

CEPHALANTHERA DAMASONIUM (MILL.) DRUCE IN MEDITERRANEAN EVERGREEN VEGETATION

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Cephalanthera damasonium is a mesophilous orchid species common in continental forests in Croatia. In the Mediterranean region, the species comes almost exclusively in sub-Mediterranean deciduous vegetation. So far only four findings in Eumediterranean evergreen vegetation in Croatia are known (Limski kanal, Rab, Lošinj, Šibenik), but are mostly characterized by a strong influence of nearby deciduous vegetation and include a small number of specimens. The island of Mljet is the southernmost finding spot of *Cephalanthera damasonium* in Croatia. In order to explain this unexpected finding, previous findings in Eumediterranean evergreen vegetation and the ecological requirements of the species are discussed.

Key words: Adriatic coast, distribution, flora of Croatia, island Mljet, orchids, *Quercus ilex*

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Cephalanthera damasonium je uobičajena mezofilna vrsta kontinentalnih šuma Hrvatske. U Mediteranu vrsta dolazi gotovo isključivo u submediteranskoj listopadnoj vegetaciji. Do sada poznata jedina četiri nalazišta u eumediteranskoj vazdazelenoj vegetaciji u Hrvatskoj (Limski kanal, Rab, Lošinj i Šibenik) karakterizira jak utjecaj okolne listopadne vegetacije i mali broj jedinki. Otok Mljet je najjužnije nalazište vrste *Cephalanthera damasonium* u Hrvatskoj. Kako bi se objasnio ovaj neočekivani nalaz, u radu se razmatraju dosadašnji nalazi u eumediteranskoj vazdazelenoj vegetaciji te ekološki zahtjevi vrste.

Ključne riječi: jadranska obala, rasprostranjenost, flora Hrvatske, otok Mljet, orhideje, *Quercus ilex*

Cephalanthera damasonium (Mill.) Druce is a Eurasian species, spreading throughout the meridional and the temperate zone and reaching its southern border in the mountains of Sicily, Algeria, Crete, Southern Turkey and Northern Iran (HULTÉN & FRIES, 1986; BAUMANN *et al.*, 2006). It is common in Southern, Central and Western Europe, extending northwards to England and South-East Sweden (MOORE, 1980). In continental Eastern Europe it is local or even vanishing (BAUMANN *et al.*, 2006). Predominantly a species of deciduous forests, it prefers mid-shade to shade, appearing rarely in open habitats (DELFORGE, 2006; LANDOLT, 2010). It is common on calcareous

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to slightly acidic substrates in a variety of beech, fir, oak, hornbeam, pine and cedar forests (BAUMANN *et al.*, 2006; DELFORGE, 2006). In the Mediterranean, it is present generally in higher mountains, and rarely in the coastal zone (BLAMEY & GREY-WILSON, 2004). In Italy, the species is found in deciduous, mostly thermophilous beech forests, (PIGNATTI, 1982). For example, in Gargano (Italy) the species is rare and grows mostly in the higher zone dominated by beech and other deciduous mixed forests (LORENZ & GEMBART, 1987). Although mentioned for Portugal by BAUMANN & KÜNKELE (1982), new research showed that its indigenous status in this country is doubtful and worth restudying (TYTECA, 1997).

Out of 157 orchid taxa in Croatia (NIKOLIĆ, 2012), 33 are typical forest species, growing exclusively in forest habitats (KRANJČEV, 2005). In Croatia, *C. damasonium* is a common forest species, growing mostly in mixed forests dominated by sessile oak and common hornbeam (Ass. *Epimedio-Carpinetum betuli* (Horvat 1938) Borh. 1963), as well as montane beech forests and mixed beech and fir forests of alliance *Aremonio-Fagion* Horvat 1938 (VUKELIĆ *et al.*, 2008). In the Mediterranean part of Croatia the species was found almost exclusively in the sub-Mediterranean zone (conf. VISIANI, 1842–1852; SCHLOSSER & VUKOTINOVIĆ, 1869; UNTCHJ, 1883; POSPICAL, 1897–1899; HIRC, 1914; ROSSI, 1930; ŠEGULJA, 1967; VÖTH & LÖSCHL, 1978; GOELTZ & REINCHARD,

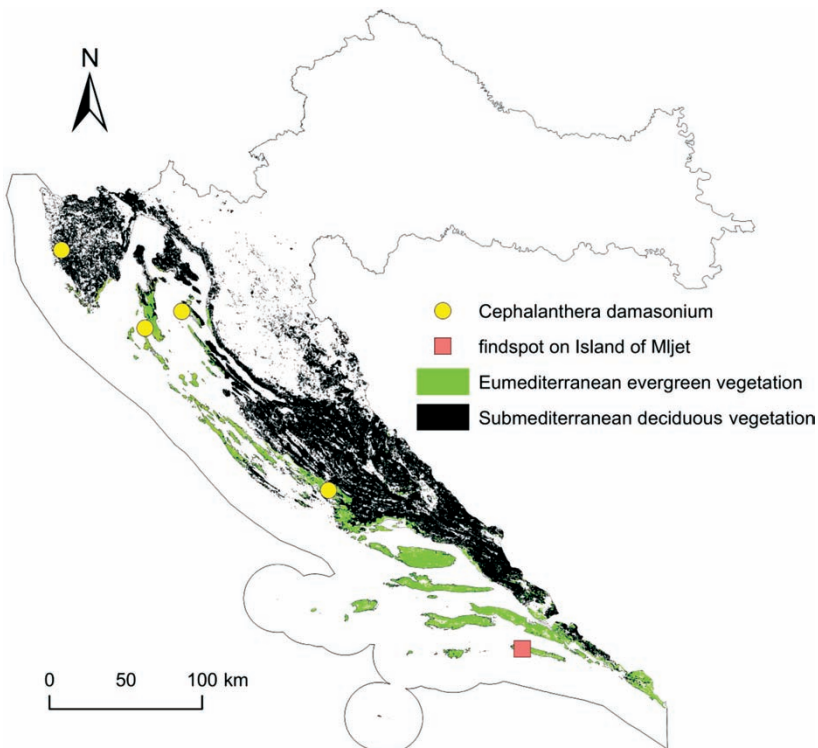


Fig. 1. Map of findings of *Cephalanthera damasonium* (Mill.) Druce in Eumediterranean evergreen vegetation in Croatia. The patches of the Eumediterranean zone in the most northerly finding area (Istria) cannot be seen due to the size of the map.



Fig. 2. *Cephalanthera damasonium* (Mill.) Druce on the island of Mljet (photo: V. Šegota)



Fig. 3. Habitat of the *Cephalanthera damasonium* (Mill.) Druce on the island of Mljet (photo: V. Šegota)

1986; RAUŠ, 1995; ŠILIC & ŠOLIC, 2002; MILOVIC, 2002). This zone is characterized by a deciduous forest vegetation developing in more humid and cooler climate conditions than in the Eumediterranean zone. In the early studies of the littoral evergreen

vegetation along the Croatian part of the Adriatic coast (HORVATIĆ, 1958; 1963) the species was not recorded. Island populations of *C. damasonium* are extremely rare and limited to the northern Adriatic islands. Thus, the species was discovered to date only on four islands in Kvarner Bay (Krk, Cres, Lošinj and Rab) (HIRC, 1913; ŠUGAR, 1967; VÖTH & LÖSCHL, 1978; ŠEGULJA & RAUŠ, 1993; HERTEL & HERTEL, 2003; STARMÜLLER, 2005).

The island of Krk belongs almost completely to the deciduous sub-Mediterranean vegetation zone, with only a few spots of evergreen Eumediterranean vegetation on its eastern coast. Since the exact finding spot of *C. damasonium* on the island of Krk (TOMMASINI in HIRC, 1913) is unknown, we can assume that the plant was most likely found in the dominant, deciduous forest vegetation type on the island. Moreover, VÖTH & LÖSCHL (1978) found this species at a few localities in Istria and Kvarner Bay, including the island of Krk, »in der Zone der sommergrünen, mesophilen Laubwälder und auch in Überlappungsgebieten dieses Biotop mit der Zone der sommergrünen, submediterranean Wälder und Buschwälder...«. However, recent investigation of evergreen vegetation of the island of Krk (TRINAJSTIĆ 2007) did not record this species.

The old finding spots on the island of Cres (near the town of Beli and in the Bay of Piškel) (HIRC, 1913) belong to the sub-Mediterranean vegetation zone as well. Moreover, while investigating stands of sweet chestnut (*Castanea sativa* Mill.) on the island of Cres, ANIĆ (1953) found *C. damasonium* at two localities (Pacijevi and Merag). The species was recorded in two relevés with only a few specimens in stands dominated by sweet chestnut, pubescent oak (*Quercus pubescens* Willd.) and turkey oak (*Quercus cerris* L.). More recently, HERTEL & HERTEL (2003) found the species in the sub-Mediterranean deciduous forests of the northern and central part of the island (near Štivan, Valun, Orlec, Beli, Belej, Orlec and Lubenice). They found *C. damasonium* to be less rare, and often growing together with *Cephalanthera longifolia* (L.) K. Fritsch. North of the village of Lubenice *C. damasonium* was recorded also by STARMÜLLER (2005) in a pubescent oak dominated forest.

On the island of Rab the species was found on Kalifront peninsula at the locality Petrovka in forest dominated by the evergreen oak (ass. *Fraxino orni-Quercetum ilicis* Horvatić (1956) 1958) (ŠEGULJA & RAUŠ, 1993). The above-mentioned paper provided a complete list of protected species found on all vegetation permanent plots in Croatia, but in the relevé from the same plot published later (RAUŠ, 1995) this orchid was not present. Neither HORVATIĆ (1963) nor MATIĆ et al. (1976) had recorded this species in the evergreen forests of Rab before.

On the island of Lošinj *C. damasonium* was found on the eastern slopes of the mountain of Osorčica (near Veli Tržić) in a mixed evergreen and deciduous forest (ass. *Fraxino orni-Quercetum ilicis quercetosum pubescentis* Šugar 1967) (ŠUGAR, 1967). Here, local topography causes cooler and more humid microclimate conditions, and therefore a number of deciduous elements penetrate into the typical Mediterranean evergreen vegetation of the island. In two floristically poor relevés in which *Quercus ilex* is less abundant than *Quercus pubescens* and *Fraxinus ornus*, this orchid was recorded with low abundances (less than five specimens per relevé).

As in Lošinj, there is a single locality of *C. damasonium* in evergreen vegetation in Istra (Kontija Protected Forest in Limski kanal, W Istra) where a single specimen in the mixed evergreen and deciduous forest (As. *Fraxino orni-Quercetum ilicis carpinetosum orientalis* Barićević et Šapić 2011) was found (BARIĆEVIĆ & ŠAPIĆ, 2011). Other

researchers into the evergreen vegetation of Istria (TRINAJSTIĆ & ŠUGAR, 1976; ŠEGULJA & BEDALOV, 1987; TRINAJSTIĆ, 1995) did not confirm the presence of *C. damasonium* in this type of vegetation. Furthermore, on the list of orchids of Istria, the islands of Krk, Cres and Lošinj (KERSCHBAUMSTEINER *et al.*, 2002), *C. damasonium* is mentioned, but the list does not provide either the data on the particular locality, or the type of vegetation. Moreover, in »Flora von Istrien« (STARMÜLLER, 1998) this species is mentioned only for Mt. Ćićarija, Mt. Učka and Rijeka, which are all localities characterized by deciduous vegetation.

In addition, one specimen of the species was found in 1997 in the town of Šibenik (Dalmatia) at the locality Šubićevac Park Forest (MILOVIĆ, 2002) in planted Aleppo pine forest with evergreen elements of *Q. ilex* forests in underbrush (MILOVIĆ, pers. comm.) representing its southernmost finding spot in evergreen vegetation in Croatian inland.

To summarize, the only localities of *C. damasonium* in the evergreen Eumediterranean vegetation zone of Croatia are Rab, Lošinj, Limski kanal (Istria) and the town of Šibenik. Additionally, the locality on Rab is dubious, Lošinj includes records of only few individuals and for Limski kanal and Šibenik only one individual is recorded.

So far, *C. damasonium* has not been recorded on the Central and Southern Dalmatian islands, where evergreen vegetation is predominant.

During comprehensive flora mapping of Mljet National Park in the period from 2008 to 2011, a number of orchid species were discovered, out of which some were recorded for the first time for the park and the island. One of the interesting findings was undoubtedly that of the species *Cephalanthera damasonium*, normally a typical and frequent species of deciduous forests in the continental part of Croatia. Here, the two populations along the hiking path called »Put po Vrsima« were discovered (1/64 MTB fields 3270231 and 3270142) at the elevation of approximately 300 m a. s. l. The specimens were recorded on the edges of evergreen vegetation that can be described as either low forest or high maquis dominated by *Quercus ilex* (ass. *Fraxino ornii-Quercetum illicis*). Thereby, the populations found here are characterized as photophile – finding optimum conditions on woodland edges, rather than sciaphile – in closed habitats. Noticed on 5th May 2010, all species were found in bloom and in good condition. However, since they grow on wood edges along the hiking path, the chance of trampling is rather high.

The finding of the species *C. damasonium* on the island of Mljet is the first note of this species on the Dalmatian Islands. From the phytogeographic point of view, this finding is even more interesting if we consider the fact that the closest other island finding spots are 300 km to the north, in Kvarner Bay. In comparison to other four finding spots in evergreen Eumediterranean vegetation (Lošinj, Rab, Limski kanal, Šibenik), where only a few specimens were found, the populations on Mljet are probably the largest in the evergreen vegetation in Croatia. Given the fact that light conditions in Eumediterranean evergreen vegetation are not favorable for most underbrush plants, the lack of any orchid species in this type of wood and shrubland would be expected. Therefore, they can be found here only at woodland edges. The occasional presence of some continental mesophilous species, such as *C. damasonium*, in Mediterranean evergreen vegetation is most probably due to relatively high air and soil humidity and lower temperatures maintained locally as a result of constant

shadiness. In addition, the mean annual precipitation on the western part of the island is around 1000 mm (PERČEC TADIĆ, 2008), which is a relatively high value for the Eumediterranean vegetation zone. Furthermore, in comparison to the surrounding environment, the finding spots of the species on the island of Mljet are characterized by comparatively deeper soil. *C. damasonium* requires similar specific ecological conditions (increased humidity and precipitation, deeper soil, wider shadiness) in sub-Mediterranean deciduous forests as well (VÖTH & LÖSCHL, 1978; ANIĆ, 1953; ŠUGAR, 1967).

Due to the enormous degradation of the Mediterranean evergreen forests in Croatian Littoral during the last two thousand years, the area of this vegetation type in Croatia has greatly decreased. The rare finding spots of the *C. damasonium* in *Q. ilex* dominated forests could be therefore additionally explained by the rarity of this kind of forest vegetation in Croatia. In Italy, for example, these forests are much more distributed, reaching sometimes more than 1000 m a. s. (BLASI, 2010). Hence, although much more common in beech-dominated forests, *C. damasonium* is not rare in *Q. ilex*-dominated forests (GUARINO, pers. comm.).

In short, the occurrence of the mesophilous species *C. damasonium* in evergreen forests dominated by *Quercus ilex* in Croatia is extremely rare and occasional. Very little was found in the literature on the question of the occurrence of this taxon in similar associations in the Mediterranean. Its origin in this type of vegetation is not known; nevertheless its existence in xerophytic conditions could be possibly explained by the relatively sufficient amounts of humidity maintained in shadiness of evergreen forests, required for the survival of this species.

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REFERENCES

- BAUMANN, H., KÜNKELE, S. & LORENZ, R., 2006: Orchideen Europas mit angrenzenden Gebieten. Ulmer Naturführer.
- BLAMEY, M. & GREY-WILSON, C., 2004: Wild Flowers of the Mediterranean. A Complete Guide to the Islands and Coastal Regions. 2. ed. A & C Black. London.
- BLASI, C., 2010: La Vegetazione d'Italia. Palombi & Partner S. r. l. Roma.
- DELFORGE, P., 2006: Orchids of Europe, North Africa and Middle East. Timber Press. Portland.
- GOELTZ, P. & REINCHARD, H., 1986: Orchideen in Jugoslawien. Ein Beitrag zur Kenntnis der Orchideenflora des Balkans. Mitt. Bl. Arbeitskr. Heim. Orch. Baden-Würt. 18(4), 689–827.
- HERTEL, S. & K. HERTEL, 2003: Die Orchideen der Inseln Cres und Lošinj. Mitt. Bl. Arbeitskr. Heim. Orch. Baden-Würt. 35(4), 685–721.
- HIRC, D., 1914: Floristička izučavanja u istočnim krajevima Istre. I. Kastav i Kastavština. Rad JAZU 204 21–75.

- HORVATÍĆ, S., 1963: Biljnogeografski položaj i raščlanjenje našeg primorja u svjetlu suvremenih fitocenoloških istraživanja. *Acta Bot. Croat.* **22**, 27–81.
- HORVATÍĆ, S., 1958: Tipološko raščlanjenje primorske vegetacije gariga i borovih šuma, *Acta Bot. Croat.* **17**, 1–98.
- HULTÉN, E. & FRIES, M., 1986: Atlas of North Europaeen vascular plants north of the tropic Cancer. Vol. 1–3. Koeltz, Königstein. 1172.
- KERSCHBAUMSTEINER, H., PERKO, M. L. & STIMPFEL, G., 2002: Die Orchideenflora Istriens und der Kvarner Inseln Krk, Cres und Lošinj – Ein Vorbericht der Arbeitsgruppe. *Mitt. Bl. Arbeitskr. Heim. Orch. Baden-Würt.* **34** (1), 115–127.
- KRANJČEV, R., 2005: Orhideje šumskih staništa. *Šumarski list* **7–8**. Zagreb.
- LANDOLT, E., 2010: Flora Indicativa. Ökologische Zeigerwerte und biologische Kennzeichen zur Flora der Schweiz und der Alpen. Haupt Verlag, Bern, Stuttgart, Wien.
- LORENZ, R. & GEMBART, C., 1987: Die Orchideenflora des Gargano (Italien). *Mitt. Bl. Arbeitskr. Heim. Orch. Baden-Würt.* **19**(3), 385–768.
- MATIĆ, S., RAUŠ, Đ. & VRANKOVIĆ, A., 1976: Rezultati početnih istraživanja trajno zaštićenog i upravljanog prirodnog šumskog rezervata Dundo na otoku Rabu. *Ekologija* **11**(2), 147–166.
- MOORE, D. M., 1980: *Cephalanthera damasonium*. In: TUTIN, T. G., HEYWOOD, V. H., BURGESS, N. A., MOORE, D. M., VALENTINE, D. H., WALTERS, S. M. & WEBB, D. A. (eds.): *Flora Europaea* 5. 328. Cambridge University Press. Cambridge-New York-Port Chester-Melbourne-Sydney.
- NIKOLIĆ, T., 2012 (ed.): Flora Croatica Database. On-Line (<http://hirc.botanic.hr/fcd>). Department of Botany, Faculty of Science, University of Zagreb.
- PERČEC TADIĆ, M., 2008: Srednja godišnja količina oborine (Karta). In: ZANINOVIC, K. (ed.): *Klimatski atlas Hrvatske 1961–1990. 1971–2009*. DHMZ. Zagreb
- PIGNATTI, S., 1982: *Flora d'Italia* 3. Edagricole. Bologna.
- RAUŠ, Đ., 1995: Sto trajnih ploha Republike Hrvatske. (Ekološka istraživanja). *Glasnik za šum. pok.* **32**, 225–376.
- ROSSI, L.J., 1930: Pregled flore Hrvatskog Primorja. *Prirod. istraž. Kral. Jugoslavije* **17**, 1–368.
- SCHLOSSER, J. C. K. & VUKOTINOVIĆ, L.J., 1869: *Flora Croatica. Sumptibus et auspiciis academiae scientiarum et artium slavorum meridionalium*, Zagreb, I-CXLI, 1–1362.
- ŠEGULJA, N., 1967: Fitocenološka istraživanja vegetacije na području sjeveroistočnog dijela Labinštine u Istri. Magistarski rad, Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu, Zagreb, 1–167.
- ŠEGULJA, N. & BEDALOV, M., 1987: Analiza florističkog sastava zimzelenih šuma i makije na području istočnojadranskog Primorja. *Ekologija* **22** (1), 47–55.
- ŠEGULJA, N. & RAUŠ, Đ., 1993: Sto trajnih ploha Republike Hrvatske. (Ekološka istraživanja). *Glasnik za šum. pok.* **29**, 133–148.
- STARMÜHLER, VON V., 1998: Vorarbeiten zu einer »Flora von Istrien«. Teil I. *Carinthia* II/188./108, 535–576.
- STARMÜHLER, VON V., 2005: Vorarbeiten zu einer »Flora von Istrien«. Teil VII. *Carinthia* II/195./115, 515–654.
- ŠUGAR, I., 1967: Biljni pokrov Osorčice. Magistarski rad, Sveučilište u Zagrebu, Zagreb, 1–196.
- TRINAJSTIĆ, I. & ŠUGAR, I., 1976: Prilog poznavanju rasprostranjenosti i florističkog sastava zimzelenih šuma i makije crnike (*Orno-Quercetum ilicis*) na području zapadne Istre. *Acta Bot. Croat.* **35**, 153–158.
- TRINAJSTIĆ, I., 1995: Sintaksonomska istraživanja šuma crnike (*Quercus ilex* L.) u istočnoj Istri (Hrvatska). *Šumarski list* **119** (7–8), 223–226.
- TRINAJSTIĆ, I., 2007: Fitocenološko-sintaksonomske značajke šuma crnike *Quercus ilex* L. na otoku Krku. *Šumarski list* **131** (9–10), 431–434.
- UNTCHJ, K., 1883: Zur Flora von Fiume. *Oesterr. Bot. Z.* **33**(3), 82–85.
- VISIANI, R., 1842–1852: *Flora Dalmatica I–III*, Lipsiae.
- VÖTH, W. & LÖSCHL, E., 1978: Zur Verbreitung der Orchideen an der Östlichen Adria. *Linzer biol. Beitr.* **10** (2), 369–430.

SAŽETAK

Cephalanthera damasonium (Mill.) Druce u mediteranskoj vazdazelenoj vegetaciji

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Cephalanthera damasonium je česta šumska vrsta brežuljkastog, brdskog i gorskog pojasa kontinentalne Hrvatske. U Mediteranu pak dolazi gotovo isključivo u listopadnim šumama submediteranske vegetacijske zone. No, poznata su i četiri nalazišta u eumediteranskoj vazdazelenoj vegetaciji: dva kopnena (šuma Kontija u Limskom kanalu, Park šuma Šubićevac u Šibeniku) te dva otočna (poluotok Kalifront na Rabu, planina Osorčica na Lošinju). Nalazište na Rabu je dvojbeno, a ostale karakterizira jak utjecaj okolne listopadne vegetacije i mali broj zabilježenih jedinki. Tijekom florističkih istraživanja Nacionalnog parka Mljet u razdoblju od 2008. do 2011. vrsta je zabilježena u sklopu visoke makije crnike na dva lokaliteta uzduž planinarskog puta »Put po Vrsima«. Otok Mljet time postaje najjužnije nalazište ove vrste u Hrvatskoj, te jedino na dalmatinskim otocima. Neočekivano pojavljivanje tipične kontinentalne orhideje unutar kserofitske mediteranske vegetacije objašnjeno je visokom količinom oborine u zapadnom dijelu otoka Mljeta (1000 mm/god.), dubokim tлом te specifičnim ekološkim uvjetima unutar vazdazelenih crnikovih sastojina (relativno visoka vlažnost zraka i tla, niže temperature, visoka zasjenjenost). Zbog iznimne rijetkosti crnikovih šuma na istočnojadranskoj obali, ostaje otvoreno pitanje da li bi ova vrsta bila češća kada bi te šume bile rasprostranjenije. Slučaj na Mljetu ukazuje na činjenicu da humidnije varijante ovih šuma ponekad mogu podržavati i mezofilne vrste poput ove orhideje.