

SILENE MULTIFLORA IN MOLDOVA (ROMANIA)

Culiță SÎRBU^{1*} , Adrian OPREA² 

¹“Ion Ionescu de la Brad” University of Life Sciences Iași, Mihail Sadoveanu Alley no. 3, Iași – Romania.

²“Alexandru Ioan Cuza” University of Iași, “Anastasiu Fătu” Botanical Garden, Dumbrava Roșie Street no. 7-9, Iași – Romania.

* Corresponding author. E-mail: culita.sirbu@iuls.ro, ORCID: 0000-0003-3217-0947

Abstract: *Silene multiflora*, a critically endangered species from the vascular flora of Romania, was first reported in the historical province of Moldova (east of the country) since the first half of the 19th century. However, the presence of this species in Moldova was later on contested (confusion with *S. nemoralis* or with *S. viscosa*?), and in the national floristic syntheses published up to now, the species has not been mentioned in the flora of this province. In this work, we confirm the occurrence of the species *S. multiflora* in northeastern Romania (Moldova), based on the specimens collected in the field, as well as on some older specimens kept in two public herbaria in Iași.

Keywords: botanical description, Caryophyllaceae, endangered species, new records, vascular flora.

Introduction

Silene multiflora (Ehrh.) Pers. Syn. Pl. 1: 496. 1805 (*Cucubalus multiflorus* Ehrh.; *Viscago multiflora* (Waldst. et Kit.) Hornem.; *V. multiflora* (Waldst. et Kit.) Baumg.; *Silene steppicola* Kleop., *S. syvashica* Kleop.) (Caryophyllaceae) is an Eurasian plant species, with a native area stretching from Central Asia and Siberia to Central Europe (Austria) [SHISHKIN, 1936; CIOCÂRLAN, 2009; CHATER & al. 2010; IZVERSCAIA, 2016].

Originally published with a short diagnosis, as *Cucubalus multiflorus*, by EHRHART (1792), it was more detailed described and illustrated, under the same name, by WALDSTEIN & KITAIBEL (1799-1802: Table 56) and later on transferred to the genus *Silene* by PERSON (1805).

Relevant iconography of this species has also been published by (in a chronological order): REICHENBACH (1844) (*Icones Florae Germanicae et Helveticae*, VI, Table CCXCI, Figure 5098); JÁVORKA & CSAPODY (1934) (*Iconographia Florae Hungaricae*, pp. 145, Figure 1160); GUȘULEAC (1953) (*Flora R. P. Române*, II, pp. 168, Pl. 22, Figure 3); DIDUKH (2002) (*Ecoflora of Ukraine*, Figure 143a); Izverșcaia (2016) (*Flora Basarabiei*, II, pp. 284, Pl. 59, Figure 2); HOCK, in KIRÁLY & al. (2011) (*Új magyar fűvészkönyv. Ábrák*. pp. 100, Figure 349); MEREĐA & al. (2012) (*Flora Slovenska*, VI(3), pp. 465, Table 33) etc.

According to the literature data, the presence of the species on the territory of Romania has been confirmed so far only from a few localities, as follows:

- Satu Mare County (Crișana; north-west Romania): Carei (“Nagy-Károli”) – “*in pratis*” (as *Cucubalus multiflorus* Ehrh.) [WALDSTEIN & KITAIBEL, 1799-1802] – the first report of this species in the country; *idem* (Herb. Kitaibel, BP) [NEGREAN & DIHORU, 2009]; Sanislău - Vermeș marsh [KARÁCSONYI & NEGREAN, 1979, cited by NEGREAN & DIHORU, 2009] and Pișcolt [KARÁCSONYI, 1995];

SILENE MULTIFLORA IN MOLDOVA (ROMANIA)

- Hunedoara County (Transylvania; central Romania): Mintia (“Marós Némethi”), Deva – hayfields and forest edges (as. *Viscago multiflora*) [BAUMGARTEN, 1816] – data confirmed by SIMONKAI (1887), UNGAR (1925), GUȘULEAC (1953) and NEGREAN & DIHORU (2009);

- the Transylvanian plain (Mezőség) [SCHUR, 1866] – hill meadows, especially on moorland. According to SIMONKAI (1887), Schur's indication is based on a specimen labelled with “Marós Némethi”, so “Mezőség” should be read “Marós Némethi” (i.e. Mintia), the same locality mentioned by BAUMGARTEN (1816);

- Timiș County (Banat; west Romania): Timișoara [GUȘULEAC, 1953];

- Tulcea County (the Danube Delta; south-east Romania): Sfântu Gheorghe – wet meadows near Caraorman [UECHTRITZ & SINTENIS, 1838-1876, cited by KANITZ (1879-1881add); BRANDZA (1898); GUȘULEAC (1953)]; Caraorman – wet meadow, south of the forest (*legit.* G. Negrean 1980-HGN) [NEGREAN & DIHORU, 2009].

The presence of the species in the Muscel Mountains, on the Motoiu hill (Argeș County; Muntenia), as indicated by HOFFMANN (1862) – cited by BRANDZA (1879-1883), has not yet been confirmed and is considered doubtful, according to recent references [e.g. NEGREAN & DIHORU, 2009].

Controversial data about this species was also mentioned from Moldova (eastern Romania), in the 19th century, as follows:

- Moldova, as *Viscago multiflora*: “C.XIX.64” (CZIHACK, 1836, XIX, p. 64) [KANITZ, 1877-1881]; *idem* “*et Exsic.!*” [BRANDZA, 1879-1883] (the sign “!” means - specimen seen by Brandza);

- Vrancea County: Focșani, as *Viscago multiflora* Baumg. – hayfields and forest edges [SZABO, 1841];

- the upper Moldova (“Moldova super.”), as *Silene multiflora* Pers., “*in pratis mont.*”: “G hj” (GUEBHARD, 1842-1848, seen in the Herbarium of the Iași Museum) [KANITZ, 1877-1881]; *idem* [BRANDZA, 1879-1883];

- Iași County, at Popricani, as *Viscago multiflora*: “Sz. man.?” (SZABO, 1873?) [BRANDZA, 1879-1883];

KANITZ (1877-1881) and BRANDZA (1879-1883) did not recognize, however, the presence of *S. multiflora* in Moldova, and considered that the data reported by CZIHACK, GUEBHARD and SZABO refers to either *S. viscosa* (L.) Pers. [KANITZ, 1877-1881] or *S. nemoralis* Waldst. & Kit. [BRANDZA, 1879-1883]. In addition, subsequent national or regional floristic syntheses from the last century [PRODAN, 1939; BORZA, 1947-1949; GUȘULEAC, 1953; BELDIE, 1977] or published more recently [OPREA, 2005; CHIFU & al. 2006; CIOCĂRLAN, 2009; NEGREAN & DIHORU, 2009; SĂRBU & al. 2013] do not confirm or even mention *S. multiflora* in the flora of Moldova.

Given its rarity in the country and the limiting factors (“located to the southern limit of its world range”; “small populations, with discontinuous distribution”; disturbance of habitats through “hydrotechnical works and grazing”; attack of the pathogenic fungus *Puccinia behenica* (DC.) Oth and the parasite *Eudarlucica caricis* (Fr.) O. Erikss.), NEGREAN & DIHORU (2009) included this species in the *Red Book of Vascular Plants from Romania*, as critically endangered (CR).

The aim of this work is to confirm the presence of *S. multiflora* in Moldova, based on field data and herbarium specimens.

Material and methods

The species has been identified by analysing herbarium specimens collected during our own field work (2023), but also of existing specimens in two public herbaria in Romania: I (Herbarium of the Faculty of Biology, University “Alexandru Ioan Cuza” of Iași) and IASI (Herbarium of the “Ion Ionescu de la Brad” Iași University of Life Science). Many relevant floristic references at national and international level were used in the process.

Since it was assumed that *Silene multiflora* was mentioned in the flora of Moldova in the old references because of misidentification with either *S. nemoralis* or *S. viscosa*, we analysed the differences between these three species using both data from the literature and voucher specimens from the I and IASI herbaria.

The geographic coordinates were recorded on the field using the OsmAnd application, available at <https://osmand.net/>. To highlight morphological details, we used a OPTIKA binocular magnifier and a OPTIKA digital camera with CCD Sensor.

Plant nomenclature followed SÂRBU & al. (2013).

Voucher specimens were deposited in the Herbarium of the “Ion Ionescu de la Brad” Iași University of Life Science (IASI).

Results and discussions

During our recent field work (in the year 2023), we identified a population of *Silene multiflora* (Ehrh.) Pers., of about 50 specimens, to the southwest of the Horlești village (Rediu commune, Iași County, north-eastern Romania).



Figure 1. Hayfield meadow with *Silene multiflora*, near the Horlești village (Iași County)

SILENE MULTIFLORA IN MOLDOVA (ROMANIA)

Specimens of *S. multiflora* are scattered in this place, on an area of approx. 100 m², in a hayfield meadow (Figure 1) which lies at the base of the steep coast that borders the Horlești village to the southwest, and where a small tributary of the Bogonos stream originates.

In this meadow, together with *S. multiflora* grow other meso-hygrophytes (*Agrostis stolonifera*, *Carex distans*, *Inula helenium*, *Rorippa austriaca*, *Rumex crispus*, *Scorzonera cana*), also mesophytes (*Centaurea jacea*, *Dactylis glomerata*, *Elymus repens*, *Lotus corniculatus*, *Poa pratensis*, *Rhinanthus rumelicus*, *Tragopogon pratensis* subsp. *orientalis*) and even helophytes (*Phragmites australis*), all these being favoured by the higher soil moisture during the springtime.

Because of the increasing drying of the soil in summer, many xerophytes / xero-mesophytes originating from the steppic grasslands of the adjacent slopes, also occur in this meadow, such as: *Festuca valesiaca*, *Dianthus membranaceus*, *Galium octonarium*, *G. verum*, *Koeleria macrantha*, *Lathyrus pallescens*, *Medicago falcata*, *Melampyrum arvense*, *Onobrychis viciifolia*, *Stachys recta*, *Trinia ramosissima*, *Verbascum phoeniceum*, *Veronica austriaca*.

The occurrence of some halophytes (*Carex distans*, *Scorzonera cana*, *Aster oleifolius*) and salinity-tolerant species (*Iris brandzae*, *Agrostis stolonifera*, *Rorippa austriaca*, *Phragmites australis*, *Rumex crispus*) reveals the presence of soluble salts in the soil.



Figure 2. *Silene multiflora*: habitus (a) and details of stem: densely short hairy below (b), glabrous and viscid toward the inflorescence (c) (scale bar: 4 cm - a; 2,5 mm - b; 1,5 mm - c)

Herbarium specimens: IASI, no. 18056: *legit. & det.* C. Sirbu & A. Oprea, the southwest of the Horlești village, Iași County, N 47.26407, E 27.43801, hay meadow, 03.06.2023; IASI, no. 18057, 18058, 18059 and 18060: *idem*, 08.06.2023.

After identifying the specimens collected on field, we have surprisingly discovered three other specimens of *S. multiflora*, in two public herbaria of the Iași city (IASI and I). These specimens were collected 80 years before, by M. Răvăruț, along the Valea Rea stream, a tributary of the Miletin River (Botoșani County). The three specimens were labelled as follows:

-IASI, no. 2231 (2 specimens): “*Silene multiflora* (Ehrh.) Pers.?”; Valea Rea (Botoșani County); meadows, hayfields; M. Răvăruț; 18.06.1943; “must be seen: the calyx is not hairy!”;

-I, no. 4489 (1 specimen): “*Silene multiflora* (Ehrh.) Pers.?”; Valea Rea (Botoșani County); M. Răvăruț; 18.06.1943.

Following this finding, in June 2023, we searched for *S. multiflora* along the entire course of the Valea Rea stream, but we did not manage to identify any specimen. It should be noted however that most of the meadows in the valley of this stream were disturbed by intensely sheep grazing, which greatly reduces the chances of this species still surviving in that place.



Figure 3. *Silene multiflora*: the inflorescence

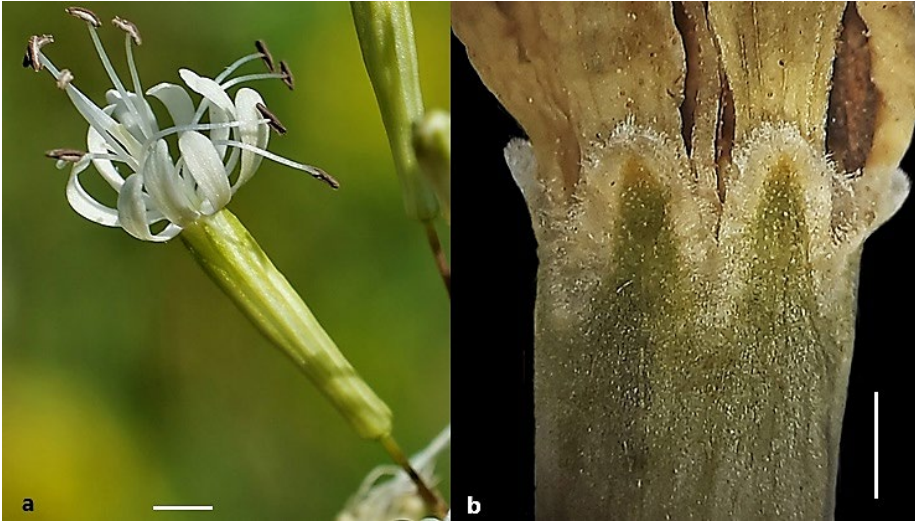


Figure 4. *Silene multiflora*: a single flower (a) and details of calyx teeth (b).
(scale bar: 3 mm - a; 1 mm - b)



Figure 5. *Silene multiflora*: a dried petal, with ciliate claw (scale bar: 1 mm)

Botanical description (based on specimens collected by us and M. Răvărut). Perennial. Stem simple, 50-80 cm tall, with 6-8 nodes, densely short hairy (hairs 0.1-0.2 mm long, bent downward), glabrous and viscid towards the inflorescence (Figure 2). Radical and lower cauline leaves long petioled; petioles short pubescent (hairs longer towards the sheath); lamina 15-40 × 8-10 mm, oblanceolate-spatulate, short pubescent especially on the edges and midvein (hairs similar to those on the stem), margins entire, apex obtuse. Middle and upper cauline leaves sessile (joined at the sheath level), lance-linear, gradually decreasing and narrowing upward, densely short hairy. Inflorescence narrowly paniculate to pseudoverticillate (Figure 3); branches short, erect, opposite, glabrous, (1-) 3 (-6) flowered; bracts and bracteoles wide membranous and ciliated, especially in the sheath area. Flowers bisexual, pedunculate, oblique-ascending; pedicels glabrous, 3-7 mm long, much longer than bracteoles (lateral flowers). Calyx cylindrical-clavate, truncate at the base, 10-12 mm long, glabrous (except the teeth margins), 10-veined; teeth ovate, obtuse, membranous and ciliated on margins (Figure 4). Petals white; claws 8-10 mm long, margins membranous, ciliate (Figure 5); limb of petals 4-6 mm long, deeply incised,

clavate, truncate at the base, 10-12 mm long, glabrous (except the teeth margins), 10-veined; teeth ovate, obtuse, membranous and ciliated on margins (Figure 4). Petals white; claws 8-10 mm long, margins membranous, ciliate (Figure 5); limb of petals 4-6 mm long, deeply incised,

with 2 broadly linear segments; coronal scales barely distinct, as 2 very short tubercles. Androgynophore 4-5 mm long, densely pubescent, with backward, very short, hairs. Stamen much longer than petals; filaments glabrous, anthers purple. Ovary ca. 5-6 mm long; styles white, 10-12 mm long. Capsules elongated-ellipsoidal, 8-9 mm long, 1.6-1.8 times as long as carpophore, with 6 recurved teeth (Figure 6). Carpophore (the former androgynophore) ca. 5.0 mm long (Figure 6). Seeds grey-black, reniform, 1 mm wide; lateral sides slightly concave, testa papillae radially elongated; dorsal side flat to slightly concave, testa papillae less elongated (tubercles-like); all papillae toothed at base (Figure 6).

Plant identification. The identification of this species was quite difficult, because there are some (seemingly?) controversial data in the literature, regarding its morphological features, such as: (Table 1: * features that match specimens examined by us): stem not viscid or viscid above*; calyx glabrous*, or sparsely to densely hairy, not glandular* or glandular; calyx teeth acute or obtuse*; petal claws - not ciliate or ciliate*; capsule equal to, shorter or longer* than the carpophore.

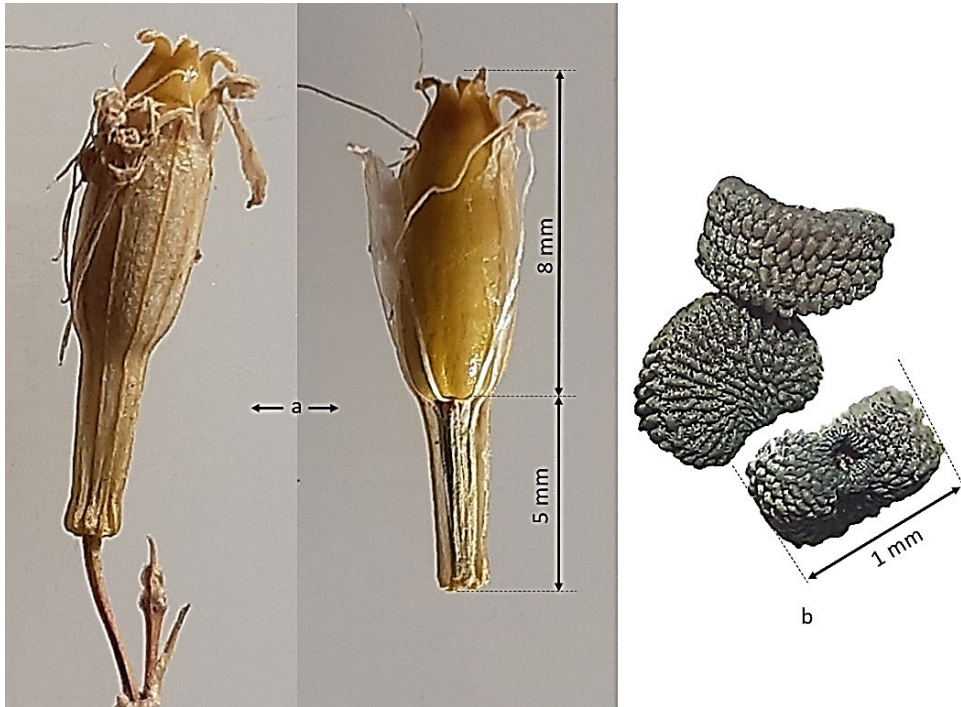


Figure 6. *Silene multiflora*: capsule with carpophore (a) and seeds (b)

We suppose that, excepting some statements that are most likely wrong (e.g., according to GUȘULEAC, 1953: the carpophore *usually* longer than capsule – as opposed to *S. chlorantha*; calyx sometimes with glandular hairs etc.), many of these controversial data in the literature reflects a large variability of the populations of *S. multiflora*, in various regions of its wide natural area. Some populations of this plant were circumscribed to different species (*S. steppicola* Kleopow; *S. syvashica* Kleopow), which subsequently were considered to the level

SILENE MULTIFLORA IN MOLDOVA (ROMANIA)

of subspecies and/ or varieties [TZELEV, 2004; TZVELEV & GELTMAN, 2012] or just variations with no taxonomic value [PROKUDIN & al. 1987; MOSYAKIN, 1999; DIDUKH, 2002; CHATER & al. 2010; FEDORONCHUK, 2023], which strengthens this supposition. This variability deserves to be investigated more carefully in the future!

All the morphological features observed by us in the specimens from north-eastern Romania, as shown in the description above, fall within the range of variability of the species *S. multiflora*, as described in various references (Table 1). The viscosity of stem is, however, a feature rarely associated with this species: *Viscago multiflora* – “caule [...] viscoso” [BAUMGARTEN, 1816]; *Viscago multiflora* – “cotor [...] cleios” (stem [...] viscid) [SZABO, 1841]; *Silene multiflora* – “not viscid except in inflorescence” (position 149 bis in the key) [CHATER & al. 2010]; *idem* – “stem pubescent at the base, often glabrous and viscid above” – for both *S. multiflora* and *S. italica* (position 19a in the key) [PROKUDIN & al. 1987].

Table 1. Some morphological features of the species *Silene multiflora*, according to various references (* features that match specimens examined by us)

Morphological features		References
Stem	viscid above*	BAUMGARTEN, 1816 (<i>Viscago multiflora</i>); SZABO, 1841 (<i>idem</i>); PROKUDIN & al. 1987 (both <i>S. multiflora</i> and <i>S. italica</i>)
	not viscid	NEILREICH, 1867; BRANDZA, 1898; GUŞULEAC, 1953; BELDIE, 1977; FISCHER & al., 2008; CHATER & al., 2010: “except in inflorescence”!; KIRÁLY, 2011; MEREĎA & al. 2012
Calyx	glabrous*	BELDIE, 1977; TZELEV, 2004 (<i>S. steppicola</i> subsp. <i>steppicola</i> ; <i>S. syvaschica</i> var. <i>glabra</i>); TZVELEV & GELTMAN, 2012 (<i>idem</i>); BELKIN, 2009
	glabrous* or sparsely hairy	ROHRBACH, 1868; SHISHKIN, 1936; FISCHER & al. 2008; CIOCÂRLAN, 2009; CHATER & al. 2010; SÂRBU & al. 2013; KIRÁLY, 2011; IZVERSCAIAM 2016
	densely to sparsely hairy	MEREĎA & al. 2012
	pubescent	EHRHART, 1792; PERSON, 1805; WALDSTEIN & KITAIBEL, 1799-1802; NEILREICH, 1867; BRANDZA, 1898; PRODAN, 1939; GUŞULEAC, 1953; TZELEV, 2004 (<i>S. steppicola</i> subsp. <i>pubescens</i>)
Calyx teeth	glandular	GUŞULEAC, 1953
	not glandular*	PRODAN, 1939; GUŞULEAC, 1953
	acute	CHATER & al. 2010; IZVERSCAIA, 2016
	obtuse*	WALDSTEIN & KITAIBEL, 1799-1802; NEILREICH, 1867; ROHRBACH, 1868; BRANDZA, 1898; SHISHKIN, 1936; PROKUDIN & al. 1987; MEREĎA & al. 2012
Petal claws	ciliate*	SHISHKIN, 1936; BELKIN, 2009; IZVERSCAIA, 2016
	not ciliate	MEREĎA & al. 2012
Fruit (F) versus carpophore (C)	F equalling C	EHRHART, 1792: “capsula longitudine thecapodii”; WALDSTEIN & KITAIBEL, 1799-1802: <i>idem</i> ; NEILREICH, 1867: <i>idem</i> (“carpophoro capsulam aequante”); ROHRBACH, 1868: \approx <i>idem</i> (“subaequans”); BRANDZA, 1898; PRODAN, 1939; CIOCÂRLAN, 2009: 8-10 mm both; NEGREAN & DIHORU, 2009: \approx 8-10 mm both; IZVERSCAIA, 2016: 6-7 mm both

<i>F</i> equalling <i>C</i> or somewhat longer	CHATER & al. 2010: (7-)8-10 mm both or carpophore a little shorter; SÂRBU & al. 2013
<i>F</i> longer than <i>C</i>*	SHISHKIN, 1936: 7-8 and 6 mm, respectively
<i>F</i> equalling or shorter than <i>C</i>	GUȘULEAC, 1953: “capsule as long as carpophore or slightly shorter”; <i>S. multiflora</i> (Ehrh.) Pers. “differs from the similar species <i>S. chlorantha</i> (Willd.) Ehrh., by [...] <i>carpophore longer than capsule</i> ”
<i>F</i> slightly shorter, equalling, or much longer* than <i>C</i>	MEREĐA & al. 2012: fruit 0.8-1.8 times as long as carpophore

By the stems with 6-8 nodes and the pedicels and calyx glabrous, the specimens we have analysed fit better to the east European (Ukrainian) populations designated as *S. multiflora* var. *glabra* (Kleop.) Fedor. (*Silene steppicola* Kleop. subsp. *glabra* Kleop.) [see TZELEV, 2004; FEDORONCHUK, 2023].

Has been *S. multiflora* actually found in Moldova since the 19th century? As shown in the *Introduction* section, according to BRANDZA (1879-1883) the distribution data of *Silene multiflora* (*Viscago multiflora*) reported by Czihak, Guebhard or Szabo from Moldova, must be taken into account for *S. nemoralis* Waldst. & Kit., while according to KANITZ (1877-1881), the same data must be considered for a much more distinct species – *S. viscosa* (L.) Pers. Certainly, the two authors could not be both right. On the other hand, the supposedly

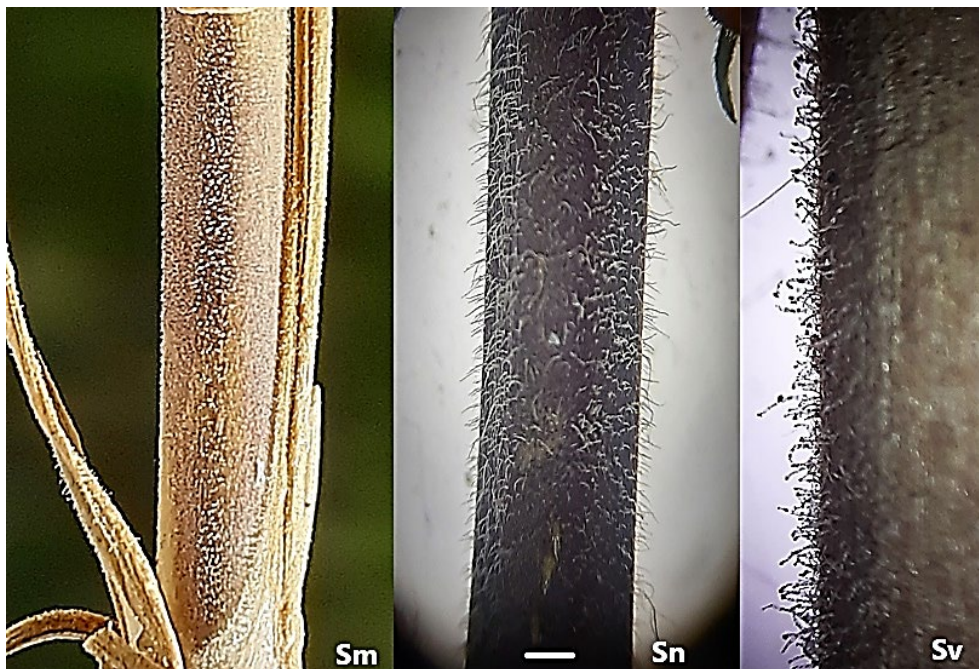


Figure 7. Differences between *S. multiflora* (Sm), *S. nemoralis* (Sn) and *S. viscosa* (Sv) regarding the stem pilosity (scale bar: 1 mm)

SILENE MULTIFLORA IN MOLDOVA (ROMANIA)

misidentification of *S. multiflora* by confusion with *S. nemoralis* or with *S. viscosa* is rather unlikely, given the obvious differences among the three species [SHISHKIN, 1936; CHATER & al. 2010; MEREĐA & al. 2012; SÂRBU & al. 2013 etc.; see also: TALAVERA, 1990 for *S. nemoralis*]. *S. multiflora* differs from *S. nemoralis* especially by: stem densely puberulent below, hairs very short, 0.1-0.2 mm long (*versus* stem pubescent, hairs less dense, much longer, up to 1 mm) (Figure 7); inflorescence narrow; branches non viscide, short, erect (*versus* panicle much wider; branches viscide, long, spreading) (Figure 8); pedicels much longer than bracteoles at the time of flowering (*versus* pedicels shorter than or equalling bracteoles) (Figure 8); calyx 12-15 mm long, glabrous (to \pm pubescent), not glandular (*versus* 14-24 mm; scattered hairy, often glandular); carpophore of 5-8 (-9) mm long, up to 1.8 times shorter than the mature capsule (*versus* 9-12 (14) mm, usually slightly longer than mature capsule) (Figure 9). Compared to *S. viscosa* it differs even more, especially by: the stem pubescence (stem, as well as the whole plant, glandular-tomentose, in *S. viscosa*) (Figure 7); basal leaves spatulate, margins entire, apex obtuse (*versus* leaves ovate-lanceolate, margins undulate-crenate, apex acute, in *S. viscosa*); calyx length and pilosity (14-24 mm, glandular-tomentose, in *S. viscosa*); carpophore-to-capsule ratio (carpophore 3-4 times shorter than the mature capsule, in *S. viscosa*) (Figure 9), etc.



Figure 8. Differences between *S. multiflora* (Sm) and *S. nemoralis* (Sn), regarding the inflorescence (left) and bracteoles to pedicel ratio (right) (scale bar: 2,5 cm – left; 2 mm – right)

Given the lack, nowadays, of herbarium specimens collected by Czihak, Guebard or Szabo, no one can prove which of the two approaches (Kanitz versus Brandza) was wrong, if not both. In these circumstances, we cannot exclude the possibility that, in fact, Czihak, Guebard and Szabo, or at least one of them, were right when mentioning *S. multiflora* from this historical province. The best proof of this is that the species is still present here, in a natural habitat whose characteristics match data from the literature (see below). In addition, it is worth

mentioning that the place where we identified *S. multiflora*, near Horlești village (Rediu commune), is not far away from Popricani (about 6 km in a straight line) – the locality from where Szabo (1873) – according to BRANDZA (1879-1883) mentioned “*Viscago multiflora*”. So, why wouldn't Szabo's data, although not confirmed by Brandza, refer to the same population as that we found, or to a neighbouring one, meanwhile disappeared?



Figure 9. Differences between *S. multiflora* (Sm), *S. nemoralis* (Sn) and *S. viscosa* (Sv), regarding the carpophore to capsule ratio (scale bar: 5 mm)

Coming back to more recent times, most likely, because of the glabrous calyx (“must be seen: the calyx is not hairy!”), Răvăruș has considered, in 1943, that the identification of specimens collected by him as *S. multiflora* is not certain (hence the question mark on the herbarium labels: “*Silene multiflora* (Ehrh.) Pers.?”). Consequently, he did not publish his herbarium data, and the presence of this species in the flora of Moldova has remained unconfirmed until now.

Ecological requirements and habitats. According to TICHÝ & al. (2023), *S. multiflora* prefers soils rather moist (M_{5.5}), alkaline (R₈), with low salinity (S_{3.5}) which is consistent with data provided by other references [JÁVORKA, 1925; PRODAN, 1935;

***SILENE MULTIFLORA* IN MOLDOVA (ROMANIA)**

SHISHKIN, 1936; BELKIN, 2009; CIOCÂRLAN, 2009; KIRÁLY, 2011; TZVELEV & GELTMAN, 2012; MEREĎA & al. 2012; SÂRBU & al. 2013] and is largely confirmed by our field data.

S. multiflora usually occurs on moist to marshy soils, dry in summer, rich in minerals and often slightly saline, in meadows and saline pastures in the lowland area, most often in communities of *Deschampsion cespitosae* and *Festucion pseudovinae* [MEREĎA & al. 2012]. It also grows on sandy soils [JÁVORKA, 1925; TZVELEV & GELTMAN, 2012; CIOCÂRLAN, 2009; SÂRBU & al. 2013], steppes [SHISHKIN, 1936; BELKIN, 2009; TZVELEV & GELTMAN, 2012], outcrops of chalk and limestone [TZVELEV & GELTMAN, 2012], and open woods [SHISHKIN, 1936; BELKIN, 2009].

According to the ecological data provided by CIOCÂRLAN (1994, 2009) and SÂRBU & al. (2013), among the *Silene* species in the flora of Romania, *S. multiflora* has the highest tolerance to seasonal water excess and soil salinity.

A proposal to protect this species. As shown in the introduction, *S. multiflora* is a very rare, critically endangered species in the flora of Romania. It is also very rare [TOFANBURAC & CHIFU, 2002; IZVERSCAIA, 2016; IZVERSCAIA & al. 2022], supposedly extinct [IZVERSCAIA & al. 2022] in the eastern neighbourhood of Romania (the Republic of Moldova). Therefore, we consider that the protection of this species in Romania is very necessary. In the northeastern Romania, this could be achieved by expanding eastward the Nature 2000 site ROSCI0058 “Dealul lui Dumnezeu”, which is located nearby, to the southwestern limit of the Horlești village.

Conclusions

Based on our own field research and specimens stored in public herbaria of Iași (Romania), we confirm in this paper the occurrence of the species *S. multiflora* in northeastern Romania (Moldova).

This is a very rare, critically endangered plant species in the flora of the country. In order to protect population of *S. multiflora* in this part of the country, we propose the extension eastward of the Nature 2000 site ROSCI0058, such that this should also include the meadow where this species grows, near the village of Horlești.

Acknowledgments

We are grateful to Mr. Myroslav Shevera (M. G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine) for the valuable advice and providing some very important references, as well as Mrs. Irina Irimia the curator of the I herbarium, for allowing us to analyse herbarium specimens.

References

- BAUMGARTEN J. C. G. 1816. *Enumeratio Stirpium Magno Transsilvaniae Principatus, I-III*, Vindobonae.
- BELDIE A. 1977. *Flora României. Determinator ilustrat al plantelor vasculare*, Vol. 1. București: Edit. Academiei Republicii Socialiste România, 412 pp.
- BELKIN D. L. 2009. Genus *Silene* L. in Altai Mountain country. *Turczaninowia*. **12**(3-4): 5-16.
- BORZA A. 1947-1949. *Conspectus Florae Romaniae, Regionumque affinium*. Cluj: Edit. Cartea Românească, 360 pp.
- BRANDZA D. 1879-1883. *Prodromul Florei Române*. București: Tipogr. Academiei Române, 568 pp.
- BRANDZA D. 1898. *Flora Dobrogei*. București: Institutul de Arte Grafice Carol Göbl, 490 pp.

- CHATER A. O., WALTER S. M., AKEROYD J. R. & WRIGLEY F. 2010. *Silene* L.: 191-218. In: TUTIN T. G. & al. (eds). *Flora Europaea*, Vol. 1, 2nd ed., 1st paperback printing. Cambridge: Cambridge University Press.
- CHIFU T., MÂNZU C. & ZAMFIRESCU O. 2006. *Flora & vegetația Moldovei (România)*. I. *Flora*. Iași: Edit. Universității "Alexandru Ioan Cuza" Iași, 367 pp.
- CIOCÂRLAN V. 1994. *Flora Deltei Dunării*. București: Edit. Ceres, 175 pp.
- CIOCÂRLAN V. 2009. *Flora ilustrată a României. Pteridophyta et Spermatophyta*. București: Edit. Ceres, 1141 pp.
- DIDUKH Y. (ed). 2002. *Ecoflora of Ukraine*. Kyiv: Phytosociocentre, 496 pp.
- EHRHART J. F. 1792. *Beiträge zur Naturkunde, und den damit verwandten Wissenschaften, besonders der Botanik, Chemie, Haus- und Landwirthschaft, Arzneigelahrtheit und Apothekerkunst*, Vol. 7. Hannover & Osnabrück: Verl. Chr. Ritscher.
- FEDORONCHUK N. M. 2023. *Ukrainian flora checklist*, Vol. 5. *Family Caryophyllaceae (incl. Illecebraceae) (Caryophyllales, Angiosperms)*. *Chornomorski Botanical Journal*. **19**(1): 5-57 [in Ukrainian].
- FISCHER M. A., OSWALD K. & ADLER W. 2008. *Excursionsflora für Österreich, Liechtenstein, und Südtirol*. 3. Aufl. Biologiezentrum der Oberösterreichischen Landesmuseen, 1392 pp.
- GUȘULEAC M. 1953. *Silene* L.: 142-184. In: SĂVULESCU T. (ed.), *Flora R. P. Române*, Vol. 2. București: Edit. Academiei Române.
- IZVERSCAIA T. 2016. Genus *Silene* L.: 280-293. In: NEGRU A. 2016 (red.), *Flora Basarabiei (Plante superioare spontane, Vol. II. Magnoliophyta)*. Chișinău: Edit. Universul.
- IZVERSCAIA T., GHENDOV V. & CIOCÂRLAN N. 2022. Extinct species of the *Caryophyllaceae* Juss. family in the spontaneous flora of Republic of Moldova. *Journal of Botany*. **XIV**, 1(24): 21-33.
- JÁVORKA S. 1925. *Magyar flora (Flora Hungarica)*, Vol. 1. Budapest, 1307 pp.
- JÁVORKA S. & CSAPODY V. 1934. *A magyar flóra képekben. Iconographia Florae Hungaricae*. Budapest.
- KANITZ A. 1879-1881. *Plantas Romaniae hucusque cognitae*. Claudiopoli, Apud E. Demjén, 268 pp.
- KARÁCSONYI C. 1995. *Flora și vegetația județului Satu-Mare*. Satu Mare: Edit. Muzeului Sătmărean, 196 pp.
- KIRÁLY G. 2011. *Új magyar fűvészkönyv. Határozóközlök*. Kiadó Aggteleki Nemzeti Park Igazgatóság. 616 pp.
- KIRÁLY G., VIRÓK V. & MOLNÁR A. (eds). 2011. *Új magyar fűvészkönyv. Ábrák*. Kiadó Aggteleki Nemzeti Park Igazgatóság, 676 pp.
- MEREĎA P. jun., ELIÁŠ P. jun., DÍTĚ D. & ŠTRBA P. 2012. *Silene* L.: 410-533. In: GOLIASOVÁ K. & MIHALKOVÁ E (eds.). *Flora Slovenska*, Vol. 6(3). Bratislava: VEDA, Vydavateľ'stvo Slovenskej akademie vied. 712 pp. [in Slovakian].
- MOSYAKIN S. I. (ed.) 1999. *Vascular plants of Ukraine. A nomenclatural checklist*. Kyiv: M. G. Kholodny Institute of Botany.
- NEGREAN G. & DIHORU G. 2009. *Silene multiflora* (Waldst. & Kit.) Pers.: 505-506. In: DIHORU G. & NEGREAN G. (eds.). *Cartea roșie a plantelor vasculare din România*. București: Edit. Academiei Române.
- NEILREICH A. 1867. *Diagnosen der in Ungarn und Slowenien bisher beobachteten gefässpflanzen*. Wien, 153 pp.
- OPREA A. 2005. *Lista critică a plantelor vasculare din România*. Iași. Edit. Universității "Alexandru Ioan Cuza" Iași, 668 pp.
- PERSON C. H. 1805. *Synopsis plantarum, seu Enchiridium botanicum, complectens Enumerationem systematicam specierum hucusque cognitam*. Pars prima. Parisiis Lutetiorum.
- PRODAN I. 1939. *Flora pentru determinarea și descrierea plantelor ce cresc în România*, Vol. 1. Cluj: Tipogr. Cartea Românească, 1278 pp.
- PROKUDIN I. N., DOBROCHAEVA D. N., ZAVERUKHA B. V., CHOPIK V. I., PROTOPOPOVA V. V. & KRITSKAIA L. I. (eds). 1987. *Opredelitel' vyshikh rastenii Ukrainy*. Kyiv: Naukova Dumka.
- REICHENBACH L. 1844. *Icones Florae Germanicae et Helveticae*, Vol. 6. Lipsiae.
- ROHRBACH P. 1868. *Monographie der Gattung Silene*. Leipzig: Verlag Von Wilhelm Engelmann. 253 pp.
- SĂRBU I., ȘTEFAN N. & OPREA A. 2013. *Plante vasculare din România. Determinator ilustrat de teren*. București: Edit. Victor B Victor, 1320 pp.
- SCHUR J. F. 1866. *Enumeratio Plantarum Transsilvaniae*. Vindobonae, 984 pp.
- SHISHKIN B. K. 1936. Genus *Silene* L. Pp. 578-692. In: SHISHKIN B. K. (ed.). *Flora USSR*, Vol. 6. Moskva-Leningrad: Izdatel'stvo Akad. Nauk SSSR. [in Russian].
- SIMONKAI L. 1886. *Erdély edényes flórájának helyesbített foglalata (Enumeratio florae Transsilvaniae vesiculosae critica)*. Budapest: Kiadja A Kir. Magyar Természettudományi Társulat, 678 pp.
- SZABO J. 1841. *Flora Principatului Moldovei, pentru cunoașterea plantelor crescătoare în Moldova*. Manuscript Iași: Central University Library.
- TALAVERA S. 1990. *Silene* L. In: CASTROVIEJO S., LAÍNZ M., LÓPEZ GONZÁLEZ G., MONTSERRAT P., MUÑOZ GARMENDIAF, PAIVA J. & VILLAR L. (eds.). *Flora Iberica*, Vol. 2. Madrid: Real Jardín Botánico, CSIC.

***SILENE MULTIFLORA* IN MOLDOVA (ROMANIA)**

- TICHÝ L., AXMANOVÁ I., DENGLER J., GUARINO R., JANSEN F., MIDOLO G. & CHYTRÝ M. 2023. Ellenberg-type indicator values for European vascular plant species. *Journal of Vegetation Science*. **34**: e13168. <https://doi.org/10.1111/jvs.13168>
- TOFAN-BURAC T. & CHIFU T. 2002. *Flora și vegetația din Valea Prutului*. Iași: Edit. CORSON, 437 pp.
- TZELEV N. N. (ed.). 2004. *Flora of Eastern Europe*, Vol. **11**. Moskva-Sankt-Petersburg: KMK. [in Russian].
- TZVELEV N. N. & GELTMAN D. V. (eds.). 2012. *Conspectus of the flora of Eastern Europe*, Vol. **1**. Sankt-Petersburg - Moskva: KMK [in Russian].
- UNGAR K. 1925. *Die Flora Siebenbürgens*. Sibiu: Verlag von Jos Drotleff, 535 pp.
- WALDSTEIN F. C. & KITAIBEL P. 1799-1802. *Descriptiones at Icones Plantarum Rariorum Hungariae*, Vol. **1**. Viennae.
-

How to cite this article:

- SÎRBU C. & OPREA A. 2024. *Silene multiflora* in Moldova (Romania). *J. Plant Develop.* **31**: 183-196. <https://doi.org/10.47743/jpd.2024.31.1.959>
-