

NEW RECORDS OF VASCULAR PLANTS FOR THE ISLAND OF MLJET (SOUTHERN DALMATIA, CROATIA)

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Flora of the south Dalmatian island of Mljet has been relatively well investigated, with 751 vascular plant taxa recorded up to this research. During floristic research on the island in June, August and October of 2008 a total of 77 new plant taxa were recorded. Therefore, the entire flora of the island of Mljet now consists of 828 vascular plant taxa. Out of newly recorded taxa, 10 are cultivated while six are considered to be invasive. Three taxa are strictly protected and 12 taxa are protected by law. Three taxa are Near Threatened (NT), two are categorized as Least Concern (LC) and other two are Data Deficient (DD).

Key words: flora, cultivated taxa, neophytes, island of Mljet, Croatia

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Flora južnodalmatinskog otoka Mljeta relativno je dobro istražena, sa zabilježenom 751 vaskularnom biljnom svojtom do ovog istraživanja. Tijekom florističkih istraživanja na otoku u lipnju, kolovozu i listopadu 2008. godine utvrđeno je 77 novih biljnih svojti. Dakle, ukupna flora otoka Mljeta sada broji 828 svojti vaskularnih biljaka. Od novozabilježenih svojti 10 je kultivirano dok se šest vrsta smatra invazivnima. Tri svojte su strogo zaštićene, a 12 je zaštićeno zakonom. Tri svojte su gotovo ugrožene (NT), dvije se smatraju najmanje zabrinjavajućim (LC), dok su dvije nedostatno poznate (DD).

Ključne riječi: flora, kultivirane svojte, neofiti, otok Mljet, Hrvatska

INTRODUCTION

The island of Mljet is a south Dalmatian island which extends in the Dinaric direction (NW-SE) 37 km long and up to 3.8 km wide. It covers an area of 98.01 km², being the eighth biggest Croatian island. The total length of its coastline is 135.18 km

(DUPLANČIĆ LEDER *et al.*, 2004). The highest peak of the island is Veliki grad with 514 m a.s.l. The island is mostly made of Cretaceous limestones and dolomites, which form mainly low and rocky coast. Steep cliffs are found mostly along its southern coast. On the easternmost part of island Dilluvial sands form sandy beaches.

The island of Mljet has a typical Mediterranean climate (BERTOVIĆ, 1975). According to the data of the climatological station in Govedari for the eleven-year period (1997–2007), the average annual air temperature was 16.9 °C and the average annual amount of precipitation was 740.7 mm. The highest amount of precipitation occurred in November and December and the lowest in July. The highest monthly average air temperature was 26.6 °C in July and the lowest 8.8 °C in January (Croatian Meteorological and Hydrological Service, unpublished data).

The island of Mljet belongs to the Mediterranean phytogeographical region and considering its height, the vegetation can be differentiated into two vegetational belts: Mediterranean-littoral and Mediterranean-montane (TRINAJSTIĆ, 1995a). The Mediterranean-littoral vegetational belt belongs mostly to the Eumediterranean vegetation zone characterized by different forest associations of the class *Quercetalia ilicis* Br.-Bl. 1947 (ass. *Quercus ilicis-Pinetum halepensis* Loisel 1971, *Junipero phoeniceae-Pinetum halepensis* Trinajstić 1988, *Myrto-Quercetum ilicis* (H-ić 1963) Trinajstić 1985, and *Fraxino orni-Quercetum ilicis* H-ić (1956) 1958). Vegetation of maquis (ass. *Pistacio lentisci-Juniperetum phoeniceae* Trinajstić 1987, *Erico arboreae-Calicotometum infestae* H-ić 1958 and *Erico arboreae-Arbutetum unedonis* Allier et Lacoste 1980) also covers significant areas. On the other hand, garrigues (ass. *Erico manipuliflorae-Cistetum cretici* H-ić 1958) are not that widely distributed. Mediterranean-montane vegetational belt belongs to the Hemimediterranean vegetation zone within which the ass. *Ostryo carpinifoliae-Quercetum ilicis* (H-ić 1958) Trinajstić (1965) 1974 is developed, although on relatively small surfaces. Other syntaxa on the island are represented with the vegetation of rocks, coastal halophytic vegetation, marshland vegetation, flooded thickets, vegetation of pseudo-steppe with grasses and annuals, weed and ruderal vegetation (TRINAJSTIĆ, 1995b).

The earliest data about the flora of the island of Mljet were given by PARTSCH (1826). In some of subsequent floristic works the island of Mljet was also mentioned with contributions to its flora (VISIANI, 1842–1852, 1872–1881; ADAMOVIĆ, 1887, 1901, 1911; HIRC, 1903–1912; LINDBERG, 1906; LATZEL, 1914; KELLER, 1915; BALEN, 1935a, 1935b, 1935c; ANIĆ, 1942; HORVATIĆ, 1958; RAJEVSKI, 1969; REGULA-BEVILACQUA, 1969; TRINAJSTIĆ, 1972, 1974, 1975, 1979; VOLARIĆ-MRŠIĆ & HORVATIĆ, 1977; VÖTH & LÖSCHEL, 1978, ALEGRO *et al.*, 2003). During last decades systematic floristic research of the island has been carried out (ILIJANIĆ, 1980; REGULA-BEVILACQUA & JURKOVIĆ-BEVILACQUA, 1980; REGULA-BEVILACQUA *et al.*, 1981; ILIJANIĆ & REGULA-BEVILACQUA, 1982; ILIJANIĆ *et al.*, 1983; REGULA-BEVILACQUA, 1983; TRINAJSTIĆ, 1985; PAVLETIĆ, 1995) and its entire flora was analysed (REGULA-BEVILACQUA & ILIJANIĆ, 1984). In her analyses of the flora of Dalmatian islands NOVOSEL (2003) reported 712 plant taxa for the island of Mljet, and the same number was used in NIKOLIĆ *et al.* (2008). Since then there have been new records of orchids on the island (KRANJČEV, 2005) and the most recent floristic list of the island of Mljet up to this contribution numbered 751 taxa (NIKOLIĆ, 2008).

MATERIALS AND METHODS

Fieldwork on the island of Mljet was carried out in June, August and October of 2008. Taxa were determined using the standard determination keys and iconographies (FIORI, 1923–1929, 1933; TUTIN *et al.*, 1964–1980; TRINAJSTIĆ, 1975–1986; PIGNATTI, 1982; DOMAC, 1994; BURNIE, 1995; BLAMEY & GREY-WILSON, 1998). The nomenclature has been adjusted according to the Croatian Flora Checklist (NIKOLIĆ, 2008). The taxa in the list are given in alphabetical order of families, genera and species. Herbarium specimens of collected plants were stored in the Herbarium of the Department of Botany, Faculty of Science, University of Zagreb (ZA).

Life forms are interpreted according to HORVAT (1949) and PIGNATTI (1982). The abbreviations of life forms are given in front of the name of each taxon in the list of newly recorded taxa: **Ch** – Chamaephyta, **G** – Geophyta, **H** – Hemicryptophyta, **Hy** – Hydrophyta, **Ph** – Phanerophyta (for some phanerophytes detailed life form was determined; **NP**: Nano-Phanerophyta, **Ph-lian**: lianose Phanerophyta), and **T** – Therophyta.

Species considered to be invasive alien plant species according to BORŠIĆ *et al.* (2008) are denoted with the abbreviation **IAS**, and cultivated species are marked with an asterisk (*). Taxa listed in the Red Book of Vascular Flora of Croatia (NIKOLIĆ & TOPIĆ, 2005) are marked with their corresponding category: **NT** – Near Threatened and **DD** – Data Deficient. Species assigned as Least Concern (**LC**) by NIKOLIĆ (2008) are also indicated. Taxa protected by the Nature Protection Act (ANONYMOUS 2005, ANONYMOUS 2008) and listed in the Ordinance on Designating Wild Taxa Protected and Strictly Protected (ANONYMOUS 2006) are denoted as **P** – protected and **SP** – strictly protected.

Investigated localities where new taxa were recorded (Fig. 1):

1 – former barracks Kulijer, Mljet National Park, island of Mljet, southern Dalmatia; 25 October 2008.

2 – cove Podrope and by the road from Ropa to the cove, island of Mljet, southern Dalmatia; 27 June 2008.

3 – Blatina in Blatsko polje, by the Blatina and through Blatinsko polje from Blatina to settlement Blato, island of Mljet, southern Dalmatia; 26 June 2008. (except species *Ampelodesmos mauritanica* which was recorded on 5 August 2008)

4 – Kozarica, island of Mljet, southern Dalmatia; 26 June 2008.

5 – Babino polje, by the road from Blatina near Sobra to Babino polje, on the crossroad to Babino polje, island of Mljet, southern Dalmatia; 27 June 2008.

6 – Blatina near Sobra, island of Mljet, southern Dalmatia; 28 June 2008.

7 – Sobra, ferry port, island of Badanj, island of Mljet, southern Dalmatia; 29 June 2008.

8 – semi-cave above the road to the settlement Okuklje, Galičnjak, island of Mljet, southern Dalmatia; 29 October 2008.

9 – Maranovići, in the settlement and eastwards, island of Mljet, southern Dalmatia; 29 June 2008.

10 – coves Blaca, Velika and Mala Saplnara, Pinjevica, island of Mljet, southern Dalmatia; 28 June 2008.

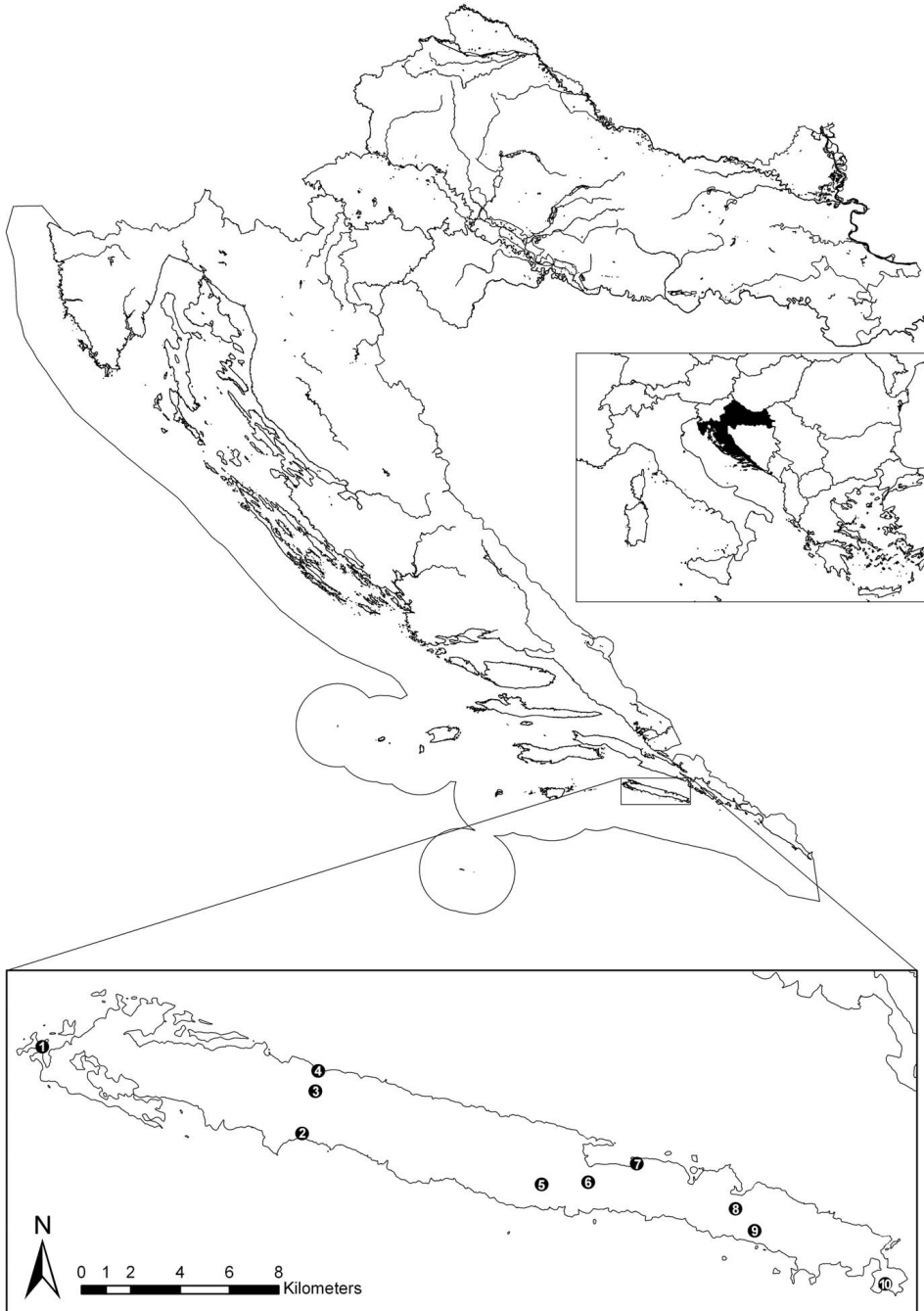


Fig. 1. Investigated localities where new taxa were recorded (for an explanation of the site numbers see text).

RESULTS

During the investigation, new taxa we recorded as follows:

Pteridophyta*Adiantaceae*

G *Adiantum capillus-veneris* L. – 8; NT; P

Aspleniaceae

H *Asplenium adiantum-nigrum* L. – 4

Spermatophyta**Gymnospermae***Cupressaceae*

Ph *Cupressus horizontalis* Mill. – 5, 10; *

Ph *Juniperus oxycedrus* L. subsp. *oxycedrus* – 7

Angiospermae**Magnoliatae***Acanthaceae*

H *Acanthus mollis* L. – 4; P

Aizoaceae

Ch *Carpobrotus edulis* (L.) N.E.Br. in Phillips – 4, 5; IAS; LC

Amaranthaceae

T *Amaranthus deflexus* L. – 5

Apiaceae

H *Foeniculum vulgare* Mill. – 3, 5, 7, 9

H *Peucedanum schottii* Besser ex DC. – 3, 6

Asteraceae

T *Bidens subalternans* DC. – 1, 7, 10; IAS

H *Centaurea spinosociliata* Seenus – 9; NT; SP

H *Cirsium palustre* (L.) Scop. – 3

T *Conyza bonariensis* (L.) Cronquist – 2; IAS

T *Dittrichia graveolens* (L.) Greuter – 5

Bignoniaceae

Ph (Ph-lian) *Campsis radicans* (L.) Seen. – 4, 5; *

Brassicaceae

H *Arabis hirsuta* (L.) Scop. – 3

T *Diplotaxis muralis* (L.) DC. – 10

H *Lepidium graminifolium* L. – 4

Capparaceae

Ph (NP) *Capparis spinosa* L. subsp. *rupestris* (Sm.) Nyman – 5

Caryophyllaceae

H *Silene latifolia* Poir. subsp. *alba* (Mill.) Greuter et Bourdet – 2, 3, 5, 9

Chenopodiaceae

T *Chenopodium album* L. – 2, 3, 7, 10

Cichoriaceae

H *Hieracium pilosella* L. – 5; P

H *Lactuca serriola* L. – 2, 3, 4, 6

T *Lactuca virosa* L. – 3; P

H *Leontodon autumnalis* L. – 7, 10

H *Picris hieracioides* L. – 2, 3

H *Scolymus hispanicus* L. – 2, 3, 4, 6, 9, 10

Convolvulaceae

H *Calystegia sepium* (L.) R. Br. – 4, 10

Crassulaceae

Ch *Sedum album* L. – 5, 9

Ch *Sedum dasyphyllum* L. – 9

Ch *Sedum sexangulare* L. – 3, 5, 7, 9

Cucurbitaceae

G *Bryonia dioica* Jacq. – 3

Dipsacaceae

H *Cephalaria leucantha* (L.) Roem. et Schult. – 7, 9

Fabaceae

Ph *Calicotome spinosa* (L.) Link – 5, 6, 9

Ph *Cercis siliquastrum* L. – 4

H *Medicago falcata* L. – 3

Ch *Trifolium repens* L. – 3, 4

Geraniaceae

Ph *Pelargonium zonale* (L.) Aiton – 4, 5; *

Juglandaceae

Ph *Juglans regia* L. – 3; *

Malvaceae

H *Malva sylvestris* L. – 5

Nyctaginaceae

- Ph (Ph-lian)** *Bougainvillea spectabilis* Willd. – 4; *
G *Mirabilis jalapa* L. – 3, 5, 7; *

Oleaceae

- Ph** *Syringa vulgaris* L. – 5; *

Plantaginaceae

- H** *Plantago media* L. – 3, 4

Resedaceae

- T** *Reseda alba* L. – 10

Rosaceae

- Ph** *Eriobotrya japonica* (Thunb.) Lindl. – 3
Ph *Malus domestica* Borkh. – 3, 5; *
H *Potentilla erecta* (L.) Raeuschel – 3, 5; **P**

Salicaceae

- Ph** *Salix fragilis* L. – 6

Scrophulariaceae

- Ph** *Paulownia tomentosa* (Thunb.) Steud. – 4
H *Scrophularia nodosa* L. – 9; **P**
H *Verbascum blattaria* L. – 3, 6
H *Verbascum macrurum* Ten. – 7, 9; **P**
H *Verbascum nigrum* L. – 3; **P**
H *Verbascum niveum* Ten. subsp. *visianium* (Rchb.) Murb. – 5; **SP**
H *Verbascum thapsus* L. – 3, 6; **P**

Solanaceae

- T** *Datura innoxia* Mill. – 4; **IAS**
Ch *Solanum dulcamara* L. – 2, 4, 6; **P**

Valerianaceae

- Ch** *Centranthus ruber* (L.) DC. – 4, 5; **P**

Verbenaceae

- H** *Verbena officinalis* L. – 3

Vitaceae

- Ph** *Parthenocissus quinquefolia* (L.) Planchon – 5; **IAS**
Ph *Parthenocissus tricuspidata* (Siebold et Zucc.) Planchon – 5
Ph (Ph-lian) *Vitis vinifera* L. subsp. *sylvestris* (C.C.Gmel.) Hegi – 3; **LC**

Zygophyllaceae

- T** *Tribulus terrestris* L. – 1; **P**

Liliatae*Arecaceae*

- Ph *Washingtonia filifera* (Linden) H.Wendl. – 4; *

Cannaceae

- G *Canna indica* L. – 4, 10; *

Juncaceae

- H *Juncus conglomeratus* L. – 4

Poaceae

- H *Ampelodesmos mauritanica* (Poir.) T.Durand et Schinz – 3; NT

- T *Avena fatua* L. – 3, 5; DD; SP

- T *Avena sterilis* L. – 2, 3, 4, 6, 7, 9, 10

- T *Bromus racemosus* L. – 3, 6, 10

- T *Dasypyrum villosum* (L.) P.Candargy – 3

- T *Digitaria ciliaris* (Retz.) Koeler – 10; DD

- G *Elymus repens* (L.) Gould – 3, 5, 10

- H *Hordeum bulbosum* L. – 3

- G *Sorghum halepense* (L.) Pers. – 10; IAS

Potamogetonaceae

- Hy *Potamogeton gramineus* L. – 4

Newly recorded taxa with exact coordinates of their localities on the island of Mljet have been entered to Flora Croatica Database (NIKOLIĆ, 2008).

DISCUSSION

In this contribution 77 previously unrecorded taxa for the island of Mljet are listed. Among the recorded taxa there are newly discovered native taxa as well as cultivated taxa and neophytes.

In this investigation four taxa were recorded at a subspecies level and are therefore listed as new for the island of Mljet although they have probably been registered before only at a species level. *Juniperus oxycedrus* L. subsp. *oxycedrus* has been recorded as *J. oxycedrus* and *Vitis vinifera* L. subsp. *sylvestris* (C. C. Gmel.) Hegi as *V. vinifera* (PARTSCH, 1826), while *Verbascum niveum* Ten. subsp. *visianium* (Rchb.) Murb. has been noted as *V. niveum* Ten. (ILIJANIĆ & REGULA-BEVILACQUA, 1982). Subspecies *Silene latifolia* Poir. subsp. *alba* (Mill.) Greuter et Bourdet has been previously registered as *S. alba* subsp. *divaricata* (Reichenb.) Walters (ILIJANIĆ *et al.*, 1983) which is considered to be *S. latifolia* Poir. by NIKOLIĆ (2008). On the other hand, other four taxa have been recorded before as subspecies while we determined them at a species level. Therefore, these four species are not listed as new for the island of Mljet.

Consolida regalis S. F. Gray has been previously recorded as *C. regalis* subsp. *paniculata* (Host) Soó (ILIJANIĆ *et al.*, 1983) and *Sonchus asper* (L.) Hill has been noted as *S. asper* subsp. *glaucescens* (Jord.) Ball (REGULA-BEVILACQUA *et al.*, 1981). *Craetagus monogyna* Jacq. was firstly mentioned as *C. transalpina* (ANIĆ, 1942) but subsequently this finding was cited as *C. monogyna* subsp. *monogyna* (ILIJANIĆ *et al.*, 1983). *Lolium rigidum* Gaudin has been registered as its typical subspecies by ILIJANIĆ *et al.* (1983).

There are 10 newly recorded cultivated taxa for the island of Mljet in this research. This number cannot be considered final because cultivated taxa have been almost completely neglected and mostly have not been noted during the systematic floristic research in the last decades (cf. ILIJANIĆ, 1980; REGULA-BEVILACQUA & JURKOVIĆ-BEVILACQUA, 1980; REGULA-BEVILACQUA *et al.*, 1981; ILIJANIĆ & REGULA-BEVILACQUA, 1982; ILIJANIĆ *et al.*, 1983; REGULA-BEVILACQUA, 1983). The data on taxa cultivated on the island of Mljet were given almost exclusively by PARTSCH (1826), in the earliest work regarding the flora of this island, and afterwards by TRINAJSTIĆ (1985).

Out of newly recorded taxa for the island of Mljet, six of them are considered to be invasive by BORŠIĆ *et al.* (2008). These are: *Bidens subalternans* DC., *Carpobrotus edulis* (L.) N.E.Br. in Phillips, *Conyza bonariensis* (L.) Cronquist, *Datura inoxia* Mill., *Parthenocissus quinquefolia* (L.) Planchon and *Sorghum halepense* (L.) Pers. All these species are neophytes and since their first records in Croatia they have been spreading intensively along the coast and on the islands (cf. MILOVIĆ, 2004; PANDŽA *et al.*, 2001; PANDŽA & TAFRA, 2008 etc.). Their findings on the island of Mljet provide new and more recent data on their distribution in the southern Dalmatia.

One of the more interesting findings is a discovery of the fern *Adiantum capillus-veneris* L. This tertiary relict was treated as rare by PAVLETIĆ (1994) while NIKOLIĆ & TOPIĆ (2005) list it as Near Threatened (NT). It is also listed as a protected species in the Ordinance on Designating Wild Taxa Protected and Strictly Protected (ANONYMOUS 2006). Although it was recorded on few islands (island of Krk (TRINAJSTIĆ, 1965), island of Rab (HORVATIĆ, 1939), island of Hvar (TRINAJSTIĆ, 1993), island of Lokrum (HEĆIMOVIĆ, 1982) and most recently island of Korčula (JASPRICA, 2007)), until now there has been no data about its existence on the island of Mljet. It was found in shady and humid semi-cave in a large population. Its record on the island of Mljet is significant as one of its most southern localities in Croatia, only with localities in Dubrovnik (MASLO, 1993; JASPRICA, unpubl. data) and island of Lokrum (HEĆIMOVIĆ, 1982) being more southern.

Other interesting species discovered in this research is the grass *Ampelodesmos mauritanica* (Poir.) T. Durand et Schinz. This west Mediterranean species has been noted for the islet Sv. Jerolim in Istria where its locality has been subsequently reported as destroyed (FREYN, 1877; FENAROLI, 1959) but where it was recently rediscovered again (BRANA & BRANA, 2006), and for the island of Lastovo (TRINAJSTIĆ, 1969). As it was rightly anticipated by TRINAJSTIĆ (1969) that there might be other isolated localities of this species on some middle or south Dalmatian islands, it has been discovered on the island of Biševo (BOGDANOVIĆ *et al.*, 2004). This species has also been recorded on the Pelješac Peninsula (JASPRICA & RUŠČIĆ, unpubl. data).

CONCLUSION

Up to this research there have been 751 plant taxa recorded on the island of Mljet. In this paper we present findings of 77 taxa new for the island. Out of them, 10 taxa are cultivated while six taxa are considered to be invasive. Three taxa are strictly protected and 12 taxa are protected by law. Although no threatened taxa have been discovered during this research, there are three taxa that are Near Threatened (NT), two are categorized as Least Concern (LC) and other two are Data Deficient (DD).

Therefore, the entire vascular flora of the island of Mljet now numbers 828 taxa. Although its flora has been relatively well investigated, we can conclude that it still is not completely known. For example, the cultivated taxa have been mostly neglected and should be more thoroughly investigated in further researches. Also, more attention should be paid to the neophytes in the future. As a consequence of high human impact in this area, particularly tourism activities, their new findings on the island of Mljet are expected.

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SAŽETAK

Novi podaci o vaskularnim biljkama otoka Mljeta (južna Dalmacija, Hrvatska)

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Flora južnodalmatinskog otoka Mljeta relativno je dobro istražena. Do ovog istraživanja na otoku je bila zabilježena 751 vaskularna biljna svojta. U lipnju, kolovozu i listopadu 2008. godine na otoku su provedena floristička istraživanja tijekom kojih je utvrđeno 77 novih biljnih svojti. Tako ukupna flora otoka Mljeta sada broji 828 svojti vaskularnih biljaka. Od novozabilježenih svojti 10 je kultivirano dok se šest vrsta smatra invazivnima. Zakonom je 12 svojti zaštićeno dok su tri svojte strogo zaštićene. Tri svojte su gotovo ugrožene (NT), dvije se smatraju najmanje zabrinjavajućim (LC), dok su dvije nedostavno poznate (DD). Posebno su zanimljivi nalazi paprati *Adiantum capillus-veneris* L. i trave *Ampelodesmos mauritanica* (Poir.) T. Durand et Schinz. Buduća floristička istraživanja trebala bi obuhvatiti kultivirane svojte, a širenje neofita bi trebalo pratiti.