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Euphorbia prostrata Aiton (subgen. Chamaesyce): a new alien species in the Tunisian flora

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Abstract. *Euphorbia prostrata* Aiton (Euphorbiaceae), native to tropical and subtropical regions of the Americas, is also scattered as an alien/naturalized species in various parts of the Old World, including several Mediterranean and African countries. This paper documents for the first time its several localities in Tunisia. It presents a morphological description with photographs, ecological features, a first map of distribution and taxonomic notes, concerning comparisons with closely related species. In addition, an updated key to identification of annual *Euphorbia* species of subgen. *Chamaesyce* sect. *Anisophyllum* in Tunisia is proposed.

Key words: *Euphorbia prostrata,* chorology, Euphorbiaceae, sect. *Anisophyllum*, Tunisia, xenophyte

1. Introduction

The Euphorbiaceae Juss. are a noticeable family among the angiosperms because of the large number of taxa (at least 6300 species and 245 genera), with a high morphological variability and many growth forms (Webster 1994, 2014; Wurdack & Davis 2009). Within this family, the genus *Euphorbia* L., with around 1840 species distributed worldwide, is one of the most diversified genera of flowering plants (Esser *et al*. 2009; Horn *et al*. 2012; Riina & Berry 2025). Species of this genus occupy a wide range of habitats and exhibit a great diversity of growth forms, including many kinds of prostrate, ascending, erect, and small ephemeral herbaceous annuals or perennials, trees, shrubs, other woody perennials, and many types of cactus-like succulents (Horn *et al*. 2012). The genus has been subdivided into 4 subgenera: *Chamaesyce*, *Esula*, *Euphorbia*, and *Rhizantium* (Bruyns *et al*. 2006). Subgenus *Chamaesyce* L. is known to include mostly annual erect or prostrate herbs, with the main stem usually aborting and growth continuing from dichotomously branching lateral branches. Stems not succulent or swollen. Leaves opposite, often with an obliquely rounded base, often marked with white or red spots; stipules filamentous to absent. Inflorescence with few cyathia, usually terminal or terminating short axillary shoots, with minute bracts, involucral glands often 4 and an entire or lobed petaloid appendage along outer margin. Seeds minutely tuberculate (rarely smooth) to distinctly wrinkled, ridged or pitted, with or without caruncles (Bruyns *et al*. 2006; Bruyns 2012; Yang *et al.* 2012).

In North Africa (including Canary Islands), this subgenus is represented by few taxa, among which only 3 are native (*E. chamaesyce* L., *E. peplis* L., and *E. petiolata* Banks & Sol. var. *petiolata*), whereas about 8 are introduced/naturalized xenophytes: *E. prostrata* Aiton, *E. maculata* L., *E. serpens* Kunth subsp. *serpens*, *E. hirta* L., *E. hypericifolia* L., *E. indica* Lam., *E. nutans* Lag., and *E. hyssopifolia* L. Some of them were only recently reported, with a remarkable expansion and naturalization during the last decades all over the word and partly in Africa, mainly through the import of potted plants for horticulture (see e.g. Mahklouf 2023; Khamar *et al*. 2021, 2024; APD 2025a; POWO 2025a). In Tunisia, *Euphorbia* species with mainly small procumbent annual habit, stipules, and asymmetrical leaf bases, are included in subgen. *Chamaesyce.* They comprise only 4 recorded taxa (natives and aliens): *E. chamaesyce*, *E. maculata*, *E. peplis*, and *E. serpens* subsp. *serpens* with no reports of *E. prostrata* (Dobignard & Chatelain 2013; APD 2025b; POWO 2025b).

In the course of our steady efforts to update the list of vascular flora of Tunisia and the surrounding countries within North Africa, special attention was paid to the Euphorbiaceae (see e.g. El Mokni 2023; El Mokni *et al*. 2024). They included some annual creeping specimens from several distant populations, within coastal regions of Tunisia, of an unfamiliar species of *Euphorbia* subgen. *Chamaesyce*. On the basis of literature and herbarium studies, it was identified as *E. prostrata* Aiton, an alien species not previously reported from Tunisia.

2. Materials and methods

Plant material collected in the field was dried in the personal herbarium of the author (Herb. R. El Mokni) and deposited at the Faculty of Pharmacy of Monastir University. The morphology of the species is described on the basis of material collected in Tunisia, in consistency with relevant descriptions (Bátori *et al*. 2012; Vladimirov *et al*. 2014; Veljic *et al*. 2017; Mugnai *et al*. 2021). Data about the habitats and population size of *E. prostrata* are based on personal observations in the field. The presented nomenclature follows POWO (2025c).

3. Results

Taxonomic description

Euphorbia prostrata Aiton, Hortus Kew. 2: 139 (1789)

Type: (lectotype, designated by Carter & Radcliffe-Smith 1988: 421): ENGLAND. Hort. Kew., s.d., *s.c. s.n.* (BM000510671 image)

≡ *Anisophyllum prostratum* (Aiton) Haw., Syn. Pl. Succ.: 163 (1812)

≡ *Aplarina prostrata* (Aiton) Raf., New Fl. 4: 99 (1838)

≡ *Chamaesyce prostrata* (Aiton) Small, Fl. S.E. U.S.: 713 (1903)

≡ *Tithymalus prostratus* (Aiton) Samp., Anais Fac. Sci. Porto 17: 45 (1931)

Morphological description (Fig. 1A-D): Herb, annual, with taproot. Stems prostrate to decumbent, usually not mat-forming, 10-30 cm long, pubescent mainly on upper parts. Leaves opposite; stipules connate or distinct, triangular-subulate or lacerate, 0.5-1.0 mm, villous to glabrate; petiole 0.5-1.5 mm, villous; blade broadly elliptic to elliptic-oblong, or ovate-spatulate, (2-)8-10(-15) mm × (1-)4-6(-8) mm, base slightly asymmetric, rounded to slightly cordate and oblique, margins serrulate, apex obtuse, abaxial surface finely villous, adaxial surface glabrous or glabrate; 3-veined from base. Cyathia solitary or in small, cymose clusters at distal nodes or on congested, axillary branches; peduncle 1-2 mm. Involucre obconic, 0.6-0.9 mm × 0.5 mm, villous or glabrous; glands 4, reddish, oval to oblong, 0.1 mm × 0.1-0.2 mm; appendages white to pink, rudimentary, 0-0.2 mm, margin entire or irregularly crenate. Staminate flowers 3-6. Pistillate flowers: *ovary* densely villous; styles 0.1 mm, 2- fid on nearly entire length. Capsules 3-angular, broadly ovoid, 1.2-2.0 mm × 1.4-1.5 mm, sharply keeled, white ciliate along keels and toward base, glabrous, smooth between keels; columella 1.0-1.2 mm. Seeds ovoid-quadrangular, sharply angled, 0.8-1.1 mm × 0.5-0.7 mm, with a thick white coat, testa brown.

Phenology: During the field observations, *E. prostrata* was found with flowers and capsules from May to October. According to earlier studies, the flowering and fruiting of the species extends from mid-June to September in Serbia (Veljic *et al*. 2017) and from May to October or November in Bulgaria (Vladimirov *et al*. 2014).

Iconography: Bátori *et al*. (2012: 239).

Habitat and ecology in Tunisia: *Euphorbia prostrata* has been recorded especially in ruderal places and at railway stations, in some parts of central and northern Tunisia. The plants often grow on poor soils together with several synanthropic plants, such as *Amaranthus deflexus* L., *Argyrolobium uniflorum* (Decne.) Jaub. & Spach, *Carlina involucrata* Poir. (Asteraceae, a Morocco-Algerian-Tunisian-Sicilian endemic), *Daucus carota* L. subsp. *maritimus* (Lam.) Batt., *Dittrichia viscosa* (L.) Greuter subsp. *viscosa*, *Eleusine indica* (L.) Gaertn., *Erigeron canadensis* L., *Euphorbia maculata* L., *E. serpens* Kunth, *Hyparrhenia hirta* (L.) Stapf, *Micromeria nervosa* (Desf.) Benth., *Portulaca oleracea* L. subsp. *oleracea*, *Salvia aegyptiaca* L., *Scabiosa thysdrusiana* Le Houér. (Caprifoliaceae, a Tunisian endemic) and *Solanum elaeagnifolium* Cav.

Distribution and alien status in Tunisia (Fig. 1E): *Euphorbia prostrata* is found within north-eastern Tunisia [NE]: Tunis (Airport Tunis-Carthage, 36°50’50”N, 10°12’57”E, 0-5 m a.s.l.), Bizerta (Nadhour, 37°19’51”N, 09°51’50”E, 10-15 m a.s.l.); within Kroumiria in north-western part [K]: Jendouba (Tabarka, 36°56’44”N, 08°47’53”E, 15-20 m a.s.l.); in the Cap Bon region [CB]: Nabeul (Hammamet South, 36°24’20”N, 10°34’00”E, 15-20 m a.s.l.); in central Tunisia [TC]: Monastir (Monastir-city; 35°46’14”N, 10°49’31”E, 15-20 m a.s.l.; Ksar Hellal, 35°39’07”N, 10°53’54”E, 20-25 m a.s.l.; Moknine, 35°37’58”N, 10°54’40”E, 0-5 m a.s.l.), Sousse (Sousse-Bab Jedid, 35°49’38”N, 10°38’30”E, 0-5 m a.s.l.), and Mahdia (Hiboun, 35°30’02”N, 11°03’50”E, 0-5 m a.s.l.). It can be considered as a well-established alien and may become an invader in the future.

Taxonomic notes: *Euphorbia prostrata* may be mainly confused with *E. serpens*, as both are annual creeping plants with non-maculate leaves and small capsules (only up to 2 mm in diameter). They can be differentiated essentially by leaflet shape, indumentum,

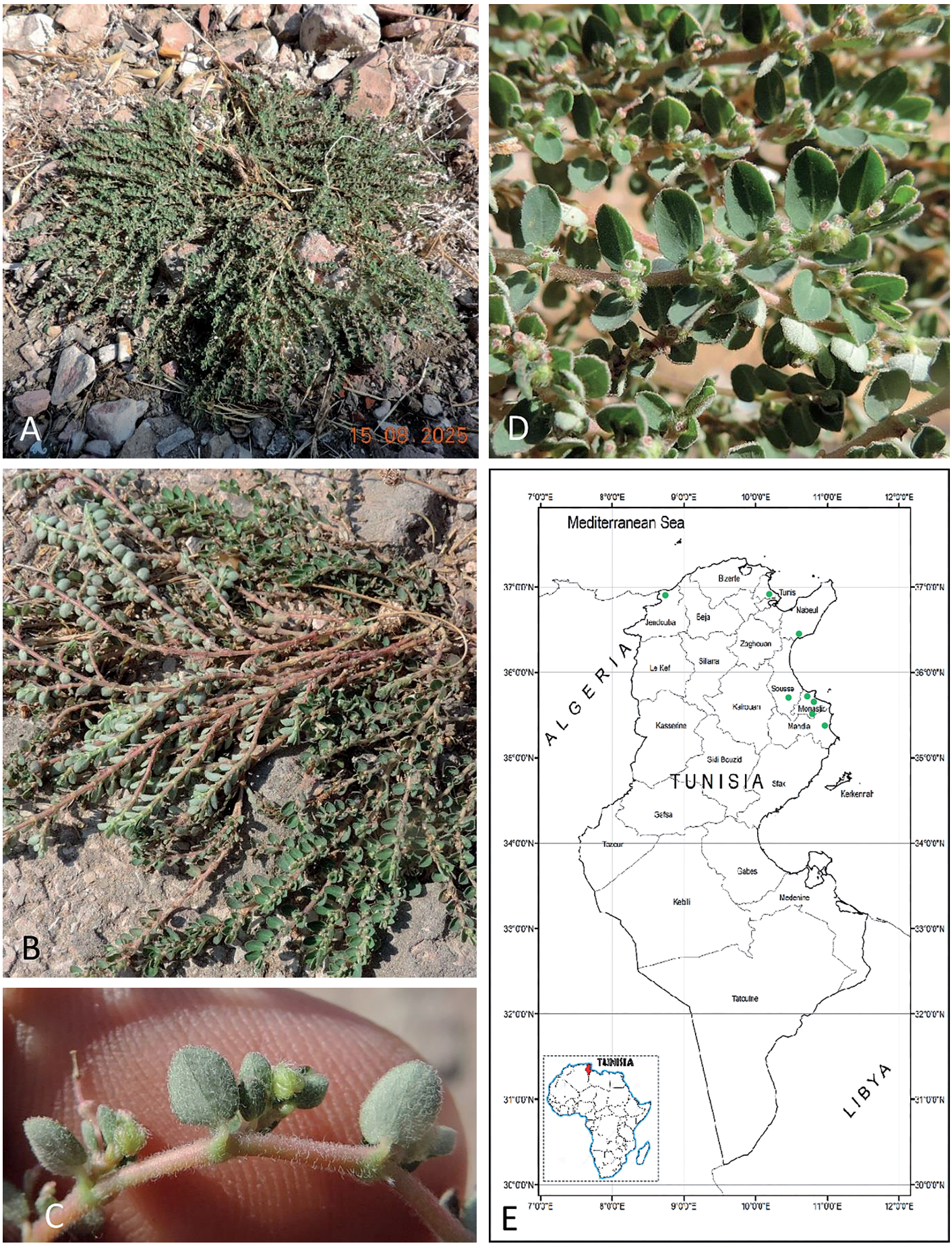

Fig. 1. *Euphorbia prostrata* in Tunisia

Explanations: A – habit and habitat, B – abaxial and adaxial views of stems and leaves, C – abaxial view of finely villous surfaces of leaves with capsules, D – stem with axillary inflorescences and adaxial view of glabrous leaf blades with serrulate margins, E – map of distribution in Tunisia (photograph by R. El Mokni)

and margin, but also capsule surface. In *E. prostrata*, stems are covered with indumentum (*vs*. totally glabrous in *E. serpens*), leaflets are broadly elliptic to lanceolate (*vs*. broadly ovate to suborbicular), densely pilose on abaxial surface, sparsely on adaxial surface (*vs*. glabrous on both sides), with a crenate-denticulate margin (*vs*. entire). In addition, capsules in *E. prostrata* are ciliate along the keels and toward the base, glabrous, smooth between keels (*vs*. glabrous to smooth with fine tubercles along the keels in *E. serpens*). If compared to *E. chamaesyce* s.l., *E. prostrata* can be easily distinguished mainly by the texture of seeds, as *E. prostrata* is characterized by pitted seeds, with 6-7 transverse ridges (*vs*. smooth seeds with 3 longitudinal narrow slits).

Specimens from Tunisia: Tunis, Aéroport Tunis-Carthage, 29/07/2017, R. El Mokni s.n. (Herb. R. El Mokni); Nabeul, Hammamet-South, 07/10/2018, R. El Mokni s.n. (Herb. R. El Mokni); Jendouba, Tabarka, 15/10/2020, R. El Mokni s.n. (Herb. R. El Mokni); Monastir-city, 22/01/2022, R. El Mokni s.n. (Herb. R. El Mokni), *ibidem*, 29/07/2025, R. El Mokni s.n. (Herb. R. El Mokni), *ibidem*, 15/08/2025, R. El Mokni s.n. (Herb. R. El Mokni); Sousse, Bab Jedid, 07/10/2022, R. El Mokni s.n. (Herb. R. El Mokni); Mahdia-city; 01/08/2023, R. El Mokni s.n. (Herb. R. El Mokni); Monastir, Ksar-Hellal, 25/09/2023, R. El Mokni s.n. (Herb. R. El Mokni), *ibidem*, 15/08/2025, R. El Mokni s.n. (Herb. R. El Mokni).

4. Discussion

The main mode of introduction of *E. prostrata* remains unintentional, mainly by way of import of potted plants for horticulture but also with air traffic, probably through the wheels of travel suitcases. In fact, the majority of the colonized areas in Tunisia are coastal localities and touristic zones near and not far away from airports. Once introduced, the species usually spreads rapidly along the watercourses due to the high number of produced seeds and its high growth rate, reproductive capacity, and adaptation potential, which enables it to become naturalized in newly occupied areas. The seeds are minute and very light, and can be easily dispersed by water and wind. The species was found in many localities with the other 2 introduced/naturalized *Euphorbia* species and perhaps all are in full process of expansion in the surrounding areas. Thus, monitoring of their dispersion range is needed in the near future.

In total, 5 species of annual creeping plants of *Euphorbia* subgen. *Chamaesyce* sect. *Anisophyllum* are recorded in Tunisia, of which 3 are aliens. They can be distinguished by using the key below.

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Key to annual creeping native and alien species of *Euphorbia* subgen. *Chamaesyce* sect. *Anisophyllum* in Tunisia

1. Plants somewhat fleshy; capsules 3.0–4.5 mm × 4.0–5.0 mm in diameter; seeds ca. 3 mm long..... .....*E. peplis* L. [≡ *Anisophyllum peplis* (L.) Haw.]
– Plants not fleshy; capsules up to 2 mm in diameter; seeds up to 1.5 mm long.....2
2. Capsules glabrous; stems glabrous or hairy.....*E. serpens* Kunth [≡ *A. serpens* (Kunth) Klotzsch & Garcke]
– Capsules and stems hairy.....3
3. Capsules with all hairs appressed, uniformly distributed; leaves usually with a central purplish spot..... .....*E. maculata* L. [≡ *A. maculatum* (L.) Haw.]
– Capsules with all hairs patent, distributed on angles only or all over; leaves not spotted.....4
4. Capsule mostly hairy on angles; seeds deeply transversely furrowed.....*E. prostrata* Aiton
– Capsule hairy all over; seeds tuberculate-rugose, not furrowed ....*E. chamaesyce* L. [≡ *A. chamaesyce* (L.) Haw.]

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