

Distribution of the species *Matthiola fruticulosa* (L.) Maire (Brassicaceae) in Croatia

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Vedran Šegota (Division of Botany, Department of Biology, Faculty of Science, University of Zagreb, Marulićev trg 20/2, HR-10000 Zagreb, Croatia; vedran.segota@biol.pmf.hr; corresponding author / autor za korespondenciju)

Nenad Jasprica (Institute for Marine and Coastal Research, University of Dubrovnik, P.O. Box 83, HR-20000 Dubrovnik, Croatia; nenad.jasprica@unidu.hr)

Sandro Bogdanović (Department of Agricultural Botany, Faculty of Agriculture, University of Zagreb, Svetošimunska cesta 25, HR-10000 Zagreb, Croatia; sbogdanovic@agr.hr)

Marija Pandža ("Murterski škoji" Primary School, Put Škole 10, HR-22243 Murter, Croatia; marija.pandza@si.t-com.hr)

Milenko Milović ("Antun Vrančić" Grammar School, Put Gimnazije 64; Medical School, Ante Šupuka, HR-22000 Šibenik, Croatia; milenko.milovic@si.t-com.hr)

Antun Alegro (Division of Botany, Department of Biology, Faculty of Science, University of Zagreb, Marulićev trg 20/2, HR-10000 Zagreb, Croatia; antun.alegro@biol.pmf.hr)

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Abstract

This paper presents the distribution of the rare plant species *Matthiola fruticulosa* (L.) Maire in Croatia. During our study, previous records on the Pelješac peninsula were confirmed, and new records were found, extending the Croatian areal to the southern

slopes of the Svilaja Mt. The species was found to be affiliated with calcareous rocky habitats (screes, rocky pastures and shrublands). Additionally, discrete identification keys were proposed, for the identification of vegetative and flowering as well as fructifying plants.

Keywords: Croatia, flora, *Matthiola fruticulosa*, Pelješac Peninsula, Svilaja Mt

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Sažetak

U radu se analizira rasprostranjenost rijetke biljne vrste *Matthiola fruticulosa* (L.) Maire u Hrvatskoj. Tijekom našeg istraživanja potvrđena su prethodna nalazišta vrste na Pelješcu, a nova nalazišta su proširila areal vrste u Hrvatskoj sve do južnih

padina Svilaje. Vrsta se pojavljuje na vapnenačkim kamenjarskim staništima (točila, kamenjarski pašnjaci i šikare). U radu su predloženi ključevi za određivanje vrsta, kako u vegetativnom obliku i tijekom cvatnje, tako i u plodu.

Ključne riječi: Hrvatska, flora, *Matthiola fruticulosa*, poluotok Pelješac, Svilaja

Introduction

The genus *Matthiola* R.Br. includes 48 species distributed across the Mediterranean Basin, Macaronesia, the Saharo-Sindian Region and NE Africa-Asia (Jaén-Molina et al. 2009). In Europe, 10 species are known (Ball 1993), a number of which are cultivated for ornamental purposes, owing to their colourful, heavily scented flowers.

Four species of the genus are present in Croatia, distributed exclusively in the Mediterranean region (Trinajstić & Drenkovski 1977, Plazibat 1997, Nikolić 2016). *Matthiola incana* (L.) R.Br. is moderately widespread along the Adriatic coast and on the islands, while *Matthiola fruticulosa* (L.) Maire, *M. sinuata* (L.) Br. and *M. tricuspida* (L.) R.Br. are extremely rare with barely a few localities; the latter, for example, due to its connection with Mediterranean coastal sands, a habitat type which is extremely rare and endangered along the eastern Adriatic coast, as well as with gravels within annual vegetation of drift lines.

Matthiola fruticulosa (synonyms: *Cheiranthus fruticosus* L., *Cheiranthus coronopifolius* Sm., *Cheiranthus tristis* L., *Matthiola tristis* (L.) R. Br., *Matthiola tristis* (L.) R.Br. var. *italica* Conti, *Matthiola stenopetala* Pomel) is Southern European species, known from all three European Mediterranean peninsulas, as well as the Balearic Islands and Sicily (Ball 1993, Euro+Med PlantBase 2016). However, it reaches as far north as the Southern Alps in Switzerland (Lauber & Wagner 1998). Additionally, the species is native to Northern Africa (Algeria, Libya, Tunisia and Morocco), while its nativeness in Middle East (Syria and Lebanon) is considered to be doubtful (Euro+Med PlantBase 2016). Thus, the species clearly shows circum-Mediterranean distribution (Jaén-Molina et al. 2009, Euro+Med PlantBase 2016).

Matthiola fruticulosa is a perennial species, with vegetative leaf-rosettes and often a long, woody stock that reaches up to 60 cm in length. Leaves are linear and entire, while the colour of petals varies from yellowish and pinkish to purplish violet. Three subspecies are recognized in Europe: (1) the typical subspecies, *M. fruticulosa* ssp. *fruticulosa*, grows throughout the range of the species, except in the Alps, (2) *M. fruticulosa* ssp. *valesiaca* (Gay ex Gaudin) P. W. Ball is present in the Pyrenees, Northern & Eastern Spain, Southern Alps and the Balkan Peninsula, while (3) *M. fruticulosa*

ssp. *perennis* (P. Conti) P. W. Ball is restricted to Northern Spain (Picos de Europa, in the Cantabrian Mountains) (Ball 1993).

In Croatia, only the typical subspecies of *M. fruticulosa* is known (Trinajstić & Drenkovski 1977, Plazibat 1997, Nikolić 2016).

Material and methods

A comprehensive floristic study of parts of the Svilaja Mountain (Southern Croatia) was carried out in 2010 and 2013, while field trips to Pelješac Peninsula were undertaken in 2009, 2010 and 2012. On the localities checklists of main vascular plants were made, and some of the interesting taxa were photographed, collected and herborized. Nomenclature of the plant taxa follows Flora Croatica Database (Nikolić 2016). All historical literature data regarding the distribution of *M. fruticulosa* in the Balkans was collected. In addition, all available herbarium collections in Croatia (CNHM - Herbarium of Croatian Natural History Museum, ZA - Herbarium Croaticum, ZAHO - Herbarium of Ivo and Marija Horvat, and ZAGR - Herbarium Facultatis Agronomiae) were cautiously checked.

Results and discussion

The analysis of literature revealed a fairly narrow distribution area of *M. fruticulosa* in Croatia. First known record dates back to mid-19th century, when Visiani (1852) noted the species on the Mt Zarina near Dubrovnik. Nowadays, this toponym is not in use and the locality is referred to as fortress Strinčjera on the Srđ plateau above the city of Dubrovnik (south Croatia). Visiani (1852) recorded the species also in "Primorje" (Littoral region), without mentioning any specific locality, on the insolated rocks and screes, and on fringes of arable fields (*in saxosis apricis et declivibus arenosis...*, *et ad margines agrorum*). Both localities have been cited later by Schlosser & Vukotinić (1869), but never reported since.

The only known data from the 20th century refer to the Pelješac Peninsula. The first record dates back to the beginning of the century, when Morton (1916) (Fig. 1) documented the species on the southern slopes of Monte Vipera hill (known today as St. Ilija Mt), located in the western part of the

Peninsula, above the settlement of Orebić. There, *M. fruticulosa* was found on the rocky screes (*in der Formation der steinigen Triften*). The species was recorded again on the same hill by Rechinger (1934), on hill slopes above the Franciscan monastery in the Podgorje area (between 300 and 400 m a. s. l.), and on rocks of the saddle above village of Stanković (ca 350 m a. s. l.).

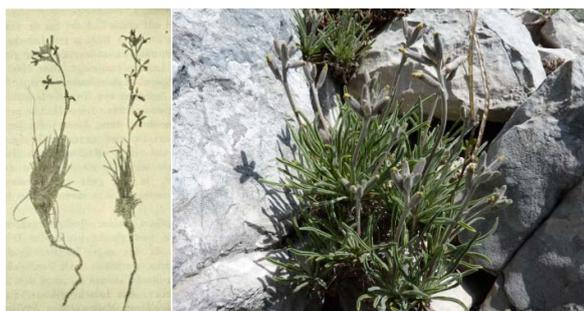


Figure 1. Photos of *Matthiola fruticulosa* from the Pelješac Peninsula published by Morton in 1916 (left) and Topić in 2010 (right), latter one published in the Flora Croatica Database.

Until now, in Croatian herbaria there were no herbarium specimens of *M. fruticulosa* collected in Croatia. The largest collection (ZA) contained no specimens, while the ZAHO and CNHM contained one each, both collected in neighbouring Bosnia and Herzegovina. Thus, even Hirc (1904) in *Revision of Croatian flora* questioned the existence of *M. fruticulosa* (as well as of *M. sinuata* and *M. tricuspidata*) in Croatia, since he could not find any specimens in any available herbarium collections. During our study, three herbarium sheets were deposited in ZAGR and one in ZA. Finally, it is worth mentioning that CNHM collection (precisely collection Trinajstić) keeps six herbarium sheets, all from the same locality (Pelješac Peninsula, slopes of Sveti Ilija Mt, above Ruskovići village, March 30th 1969, collector I. Trinajstić), with specimens assigned as *Matthiola illyrica* nova on the herbarium label. However, we found no morphological evidence for the establishment of the new taxon, thus those specimens belong to *M. fruticulosa*.

More recently, *M. fruticulosa* was rediscovered on several localities on the Pelješac Peninsula. On June 27th 2009 it was found firstly on the southern slopes of the Sveti Ilija Mt, in the Podgorje area, above Gurića selo village, on 200 m a. s. l. (HTRS96 coordinates: 553423, 4760470), and then above the village of Postup, beneath the Kapetan hill, on ca 300 m a. s. l. (HTRS96 coordinates: 561509, 4759019). On April 18th 2010 it was recorded on the very top of the peninsula – Sveti Ilija peak (961 m a. s. l.) HTRS96 coordinates: 553770, 4762039) (Topić 2010) (Fig. 1), and

finally, on June 17th 2012 near the Žukovac village (HTRS96 coordinates: 551595, 4760876) (Fig. 2). All localities belong to the same mountain massif on the south-western part of the peninsula, with less than 10 km between the most distant sites. In this area, we found *M. fruticulosa* inhabiting mostly rocks, screes and rocky pastures. On screes, it was accompanied with *Asphodelus fistulosus* L., *Asphodeline liburnica* (Scop.) Rchb., *Euphorbia spinosa* L., *Iris pseudopallida* Trinajstić, *Alyssoides utriculata* (L.) Medik., *Cephalaria leucantha* (L.) Roem. et Schult., *Campanula pyramidalis* L., *Cerinth minor* L., *Crucianella latifolia* L., *Convolvulus althaeoides* L. ssp. *tenuissimus* (Sibth. et Sm.) Stace, etc. Furthermore, we found *M. fruticulosa* in the recently described subassociation *Fraxino ornio-Quercetum cocciferae* (Horvatić 1958) Trinajstić 1985 *nerietosum oleandri* Jasprica et Škvorc 2015 (Jasprica et al. 2015), as well as on dry rocky grasslands of the *Scorzoneretalia villosae* Kovačević 1959 alliance (Terzi 2015), where it was found among *Sedum ochroleucum* Chaix, *Jurinea mollis* L., *Melica ciliata* L., *Tanacetum cinerariifolium* (Trevir.) Sch.Bip., *Micromeria juliana* (L.) Benth. ex Rchb., *Petrorhagia saxifraga* (L.) Link, *Teucrium montanum* L., *Edraianthus tenuifolius* (Waldst. et Kit.) A.DC., *Satureja montana* L., etc.

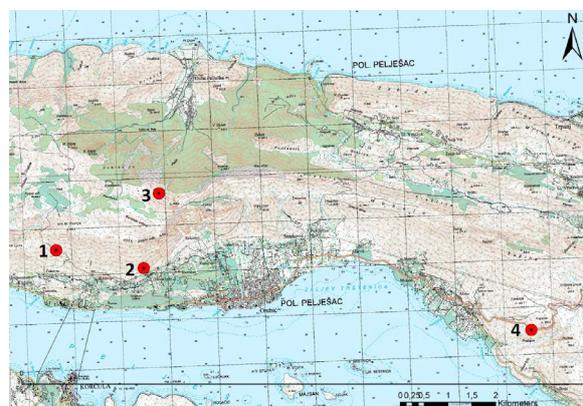


Figure 2. Recent findings of *Matthiola fruticulosa* on the Pelješac Peninsula: 1. Žukovac, 2. Gurića selo, 3. Sveti Ilija peak and 4. Kapetan.

During the floristic study of the Svilaja Mt in May 2010, the species was discovered beneath Orlove stine peak, on 900 m a. s. l., more precisely, between two ridges (Gola kosa and Krajna kosa), northern from villages of Gornje Ogorje and Zelovo (HTRS96 coordinates: 502082, 4846540). Orlove stine are part of the southernmost slopes of the large Svilaja Mt. The small population consisting of barely ten individuals, caught in the bloom at the time of our visit, grew on the bare stone debris substrate (Fig. 3). This scree-like habitat was situated on the edge of the rocky calcareous grasslands developed

on the slight slope terrain. Here, *M. fruticulosa* was accompanied with *Cephalaria leucantha* (L.) Roem. et Schult., *Edraianthus tenuifolius* (Waldst. et Kit.) A.DC., *Fumana procumbens* (Dunal) Gren. et Godr., *Globularia cordifolia* L. ssp. *bellidifolia* (Ten.) Wettst., *Helichrysum italicum* (Roth) G.Don, *Inula ensifolia* L., *Satureja subspicata* Vis., *Jurinea mollis* (L.) Rchb., *Anthyllis vulneraria* L. ssp. *praepropera* (A.Kern.) Bornm., etc.



Figure 3. The specimen of *Matthiola fruticulosa* on the Svilaja Mt (Photo: V. Šegota, May 2010).

On May 18th 2013, two new and larger populations were discovered on the Svilaja Mt, again beneath the Orlove stine peak; the first one between the Gola kosa and the Ječmenjaci ridges, on 950 m a. s. l. (HTRS96 coordinates: 501534, 04846066), and second one in the close vicinity of the mountaineering lodge "Orlove stine", on 1100 m a. s. l. (HTRS96 coordinates: 502000, 04847603) (Fig. 4), mostly on the rocky grasslands with shallow soils within the *Saturejion subspicatae* Tomić-Stanković 1970 alliance, partly in vegetation succession. The species grew along with *Jurinea mollis* L., *Koeleria splendens* C.Presl, *Paronychia kapela* (Hacq.) A. Kerner, *Prunus mahaleb* L., *Pyrus amygdaliformis* Vill., *Ranunculus illyricus* L., *Satureja montana* L., *Scorzonera villosa* Scop., *Sesleria autumnalis* (Scop.) F.W.Schultz, etc.

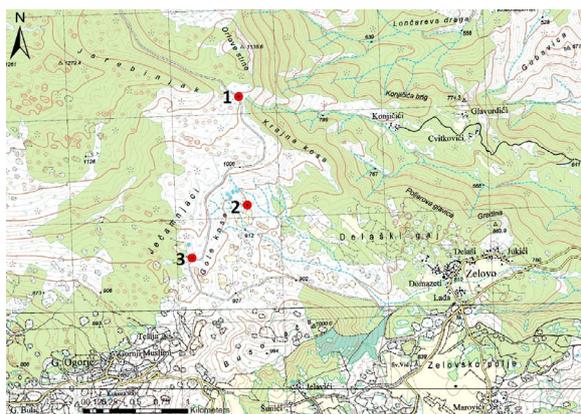


Figure 4. Recent findings of *Matthiola fruticulosa* on the the Svilaja Mt: 1. Orlove stine mountaineering lodge, 2. Gole kose and 3. Ječmenjaci.

The finding of *M. fruticulosa* on the Svilaja Mt represents a noteworthy extension of the species' areal in Croatia (Fig. 5). Since the old finding in the vicinity of Dubrovnik was not checked, Pelješac peninsula and Svilaja Mt remain the only present known localities in Croatia. These localities are most likely the northernmost on the Balkan Peninsula, connected with those in neighbouring Bosnia and Herzegovina, and Montenegro. In Bosnia and Herzegovina, *M. fruticulosa* is considered a very endangered species (Šilić 1996), meaning that it is so endangered that it could easily vanish if the human influences remain. In Montenegro, all localities are located in the southern part of the country (Rohlena 1942, Stešević et al. 2009).



Figure 5. Findings of *Matthiola fruticulosa* in Croatia.

Since the identification keys for Croatian flora do not recognize all of *Matthiola* species, we have prepared a complete key for the genus in Croatia. Additionally, seeing that most of the keys are based exclusively on fruit (silique) characters, beside such key we have prepared an additional key, for specimens without fruits.

Determination key for plants without fruit:

- 1a Leaves entire2
 1b Leaves sinuate to pinnatifid3
- 2a Leaves linear, 2 - 4 mm wide; flowers (sub)sessile.....
*M. fruticulosa*
- 2b Leaves lanceolate, 10 - 30 mm wide; flowers on short
 pedicels*M. incana*
- 3a Leaves up to 10 cm long; biennials*M. sinuata*
 3b Leaves up to 5 cm long; annuals*M. tricuspida*

Determination key for plants in fruit:

- 1a Siliqua with 3 ± equal triangular horns at the apex,
 horns 2-6 mm long, plants annual
*M. tricuspida*
- 1b Siliqua without conspicuous horns or with only 2
 shorter than 2 mm; biennials or perennials2
- 2a Siliqua ± cylindrical, usually not more than 2 mm
 in diameter; fruit pedicels not more than 3(-8)
 mm long*M. fruticulosa*
- 2b Siliqua compressed, at least 2 mm wide; lower
 fruit pedicels up to 25 mm long3
- 3a Siliqua with large, conspicuous blackish or
 yellowish glands, easily visible even when
 immature*M. sinuata*
- 3b Siliqua without conspicuous glands, but usually
 with minute glandular hairs*M. incana*

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