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Echinophora spinosa L. (Apiaceae), a new species in the flora of Tunisia and second report from North Africa

Ridha El Mokni[1, 2]

Key words: *Echinophora spinosa* L., Apiaceae, new find, North Africa, Kroumiria.

Ključne besede: *Echinophora spinosa* L., Apiaceae, nova najdba, Severna Afrika, Kroumiria.

Abstract

Echinophora spinosa L., a perennial member of the Apiaceae (Umbelliferae) family is known to be native to southern Europe and Algeria. More recently this taxon was collected from Tabarka (Jendouba-Kroumiria, North-Western of Tunisia) and is reported as a new species for the terrestrial flora of Tunisia. It is described and illustrated and notes on its ecology and phytosociological remarks are provided.

Izvleček

Echinophora spinosa L., trajnica iz družine Apiaceae (Umbelliferae), je domorodna vrsta južne Evrope in Alžirije. Nedavno smo to vrsto našli tudi pri mestu Tabarka (Jendouba-Kroumiria, severozahodna Tunizija). Najdba predstavlja novo vrsto v flori Tunizije. Predstavljamo njen opis ter opis ekoloških in fitocenoloških razmer.

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1 University of Jendouba, Laboratory of Silvo-Pastoral Resources, Silvo-Pastoral Institute of Tabarka, BP. 345, 8110-Tabarka, Tunisia.

2 University of Monastir, Department of Pharmaceutical Sciences "A", Laboratory of Botany, Cryptogamy and Plant Biology, Faculty of Pharmacy of Monastir, Avenue Avicenna, 5000-Monastir, Tunisia. Email: ridha.elmokni@fphm.rnu.tn

Introduction

In the context of our extensive field surveys and floristic investigations aiming at updating and improving the knowledge on the Tunisian vascular flora, mainly focused on the Kroumiria region (North-Western of Tunisia) (see e.g., El Mokni & El Aouni 2012, El Mokni et al. 2014, 2015a, 2015b, El Mokni 2018, El Mokni & Verloove 2017, 2019, El Mokni & Domina 2019), in coastal dunes of Tabarka region in August 2018, an interesting spiny plant was found. Specimens, which are available in great abundance, resemble sea holly in their general appearance, but differ, especially in their gathered flowers in umbels. After checking the pertinent works on the Tunisian flora and checklist, and the North African flora (e.g., Pottier-Alapetite 1979, Le Floc'h et al. 2010, Dobignard & Chatelain 2011, APD 2019) we can state that our discovery represents the first record of the genus in Tunisia and the second for North Africa.

The genus *Echinophora* L. (Apiaceae) in the Mediterranean area is represented by seven species (Hand 2011). In North Africa, only *E. spinosa* L. was reported from Algeria as a very rare taxon (Quézel & Santa 1963, APD 2019).

A more detailed examination of collected specimens revealed it to be *Echinophora spinosa* L., which is a new record for the flora of Tunisia (Pottier-Alapetite 1979, Le Floc'h et al. 2010, Dobignard & Chatelain 2011, Hand 2011, APD 2019). In this paper, the finding of the new species is reported, detailed illustrations of its components are provided, its new actual distribution area together with its syntaxonomic status are discussed.

Material and methods

The present work is based on both field surveys within Kroumiria region (periods 2015–2019), analysis of relevant literature and examination of specimens preserved at National Superior School of Agronomy of El Harrach (Algiers) available at http://gdebelair.com/herbier.html and my personal collection which is deposited in the Herbaria of the Faculty of Pharmacy of Monastir (not listed in Index Herbariorum).

The description is in part original based on direct observations of Tunisian specimens.

Research area

Kroumiria in Tunisia is defined geographically as series of mountainous chains, South South-Western – North North-Eastern, which rise to 1203 m at Djebel El Ghorra on the Tunisian-Algerian border. It is about 30 km wide, bordered on the South by the "MejardaValley" , on the West by the Algerian border and on the North and East by the Mediterranean sea, area of the extended dunes (Tabarka region) (Rouvier 1977, Talbi et al. 2008) with coordinates between 36°24'08"N to 37°02'00"N and 08°09'14"E to 08°59'26"E. Geologically, the entire study area corresponds to the field of *flyshs* with the largest Numidian unit. This unit extends from the Oligocene to the lower Miocene (Rouvier 1977). Kroumiria is bioclimatically the most rainy region of Tunisia sometimes till 2200 mm per year) included in the humid bioclimate with mainly temperate to hot winters, in the dunes of Tabarka.

Vegetation within Kroumiria is dominated by oak species (*Quercus* spp.) with sporadically conifers and deciduous trees at little extends and very diverse undergrowth (shrubs and bushes). Dunes are dominated by communities of *Quercus coccifera* and planted pines and eucalyptus.

Results and discussion

Echinophora spinosa L. Sp. Pl.: 239. 1753 ≡ *Selinum spinosum* (L.) E. H. L. Krause J. Sturm, Deutschl. Fl. Abbild., ed. 2, 12: 81 (1904) ≡ *Echinophora maritima* Gouan (cf. Hassler 2018). Described firstly from "*Habitat ad litora maris praesertim mediterranei.*" – Generitype (designated by Hitchcock, Prop. Brit. Bot.: 138. 1929.). Lectotype: Herb. Burser XVI (2): 14 (UPS) (designated by Reduron & Jarvis in Jarvis et al. (ed.), Regnum Veg. 127: 44 (1993)).

Description (Figure 1): Perennial plant 20–50 cm, glaucous, glabrescent, with thick and deep roots; stem robust, furrowed, full, with many branches spread in high corymbs; leaves stiff, fleshy, oblong, bipennate, with spiny lobes, carinated below, canaliculate above; white or slightly pink, radiant, polygamous flowers, only the central is fertile in the sessile umbellula; umbels 9-12(-14) short, thick, angular, unequal, pubescent; involucre with 5–8 linear-lanceolate, spiny, keeled leaflets, almost as long as the umbel; calyx with 5 stiff, spiny teeth; petals obovate, emarginate, with curved tip; erect, elongated styles; fruit enclosed in the receptacle, oblong, short-billed; mericarps with 5 equal sides, depressed, wavy.

Phenology: flowering and fruiting times August-October.

Native habitat and distribution area: *Echinophora spinosa* L. is native to southern Europe (Albania, Baleares, Corse, Corfu Island, Croatia, France, Greece, Italy, Montenegro, Sardegna, Sicilia, Spain) and Algeria (Govaerts 2001, Dobignard & Chatelain 2011, Hand 2011, KBD 2017, APD 2019).

In Tunisia, our first observation was in august 2018 along the coastal dunes of Tabarka (North-Western of Tunisia).

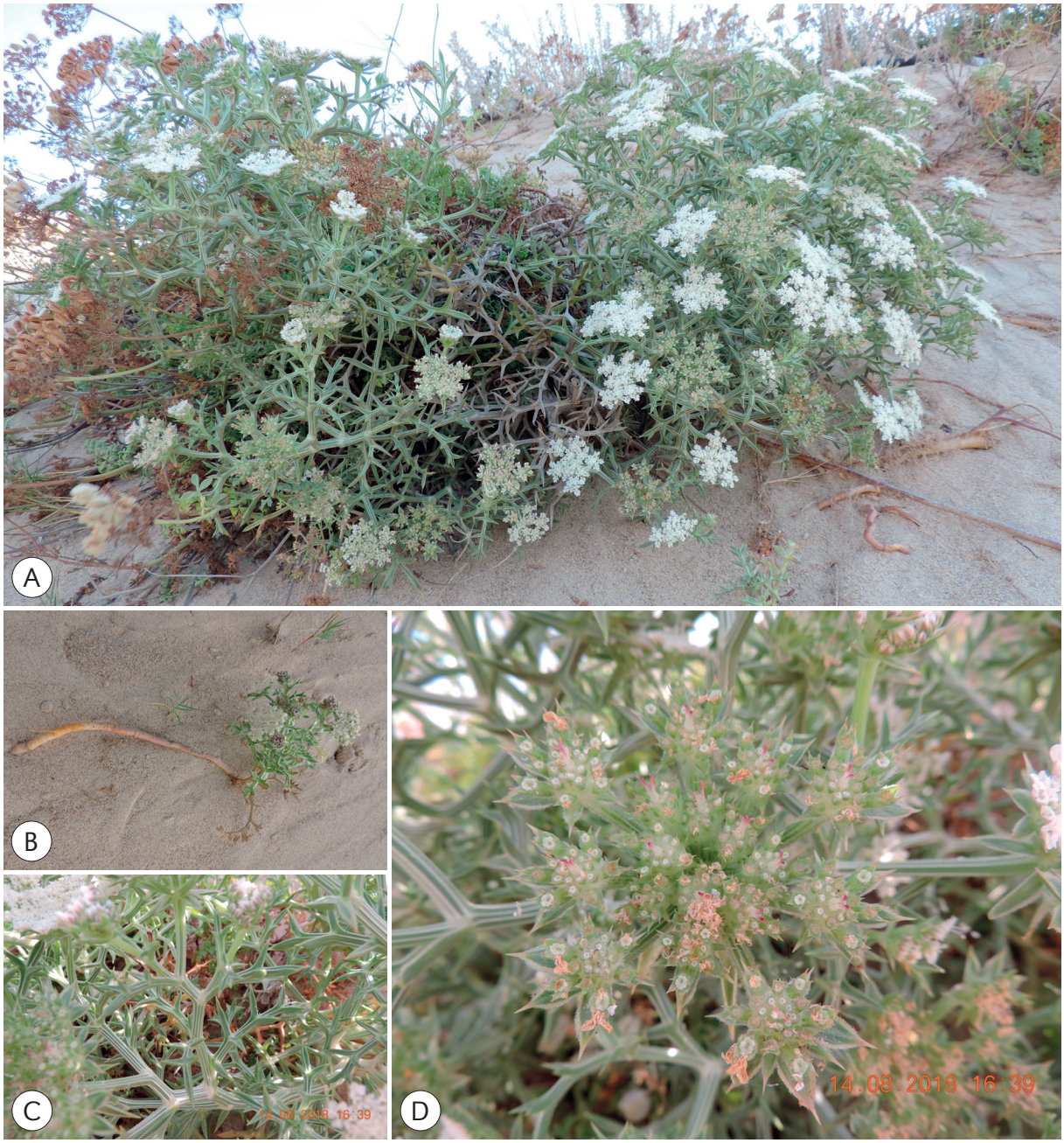

Figure 1: Habit of *Echinophora spinosa* L. A: Plant in its habitat; B: perennial thick and deep root; C: bipennate, spiny leaf; D: several umbellula within an umbel at the sandy low dunes of Tabarka (Kroumiria, North-Western of Tunisia) where the species was recorded for the second time to North Africa. Photos: R. El Mokni.

Slika 1: Habitus vrste *Echinophora spinosa* L. A: rastlina na rastišču; B: trajna in globoka korenina; C: deljeni, trnasti listi; D: več kobulčkov, združenih v kobul, na peščenih sipinah pri mestu Tabarka (Kroumiria, severozahodna Tunizija), kjer je bila vrsta v Severni Afriki zabeležena drugič. Fotografije: R. El Mokni.

Habitat and ecological notes: *Echinophora spinosa* L. grows in Tunisia in open sandy communities not far away the sea at low altitudes of about 2–3 m a.s.l. Historically, the plant was not cited before nevertheless it may be present but not distinguished or misidentified.

Notes on vegetation and syntaxonomy: *Echinophora spinosa* L. was found in open and herbaceous communities characterized mainly by native medium-sized species, some of them have high national/regional ecological value (endemics and subendemics) (see Table 1).

Table 1: Plants identified within the habitat of *Echinophora spinos*a L. (Apiaceae) in Tabarka (Kroumiria, North-Western of Tunisia). The actual status (3rd column) is due to our floristic monitoring within Kroumiria region and mainly the coastal area of Tabarka, since 2001. Abbreviations. 2nd column: C = chamaephyte, G = geophyte, H = hemicryptophyte, Ph = phanerophyte, T = therophyte. Simple asterisks (*) in the 1st column indicate species with high national ecological value within the region of the new record. Double asterisks (**) in the 1st column indicate species with high Mediterranean ecological value (Tuniso-Algerian endemics in Domina & El Mokni 2019).

Tabela 1: Vrste najdene na rastišču vrste *Echinophora spinosa* L. (Apiaceae) pri mestu Tabarka (Kroumiria, severozahodna Tunizija). Pogostnost vrste je predstavljena v tretjem stolpcu na podlagi florističnega monitoringa območja Kroumiria in predvsem obalnega predela pri mestu Tabarka od leta 2001. Okrajšave: drugi stolpec: C = hamefit, G = geofit, H = hemikriptofit, Ph = fanerofit, T = terofit. Zvezdica (*) v prvem stolpcu označuje vrste z veliko ekološko vrednostjo na nacionalnem nivoju. Dve zvezdici (**) pa označujeta vrste z veliko ekološko vrednostjo v Sredozemlju (endemiti Tunizije in Alžirije po Domina & El Mokni 2019).

Plants name	Life form	Status
Achillea maritima (L.) Ehrend. & Y. P. Guo	C	Quite abundant
Ammophila arenaria subsp. *arundinacea* (Host) H. Lindb.	G	Quite abundant
Anthemis maritima L. subsp. *maritima*	C	Quite abundant
Calendula suffruticosa Vahl	H	Abundant
Calystegia soldanella (L.) Roem. & Schult.	H	Quite abundant
Centaurea sphaerocephala L.	C	Quite abundant
Elytrigia juncea (L.) Nevski	G	Quite abundant
Eryngium maritimum L.	H	Quite abundant
* *Euphorbia biumbellata* Poir.	H	Very scarce, restricted to Tabarka (Kroumiria) in Tunisia
Euphorbia paralias L.	C	Quite abundant
Euphorbia peplis L.	T	Scarce, very located
** *Linaria pinnifolia* (Poir.) Maire	H	Scarce, very located with vulnerable habitat
Lomelosia rutifolia (Vahl) Avino & P. Caputo	H	Quite abundant
Lotus cytisoides L.	H	Quite abundant
* *Orobanche litorea* Guss.	T	Scarce, restricted to Tunisia in North Africa and to Tabarka (Kroumiria) in Tunisia
Pancratium maritimum L.	G	Quite abundant
Polygonum maritimum L.	H	Quite abundant
Rouya polygama (Desf.) Coincy	C	Scarce, very vulnerable habitat
** *Rumex aristidis* Coss.	C	Very scarce, very located with vulnerable habitat
Salsola tragus L.	T	Quite abundant
Sporobolus pungens (Schreb.) Kunth	G	Quite abundant, first report from Kroumiria in Tunisia
Tamarix africana Poir.	Ph	Some individuals

These pioneer perennial plant communities develop typical floral carpet from spring to autumn in coastal mobile embryonic sandy dunes. From the phytosociological point of view, plant communities rich with several chamaephytes (*Achillea maritima*, *Anthemis maritima* subsp. *maritima*, *Centaurea sphaerocephala*, *Euphorbia paralias*, *Rouya polygama*, *Rumex aristidis*) including *Echinophora spinosa* L. as one of the *Ammophiletea* elements and as an accompanying species could belong mainly to *Crucianellion maritimae* Rivas Goday et Rivas-Martínez 1958 (Marcenò et al. 2018). Throughout the North African coastline, such syntaxon identified mainly due to its similar exceptional vegetation (*Ammophila arenaria* subsp. *arundinacea*, *Calystegia soldanella*, *Elytrigia juncea*, *Eryngium maritimum*, *Euphorbia paralias*, *Pancratium maritimum*, *Polygonum maritimum*, *Sporobolus pungens*) extends within the sandy coast in the East of Jijel (Algeria), where it is formed by an "exclave" of dune wherein *Echinophora spinosa* and *Achillea maritima* are the characteristics species (see Thomas 1968, Géhu et al. 1992, Khennouf et al. 2018). According to this available literature and on the basis of our recent observations and our new reports, the actual status of this syntaxon shows an extended area in North African coastline (from Jijel to Annaba in Algeria then to Tabarka dunes in Tunisia) and this is its first report from Tunisia in the south of the Mediterranean basin. This finding contributes well to the knowledge of the chorology and ecology of *Echinophora spinosa* within the Mediterranean area. It emphasizes also the great botanical value attributed to this whole area of the North African coast as a regional "hot-spot" of biodiversity, named "Kabylia-Numidia-Kroumiria" (Véla & Benhouhou 2007). Thus, more recently coastal

dunes of Jijel (Algeria) are proposed as a new Important Plant Area (Khennouf et al. 2018). For Tunisia, this discovery increases the Tunisian floristic diversity with two taxa (a genus and a species within the Apiaceae family) and a dunal syntaxon which is still very localized within Kroumiria region in the North-Western.

Taxonomic notes: Compared to European description (see e.g. Jeanmonod & Gamisans 2007, Tison et al. 2014), and herbaria vouchers in gdb herbarium (Algeria, North Africa) available at http://gdebelair.com/tax/famiumbe.html#Echinophora, habit of collected samples in Tunisia (North Africa, South Mediterranean Basin) appear to be similar to those of European countries (North Mediterranean basin) concerning the leaves shape and the colour of flowers (white or pink). However, umbels despite their habitual morphology, show 9-12(-14) short and unequal rays (vs 5-8(-20) in European descriptions) (see e.g., Coste 1990, Jeanmonod & Gamisans 2007, Tison et al. 2014).

Specimens examined (new records to the flora of Tunisia): Tabarka (Kroumiria, North-Western of Tunisia), on sandy coastal dunes, inflorescence white to pink, 36°57'15"N, 8°47'14"E, 2–3 m above sea level (Figure 2).

Specimina visa: TUNISIA. Tabarka: North-eastern of Kroumiria, 36°57'15"N, 08°47'14"E sandy communities, not far away from road margins, and typically on and between low sandy hills at 2–3 m a.s.l., 14 August 2018, *El Mokni s.n.* (Herb. El Mokni!), El Mokni *s.n.* (Herb. Univ. Monastir).

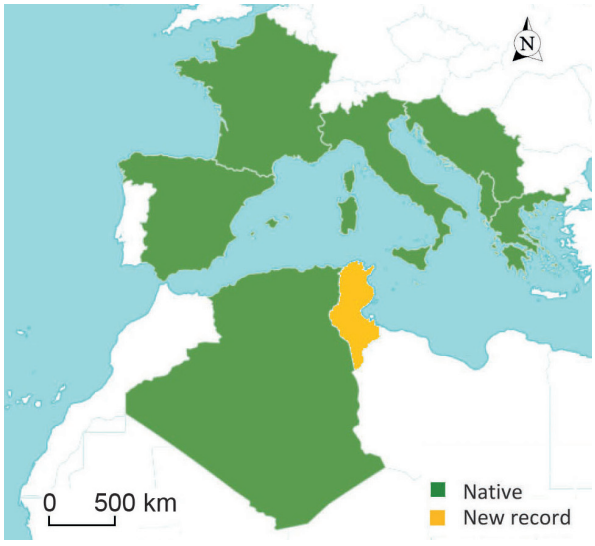

Figure 2: Actual distribution area of *Echinophora spinosa* L. with new localities for Tunisia, North Africa. (Source: http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:841514-1, slightly modified by the Author!).

Slika 2: Območje razširjenosti vrste *Echinophora spinosa* L. z novimi lokalitetami v Tuniziji (Severna Afrika).

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Ridha El Mokni, https://orcid.org/0000-0003-3849-1039

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