

Short communication

Rare plants of threatened habitats – the Croatian case of *Corrigiola litoralis* L. (Caryophyllaceae)

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Abstract – *Corrigiola litoralis* is the only member of the genus in the Croatian flora. Most available data are more than 50 years old, and include only four localities in Croatia, exclusively in the islands of the Mediterranean region. During a floristic survey of the island of Molat (Northern Dalmatia) we recorded a small population in Zapuntelsko polje, in a damp, shallow depression, seasonally occurring as a temporary pond. Comparison with the existing literature shows that *C. litoralis* often occurs in Mediterranean temporary ponds and similar globally important and threatened habitats. We strongly believe that careful studies of populations of *C. litoralis* and other species with similar ecologies are necessary in order to preserve these habitats and therefore propose actions to achieve this goal.

Keywords: endangered habitats, IUCN, Mediterranean temporary ponds, Molat

Introduction

According to Flora Europaea, the genus *Corrigiola* is represented in Europe by two species: *C. litoralis* L. (with two subspecies, *C. litoralis* L. ssp. *litoralis* and *C. litoralis* L. ssp. *telephifolia* (Pourr.) Briq.), and *C. imbricata* Lapeyr (Walters and Akeroyd 1993). According to the Croatian checklist, *C. litoralis*, and a typical subspecies (*C. litoralis* L. ssp. *litoralis*) have so far been registered in Croatia (Nikolić 2016).

C. litoralis is a short, prostrate annual, with slender stem, very small flowers (2 mm diameter when expanded), and alternate leaves (unlike most Caryophyllaceae) (Coker 1962, Walters and Akeroyd 1993). It grows on periodically wet, sandy or gravel ground, in damp, open environments; often in sites along rivers, lakes and ponds subject to fluctuating water levels and with seasonally exposed shores (Walters and Akeroyd 1993, McHugh 2007, Hamston 2010). Native distribution of *C. litoralis* is Mediterranean-Atlantic, with occurrences in North, East and South Africa (Coker 1962, Rankou et al. 2015). The introduced range includes Australia (Rankou et al. 2015) and probably America (Coker 1962, Rankou et al. 2015). In the Mediterranean parts of South and West Europe, the species is very widespread and common (Rankou et al. 2015). According to the IUCN, *Corrigiola litoralis* is globally considered a species of least concern (LC), for the

overall trend of the population appears stable, although it is very rare and threatened locally, for example in England, at the northern fringe of its distribution (Hamston 2010).

In Croatia, only four localities were known prior to this study, and moreover, only one historical record was confirmed during the 21st century (Visiani 1852, Lusina 1938, Trinajstić 1979, Škunca et al. 2008) (Fig. 1). The first known records date from the middle of the 19th century, when Visiani (1852) noted this species for the islands Krk (northern Adriatic) and Korčula (southern Adriatic). The record from Krk was confirmed later by Schlosser (1856) (ZA collection), Tommasini (1875) and Trinajstić (1965), while a finding from Korčula was cited once without confirmation (Trinajstić 1985), and never mentioned in the literature since. As much as 86 years after the first records, a new record from Lusina (1938) was published, of a finding of *C. litoralis* on the island of Unije (northern Adriatic). This record was confirmed by the same author almost two decades later (Lusina 1956), and cited in recent times but without confirmation (Wallnöfer 2008). Finally, the species was found by Trinajstić (1979) on the island of Lastovo (southern Adriatic), and confirmed in recent times during a floristic study of the Lastovsko otočje Nature Park (Škunca et al.

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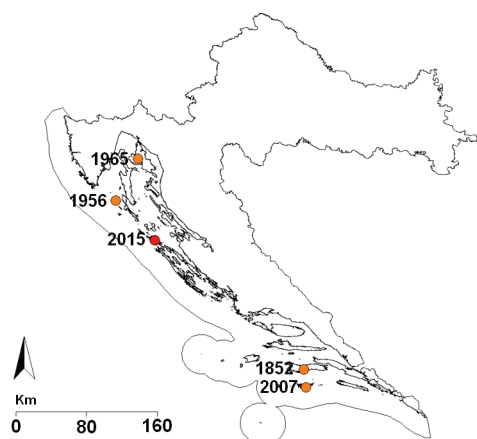


Fig. 1. All known localities of *Corrigiola litoralis* in Croatia (from the top downwards: Krk, Unije, Molat, Korčula, Lastovo); our record is denoted with a red dot. The years of the last known field confirmations are shown.

2008). The data on *C. litoralis* on Krk and Unije published by Rottensteiner (2014), refer to previously mentioned historical data, and were not confirmed in recent times.

Literature data show that *Corrigiola litoralis* often occurs in Croatia on sandy soil, regularly around ponds or lakes, exclusively in the Mediterranean part of the country (Visiani 1852, Hayek 1924–1927, Lusina 1938, 1956, Trinajstić 1965, Topić and Vukelić 2009, Rottensteiner 2014). Trinajstić (1965, 2008) recorded it in Ponikve (Krk) along the shores of a temporary pond (dry at the time) within the association *Plantagini intermediae-Crypsidetum schoenoidis* Trinajstić 1965, a community associated with Mediterranean temporary ponds (Topić and Vukelić 2009). Although *C. litoralis* is extremely rare in Croatia, it was never estimated according to the IUCN criteria.

Materials and methods

In October 2015, several fieldtrips were undertaken within a floristic study of the island of Molat in the Zadar archipelago (Northern Dalmatia). The north-western part of the island, in the area of Zapuntelsko polje, was researched on 25th October. GPS coordinates (according to WGS84) were recorded and lists of vascular plants were prepared for four selected sites in that area, while some plant taxa were photographed. Specimens of *Corrigiola litoralis* were collected and stored in Herbarium Croaticum (ZA).

Shortly after the fieldtrip, the Flora Croatica Database (Nikolić 2016) was searched for *C. litoralis*, and all the related literature was closely examined. Both Herbarium Croaticum (ZA) and Herbarium Ivo and Marija Horvat (ZAHO) were searched for *C. litoralis* (Appendix 1).

Results and discussion

Corrigiola litoralis was found in the Zapuntelsko polje (Fig. 2), at coordinates 44°14'59"N, 14°48'28"E. It was recorded in a shallow depression in the north-western part of

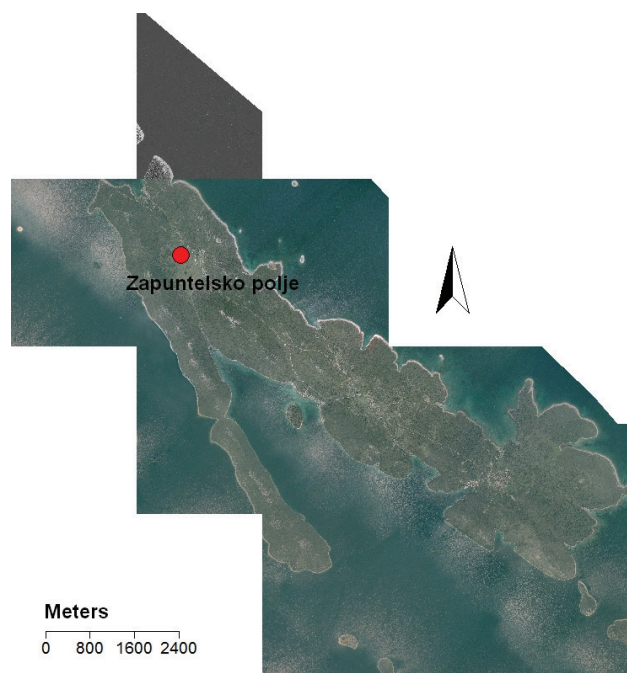


Fig. 2. Aerial photographs of Molat, showing the exact location of *Corrigiola litoralis* in Zapuntelsko polje.

the field, dry at the time of our visit, but occasionally existing as a pond (Fig. 3). The water regime varies from year to year, depending on the rainfall, but the pond seasonally dries out, and the drought period usually extends from late spring, till late autumn. The pond is not particularly maintained by the local inhabitants; nevertheless the nearby area is occasionally used for pasturing (mainly by sheep). Although the area was dry at the time, the presence of some plants commonly found in moist habitats, such as *Agrostis stolonifera* L., *Poa trivialis* L. ssp. *sylvicola* (Guss.) H. Lindb., *Ranunculus sardous* Crantz, *Oenanthe pimpinelloides* L., *Carex divulsa* Stokes and others, clearly indicates the importance of water in this particular site.

Only a few plants of *Corrigiola litoralis* were found, growing on patches of bare soil, in periodically flooded parts of the field (Fig. 3). All individuals were vigorous and generally in a good state, showing no signs of herbivory or pathogens, and flowering at the time (Fig. 4). The species was recorded in a typical microhabitat; it prefers open sites, with sparse vegetation preferably not higher than 2–4 cm, in areas where occasional flooding and moderate trampling reduce the competition from more robust plants (Coker 1962). In addition, the same microhabitat in Zapuntelsko polje was occupied by some peculiar and rare ephemeral liverworts (*Fossombronia echinata* Macvicar, *Fossombronia caespitifomis* De Not. ex Rabenh. ssp. *multispira* (Schiffn.) J. R. Bray & D. C. Cargill, *Riccia sorocarpa* Bisch., *Riccia bifurca* Hoffm. and *Riccia subbifurca* Warnst. ex Croz.), typically growing on patches of bare ground, usually in damp micro-depressions subject to trampling. Notably, the invasive grass *Paspalum paspaloides* (Michx.) Scribn was recorded on the same local-

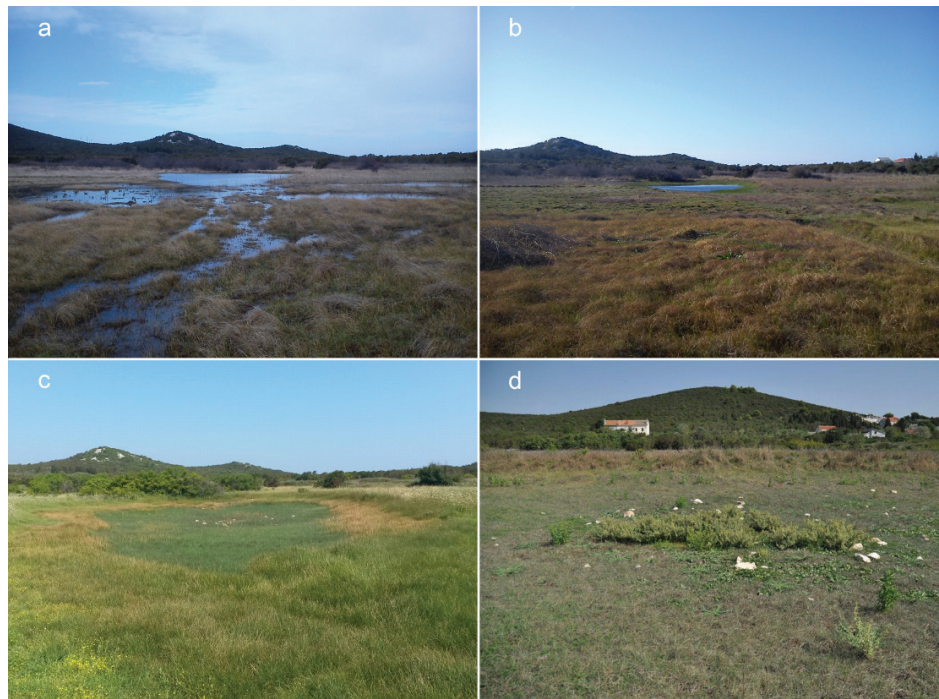


Fig. 3. A temporary pond in Zapuntelsko polje (Molat) where *Corrigiola litoralis* occurs, photographed in 2015. (a) 28th February, (b) 09th April, (c) 08th June, (d) 25th October (time of our visit). Photos by Z. Sedlar.



Fig. 4. *Corrigiola litoralis* in bloom, on 25th October 2015. Photo by A. Alegro.

ity, aggressively occupying the area around the pond, as well as other moist micro-depressions in near vicinity. Another invasive species, *Aster squamatus* (Spreng.) Hieron, was also recorded in the area.

Due to the extremely low number of findings in Croatia, and the affiliation with specific microhabitats, *C. litoralis* is presumably threatened with extinction, and should be evaluated according to the IUCN criteria. At the best, even without insights into the current state of the population or its habitats, assuming that the species is still present in all historically known sites, it could qualify as vulnerable (VU) according to criterion D (IUCN 2013).

In order to obtain more comprehensive data on the Croatian distribution of *C. litoralis*, historical localities should be

searched for the presence of its populations, since only records from Molat and Lastovo have been confirmed within the last 50 years. In particular, other temporary ponds along the eastern Adriatic coast, including the islands, should be carefully studied. Mediterranean temporary ponds are, beyond any doubt, globally significant in the context of the preservation of rare and endangered species (Zacharias et al. 2007). Unfortunately, these habitats are simultaneously facing a rapid decline worldwide (Rhazi et al. 2012), accordingly being listed as a priority habitat in the Habitats Directive (NATURA 2000 priority habitat type 3170, Anonymous 2007). Other rare/endangered plants with similar ecologies, such as *Pilularia minuta* Durie ex. A. Braun, *Cicendia filiformis* (L.) Delarbre, *Damasonium polyspermum* Cosson, *Crypsis aculeata* (L.) Aiton, *Crypsis schoenoides* (L.) Lam., *Fimbristylis bisumbellata* (Forssk.) Bubani, *Lythrum tribracteatum* Salzm. ex Spreng. etc., are typically recorded in these and similar habitats (Nikolić and Topić 2005, Anonymous 2007, Topić and Vukelić 2009, Boršić and Posavec Vukelić 2012, Vuković and Jelaska 2015), within ephemeral communities or their fragments. Due to their specific ecological requirements, the survival of these species and communities is not supported beyond the very specific conditions of the corresponding habitats. Keeping this in mind, it is strongly advisable to study these species, including *Corrigiola litoralis*, more closely. For the future, we propose careful studies of Mediterranean temporary ponds through fieldtrips during the droughty period when ephemeral plants and mosses can be detected and recorded, their population size estimated, and threats identified. To monitor their population trends and quantify the level of habitat loss, we advise these activi-

ties be performed periodically (preferably yearly). Finally, we would suggest re-introducing pond maintenance (mowing, grazing) as a way to prevent further loss of this rare and endangered habitat and species.

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Appendix 1.

Specimina visa

Schlosser C. J.: Island of Krk (in arenosis insulae Veglia), 1856 (ZA), Šegota, V., Vuković, N., Alegro, A., Sedlar, Z.: Island of Molat, Zapuntelsko polje, 2015 (ZA).