

UNUSUAL ASPECTS OF PHYTOCENOLOGY OF *DROSERA ROTUNDIFOLIA* L. (DROSERACEAE SALISB.) IN CENTRAL RUSSIA

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Distribution

Common sundew (*Drosera rotundifolia* L.) is an insectivorous plant in the Droseraceae family. *Drosera* is the largest genus of this family, containing more than 90 species. Representatives of this genus are found in almost all climatic belts of both hemispheres. Most species of *Drosera* are located in Australia, New Zealand, and South Africa (Lloyd 1942; Denisova 1981).

Common sundew is a boreal circumpolar species typical of oligotrophic and mesotrophic swamps of the taiga zone. Its range includes forest regions of the European part of the former USSR, the sub polar and polar Urals, middle and southern taiga regions of Siberia; isolated populations of common sundew are present in the Putorana Mountains, Russian Primorye and Priamurye, on Sakhalin, Kuril Islands, and in Kamchatka. It covers almost all of Western Europe (excluding Mediterranean), as well as Japan, Aleutians, Alaska, extreme southern Greenland, and forested areas of North America south to central California and Nevada, along the Atlantic coast from Labrador and Newfoundland south to Pennsylvania and Virginia and isolated areas in the mountains of Alabama and Florida (Arctic flora of the USSR 1984). In central Russia, common sundew is found in all regions, but here it becomes a rare plant and needs protection (Gubanov *et al.* 1976; Gubanov *et al.* 1987).

Ecology

Common sundew grows in many wetland habitats, including oligotrophic and mesotrophic sphagnum swamps, bogs, peat pond surroundings, and more rarely on peat along ditches. It is a typical representative of moss bogs, able to succeed after annually growing moss with the help of growing shoots (Gubanov *et al.* 1987). Common sundew is usually found in the central part of oligotrophic swamps (Yurkovskaya 1980).

Common sundew reaches its highest abundance according to the scale of L.G. Ramenskij *et al.* (1956) at degrees of moistening from 87 to 92 (swamp-meadow moistening). It is an indicator of wet habitats (degree 5 of E. Landolt (1977) scale). Common sundew is an indicator of poor soils (degree 1 of E. Landolt scale); according to L.G. Ramenskij *et al.* (1956), it occupies degree 1-2 of scale of soil fertility (especially poor soils and peat). According to B.A. Bykov (1965), it is a mesohydrophilous plant. E. Landolt treats common sundew as an indicator of raw humus or peat (degree 5 of the scale).

Usage

Common sundew is an ancient medicinal plant. The aboveground part of it is used in the treatment of some diseases of the respiratory system. Plumbagin and droserone, suppressing growth of pathogenic fungi and bacteria, were extracted from this plant. Before the appearance of antibiotics, common sundew drugs were used during treatment of lung tuberculosis and pertussis. Because of



Figure 1: Common sundew on dry sand (Photo by Anna N. Demidova).



Figure 2: Collecting common sundew on dry sand (Photo by Anna N. Demidova).



Figure 3: *Drosera rotundifolia* L. with *Calamagrostis epigeios* (L.) Roth on dry sand (Photo by Anna N. Demidova).



Figure 4: View of club moss – common sundew community on dry sand (Photo by Anna N. Demidova).

spasmolytic and cough-calmativ action of common sundew leaves, they are used in antitussive teas. In northern Russia, leaves were used even for steaming of milk jugs, because ferment present in the leaves dissolves proteins even in the porous walls of milk crockery. In Italy, common sundew was used for preparation of liqueurs (Gubanov *et al.* 1976).

Aboveground parts of common sundew contain quinones, plumbagin, and droserone, vitamin C, malic, citric, and benzoic acids, flavonoids, tannins, and other substances. They have an anti-inflammatory, spasmolytic, expectorant, bactericide, sweating action. Infusion of common sundew is used during treatment of catarrhal diseases, bronchitis, and bronchial asthma. Nowadays it is used only in vernacular medicine and homeopathy (Gubanov *et al.* 1987).

Unusual finding

We made an especially interesting finding of common sundew at the end of July 2010, during an expedition devoted to study of flora and vegetation of the Unzha river basin (Kostroma region, central Russia). In the system of botanical-geographical zoning of the European part of the former USSR, the area under study belongs to Valdai-Onega sub-province of north European taiga province of Eurasian taiga (conifer forest) region (Isachenko & Lavrenko 1980).

Sundew was found in non-typical habitat – in dry sand borrow both at concave and prominent relief elements (see Figure 1). The finding was made in Mezhevskoi district of Kostroma region, 5 km south of Gubino settlement (58°40.241'N latitude, 45°02.868'E longitude, 140 m above sea level). Here, in dry sand, after two-month drought, both vegetative and well-developed flowering specimens of common sundew about 20 cm in height were observed in a practically monodominant population (with an insignificant presence of vegetative shoots of *Calamagrostis epigeios* (L.) Roth) in an area of about 150 m² (see Figures 2 and 3). It is of interest that we did not find any swamps with common sundew in the neighborhood of this borrow. It is known that common sundew can spread long distances with the help of wind due to the light ventricose seeds having appendices and fuzz (Masing 1955, cited by Balandin & Balandina 1993).

About 100 m from the first point, at abandoned overgrowing elevated sites of the borrow with plain relief, we have found and described another extremely interesting community with a predominance of *Lycopodium clavatum* L. and *Drosera rotundifolia* L. (see Figures 4 and 5). This site was about 400 m²; *Betula pubescens* Ehrh. (+), *Pinus sylvestris* L. (1), *Alnus incana* (L.) Moench (1), *Populus tremula* L. (+) about 1.5 m in height were present in the undergrowth (estimation of abundance/coverage of undergrowth and herbs is used according to Braun-Blanquet (1921) scale: + – the species is present scantily (projective coverage up to 1% of the description square), 1 – significant amount (projective coverage equaling 1-5% of the square), 2 – the species is abundant, but projective coverage is lesser than 25%, 3 – the species is well developed (projective coverage equaling 25-50%), 4 – projective coverage 50-75%, 5 – continuous closed cover (projective coverage 75-100%)). Species names of vascular plants in our geobotanical description are given according to S.K. Czerepanov (1995), of mosses – according to M.S. Ignatov *et al.* (2006). Total projective coverage of undergrowth reached 5%. Coverage of herb layer was 70%, with *Drosera rotundifolia* L. equaling 2, *Hieracium umbellatum* L. – +, *Juncus alpino-articulatus* Chaix – 1, *Lycopodium clavatum* L. – 4, *Trifolium hybridum* L. – +. Coverage of moss layer at the site was 35%, with *Aulacomnium palustre* (Hedw.) Schwaegr. covering 5%, *Pohlia nutans* (Hedw.) Lindb. – 5%, *Polytrichum commune* Hedw., *P. juniperinum* Hedw. – 25%. Both club moss and common sundew had an even distribution in the area; specimens of both species were well developed. Such communities in similar habitats have not been described in the literature.



Figure 5: Fragment of club moss – common sundew community on dry sand (Photo by Anna N. Demidova).

Phytocenology

It is known from the literature that common sundew is a dominant species of *Carex lasiocarpa* – *Comarum palustre* – *Drosera rotundifolia* – *Sphagnum* spp. association (Lavrenko 1940, cited by Bykov 1965); it reaches especially high abundance in swamps with the predominance of *Sphagnum magellanicum* (Galkina 1956). According to “Prodromus and diagnostic species of the highest units of vegetation of the territory of the former USSR” (Mirkin & Naumova 1998), common sundew is a diagnostic species of the following classes of swamp vegetation:

1. Oxycocco-Sphagnetea Br.-Bl. et R. Tx. ex Westhoff et al. 1946 (oligotrophic and oligomesotrophic sphagnous raised and intermediate swamps of holarctic regions) with the following diagnostic species: *Andromeda polifolia*, *Aulacomnium palustre*, *Baeothryon cespitosum*, *Carex pauciflora*, *Drosera rotundifolia*, *Eriophorum vaginatum*, *Oxycoccus palustris*, *Polytrichum strictum*, *Sphagnum magellanicum*;

2. Scheuchzerio-Caricetea fuscae R. Tx. 1937 (low-sedge moss mesotrophic swamps); order *Scheuchzerietalia palustris* Nordhagen 1937 (sedge-moss meso- and oligotrophic swamps) with the following diagnostic species: *Scheuchzeria palustris*, *Carex rostrata*, *Drosera anglica*, *D. rotundifolia*, *Naumburgia thyrsiflora*, *Rhynchospora alba*, *Sphagnum cuspidatum*, and presence of diagnostic species of *Oxycocco-Sphagnetea* class; union *Rhynchosporion albae* Koch 1926 (meso- and oligotrophic sedge-moss swamps) with the following diagnostic species: *Rhynchospora alba*, *R. fusca*, *Scheuchzeria palustris*, *Carex limosa*, *C. pauciflora*, *Drepanocladus fluitans*, *Drosera anglica*, *D. rotundifolia*, *Oxycoccus palustris*, *Sphagnum balticum*, *S. cuspidatum*, *S. majus*.

Nevertheless, singular occurrences of common sundew in non-typical habitats at dry substrates are known from the literature. Thus, common sundew was found in high numbers and good state by A.P. Shennikov (1964) in the Leningrad region on dry pine-forest sands. D.E. Swales (1975) found a vegetation community with large numbers of common sundew at Ile Perro (Canada) growing on dry abandoned pasture that was previously swampy land drained in the 19th century.

According to P.I. Belozyorov (2008) data, common sundew is found within the whole Kostroma

region occasionally, in sphagnum raised peat swamps. Our finding makes it possible to extend our knowledge about ecology and phytocenology of this extremely interesting swamp plant.

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