

## SYNOPSIS ON GENUS *ERODIUM* L`Her. (GERANIACEAE Juss.) IN THE DNIESTER-PRUT RIVER REGION

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**Abstract:** *The article brings the list of the genus in Geraniaceae Juss. family – Erodium L`Her., which embodies 4 species in the Dniester-Prut region. The dichotomic key for genus Erodium, as well as brief ecological and habitat characters for each species are given.*

**Key words:** *flora, Geraniaceae, Erodium, biology, ecology, common and local distribution, illustration.*

### INTRODUCTION

The maintenance of floristical diversity nowadays is based on fundamental monographic studies and knowledge (in fundamental and practical aspect) on separate taxonomic groups.

Geraniaceae is a family of flowering plants placed in the order Geraniales. The family name is derived from the genus *Geranium*. The family comprises 830 species placed in five to seven genera. Numerically, the most important genera are *Geranium* L., *Pelargonium* L`Her. and *Erodium* L`Her.

Genus *Erodium* – variable in morphology and ecological characteristics, holds of the central position in system of family Geraniaceae Juss. The genus includes species, native to North Africa, Indomalaya, the Middle East, and Australia [6]. They are perennials, annuals, or subshrubs, with 5-petalled flowers in shades of white, pink and purple, that strongly resemble the species of better-known *Geranium* (cranesbill) genus.

### MATERIAL AND METHODS

During our investigation concerning genus *Erodium* for the flora of Dniester-Prut region, we performed all necessary research on field and laboratory examination. Firstly we reviewed all published information on the presence of species in the territory, and consulted specimen materials in different scientific herbaria (Herbarium of the Botanical Garden (Institute) of ASM, Herbarium of the State University of Moldova, Herbarium of the Botanical Institute Komarov (Sankt-Petersburg, Russian Federation), Herbarium of National Museum of Ethnography and Natural History of Moldova, etc. The illustration has been performed by Vinogradscaia O. and Teleuta S.

### RESULTS AND DISCUSSIONS

Genus *Erodium* L`Her. is one of the largest in the family Geraniaceae which comprises about 100 species, widespread in temperate, subtropical, and tropical zones of the northern and southern hemisphere, mainly in the Mediterranean region [6, 13]. In the flora of Europe it embodies 34 species [6], in Dniester-Prut river region – 4 species.

*ERODIUM* L`Her. – Stork's bill. – Прибої. – Аїстник

C.L. L'Heritier de Brutelle, 1789, in Aiton, Hort. Kew. 2: 414

Annual to perennial herbs, usually with hermaphrodite flowers, rarely dioecious. Leaves mostly opposite, usually longer than wide, pinnatifid to pinnate, or rarely undivided, usually with appressed hairs. Inflorescence an umbel (rarely reduced to a single flower), subtended by 2 or more usually scarious bracts. Flowers actinomorphic or slightly zygomorphic. Stamens 5, antesealous, with a nectary at the base of the filament, alternating with 5 scale-like staminodes. Fruits – indehiscent mericarps, separating from the base upwards,

retaining during dispersal the outer part of the style as a long beak, which at maturity, in most species become twisted into a spiral, the spiral pitch is varying depending on air humidity. Stigmas 5, filiform.

Lectotypus: *E. crassifolium* Soland. ex Ait. (= *E. hirtum* (Forssk.) Willd.)

#### Key to species of *Erodium*

- 1a. Perennial, with thick rhizome (up to 2-4 mm in diameter)..... 4. *E. ruthenicum*.
- 1b. Annual, with thin roots (less than 2 mm in diameter)..... 2.
- 2a. Leaves with the lobes excurrent on rachis..... 3. *E. hoefftianum*.
- 2b. Leaves with the lobes not excurrent on rachis..... 3.
- 3a. Leaves oblong, without intercalary lobes. Sepals 4-5 mm. Mericarps 4-7 mm..... 2. *E. cicutarium*.
- 3b. Leaves oblong-ovate up to triangular, with intercalary lobes. Sepals circa 7 mm. 1. *E. ciconium*.  
Mericarps 5-10 mm.....

1. *E. ciconium* (L.) L'Her. 1789, in Aiton, Hort. Kew. 2: 415; Введенский, 1949, Фл. СССР, 14: 71; Доброчаева, 1955, Фл. УРСР, 7: 39; Şerbănescu, 1958, Fl. R. P. Române, 6: 157; D.A. Webb a. Chater, 1968, Fl. Europ. 2: 201; Гейдеман, 1986, Опред. высш. раст. Молд.ССР, изд. 3: 336; Цвелев, 1996, Фл. Вост. Евр. 9: 386; Бойко, 1999, Опред. высш. раст. Укр., изд. 2: 222; Negru, 2007, Determ. pl. fl. R. Moldova: 161; Ciocărlan, 2009, Fl. ilustr. a României: 453. – *Geranium cyconium* L. 1755, Cent. Pl. 1: 21. – Common stork s bill. – *Pliscul berzei*. – АИСТНИК АИСТОВЫЙ.

Annual plant. Stems 10-70 cm, with short, usually deflexed and glandular hairs. Leaves up to 9 cm, pinnate at least near the base; leaflets pinnatisect, the ultimate segments dentate or pinnatifid; intercalary lobes present. Umbels with 3-10 flowers. Bracts ovate-lanceolate, densely pubescent. Sepals 12-15 mm, glandular-hairy. Petals c. 8 mm, bluish or lilac, with darker veins. Mericarps 9-11 mm, with numerous whitish hairs; apical pits deep, densely glandular, without a furrow at the base; beak 60-100 mm long. (Fig. 1)  $2n = 18$ .

It is an annual therophyte. The plants bloom in April-June and fructify in May-July. Propagate by seeds.

The plants grow solitarily or in small groups with the number of 1-2, in habitats of edges of forests with *Quercus pubescens* Willd. and steppe vegetation with the dominance of *Festuca valesiaca* Gaudin and the species of genus *Stipa*. [14] The single recently registered (May 2013) population embraces a group of about 30 mature specimens. The limitation factors of the distribution in the region are the reduced capacity of propagation and distribution, taking into account that it is an annual species that is less stable in comparison with perennial ones; extremely poor and isolated populations; afforestation of steppe clearings; excessive grazing.



Fig. 1. *Erodium ciconium* (L.) L'Her.

In the Dniester-Prut River region, it is present in the Lower Dniester region (the areas between the commune of Copanca and the village of Leuntea (Causeni district). It is indicated on the base of herbarium materials, collected by T. Savulescu in 1934 and by C. Zahariadi in 1937, for the southern part of the zone of Bugeac steppe (in the outskirts of the villages Budaki, Sergeevka and Bolgrad town). Outside the country, Common stork's bill is met in the Atlantic, Central and Eastern (in the south) Europe, Crimea, Mediterranean region, Minor and Middle Asia, Iran, the Caucasus (Pannonian-Ponto-Sarmatian geographical element). [6, 13]

The species is rare; as critically endangered taxa (CR), it has been included in the Red Book of Republic of Moldova [3]. The species is protected in the Wetland of international importance – Ramsar Site №1316, “The Lower Dniester” on the territory of the Forest Natural Reservation “Copanca”. [7] The species has been transferred to the steppe sector of the Botanical Garden of the Academy of Sciences of Moldova and is successfully growing in ex-situ conditions.

Protection measures for the preservation of the species in the Republic of Moldova: inclusion in the list of the species protected by law; identification and protection of the new places of the species growth; monitoring of the populations status; the species propagation in ex-situ conditions and its repatriation to the natural habitats. [3]



Fig. 2. *Erodium cicutarium* (L.)  
L'Her.

2. *E. cicutarium* (L.) L'Her. 1789, in Aiton, Hort. Kew. 2: 414; Введенский, 1949, Фл. СССР, 14: 71; Доброчаева, 1955, Фл. УРСР, 7: 38; Şerbănescu, 1958, Fl. R. P. Române, 6: 157; D.A. Webb a. Chater, 1968, Fl. Europ. 2: 202, р. max. р.; Гейдеман, 1986, Определ. высш. раст. Молд.ССР, изд. 3: 336; Цвелев, 1996, Фл. Вост. Евр. 9: 387; Бойко, 1999, Определ. высш. раст. Укр., изд. 2: 222; Васильева и Коваленко, 2003, Консп. флори Півден. Бессарабії: 127; Negru, 2007, Determ. pl. fl. R. Moldova: 161; Ciocârlan, 2009, Fl. ilustr. a României: 453. – *Geranium cicutarium* L. 1753, Sp. Pl.: 680. – Redstem stork's bill. – *Priboi cicutifoliu*. – Аистник обыкновенный.

Usually caulescent, often somewhat fetid. Stems up to 60(-100) cm. Leaves up to 15 cm long, pinnate, without intercalary lobes, with variable indumentum; leaflets pinnatifid to pinnate, but always divided for more than half-way to midrib. Umbels with up to 12 flowers. Bracts brownish. Sepals 5-7 mm. Petals 4-11 mm, purplish-pink, lilac or white. Mericarps 4-7 mm, with ascending hairs; apical pits eglandular; beak 10-70 mm long. (Fig. 2)  $2n = 20, 30, 36, 40$ .

It is an annual therophyte. The plants bloom in May-August and fructify in June-September. Propagate by seeds.

The plants usually grow in small groups or form small thick stands, sometimes they occur solitary as a weed along roadsides and in field margins, pasture, in habitats of edges of arid forests, in steppe and calcareous slopes, dry meadows. The species is widely distributed throughout the region. The area of distribution covers the territory of Eurasia and North America, being introduced in other regions. [6, 13] Circumpolar geographical element.

3. *E. hoefftianum* C.A. Mey. 1855, Mém. Acad. Sci. Pétersb. 6, ser. 7: 3; Введенский, 1949, Фл. СССР, 14: 70; Доброчаева, 1955, Фл. УРСР, 7: 37; D.A. Webb a. Chater, 1968, Fl. Europ. 2: 201; Цвелев, 1996, Фл. Вост. Евр. 9: 386; Бойко, 1999, Определ. высш. раст. Укр., изд. 2: 222; Ciocârlan, 2009, Fl. ilustr. a României: 454. – Hoefft stork's bill. – *Priboi Heft*. – Аистник Геффта.

Annual plant. Stems 15-50 cm, usually with patent hairs. Leaves not more than 6 cm, triangular-ovate,

occasionally without free pinnae at the base, the upper part pinnatifid; lobes dentate or pinnatifid. Umbels with 1-8 flowers. Bracts several, linear-lanceolate, hairy, brown. Sepals 7-10 mm. Petals c. 8 mm, violet. Mericarps 6-7 mm long, densely hairy; apical pits more or less eglandular, without a furrow at the base; beak 50-75 mm. (Fig. 3)

It is an annual therophyte. The plants bloom in April-May and fructify in May-June. Propagate by seeds.

It is met only in the south, in the sandy habitats on the banks of estuaries and lakes. The limitation factors in the region are: extremely poor and isolated populations; small territories of natural habitats; destruction of the growing sites due to recreational activities.

As a rare species, it is indicated for the region from 2 localities (in the outskirts of towns Belgorod-Dnestrovsky and Ismail, Odessa region, Ukraine) on the base of herbarium, collected by T. Savulescu in 1934 and C. Zahariadi in the 1937 and 1938. The species has not been found on the territory of the Republic of Moldova yet. Outside the Dniester-Prut river region it grows in Central (south-eastern part) and Eastern (southern part) Europe, ?Crimea, Mediterranean region (eastern part), the Caucasus, Middle Asia (Mediterranean-Ponto-Sarmatian geographical element). [6, 13]

It is rare on the territory of neighboring Romania and has been included in the Red Book of vascular plants in Romania [1] as critically endangered taxa (CR).

Protection measures for the preservation of the species in the Republic of Moldova: identification and protection of the new places of the species growth.

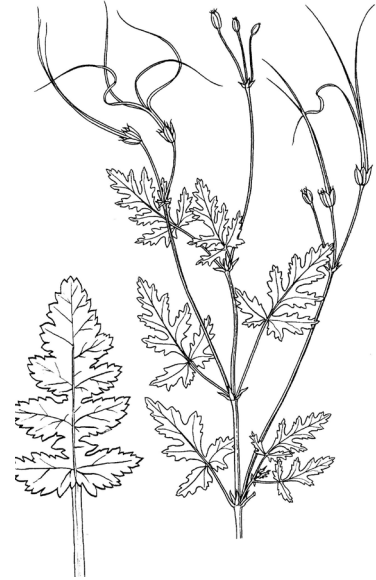


Fig. 3. *Erodium hoefftianum* C.A. Mey.

4. *E. ruthenicum* Bieb. 1810, Cent. Pl. Rar. Ross. Merid. 1: tab. 48; Введенский, 1949, Фл. СССР, 14: 68; Доброчаева, 1955, Фл. УРСР, 7: 35; Şerbănescu, 1958, Fl. R. P. Române, 6: 155; D.A. Webb a. Chater, 1968, Fl. Europ. 2: 201; Гейдеман, 1986, Опред. высш. раст. Молд.ССР, изд. 3: 336; Цвелев, 1996, Фл. Вост. Евр. 9: 386; Бойко, 1999, Опред. высш. раст. Укр., изд. 2: 222; Васильева и Коваленко, 2003, Консп. флори Півден. Бессарабії: 127; Negru, 2007, Determ. pl. fl. R. Moldova: 161; Ciocârlan, 2009, Fl. ilustr. a României: 453. – *E. serotinum* Stev. 1811, Mém. Acad. Sci. Pétersb. 3: 297, tab. 15, fig. 2. – Russian stork's bill. – Прибой русск.



Fig. 4. *Erodium ruthenicum* Bieb.

Perennial plant. Stems 15-50 cm, usually with patent hairs. Leaves up to 8 cm long, triangular-ovate, with one pair of free pinnae at the base, the upper part pinnatifid; lobes dentate or pinnatifid. Umbels with 3-13 flowers. Bracts linear-lanceolate, hairy, brown. Sepals 10-12 mm long. Petals about 12 mm, violet. Mericarps about 8 mm, densely hairy; apical pits glandular, without a furrow at the base; beak 30-70 mm long. (Fig. 4)

It is a perennial hemicryptophyte. The plants bloom in May-August and fructify in June-September. Propagate by seeds.

The plants grow in dry open habitats of steppe and calcareous slopes, shrub stands,

different types of dry grasslands with disturbed vegetation. The limitation factors of the distribution in the region are: extremely small and highly fragmented populations, with a small number of specimens; reduced specific habitats; destruction of the species' growing sites as a result of recreational activities and afforestation with allochthonous species; grazing.

It is met in the south-eastern part of Dniester river basin (Shtefan-Voda district) and southern district (in the outskirts of Tatar-Bunar town, Odessa region, Ukraine). It is indicated for the region on the base of herbarium specimens, collected by T. Savulescu in 1934 and by N.M. Zelenetzki (without the date of collection). The area of distribution includes Central and Eastern (southern part) Europe, the Caucasus (Panonian-Pontic geographical element). [6, 13]

Protection measures for the preservation of the species in the Republic of Moldova: inclusion in the list of the species protected by law; identification and protection of the new places of the species growth; the species propagation in ex-situ conditions and its repatriation to the natural habitats.

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