2012).

Leaves in the pre-root rosette are stretched, with long petioles and with a round or transversal oval laminae; the stipules connate to the petiole, before the middle or higher are split into almost bristly parts. Flower stems are single or more often in pairs thin, reddish, straight, sometimes winding, 10–25 (30) cm tall, several times longer than the leaves (Fig. 7).

Inflorescences are mostly multiflorous; sepals at the base are grown, oblong, small glandular-serrate, 5 mm long, approximately 1.5 mm in width; lobes are white, spade-shaped, 5–6 mm in length, approximately 3 mm in width; the ovary is ellipsoidal, has 3 columns, from the base of 2-split, with ascending, clavate at the top, integral, rarer sinuate-cut parts. The capsule is egg-shaped, and longer than the calyx. Seeds are small, narrow spindle-shaped with brown, loosely adjoining skin. Blossoms are in June – August. The plant is medical.

Conditions of growing locations are humid, wet pine forests and boreal forests, sandy substrates with gley of periodically flooded ephemeral water bodies, channels and gaps in open, non-darkened areas, oligotrophic, mesotrophic, flooded meso-eutrophic marshes, mainly sedge-sphagnum quaking bogs of karst and proglacial types of lakes, belonging to the classes Scheuchzeria-Caricetea Tüxen 1937, Oxyccoco-Sphagnetum Braun-Blanquet et Tüxen ex Westhoff, Dijk et Paschier 1946, associations: *Rhynchosporium albae* Osvald 1923, *Drosera intermediae-Rhynchosporium albae* (Allorge et Denis 1923) Allorge 1926, *Drosera rotundifoliae-Lycopodiellum* Passarge 1999, *Drosera rotundifoliae-Sphagnetum* Konishchuk 2009, *Oxyccoccus palustris-Sphagnetum* Konishchuk 2009, *Sphagno-Caricetum rostratae* Steffen 1931, *Caricetum chordorrhizae* Paul et Lutz 1941, *Caricetum lasiocarpae* Koch 1926, and others.

D. rotundifolia, the round-leaved sundew, usually grows in groups with other species of the *Drosera* L. genus, but is more commonly distributed in wide amplitudes of ecological valency. Water pH 3–5 (6–8), peat of different ash content with decomposition degree from 10–20% to 30–50%, possibly substrate from shrub remains, sod-podzolic soils, loam, rocky surfaces with lichen-moss coverage or gley-silt sediment. Can be dominant in sub-associations. The plant is perennial, light-loving oligotroph. The round-leaved sundew is included in the Red List of Mushrooms and Plants of Poland as a species on the verge of extinction, Red Book of Briansk, Kaluga, Orlov Oblasts of RF as a rare species with falling abundance. It has the status of a regional rare species in most regions of Polissia. It is recommended to include the species into the next edition of the Red Book of Ukraine. According to the literature and herbarium data we analyzed, and our own data of the chorological characteristic of *D. rotundifolia* L. is given (Fig. 8).

Location of *D. rotundifolia* L. in Ukraine:

Vinnitsia region: Kalynivskiy d. – Kalynivka, Medvidska Dacha forest (V. M. Virchenko, 2003, KW); v. Horkiv, Zhar Bog (D. K. Zerov, 1927, KW); Litynskiy d. – Nature Reserve Zhar (V. V. Konishchuk, 2010).

Volyn region: Volodymyr-Volynskiy d. – Volodymyr-Volynsk (A. S. Rohovych); Verba, Ovadne (Y. K. Pachoskiy); Holovnianskiy (Liubomylskiy) d. – v. Opalyn (A. I. Barbarych, 1949, KW); Zabolottivskiy (Ratnivskiy) d. – Zabolottia, the shore of Lake Tur (A. I. Barbarych, 1949, KW); Zabolottia Bog (S. Kulczyński, 1939); Kamin-Kashyrskiy d. – v. Novi Chervyshcha (V. L. Shevchyk, D. M. Yakushenko, E. O. Vorobiov, 1998, KW); v. Rudka Chervynska (T. L. Andrienko, 2007, KW); Mishch Nature Reserve (v. Voiehoscha), the bog near Verkhy village; Vutvitskiy Nature Reserve (v. Nuyne) (V. V. Konishchuk, 2008); Nature monument Ozero Dobre (v. Pidrichia); Stokhid Nature Reserve (V. V. Konishchuk, 2002); Kivertsivskiy d. – Kiverts, Zvirynets, Bereshchany (J. Panek, 1935, 1938); Zhuravychivskiy Nature Reserve (V. V. Konishchuk, 2000); Kormyn Nature Reserve (v. Berestiane); Chortove Bog; Kivertsivskiy National Nature Park Tsumanska Pushcha; Kovel'skiy d. – Kovel (O. S. Rohovych, V. V. Montrezor); v. Shkroby, bog near Lake Synovo (N. I. Batova, 1998, KW); trembling bog, l. Liubche (V. P. He-liuta, 2001); trembling bog, l. Okhotyn (E. Batiura and others, 2005); trembling bog, l. Midikivske (N. Romaniuk and others, 2005); Nature Reserve of Nechymne (v. Skulyn) (T. L. Andrienko and others, 2006); Liubeshivskiy d. – National Nature Reserve of Pripjat-Stokhid; trembling bog, l. Chervyshchanske (Shyni); bog Rohizne (V. V. Konishchuk, 2012); Liubomylskiy d. – Opalyn (A. I. Barbarych); trembling bog, l. Orikhove (E. Batiura and others, 2005); Zghorany Lakes and Moshne Reservoirs (v. Zghorany, v. Sylne) (T. L. Andrienko and others, 2006); Manevitskiy d. – Vutyshno Bog, to the south from village of Sofianivka

(E. M. Bradis, 1954); Cheremskyi Nature Reserve, Cheremske Bog, Nature monument Bolittse (V. V. Konishchuk, 2002); Troianivski Bolota (Babinets, Plyskovets, Sokolske, Liute) (V. V. Konishchuk, 2011); Osnytskyi Nature Reserve (v. Osnytsia), Kruchene Ozero (v. Cherevakha); trembling bog, l. Trosne, Sviatse, Bile (v. Karasyn) (V. V. Konishchuk, 2000); trembling bog, l. Dovhe, Okhnych, Lokottia, the stows of Storonovicha, Tatarskyi Mokh, Pohonia, Krai, Ozhynnie, Truniak, Piatykuna (v. Zamostia) (V. V. Konishchuk, 2000–2016); Nature Reserve Rys (v. Troianivka); Ratnivskyi d. – Ratne (A. I. Barbarych, 1949, KW); Nature monument Ozero Sviatse (Zabolottia) (T. L. Andrienko and others, 2006); Staro-

vyzhivskyi d. – Bobotske Bog (v. Zalymanamy) (E. M. Bradis, Radzyevskyi, 1949, KW); Ozeryshche Nature Reserve (v. Komarove); Karasyn Bog (Nuivivske Forestry) (N. Romaniuk and others, 2005); Shatskyi d. – v. Svitiaz (A. I. Barbarych, 1949, KW), v. Shatsk; Krasynets Bog (V. I. Honcharenko, 2005, KW); Shatskyi National Nature Park, Pulmivskyi Riv Bog (D. M. Yakushenko, 2005, KW); Luky Bog, the stow of Shyia-Peremut (v. Melnyky) (T. L. Andrienko and others, 2006, 2010); Chakhivskyi Nature Reserve (v. Prypiat); Shatskyi National Nature Park, trembling bog, l. Buzhnia (V. V. Konishchuk, 2016); Vtenskyi Nature Reserve (v. Rostan), Pishchanskyi, Pulemetskyi (PZF Ukrainy, 1999).



Fig. 7. *Drosera rotundifolia* L., Rivnenskyi and Cheremskyi Nature Reserves (Photo: V. V. Konishchuk)

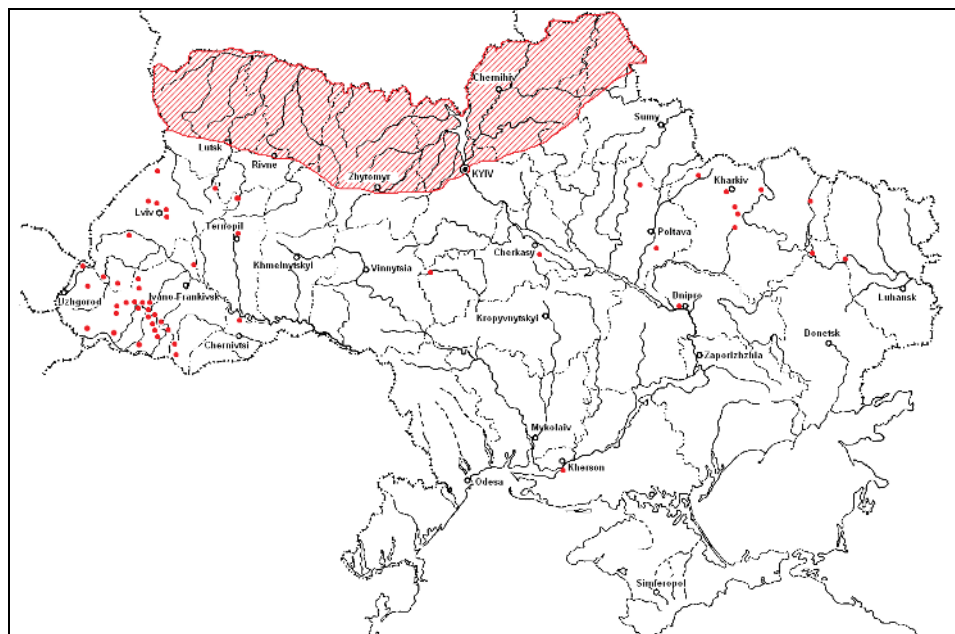


Fig. 8. Location of *Drosera rotundifolia* in Ukraine

Dnipro region: near village of Rybalske (Dnipro city) (Shmalhauzen, Akinfeev, Sidorov).

Donetsk region: Krasnolymanskyi d. – v. Yarova (V. M. Ostapko, V. V. Kucherevskyi, 1979, KW).

Zhytomyr region: Yemilchynskyi d. – Nature Reserve of Chasnykivskyi (v. Kochychyne); Zabarskyi Nature Reserve (v. Paranyne); Zhytomyrskyi d. – Zhytomyr (Lohovskyi, Montrezor); near Zhytomyr, Vyla (Artemchuk); bog beyond the River Huiva (D. Zerov, P. Oksiuk); the

outskirts of Zhytomyr (D. Zerov, P. Oksiuk, 1925, KW); Korostenskyi d. – v. Horshchik; Korostyshivskyi d. – Korostyshiv (V. Sovinskyi); Horodnytsia (Vernie); v. Osykove (D. M. Yakushenko, 2008, KW); Narodnytskyi d. – Drevlyanskyi Nature Reserve (V. V. Konishchuk, 2015); Novograd-Volynskyi d. – Horodnytskyi Nature Reserve (T. L. Andrienko, 1978, KW); Reserve of Kaziava (Bronyske Forestry); Nature Reserve of Chervonovilskyi (v. Perelissianka); Ovrutskyi d. – Ovruch (O. S. Rohovych); the stow of Yamne (v. Usove); v. Chervonka, boggy

shores along the Chervonka River, the stow of Robech and peat bogs (Smyk, 1963, KWHA); Poliskyi Nature Reserve (T. L. Andrienko and others, 2006), Dobre Bog, the stow of Brid (v. Kovanka, v. Symitsa); Nature Reserve of Didove Ozero (V. V. Konishchuk, 2013); Myroshy Bog (L. S. Balashov, 1972, KW); v. Horodets (D. M. Yakushenko, O. O. Orlov, 2006, KW); Kutne Nature Reserve (v. Borutyn); Olevskiy d. – v. Ozeryany (M. N. Kopachevskaya); Rudnia-Radovilska (D. K. Zerov); Lopatychi, Zamyshlyvychi (Y. K. Pachoskyi); Post Droviany (M. I. Kotov); Nature Reserve of Plotnytsya (PZF Ukrainy, 2009).

Zakarpattia region: Karpatskyi Biosphere Reserve; Uzhanskyi National Natural Park; National Natural Park Synevyr (Lake Dyke); Berehivskiy d. – the outskirts of the city of Berehovo; Vynohradivskiy d. – the outskirts of the city of Vynohradiv (L. M. Felbaba-Klushyna, 2012); Irshavskiy d. – the sphagnum bog under the Boomsora mount, 750 m above sea level (V. I. Chopyk, 1968, KW); National Natural Park of Zacharovanyi Kray, v. Ilnytsia (V. V. Lutak, 2012); Svydovets range, mountain valley Krachuneska, bog on a slope at 1415 m above sea level (L. M. Borsukevych, 2007, KW); Perechynskiy county, valley of Lunymur (E. M. Bradis, 1948, KW); Mizhhriskiy d. – v. Liskovets; Mukachivskiy d. – Mukachevo city, Seme Bog; v. Ivanivtsi, v. Puzniakivtsi (A. Margittai); nature monument Boloto Chome Bahno, v. Zahattia, Chome Bahno Bog (E. Bradis, 1947, V. Komendar, 1953, O. Lovelius, 1984, S. L. Mosiakin, 1985 KW); Rakhivskiy d. – on the mountain valley Blyznitsia near the village of Yasinya (A. Margittai); v. Choma Tysa, sphagnum bog Chome Bagno (V. I. Chopyk, 1961); the foot of Blyznitsa Mountains parts of the massif Svydovets, between the rivers Choma Tysa and Kosivska, the sphagnum bog (Rudenko, 1952, KWHA); Tiachivskiy d. – the outskirts of Lopukhiv village, the stow of Kerdyn, on the sphagnum swamp (S. S. Kharkevych, 1957, KWHA), v. Bushtyno; Khustskiy d. – the outskirts of Khust city (L. M. Felbaba-Klushyna, 2012).

Ivano-Frankivsk region: Verkhovynskiy d. – Karpatskyi National Nature Reserve; Nature monument Boloto Vysyache, v. Burkut; Halytskyi d. – Halytskyi National Nature Park; Dolynskiy d. – between Debelivka and Hoshovy (D. Knapp); Nature Reserve Boloto Shyrkovets, v. Stary Mizun (PZF Ukrainy, 2009); Nature monument Boloto Lysok, v. Myslivka; Zhabiyevskiy (Verkhovynskiy) d. – v. Yavimyk (A. Reman, A. Slendinskyy); Kosivskiy d. – National Nature Park Hutsulshchyna; Nadvimiyskyy d. – Tavpyshyrkivskiy Nature Reserve, v. Bystrytsia; Nature monument Verkhnie Ozeryshche, v. Bystrytsia; Rozhnatiivskiy d. – Yaikivskiy Nature Reserve (Mshanske Forestry); Nature monument Boloto Mshana (V. I. Chopyk, V. O. Dubovyk, 1967, D. M. Yakushenko, 2008, KW); Yaremchanskyy d. – mountain range of Chomohora, v. Vorokhta (V. I. Chopyk, V. O. Dubovyk, 1967, KW); Turova Dacha Nature Reserve, v. Krasne; v. Vorokhta, pine-spruce forest with sphagnum, in the stow of Malyy Bahonchik, very often found near the forest complex (S. S. Kharkevych, 1961, KWHA).

Kyiv region: Chomohyl Radiation and Ecological Biosphere Reserve (V. V. Konishchuk, 2016); Baryshevskiy district – (Pereiaslav district), the outskirts of village Korzhi (D. K. Zerov, 1922; I. Olshanskyy, 2008, KW); sphagnum bog (v. Korzhi), (Y. K. Pachoskyi, 1913); Boryspilskiy d. – near the village of Stare, Karan Bog (O. M. Dubovyk, H. F. Bachurina); Brovarkiy d. – Brovary (O. S. Rohovych); Vyshhorodskiy d. – Nature Reserve Dniprovsko-Desnianskyi; Zhuravlynyi (v. Pirmove); Zhurivskiy d. – Nature Reserves of Usivskiy I, II; Ivankivskiy d. – Nature Reserve Haidamatske Boloto (Zherevske, Obukhovske Forestry); Kyevo-Sviatoshynskiy d. – Tolopun (A. Zapiatova, 1968, KW); the outskirts of Kyiv, v. Romanivka (O. S. Rohovych, I. F. Shmalhauzen); Nature Reserve Zhukiv Ostriv (Irpri Forestry) (T. L. Andrienko and others, 2006); the outskirts of Kyiv, near the l. Rybne (I. F. Shmalhauzen, Y. M. Semenkevych); near l. Rybne (D. K. Zerov, 1925, V. I. Litskiy, 1924, M. I. Kotov, 1946, Y. M. Semenkevych, 1913, KW) (in 2016, the locations were not found by us); partially drained bog Imshan to the south from Kyiv (post Mykilskiy) (V. V. Konishchuk, 2013); Obukhivskiy d. – Pidhirtsi (A. Bazylevych, H. F. Bachurina); v. Pidhirtsi (T. Pomahaiba, 1934, KW); Myronivskiy d. – Zesarivskiy Nature Reserve (Nizhylovske Forestry); Sviatoshynskiy d. – Sviatoshyn (S. M. Vasyliiev-Yakovlev, 1905, KW); Sviatoshyn (Vasyliiev-Yakovlev, Bordzilovskiy, Matiushenko); Borshchahivka (O. S. Rohovych, V. V. Montrezor, Y. M. Semenkevych); Kyievo-Mezhyhirska State

Cottage near the River Shcherbynets (Y. M. Semenkevych, 1914, KW); Pereiaslav-Khmelnitskiy d. – v. Khotskyi (O. S. Rohovych).

Luhansk region: Kremynskiy d. – Bunchuzhnyi drive away, v. Kremynna (M. V. Klovkov, Y. M. Lavrenko).

Lviv region: Brodivskiy d. – the outskirts of the city of Brody, carbonate marshes, Kempa Bog (T. S. Bahatska 2007, KWHA); Briukhovitskiy (Yavorivskiy) d. – Birky, Zavadiv, Riasne-Ruske, Riasne; Buskiy d. – v. Polonychi with 36 squares of Radekhivskiy forestry (A. V. Shumylova, 1986, KW); Vinnykivskiy (Pustomytivskiy) d. – v. Lysynychi (A. Tomashchek); Lvivskiy d. – Bilohorshcha peatland, the outskirts of the city of Lviv (O. H. Kuziarin, 2010); Turkivskiy d. – the valley of the River Husnivka, the stow of Ratsyne (O. Krysta, I. Vainahy, 1986, KW); near Horishnii Dzvinach (Knapp); Sambirskiy d. – the outskirts v. Velyka Bilianka (Y. R. Sheliakh-Sosonko, 1960, KW); the stow of Velyki Bolota (v. Velyka Bilina); Skolivskiy d. – National Nature Park Skolivski Beskydy; Sokalskiy d. – Nature Reserve Volyskiy, v. Khlevchany; Yavorivskiy d. – Shklo, Ivano-Frankove; Zhemyska, bog in Lelekhivka; Nature Reserve Roztochia (the stow of Zalyvskiy) (PZF Ukrainy, 2009).

Poltava region: Zinkivskiy d. – the outskirts of Zinkiv, bog in the valley of the Tashan River beyond the village of Deikalivka (D. K. Zerov); Novosanzharskiy d. – Nature Reserve of Malopereshchepynskiy, the solonchak hollow of the valley of the Vorskla River on the ledge of bark terrace (T. L. Andrienko, O. M. Bairak); Shyshatskiy d. – v. Zhabokirce (O. S. Rohovych).

Rivne region: Bereznivskiy d. – v. Bohushi, Kniazivka, Ozerts, the stow of Solomniak (V. V. Konishchuk, 2008); Nadsluchanskyy Regional Landscape Park; Nature Reserve Boloto Halo; Nature Reserve Urochyshe Bryshche (v. Kniazivka); Volodymyretskiy d. – Koza Bog (v. Ozerts) (H. Antonova, 1975, ROKM); bog on the shore of l. Bile (v. Bilska Volia) (H. Antonova, 1975, ROKM); Khinotskiy Nature Reserve (v. Khinochi); Koza-Berezyna Bog (v. Rudka); Nature Reserves Voronkivskiy, Ozeretskiy (V. V. Konishchuk, 2002); Dubrovitskiy d. – Dubrovitsia (Y. K. Pachoskyi); Pochayivskiy Nature Reserve (T. L. Andrienko, V. M. Virchenko, O. I. Priadko, 1980, KW); Nature Reserve Zolotynskiy, Ozerskiy; Nature monument of Velyke Pochayivske Ozero (T. L. Andrienko and others, 2006); Zarichnenskiy d. – Morochno Bog (v. Vysotsk) (S. Kulczynski, 1939); Regional Landscape Park Prypiat-Stokhid; Dibrivskiy, Svarytsevytskiy, Ostrivskiy, Vychivskiy Nature Reserves (T. L. Andrienko and others, 2006); the shore of l. Nobel; Zdobunivskiy d. – Regional Landscape Park Demansko-Mostivskiy; Nature Reserve Boloto Kruhliak; Klesivskiy d. – v. Lomek (E. M. Bradis, 1950, KW); Ostrozkiy d. – v. Bushcha (I. Olshanskyy, 2009, KW); Bushchanskyy Nature Reserve; National Nature Park Demansko-Ostrozkiy; Radyvylivskiy d. – v. Sestriatyn (V. M. Batochenko, 1999); Rivnenskiy d. – Rivne (O. S. Rohovych); Rubche, Rivne (J. Panek, 1926); Rokytianskiy d. – Rivnenskiy Nature Reserve, the stow of Syra Pohonia, Perebrody; Pohonia Bog (v. Yelnia) (E. M. Bradis, 1950, KW); v. Bilska, on the walls of the ditch from the old track in the forest, v. Khmil, l. Bile (N. M. Shyian, O. O. Orlov, I. O. Bednarska, 2004, KW), (L. L. Onuk, O. I. Skakalska, I. O. Skoropliash, 2013); within the boggy shores of l. Chome (L. L. Onuk, O. I. Skakalska, I. O. Skoropliash, 2013), (O. I. Skakalska, 2014); v. Berezove (L. Slipailova, 1958, KW); Cheretyno Bog (v. Stare Selo) (S. Kulczynski, 1939); Samenskiy d. – Kremenne Bog (A. Halkina, 1976, ROKM); Torpovyshe Mak Bog (v. Antonivka); the seepage of the River Chekva and the shores of Horyn River; Chemerne Bog (near the city of Samy); near Lake Somyno (Ozersk) (S. Kulczynski, 1939); Rivnenskiy Nature Reserve, the stow of Somyno (PZF Rivnenskoï oblasti, 2008).

Sumy region: Desniansko-Starohutskiy National Nature Park; Hlukhivskiy d. – Tulyholove, Shevchenkove (O. S. Rohovych); Lebedynskiy d. – Budylka, Bobrove (H. I. Shyriaev); Seredynno-Budskiy d. – v. Sorokine (T. Bazan, S. Panchenko, 2008, KW); Yampilskiy d. – Olyne Bog (T. L. Andrienko, O. P. Chornous, 2003, KW).

Temopil region: Zborivskiy, Temopilskiy d. – Nature Reserve Seretskiy (swampy flood plain of Seret River); Kremenetskiy d. – National Nature Park Kremenetski Hory.

Kharkiv region: Bohodukhivskiy d. – v. Bohodukhiv (Zasydko); Iziumskiy d. – the outskirts of Lyman (E. M. Lavrenko); Zmiivskiy d. – Zmiyiv, v. Lyman (E. M. Lavrenko, 1920, 1923, KW); Kupianskiy d. – the outskirts of Kupiansk (M. V. Klovkov); near Kucherivka (M. I. Kotov); the

city of Kupiansk (M. Klovov, S. Piskunov, 1910, KW); Pechenzkyi d. – the outskirts of Pechenihy (V. M. Cherniaiev, E. M. Lavrenko); Khar-kivskyi d. – the outskirts of Kharkiv, Osnova (V. M. Cherniaiev); Kliuk-venne Bog (H. I. Shyriaev, 1907, KW), (H. I. Shyriaev, M. I. Kotov); near the village of Vasysheche (V. M. Cherniaiev); Shpaky, Bezliudivka (H. I. Shyriaev); near Kalynnykovka (V. I. Taliev, P. K. Kozlov, M. I. Kotov).

Kherson region: Tsuriupinskyi d. – Kozachelarska arena (V. P. Polishchuk, 2009); Lower Dnipro sands, the stow of Rakiv Kutochok (O. Y. Umanets, I. I. Moisienko, 2012).

Khmelnyskyi region: Netishynskyi d. – Netishyn city, in the sands near the Khmelnytska NPS reservoir (H. A. Chorna, M. M. Hubar, 2004, KW); Iziaslavskyi d. – Nature reserve Mykhelskyi (v. Mykhlia); the shore of Lake Sviate (Mykhelske Forestry) (A. I. Barbarych, 1952, KW); Nature Reserve Ozero Sviate (v. Radoshivka) (PZF Ukrainy, 2009), (O. I. Skakalska, V. V. Konishchuk, A. V. Sasiuk, O. A. Bilkovskyi, O. V. Mniukh, 2015); Shekerenetskyi Nature Reserve; on the border of Shepetivskyi and Polonskyi d. – Regional Landscape Park Malovanka (L. S. Yuhlichek, 2010); Letychivskyi d. – Nature Reserve Bashta (v. Stavyshechany); Slavutskyi d. – Trebizhi Nature Reserve, Holytske Forestry; Nature monument of the seepage of Utkha River, Slavutske Forestry (T. L. Andrienko, 2010); National Nature Park Male Polissia (O. I. Skakalska, 2014).

Cherkasy region: Smila city (D. K. Zerov, Y. D. Kleopov, 1923, KW); Smila (A. Rakochi, D. Zerov); Zhashkivskyi d. – Nature reserve Shuliatske Boloto (v. Shuliaky).

Chernivtsi region: Zastavinskyi, Kitsmanskyi d. – Nature Reserve Sovytski Bolota (v. Verechanka, v. Klivodyn) (PZF Ukrainy, 2009).

Chernihiv region: Horodnianskyi d. – Drozdovysia (O. S. Rohovyeh); Ichnianskyi d. – Ichnianskyi National Nature Park; Kozeletskyi d. – Shakhove Bog (near Oster town) (A. Rakochi); Mizhrichynskyi Regional Landscape Park, Vovche Bog, Zhuravlyne; Nature Reserve Ozero Sviate (v. Koropie) (V. V. Konishchuk, 2015); Koropskyi d. – Mezynskyi National Nature Park; Nature Reserve Obolonskyi (v. Obolonna); Koriukivskyi d. – Bretskyi Nature Reserve (v. Brech); Nizhynskyi d. – Nature Reserve Serebryshchyna (v. Kukshyn); Prylutskyi d. – Kliukvenne Bog (Budy) (A. S. Poretskyi, S. O. Illichevskyi); Ripkynskyi d. – Yarylovychi (V. V. Montezor); Zamhlai Nature Reserve; Chernihivskyi d. – Kolychivka (K. V. Manoilenko); Shchorskyi d. – natural monument of the Halskyi Mokh (v. Zahrebelna Sloboda); Nature Reserve Boloto Mokh (Novoborovytske Forestry).

In the temperate zone of Europe, the main morphometric feature of *Drosera* L. species is the form of roundness of the leaf (the ratio of width and length). We took the parameters of the leaves without the petiole and the length of the trichomes. Weakly developed, damaged leaves were not measured for objective assessment. We compared individuals collected in about the same period (summer, 2000–2016), and also analyzed older collected herbarium specimens. Weather-climatic, edaphic, hydrological conditions certainly influenced the phytproductivity, but the patterns of the correlation of morphoparameters remained. To determine the peculiarities of ratio of certain morphometric parameters, we performed a comparative-correlation analysis of taxa of *Drosera* L. from typical growing locations (Tables 1–5).

Table 1
Anatomical characteristics and leaf morphometry of *D. longifolia*

No	Chorology, biotope, collector, date	Anatomical characteristic	The ratio of width / length in presentation of leaves, mm	Index of roundness of the leaf
1	Volyn region, Manevitskyi district, village Zamostia, Cheremskyi Nature Reserve; Cheremske sedge-sphagnum bog, drain stream Lisovyi; V. V. Konishchuk, August 2, 2002	Stem – 2 (length 7.0, 8.0 cm), capsule at the stage of formation, leaves – 10 (length with petiole 5–10 cm), root length 40.0 mm	3.1/5.5, 5.0/10.4, 5.1/28.3, 5.0/19.0, 4.1/5.6, 3.0/20.0, 5.2/10.5, 5.1/25.2	0.564, 0.481, 0.180, 0.263, 0.732, 0.150, 0.495, 0.202, Medium 0.383
2	Volyn region, Manevitskyi district, village of Zamostia, Cheremskyi Nature Reserve; Cheremske sedge-sphagnum bog, drain stream of Lisovyi; V. V. Konishchuk, August 2, 2002	Stem – 4 (length to 22 see), small capsule – 6 (on a 1 stem), leaves – 12 (length with a petiole 5–7 see), length of root 25.0 mm	2.0/5.6, 3.1/15.2, 3.0/18.1, 3.2/20.3, 2.0/6.0, 2.1/20.0, 3.0/17.1, 3.0/28.1, 3.0/17.2, 3.0/20.1, 5.0/24.5, 4.0/21.3	0.357, 0.204, 0.166, 0.158, 0.333, 0.105, 0.175, 0.107, 0.174, 0.149, 0.204, 0.188, Medium 0.193
3	Volyn region, Manevitskyi district, village of Zamostia, Cheremskyi Nature Reserve; Cheremske sedge-sphagnum bog; V. V. Konishchuk, August 4, 2004	Stem – 1 (length 22.0 see), small capsule – 6 (maks. a size 5.5x8.8 mm), leaves – 15 (length with a petiole 1–9.5 see), length of root 20.9 mm	4.3/32.4, 4.0/29.5, 2.9/32.0, 2.6/31.0, 4.0/21.2, 3.0/24.4, 3.0/26.0, 3.2/27.0, 3.0/24.6, 3.3/22.0	0.133, 0.136, 0.091, 0.084, 0.189, 0.123, 0.115, 0.119, 0.122, 0.150, Medium 0.126
4	Volyn region, Shatskyi district, Melnyky village, Shatskyi National Natural Park; carboniferous, grassland moss bog Unychi (Zvunyeh); V. I. Honcharenko, June 23, 2004	Stem (in the stage of forming), small capsule absent, leaves – 11, length of root a 45.6 mm	3.6/21.6, 3.6/21.5, 3.8/19.3, 3.8/22.0, 3.1/19.2	0.167, 0.167, 0.197, 0.173, 0.161, Medium 0.173
5	Zhytomyr region, Olevskyi district, Zamyslovyske Forestry, quarter number 3, Reserve Plotnytsia; bog; O. O. Orlov, July 20, 2008	Stem – 1, small capsule – 5, leaves – 12 (length with a petiole a 1–8.5 cm), length of root a 28.8 mm	2.9/29.0, 2.3/21.2, 3.5/14.0, 1.9/12.0, 3.1/19.9, 2.9/15.9	0.100, 0.108, 0.250, 0.158, 0.156, 0.182, Medium 0.159

Table 2
Anatomical characteristics and leaf morphometry of *D. intermedia*

No	Chorology, biotope, collector, date	Anatomical characteristic	The ratio of width / length in presentation of leaves, mm	Index of roundness of the leaf
1	Rivne region, Samenskyi district, Rivnenskyi Nature Reserve; Somyno massif, Kremynna-Sehivske tract; T. L. Andrienko, O. I. Priadko, July 16, 2004	Stem – 4 (length 9.0 cm), capsule – 9, 8, 5 pieces, leaves – 44 (length with petiole 1–4.5 cm), the length of the root 10.5 mm	2.6/10.5, 3.5/11.2, 2.0/10.4, 2.2/8.8	0.248, 0.313, 0.192, 0.250, Medium 0.251
2	Volyn region, Shatskyi district, Pulmo village, Shatskyi National Nature Park; sandy bottom of a pit in quarry; D. M. Yakushenko, July 20, 2005	Stem – 2 (length 5.0 cm), capsule – 4, 2 pcs., Leaves – 12 (length with petiole 1–4.0 cm), root length 30 mm	3.6/11.6, 3.0/10.0, 2.9/9.9	0.310, 0.30, 0.293, Medium 0.301
3	Zhytomyr region, Korostenskyi district, Bolechivske Forestry, quarter №117, division 14; Lozanove Bog; O. O. Orlov, August 28, 2008	Stem – 1 (length 12.0 cm), capsule – 6, leaves – 34 (length with petiole 1–5.5 cm), length of the root of 10.0 mm	3.6/11.8, 3.8/11.0, 3.1/12.0, 3.5/12.4, 2.6/7.0, 1.7/5.7	0.305, 0.345, 0.258, 0.282, 0.371, 0.298, Medium 0.310
4	Volyn region, Manevitskyi district, village Zamostia; shore Lake Okhnyeh, sedge-sphagnum trembling bog; V. V. Konishchuk, July 10, 2014	Stem – 1 (length 9.0 cm), capsule – 3, leaves – 30 (length with petiole 1.0–5.0 cm), length of the root 9.0 mm	1.0/1.1, 1.0/2.0, 1.0/2.0, 1.0/3.0, 1.0/4.0, 2.0/3.0, 2.0/3.0, 2.0/3.0, 2.0/3.0, 4.0/5.0, 4.0/5.0, 4.0/5.0, 4.0/6.0, 4.0/6.0, 2.0/3.0, 2.0/3.0, 2.0/3.0, 2.0/3.0, 2.0/4.0, 2.0/4.0, 2.0/3.0, 2.0/3.0, 2.0/3.0, 2.0/4.0, 2.0/4.0, 2.0/3.0, 2.0/3.0	0.909, 0.5, 0.5, 0.333, 0.250, 0.667, 0.667, 0.667, 0.667, 0.667, 0.8, 0.8, 0.8, 0.667, 0.667, 0.667, 0.667, 0.667, 0.667, 0.5, 0.5, 0.667, 0.667, 0.667, 0.5, 0.5, 0.5, 0.667, 0.667, Medium 0.624
5	Chernihiv region, Kozeletskyi district, Koropie village, hydrological monument of nature Ozero Sviate, sedge-sphagnum bog; V. V. Konishchuk, July 20, 2015	Stem – 4 (length 8.0 cm), capsule – 3, leaves – 12 (length with petiole 1.0–5.0 cm), length of the root 9.0 mm	1.0/8.0, 3.0/10.0, 2.0/7.0, 2.0/7.0, 1.5/12.0, 1.0/10.0, 2.0/10.0, 2.0/11.0, 2.0/12.0, 2.0/10.0, 2.0/11.0	0.125, 0.30, 0.286, 0.286, 0.125, 0.100, 0.200, 0.182, 0.167, 0.200, 0.182, Medium 0.196

Table 3Anatomical characteristics and morphometry of leaves of *D. x obovata*

No	Chorology, biotope, collector, date	Anatomical characteristic	The ratio of width / length in presentation of leaves, mm	Index of roundness of the leaf
1	Kharkiv region, the city of Kharkiv; marsh tract; V. Serheiev, August 12, 1910	The stalk is not developed, the capsule are absent, the leaves – 12 (length with petiole 1.0–6.5 cm), the length of the root of 23.0 mm	6.0/15.3, 5.2/13.6, 5.2/13.6, 6.0/16.9, 5.0/13.1, 5.1/10.8	0.392, 0.382, 0.382, 0.355, 0.382, 0.472, Medium 0.394
2	Kyiv region, the outskirts of Kyiv, Lake Rybne; trembling bog; D. K. Zerov, P. Oksiuk, July 22, 1921	Stem – 3 (maximum height 21 cm), capsule of 11, 6 and 1 pc., leaves – 10 (length with petiole 1–8 cm), length of the root 47.6 mm	4.2/9.7, 3.4/7.6, 6.0/15.0	0.433, 0.447, 0.400, Medium 0.427
3	Volyn region, Zabolottia city; shore Lake Tur; A. I. Barbarych, O. I. Barbarych, July 25, 1949	Stem – 1 (maximum height 16 cm), capsule – 6, leaves – 20 (length with petiole 1.0–6.5 cm), root length 20.0 mm	4.4/11.6, 3.8/7.7, 5.5/10.8, 3.8/8.4	0.379, 0.494, 0.509, 0.452, Medium 0.459
4	Volyn region, Manevtskiy district, village Zamostia, Cheremskiy Nature Reserve; shore Lake Redychi, sedge-sphagnum trembling bog; V. V. Konishchuk, June 30, 2002	Stem – 1 (length 17.0 cm), capsule – 3, leaves – 10 (length with petiole 1–13 cm), length of the root 50.1 mm	7.5/26.4, 7.5/21.7, 6.1/13.6, 5.7/13.1	0.284, 0.346, 0.449, 0.435, Medium 0.379
5	Rivne region, Rokytnivskiy district; shore Lake Bile, sedge-sphagnum trembling bog; O. I. Skakalska, L. L. Onuk, July 3, 2013	Stem – 2 (not developed), no capsule, leaves – 13 (length with petiole 4–10 cm), root length 40.0 mm	3.0/7.0, 2.4/5.5, 6.0/20.4, 6.0/20.0, 4.0/10.0, 3.0/19.0, 2.5/20.0, 3.0/19.0, 6.0/16.0, 4.0/19.0, 4.0/18.0, 4.1/14.1, 4.0/14.0	0.429, 0.436, 0.294, 0.30, 0.40, 0.158, 0.125, 0.158, 0.375, 0.211, 0.222, 0.291, 0.286, Medium 0.283

Table 4Anatomical characteristics and morphometry of leaves *D. rotundifolia*

No	Chorology, biotope, collector, date	Anatomical characteristic	The ratio of width / length in presentation of leaves, mm	Index of roundness of the leaf
1	Kyiv region, the outskirts of Kyiv, Lake Rybne; D. K. Zerov, July 24, 1925	Stem – 1 (length 9.5 cm), capsule – 3, leaves – 11 (length with petiole 1–6.0 cm), length of the root of 10.0 mm	8.5/9.0, 7.3/7.3, 10.8/12.0, 7.4/7.5	0.944, 1.0, 0.9, 0.987, Medium 0.958
2	Rivne region, Rokytnivskiy district, Khmil village; shore Lake Bile; N. M. Shyian, O. O. Orlov, I. O. Bednarska, June 16, 2004	Stem on the stages of formation, the capsules are absent, the leaves – 14 (length with petiole 1–5.5 cm), the length of the root 10.5 mm	15.7/12.0, 12.0/10.4, 14.8/12.4, 8.9/8.9	1.308, 1.154, 1.194, 1.000, Medium 1.164
3	Zhytomyr region, Ovrutskiy district, village Horodets; near the forestry, shore; D. M. Yakushenko, O. O. Orlov, June 15, 2006	Stem on the formation stages, no capsule, leaves – 22 (length with petiole 1–5.0 cm), root length 5.0 mm	11.5/13.0, 9.5/8.7, 8.0/8.1, 8.5/6.0	0.885, 1.092, 0.988, 1.417, Medium 1.096
4	Khmelnitskiy region, Slavutskiy district; National Natural Park Male Polissia; O. Skakalska, 09.29.2014	Stem – 1 (length 15 cm), capsule – 2, leaves – 18 (length with petiole 1–6.0 cm), length of the root of 10.0 mm	3.0/2.0, 3.0/2.0, 3.0/2.0, 3.0/2.0, 2.0/1.0, 2.0/2.0, 2.0/1.0, 4.0/3.0, 4.0/3.0, 4.0/3.0, 3.0/2.0, 4.0/2.0, 4.0/3.0, 4.0/3.0	1.5, 1.5, 1.5, 1.5, 2.0, 1.0, 2.0, 1.333, 1.333, 1.333, 1.5, 2.0, 1.333, 1.333, Medium 1.512
5	Chemihiv region, Kozeletskiy district; Regional Landscape Park Mizhrichynskiy; V. V. Konishchuk, July 20, 2015	Stem for formation stages, no capsule, leaves – 11 (length with petiole 1–5.0 cm), root length 25.0 mm	4.0/4.0, 5.0/4.0, 5.0/4.0, 10.0/7.0, 3.0/3.0, 6.0/6.0, 6.0/6.4, 8.0/7.0, 6.0/5.0, 5.0/6.0, 7.0/5.0	1.0, 1.25, 1.25, 1.429, 1.0, 1.0, 0.938, 1.143, 1.2, 0.833, 1.4, Medium 1.131

Discussion

By morphometry, the most similar to *D. anglica* and *D. intermedia* is *D. obovata* while *D. rotundifolia* is completely different. Using the mathematical methods for analysis of statistical data, for 5 variants of the index of sundrewns' leaf roundness, we determined the value of class interval ($\lambda = (x_{\max} - x_{\min}) / k$) and the variation as the mean linear deviation ($d = \sum (x_i - x_{\text{mid}}) / n$).

The results for different taxa are as follows: $\lambda_{D. longifolia} = 0.051$, $\lambda_{D. intermedia} = 0.086$, $\lambda_{D. obovata} = 0.035$, $\lambda_{D. rotundifolia} = 0.111$, $d_{D. longifolia} = 0.071$, $d_{D. intermedia} = 0.115$, $d_{D. obovata} = 0.046$, $d_{D. rotundifolia} = 0.136$. Therefore, the value of the class interval in the review of the variation series by the average parameters of roundness of the leaf is the lowest for *D. x obovata* – 0.035, the same relates to the variability – 0.046. This indicates a slight deviation in the morphometric stability (constancy) of the parameters, and maintaining the linear parameters of the ratio of the width and length of the leaf of *D. x obovata* in comparison with other taxa of the genus, which in principle is not very characteristic of hybrids. The reliability of these results is confirmed for various physical-geographical regions (Western, Central, Eastern Polissia, Forest-Steppe). One can draw a hypothesis about distinguishing *D. x obovata* as a subspecies instead of hybrid. In our opinion, the confirmation of this may be the similarity of the seeds for a long period of time and its germination rather than sterility, preservation of a special morphometry, distribution separately from the mother individuals. But this issue remains rather controversial and requires further phylogenetic research.

Drosera spp. are grown in botanical gardens (Krakow, Kyiv, Lviv, others). Earlier, there were no data on propagation and cultivation of *Drosera* L. in specially created conditions. In laboratory conditions and in specially created collection nurseries (Kremenets Botanical Garden,

Kremenetski Hory National Nature Park, Botanical Garden in Krakow), cultivating and propagating of sundrewns has been successfully demonstrated. The agrotechnique of *Drosera* L. *ex-situ* cultivation has been analyzed: the volume of the container for the soil is 1–2 dm cubic; substrate is peat (transitional with high-moor peat) with addition of sand; sod-podzolic soil with sapropel addition, pH 5–7 (3–4); it is symbiotically advisable to combine with sphagnum, Hypnaceae, Mniaceae mosses; watering mode is 1–2 times a week (rain water, or distilled with the addition of microelements, enzymes); nutrition – measured addition of organic-mineral fertilizers (compost and extracts: sapropel + peat), ~ 1 time per month; a supplementation with small insects (mosquitoes, drosophila, black flies); lighting mode is moderate, exposure to the south is not desirable; in laboratory (orchard) conditions the humidity of the air is regulated. For acidifying of the alkaline substrate, there are used nitrate, or sulfur reagents. Pine sawdust and bark is added to the substrate. The optimal combination of the created phytocompositions of *Drosera* are with *Carex*, *Eriophorum*, *Juncus*, *Sphagnum*, *Polytrichum* species near a regulated drainage of water bodies with *Phragmites*, *Typha*, *Scirpus* and others.

Sundrewns are used for medicinal purposes (leaves, Herba Droserae, H. Rossellae), prepared during the blossom period. Sundrewns are not officinal in Ukraine (not included in the State Registry of Production of Medical Preparations). The above-ground part of the sundew has a spasmolytic effect, its tincture is used against whooping cough, chronic bronchitis, asthma and arteriosclerosis. The extract from sundrew called "Drozerol" is included in expectorant preparations. Dry grass of *Drosera* contains naphthoquinones (drozeron, plumbagin), flavonoids, hyperoside, myricetin, kaempferol, proteolytic enzyme, organic acids (citric, malic, tartaric, succinic, benzoic), tannic and viscid substances, fats, sugars (4.4%), traces of essential oil, vitamin C, 5% of mineral salts

(silica, iron, magnesium, phosphorus, sodium, calcium and manganese) (Likarski roslyny, Hrodzyskyi, 1992). Droserae are known in Polissia as "Dew of God" it is rubbed in the temple and the nape against headache, and was earlier before preparing tinctures added to drinking water and dairy products.

Table 5

Index of roundness of the leaf of *Drosera* L. species

Indicator index	<i>D. longifolia</i>	<i>D. intermedia</i>	<i>D. x obovata</i>	<i>D. rotundifolia</i>
Option 1	0.126	0.196	0.283	0.958
Option 2	0.159	0.251	0.379	1.096
Option 3	0.173	0.301	0.394	1.164
Option 4	0.193	0.310	0.427	1.131
Option 5	0.383	0.624	0.459	1.512
	0.084	0.100	0.125	0.833
Minimum	(2.6/31.0 mm)	(1.0/10.0 mm)	(2.5/20.0 mm)	(5.0/6.0 mm)
	0.732	0.909	0.509	2.000
Maximum	(4.1/5.6 mm)	(1.0/1.1 mm)	(5.5/10.8 mm)	(2.0/1.0 mm)
Average	0.207 (-0.2)	0.336 (-0.3)	0.388 (-0.4)	1.172 (-1.2)
Standart deviation	0.101	0.167	0.067	0.205

Note: the minimum, maximum and average values are given for all dimensions of the samples, rather than the average arithmetic of the 5 variants examined.

The use (collection of herbarium) of English sundew and oblong-leaved sundew is regulated, in particular, it must be approved by the National Commission of the Red Book of Ukraine with the approval of the limits by the Ministry of Ecology and Natural Resources of Ukraine, corresponding permission of the object of the nature reserve fund and land user. Round-leaved sundew is protected at the regional level, outside the territories of the nature reserve fund, permission for limited collecting may be provided by the Department of Ecology of the Oblast Administration with agreement of the landowner and the land user. However, we suggest completely prohibiting the collecting of all sundews in natural ecotopes, and for repatriation and medicinal purposes, we suggest starting their artificial reproduction. In phytodesign only artificially propagated decorative hybrids and forms are effective.

For all taxa of Droserae, the degree of natural renewal is unsatisfactory. We first recommended the provision of state protection for all species of *Drosera* (V. V. Konishchuk, Zapovidna sprava v Ukraini, 2004). Mostly, sundews are protected in the objects of the nature reserve fund, they grow in groups in marshes and are protected by the Green Book of Ukraine (2009). Among the types of natural habitats of Ukraine where sundews grow and are protected by the jurisdiction of the Convention for the Protection of Wild Flora and Fauna and Natural Habitats in Europe (September 19, 1979, Bern, Switzerland) the dominant are: 3140. Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., 3150. Natural eutrophic lakes with Magnopotamion or Hydrocharition – type vegetation, 6410. Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*), 7110. Active raised bogs, 7120. Degraded raised (oligotrophic) bogs still capable of natural regeneration, 7140. Transition mires and quaking bogs, 7150. Depressions on peat substrates of the Rhynchosporion, 7210. Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*.

The dynamics of peat accumulation, the degree of mineralization, phytoadaptation to climate changes and the orientation of the successions, may correlate with the ecological condition of phytocenoses with sundews. The priority phytosozological task remains the issue of repatriation and monitoring of *Drosera* L. taxa.

Conclusions

Hydrohelophytes of the *Drosera* L. genus, despite being protected in a large part of the territory of the Nature Reserve Fund of Ukraine (nature reserves, national parks, Ramsar wetlands, reserves etc.) are very sensitive to the slightest negative changes in the environment (including changes in water regime) and may be an indicator of the ecological condition of the environment. As a result of succession, sylvatization of open sedge-sphagnum, hypnum marshes, reduction of trampling and cutting down of marsh plants (upper layer –

phytocenoses of *Carex rostrata* Huds., *C. lasiocarpa* Ehrh.), the sundews are displaced by other species of flora. In addition to feeding on insects – mosquitoes (Culicidae), black flies (Simuliidae), syrphid flies (Syrphidae), sundews use other sources (moving forms of macroelements, microelements and chemical compounds of the substrate of the pedosphere, water, photosynthesis energy, etc.), thus this specific group of plants would be more correctly termed heterotrophic rather than insectivorous species.

We have proved the possibility of growing all *Drosera* L. taxa of the natural flora of Ukraine *ex-situ* with subsequent repatriation subject to the appropriate scientific substantiation and the availability of legal support. Phytosozonomic criteria for *Drosera* L. species are as follows: chorological, population, ecological-coenotic, florogenic, ontogenetic, pragmatic and aesthetic.

In Ukraine, the area with the most important phytosozological value for sundews in Ukraine is Western Polissia (Volyn, Rivne region) (*D. longifolia* – 31, 20, *D. intermedia* – 31 and 30 growing locations respectively). Round-leaved sundew is most widespread in the humid zone (Polissia, Carpathians). The vanishing taxon – *D. obovata*, despite its presence in Cheremskyi, Rivnenskyi Nature Reserves, Shatskyi National Nature Park, several reserves, is disappearing due to succession, afforestation, water regime change etc. Of 17 known locations 2 are lost. In Polissia we have reliably confirmed almost all growing locations of sundews, some have preserved autochthonous distribution for over 100 years since the onset of destructive anthropogenic impact (Western drainage-meliorative expedition, Y. I. Zhylynskyi, 1873, etc.), others need clarification, conducting additional recording and monitoring, four new populations have been discovered. Some populations periodically renew, particularly *D. intermedia*. In some cases repatriation is needed, therefore we provide all known places of record according to the literature, herbarium data and data of field surveys. The most vulnerable ecotopes are in the Forest-Steppe and drained mires. Growing locations of *D. rotundifolia* were previously sited on above floodplain pine terraces of the Dnipro, Siverskyi Donets, South Bug, in the outskirts of Kharkiv, most of them are lost (Andrienko, 2010). Y. K. Pachoskyi demonstrated the data on sundews in the territory of the current Kaniv reservoir, valley of Trubizh, Dnipro, which have disappeared. As a result of climate change, reduction of functions of self-regulatory ecological condition of hydrohelolandsapes, complete cutting down of the trees in the areas, extraction of amber, quarry development of carbonate rocks and draining of peat swamps, the ecological condition of typical biogeocenoses of hydrohelophytes continues to deteriorate. Therefore, we suggest the inclusion of all taxa of *Drosera* L. in the next edition of the Red Data Book of Ukraine.

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