

Ranunculus paludosus and *Erodium botrys*: two new species for the Bulgarian flora

Georgi Kunev & Rossen Tzonev

Department of Ecology and Environmental Protection, St. Kliment Ohridski Sofia University, Faculty of Biology, 8 Dragan Tzankov Blvd. 1164 Sofia, Bulgaria, e-mails: gorokunev@abv.bg (corresponding author); rossentzonev@abv.bg

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Abstract. *Ranunculus paludosus* is reported for the first time from Bulgaria. The occurrence of *Erodium botrys* has already been indicated for the Bulgarian flora. However, it has been subsequently rejected, due to lack of reliable data. The present paper confirms its distribution in the country.

Key words: Bulgaria, Geraniaceae, new taxa, Ranunculaceae

Introduction

The flora of Bulgaria is rather well known, but nevertheless new species have been found during the last years. However, these are occasional finds, and the species are mostly some aliens. Representatives of the natural flora are found more seldom. This article provides information on the occurrence of *Ranunculus paludosus* and *Erodium botrys*. They are native to Europe and mostly to the Mediterranean region. Both are also known from the neighboring countries. In the past, the second species was even recorded erroneously from Bulgaria. The authors provide concise descriptions, with emphasis on the characters distinguishing the species from morphologically similar common species already known from Bulgaria. Some notes on their ecology, phenology and habitats are also supplied in this study.

Material and methods

Herbarium material representing both taxa has been compared to plants kept in the Herbarium of the Insti-

tute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (SOM) and in the Herbarium of the St. Kliment Ohridski Sofia University (SO). As far as possible, descriptions of the species are based on herbarium specimens collected on the Balkan Peninsula and on personal data. However, the descriptions of *Ranunculus paludosus* (Tutin & Akeroyd 1993) and *Erodium botrys* (Webb & Chater 1968) were also used. Photographs of living plants and/or herbarium specimens are provided.

Results and discussion

Ranunculaceae

Ranunculus paludosus Poir., *Voy. Barb.* 2: 184 (1789)

Rhodope Mountains (*Eastern*): Fotinovo village (Kardzhali district), in therophytic communities maintained as pastures, along the road to the village, 290 m a.s.l., 41°23'49.69"N, 25°21'36.75"E, LF 68, 22.04.2018, coll. & det. G. Kunev (SO 107952, 107953; SOM 176295, 176294); very close (60 m) to the previous locality, 295 m a.s.l., 41°23'48.05"N, 25°21'37.76"E, 23.04.2018, coll. & det. G. Kunev (SO 107954, 107955);

between the villages Dryanova Glava and Zagorichane (Kardzhali district), 41°22'47.74"N, 25°19'11.85"E, LF 58, 22.04.2018, G. Kunev (pers. observ.); Hadzhiysko village, (Kardzhali district), in communities of *Genista rumelica*, 300 m, 41°23'59.88"N, 25°21'25.49"E, LF 68, 25.04.2017, G. Kunev (pers. observ. (Fig. 1)

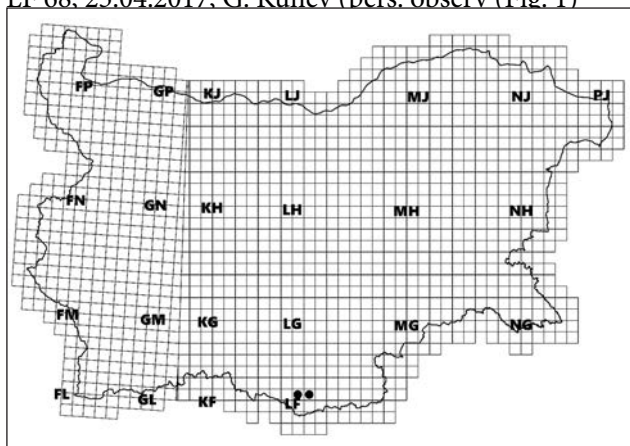


Fig. 1. Distribution map of *Ranunculus paludosus* and *Erodium botrys*, grid squares 10×10 km (LF 58, LF 68).

Species description

A perennial herb, with ovoid fleshy roots (tubers), stems 5–25(50) cm high. Stock usually short and swollen, with persistent fibers. Outer basal leaves usually simple, broadly wedge-shaped, ovate, broadly toothed or shallowly 3-lobed; inner 3-fid; middle segment long-stipitate; all divided into dentate segments. Flowers 1–8, but mostly one or two in number, 12 to 20(25) millimeters in size, yellow. Receptacle glabrous. Achenes c. 2 mm, minutely punctate, sparsely pubescent, strongly keeled back, tapering into a nearly straight beak almost as long as the achene and hooked at tip. Chromosomes: $2n = 16, 32$.

In the Bulgarian flora, this species (Fig. 2) is most similar to *Ranunculus sprunerianus* Boiss (see Penev 1970). However, there are some differences between



Fig. 2. *Ranunculus paludosus* (Photo G. Kunev).

both species. *Ranunculus sprunerianus* is normally about or over 40 cm high. The flowers are numerous, 10 and more, 25 mm wide in diameter. The stock is not swollen, nor fibrous; the fleshy roots are fusiform and oblong. *Ranunculus paludosus* is a low plant – normally below 20 cm. The flowers are solitary (very often even single) and their diameter is normally below 20 mm. The stock is swollen and densely fibrous. The fleshy roots (tubers) are ovoid (Fig. 3).

Ranunculus paludosus is a widespread species in the Mediterranean region of Europe, Turkey, Near East, North Africa, and Cyprus (Tutin & Akeroyd 1993; Hörandl & Raab-Straube 2015). It occurs in the countries neighboring to Bulgaria, namely Serbia, Greece, Macedonia, and European Turkey (Hayek 1927; Sarić 1992; Greuter & al. 1989; Dimopoulos & al. 2013; etc.). Its



Fig. 3. Rootstock of *Ranunculus paludosus* (Photo G. Kunev).

restricted distribution in most Mediterranean areas of SE Bulgaria, hardly noticeable habitus and early flowering (typical for the geophytes and therophytes in this region) most probably are the reason to remain so far unknown for the Bulgarian flora.

In the newly found localities in Eastern Rhodope Mts (Bulgaria), the population of *Ranunculus paludosus* is represented by small groups (Fig. 4) or clusters, mostly due to its vegetative germination. They consist predominantly of 20–25 individuals. The flowering period is probably from the end of March until the beginning of May (III–V). The habitats in these localities are mosaic, of grasslands and low scrublands. They are dominated by *Genista rumelica*, *Cistus incanus* and *Chrysopogon gryllus*. The species composition of these communities includes *Sanguisorba minor*, *Anthoxanthum aristatum*, *Moenchia erecta*, *M. mantica*, *Centaurea rutifolia*, *Thymus* ssp., *Vicia villosa*, *Asyneuma limonifolium*, *Rubus* ssp., and *Rosa* ssp. *Saponaria stranjensis* is another species of conservation significance in one of these localities.



Fig. 4. *Ranunculus paludosus* in its natural habitat (Photo G. Kunev).

Geraniaceae

Erodium botrys (Cav.) Bertol. *Amoen. Ital.*: 35 (1819).

Rhodope Mountains (*Eastern*): Benkovski village (Kardzhali district), in therophytic communities, on the left bank of river Varbitsa, at the bridge between Benkovski and Mogilyane, 340 m a.s.l., 41°22'47.53"N, 25°14'42.24"E, LF 58, 22.04.2018, coll. & det. G. Kunev (SO 107948; SOM 176293); Podkova village (Kardzhali district), in therophytic communities maintained as pastures, close to the banks of river Kazalach, growing in abundance, 290 m a.s.l., 41°23'02.59"N, 25°24'16.21"E, LF 68, 23.04.2018, coll. & det. G. Kunev (SO 107949; SOM 176292); Fotinovo village (Kardzhali district), in pastures, on the left bank of river Varbitsa, growing in abundance, 290 m a.s.l., 41°23'48.09"N, 25°21'38.23"E, LF 58, 23.04.2018, coll. & det. G. Kunev (SO 107950, 107951; SOM176296); Hadzhiysko village (Kardzhali district), 41°24'1.50"N, 25°21'26.75"E, LF 68, 23.04.2018, G. Kunev (pers. observ.); Dobromirski village (Kardzhali district), 41°22'36.76"N, 25°13'27.97"E, LF 58, 23.04.2018, G. Kunev (pers. observ.) (Fig.1).

Species description

A caulescent annual; stems (5-)10–40 cm, with long patent or deflexed hairs. Leaves up to 5 cm, usually appressed-setose, oblong or ovate, at least the upper deeply pinnatifid or pinnatisect; lobes pinnatifid or dentate. Umbels with 1–4 flowers; bract ovate-lanceolate, acute, subglabrous, brown. Sepals 10–13 mm; petals c. 15 mm, violet. Mericarps 8–11 mm, with ascending whitish hairs, apical pits deep, eglandular, with two furrows at the base, the upper larger. Beak 50–110 mm. Chromosomes: $2n = 40$.

In the Bulgarian flora, the species is most similar to *Erodium hoefftianum* and *Erodium cionium*. However, their leaves are pinnate and seldom pinnatisect. The apical pits of their mericarps are without, or with only one furrow. The beak of the fruits is 50–75 mm long. *Erodium botrys* has pinnatisect leaves (Fig. 5), often not very deeply divided. The most important difference is that the apical pits of the mericarps are with two conspicuous furrows at their base (Fig. 6). The length of the fruit's beak of most of the observed individuals exceeds 80 mm.

Erodium botrys is mostly a South European species distributed also in some neighboring to Bulgaria



Fig. 5. *Erodium botrys* (Photo G. Kunev).



Fig. 6. *Erodium botrys* – the apical pits of the mericarps (Photo G. Kunev).

countries like Greece and in the countries of former Yugoslavia (Webb & Chater 1968; Greuter & al. 1986; Aldasoro & al. 2009). It has been also reported from Bulgaria, from the Struma Valley (in the vicinities of Simitli town) (Stojanov 1924; Stojanov & Stefanov 1925; Stojanov & al. 1967). However, due to lack of herbarium materials, distribution of this species in Bulgaria was regarded as doubtful, or as a result of misidentification of *Erodium hoefftianum* (Hermann & al. 1931; Stojanov & Stefanov 1933; Petrova & Kozuharov 1979).

In the newly-found localities in the Eastern Rhodope Mts, the flowering period of *Erodium botrys* starts at the end of March and lasts until the beginning of May (III-V). All identified populations (Fig. 7) inhabit dry grasslands used for active grazing. They have a diverse floristic structure. In the spring, they are rich in therophytes, such as many annual clovers: *Trifolium resupinatum*, *T. subterraneum*, *T. tenuifolium*, *T. scabrum*, *T. cherleri*, *T. arvense*, *T. dubium*, as well as other species: *Myosotis ramosissima*, *Molineriella minuta*, *Saxifraga tridactylites*, *Romulea linaresii* subsp. *graeca*, *Ornithoga-*



Fig. 7. *Erodium botrys* in its natural habitat (Photo G. Kunev).

lum sibthorpii, *Veronica acinifolia*, *V. verna*, *Teesdalia coronopifolia*, *Erophila verna*, *Aphanes arvensis*, *Cerastium brachypetalum*, *Tuberaria guttata*, *Ornithopus compressus*, *Hypochaeris glabra*, *Poa bulbosa*, *Bellis perennis*, *Parentucellia latifolia*, *Juncus bufonius*, *Plantago bellardii*, etc. From the middle of June, their aspect is dominated by tall grasses, mostly *Chrysopogon gryllus*. Common are also some shrubs and semi-shrubs like *Genista rumelica*, *Cistus incanus*, *Prunus spinosa*, etc. It is impossible to observe *Erodium botrys* during that period and probably this explains why it has not been found so far.

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