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Five records of new and rare alien species to the flora of the United Arab Emirates (UAE)

V. V. Byalt^{1*}, M. V. Korshunov²

¹ Komarov Botanical Institute of RAS, Prof. Popova St., 2, St. Petersburg, 197376, Russian Federation
E-mails: byalt66@mail.ru, VByalt@binran.ru; ORCID iD: <https://orcid.org/0000-0002-2529-4389>

² Russian State Agrarian University – K. A. Timiryazev Moscow Agricultural Academy, Timiryazevskaya St., 49, Moscow, 127434,
Russian Federation. E-mail: mikh.korshunov@gmail.com; ORCID iD: <https://orcid.org/0000-0003-1566-171X>

* Corresponding author

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Summary. The article presents new records for five alien species previously unknown from the flora of the United Arab Emirates (UAE) or very rare in the country – *Chenopodium ficifolium* (Chenopodiaceae/Amaranthaceae s. l.), *Acalypha indica*, *Euphorbia maculata* (Euphorbiaceae), *Gamochaeta pensylvanica* (*Gnaphalium pensylvanicum*), and *Verbesina encelioides* (Asteraceae). Some of them have been recorded for the first time from the emirate Fujairah in north-eastern part of the UAE. *Euphorbia maculata*, which is rare in the country, was found only in “Salman Nursery” at Masafi town and in an irrigated garden near village Bithna, *Chenopodium ficifolium* was found in environs of Al Siji, in Wadi Siji on the road-dam and in “Al Phoenician Nursery” at Al Dibba town, *Acalypha indica* L. grows as weed in a plant market on the roadside in Al Bidya and in “The Green Nursery Sales Dibba” at Al Dibba town, they are new for the flora of Fujairah and UAE at all. *Gamochaeta pensylvanica* was found in a small quantity in a plant market and plant nursery in the Masafi friday market, and *Verbesina encelioides* – was found naturalized in Khor-Fakkan (Emirate of Sharjah) – both are very rare in the UAE.

Species, synonyms, spatial distribution, habitat preferences, and species taxonomy with remarks on identification and differentiation from the most similar taxa occurring in the study area, as well as the list of localities are presented. The herbarium materials were transferred to the Herbarium of the Komarov Botanical Institute (LE, St. Petersburg, Russia), the duplicates – to the Herbarium of Altai State University (ALTU, Barnaul, Russia) and the Scientific Herbarium of Fujairah (FSH, Wadi Wurayah national park, Fujairah, United Arab Emirates).

Пять новых и редких чужеродных видов для флоры Объединенных Арабских Эмиратов

В. В. Бялт¹, М. В. Коршунов²

¹ Ботанический институт им. В. Л. Комарова РАН, ул. Проф. Попова, д. 2, г. Санкт-Петербург, 197376, Россия

² Российский государственный аграрный университет – Московская сельскохозяйственная академия им. К. А. Тимирязева, ул. Тимирязевская, д. 49, г. Москва, 127434, Россия

Ключевые слова: Аравийский полуостров, география растений, Объединенные Арабские Эмираты, хорология, чужеродные виды, Фуджейра, Шарджа, Asteraceae, Chenopodiaceae (Amaranthaceae s. l.), chorology, Euphorbiaceae.

Аннотация. В статье представлены новые находки пяти чужеродных видов, ранее неизвестных во флоре Объединенных Арабских Эмиратов (ОАЭ) или очень редких в стране – *Chenopodium ficifolium* (Chenopodiaceae/Amaranthaceae s. l.), *Acalypha indica*, *Euphorbia maculata* (Euphorbiaceae), *Gamochaeta pensylvanica* (*Gnaphalium pensylvanicum*) и *Verbesina encelioides* (Asteraceae). *Euphorbia maculata* обнаружена только в «питомнике Салмана» в городе Масафи и на поливе в саду около пос. Битна, *Chenopodium ficifolium* Sm. была найдена в окрестностях пос. Аль-Сиджи, в вади Сиджи на дорожной дамбе и в питомнике растений “Al Phoenician Nursery” в г. Аль-Дибба, *Acalypha indica* L. – растет как сорное на рынке растений на обочине дороги в пос. Аль-Бидья и в “The Green Nursery Sales Dibba” в г. Аль-Дибба. Все они зарегистрированы впервые в эмирате Фуджейра в восточной части ОАЭ. *Gamochaeta pensylvanica* был обнаружен в небольшом количестве в качестве сорняка на рынке растений и в питомнике растений на пятничном рынке г. Мазафи (“Masafi Friday market”), а *Verbesina encelioides* был найден одичавшим в Хор-Факкане (Эмират Шарджа) – оба эти чужеродных вида очень редки в ОАЭ.

Представлены виды, синонимы, распространение, местообитания и примечания по систематике видов с замечками по их отличию от наиболее близких таксонов, встречающихся на территории исследования, а также список местонахождений. Гербарные материалы переданы в Гербарий Ботанического института им. Комарова (LE, г. Санкт-Петербург, Россия), дубликаты – в Гербарий Алтайского государственного университета (ALTB, г. Барнаул, Россия) и Научный гербарий Фуджейры (FSH, Национальный парк «Вади Вурая», Фуджейра, Объединенные Арабские Эмираты).

This research is part of the project “Flora of Fujairah, United Arab Emirates”, under a cooperation agreement between the Office of the Crown Prince of Fujairah and the Komarov Botanical Institute of the Russian Academy of Sciences, St. Petersburg (Byalt et al., 2020a–c, 2021a, b, 2022; Byalt, Korshunov, 2021a, b, 2022a–c; etc.). During the field investigations in 2017–2022 the authors have clarified information on the distribution of new alien plant species in the territory of the Emirate of Fujairah, United Arab Emirates (UAE). The article presents new records for *Chenopodium ficifolium* Sm. (Chenopodiaceae/Amaranthaceae s. l.), *Acalypha indica* L., *Euphorbia maculata* L. (Euphorbiaceae), *Gamochaeta pensylvanica* (Willd.) Cabrera (*Gnaphalium pensylvanicum* Willd.) and *Verbesina encelioides* (Cav.) Benth. et Hook. f. ex A. Gray (Asteraceae).

Material and methods

During various botanical surveys in the UAE in 2017–2022 years, the specimens of some new alien species were collected by the authors in several localities in the territory of the Emirate of Fujairah and Sharjah (UAE) (Fig. 1). Data on plant populations and habitats were also gathered during the expeditions. The following flora compendia and identification guides were used to identify specimens and determine their taxonomic status: local Floras and field guides for UAE (Western, 1989; Jongbloed et al., 2000, 2003; Karim, Fawzi, 2007) and Floras for neighboring countries (Batanouny, 1981; Collenette, 1985, 1999; Daoud, Al-Rawi, 1985; Cornes C.,

Cornes M., 1989; Ghazanfar, 1992; Migahid, 1996; Miller, Cope, 1996; Wood, 1997; Jongbloed et al., 2003; Norton et al., 2009; etc.). The status of the alien species was determined using above sources as well “Global Biodiversity Information Facility” (GBIF. URL: <https://www.gbif.org>).

The alien plant status was determined by the following criteria (Egorov et al., 2016; Baranova et al., 2018): 1) an indication in the literature that the species has been introduced into the study area or a larger region encompassing the study area; 2) the species occurred only or mainly in ruderal and/or weedy habitats; 3) the species occurred in isolation from its main natural geographic range. The status of the alien species was determined to be casual, naturalized, or invasive, using the approach developed by Pyšek et al. (2004) and which is quite widely used in Western Europe (Galasso et al., 2018). However, because our observations were made only once, the alien species status that we give might not be correct.

Specimens were deposited in the following herbaria (acronyms according to Thiers, 2021): Herbarium of the Komarov Botanical Institute of the Russian Academy of Sciences, St. Petersburg (LE), and Wadi Wurraya National Park (FSH, not acronym yet).

A Garmin GPS 72H was used for the geographic coordinates of the collecting sites. The identification was performed with different relevant florals. The location of the plants was determined using a GPS receiver or Google Maps. All coordinates use the WGS84 standard.

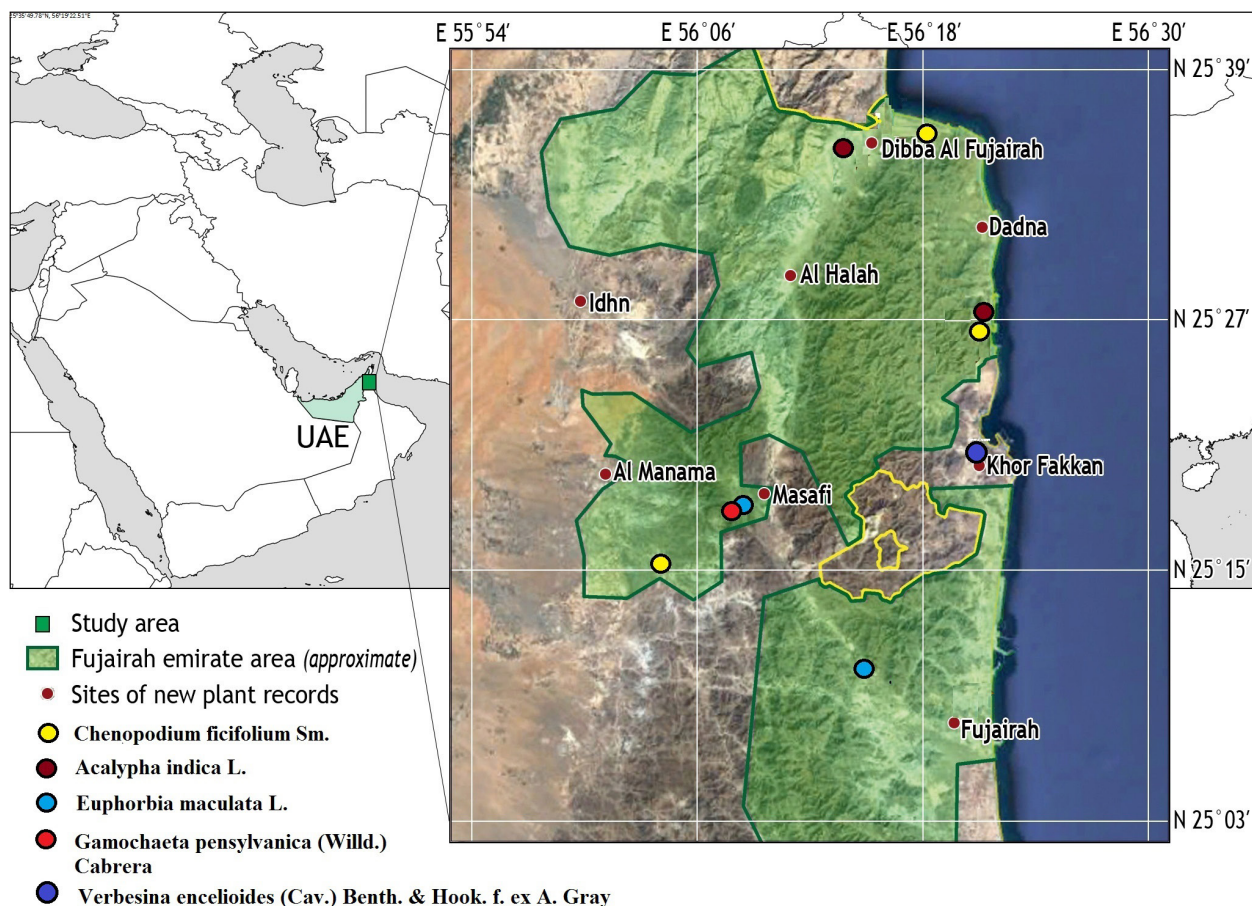


Fig. 1. Map of the distribution of new alien plants in the Emirate of Fujairah (based on Google Earth, map base was designed by I. Sokolova).

The locations of the study sites Emirate of Fujairah: Al Dibba town, environs of Masafi, 1 km East from Wadi Siji Old Dam, villages Al Bidya and Bithnah.

Accepted abbreviations: United Arab Emirates – UAE, fl. – with flowers, fr. – with fruits, juv. – young, underdeveloped. LE – Herbarium Komarov Botanical Institute of RAS, FSH [not yet acronym] – Fujairah Scientific Herbarium (Byalt et al., 2020). The labels are in English as in the original. The numbers in square brackets indicate the place of our research, recorded by GPS [point 776] and others. They are given on the labels for the convenience of working with the herbarium.

Results

***Chenopodium ficifolium* Sm.** (Chenopodiaceae / Amaranthaceae s. l.): “United Arab Emirates, Fujairah Emirate, village Bithna, villas with gardens. 25°11'27.92"N, 56°13'59.54"E, elevation 190 m [point 723]: on roadside in irrigated spots. 30 III 2020. [Fr.] Leg.: V. V. Byalt, M. V. Korshunov. No. 1364. Det.

A. Sukhorukov (MW), 21 XI 2022” (LE 01229208); “UAE, Fujairah Emirate, Al Siji, wadi Siji, road-dam 1 km East from Wadi Siji Old Dam, 25°15'7.86"N, 56°5'15.17"E, elevation 286 m [point 729]: in sand-gravel wadi lower dam; left bank of sand wadi with pond. 1 IV 2020. [Fl., fr.] Leg.: V. V. Byalt, M. V. Korshunov s. n. Det. A. Sukhorukov (MW), 21 XI 2022.” (LE 01229191) (Fig. 2); “UAE, Fujairah Emirate, Masafi friday market, E88 Al Dhaid – Masafi road, 5.2 km to Masafi. 25°17'28.28"N, 56°6'48.62"E, elevation 370 m [point 732]: weed in plant market and nursery. 3 IV 2020. [Fl. juv.] V. V. Byalt, M. V. Korshunov. No. 1683-2” (LE 01259794); “UAE, Fujairah Emirate, Al Dibba town, Al Phoenician Nursery, 0.3 km to South-West from first roundabout on the E99 road from Khorfakkan to Dibba. 25°35'49.78"N, 56°19'22.51"E, elevation 11 m [point 791]: weed on sand under palm trees (*Washingtonia*), in mass. 26 V 2020. [Fl.] V. V. Byalt, M. V. Korshunov. No. 3232” (FSH); “UAE, Fujairah Emirate, Al Bidiya, Al Qalamoon Nursery, 0.3 km East from Eid Prayer Ground Bidiyah, 25°25'24.70"N, 56°20'18.77"E, elevation 22 m [point 781]: weed

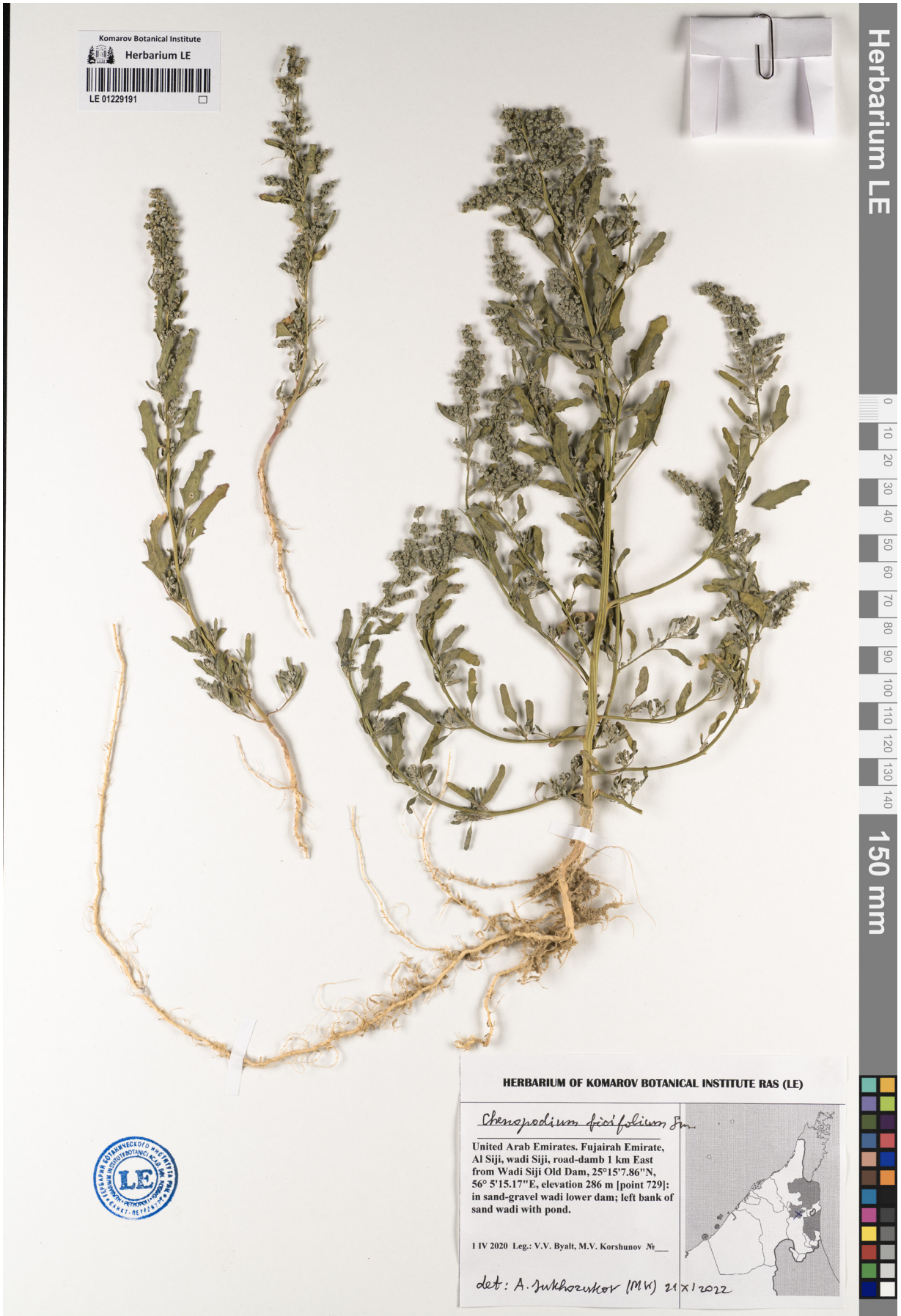


Fig. 2. Herbarium specimen of *Chenopodium ficifolium* Sm. collected from Wadi Siji in the Fujairah Emirate kept in LE (LE01229191, scan by M. Legchenko).

in and between plastic pots with cultivated plants. 15 V 2020. [Fl.] V. V. Byalt, M. V. Korshunov. No. 2861” (LE 01229209). – Therophyte / Annual. Eurasian-North African. Naturalized. Xenophyte, colonophyte, euneophyte. Distributed by seeds; autochorous, anthropochorous. Weed. Alien species in Fujairah and the UAE.

The distribution range of this species is from Europe to Korea and N. Indo-China but originally native to the Irano-Turanian floristic region (Nobis et al., 2018). It is an archaeophyte weed in Europe and can now be found in temperate crop-growing regions in most of the world (Harrap, 2014). *Chenopodium ficifolium* is an annual and grows primarily in the temperate biomes (POWO, 2023), and recorded as introduced in 13 countries of the World, including Saudi Arabia in the Arabian Peninsula (*Chenopodium ficifolium*, 2023); reported as invasive in Japan (Ikeda et al., 2021), the Republic of

Korea (Foxcroft et al., 2020), Great Britain (Roy et al., 2020), etc. A new alien (adventives) species for Fujairah and the UAE as a whole. For the Arabian Peninsula, it was recorded for Saudi Arabia (Boulos, 1996; Checklist of Flora..., 2011–2023) but not for other countries (Cornes C., Cornes M., 1989; Ghazanfar, 1992; Miller, Cope, 1996; Wood, 1997; Jongbloed et al., 2000, 2003; Ghazanfar, 2007; Norton et al., 2009; Al-Khulaidi, 2013; Pahlevani, 2017; etc.). In Fujairah it has been found on a bank of Siji pond and in a plant nursery “Al Qalamoon Nursery” in village Al Bidya, on roadside in irrigated spots in village Bithna and “Al Phoenician Nursery” in Dibba town, but it is represented there in a large number of individuals, apparently.

Chenopodium ficifolium differs from the closely related annual species of genus *Chenopodium* in the following features (see Table 1).

Table 1

Comparative features of closely related annual species to *Chenopodium opulifolium* L.

Species	Inflorescence	Leaves	Pericarp	Seeds
<i>Ch. opulifolium</i> L.	Leafless in the upper part	Lower and median leaves as wide as long or slightly longer than wide, rarely exceeding 5 cm in length	Pericarp somewhat persistent	Seeds horizontal, black, glossy, 1.2–1.5 mm in diam.
<i>Ch. ficifolium</i> Sm.	Leafless in the upper part	Lower and median leaves distinctly longer than wide, up to 10 cm in length	Pericarp persistent	Seeds horizontal, black, glossy, keeled, ca. 1.2 mm in diam.
<i>Ch. fasciculosum</i> Aellen	Leafy almost to the top	Leaves broadly ovate to deltoid, 2–8 cm in length × 1.5–6 cm, acute at the tip, the margins with irregular sharp teeth	Pericarp easily detached	Seeds not keeled along the margin, 1.5–2 mm in diam.
<i>Ch. album</i> L.	Leafless in the upper part	Leaves variable in shape and size, rhombic-ovate to narrowly lanceolate. Lower and median leaves distinctly longer than wide, up to 10 cm in length	Pericarp free	Seeds horizontal, black, glossy, slightly keeled, 1.2–1.6 mm in diam.
<i>Ch. murale</i> L.	Leafy almost to the top	Leaves ovate-rhombic or deltoid, less often narrowly elliptic-lanceolate, 1.5–10 × 1–7 cm, coarsely dentate but not lobed, acute or obtuse at the tip	Pericarp firmly adherent to the seed	Seeds horizontal, black, glossy, strongly keeled, 1.2–1.5 mm in diam.

Acalypha indica L.: “UAE, Fujairah Emirate, Al Bidya, plant market 0.2 km to south to old Al Bidya mosque, 25°26'8.53"N, 56°21'11.70"E, elevation 5 m: weed in plant market on roadside, on wet sand. 22 III 2020. [Fl.] V. V. Byalt, M. V. Korshunov. No. 951” (LE 01229242); “United Arab Emirates. Fujairah Emirate, Al Bidiya, Al Qalamoon Nursery, 0.3 km East from Eid Prayer Ground Bidya, 25°25'24.70"N,

56°20'18.77"E, Elevation 22 m [point 781]: weed between plastic pots with cultivated plants; between irrigated lines. 19 V 2020. V. V. Byalt, M. V. Korshunov. Det. D. Geltman” (LE 01229243); “UAE, Fujairah Emirate, Al Dibba town, The Green Nursery Sales Dibba, 0.2 km South from Khalid Hadi Resort Dibba. 25°34'29.81"N, 56°14'16.32"E, elevation 44 m [point 795]: weed between plastic pots, between ir-

rigated lines. 8 VI 2020. [Fl.] Leg.: V. V. Byalt, M. V. Korshunov. No. 3775" (LE 01229231, FSH) (Fig. 3). – Therophyte / annual. Xenophyte, colonophyte (hemiepoecophyte), neophyte. African-South Asian-New Guinean tropical. Distributed by seeds; anemochorous, ballistochorous, anthropochorous.

The native range of this species is from Eritrea to S. Africa, Arabian Peninsula to Tropical and Subtropical Asia, including some Arabian countries (Oman, Saudi Arabia). It is an annual and grows primarily in the wet tropical biomes (Govaerts, 1995; Govaerts et al., 2000; Balakrishnan, Chakrabarty, 2007; POWO, 2023), and recorded as introduced in 23 countries of the World (*Acalypha indica*, 2023); it has been reported as invasive in Mexico (González Martínez et al., 2020), Madagascar (Randrianizahana et al., 2020), Seychelles (Friedmann, 2014; Paggard, 2020), etc. This plant is held in high esteem in traditional Tamil Siddha medicine as it is believed to rejuvenate the body. The plant has also been eaten

as a vegetable in Africa and India but requires care when eating it since it contains several alkaloids as well as hydrocyanic acid (Schmelzer, Gurib-Fakim, 2008).

For the Arabian Peninsula, it was reported only for Oman (Ghazanfar, 1992, 2007; Pickering, Patzelt, 2008; Mosti et al., 2012), Saudi Arabia (Colletette, 1985, 1999; Checklist of Flora..., 2011–2024) and Yemen (Wood, 1997; Al Khulaidi, 2013). It is a new alien species for the Emirate of Fujairah and the UAE as a whole.

It has been found in some plant nurseries and plant market, such as "Al Qalamoon Nursery" in Al Bidya, "The Green Nursery Sales Dibba" in Dibba, "Bidya plant market", but it is represented there in a large number of individuals, apparently, is a potentially invasive species.

It differs from closely related species, that are common in South Asia in the following features as indicated in Table 2.

Table 2

Comparative features of closely related species to *Acalypha indica* L.

Species	Inflorescens	Branchlets	Bracts	Leaf blades
<i>A. indica</i> L.	Inflorescences all axillary, pedunculate, androgynous, spicate, up to 10 cm long, with female bracts 3–9, less than 5 mm	Branchlets adpressed pubescent when young	Bracts of the female flowers ovate-cordate, crenulate	Leaf-blade ovate, rhombic-ovate or ovate-lanceolate, 2–6(9) × 1–5 cm, acute or subacute, cuneate, crenate-serrate
<i>A. lanceolata</i> L.	Inflorescences axillary, bisexual, pubescent; peduncle short, 1–3 together, 1–2.5 cm, with female bracts 3–9, less than 5 mm	Branchlets pubescent and sparsely hirsute when young	Female bracts fan-shaped, denticulate	Leaf-blade rhombic-ovate or oblong-ovate, 4–8 × 2–4 cm, in base cuneate or broadly cuneate, margin crenate, apex acuminate; basal veins 5
<i>A. ciliata</i> Forssk.	Inflorescences axillary, sessile, androgynous, spicate, up to 2 cm long, with female bracts up to 12 mm	Branchlets sparingly puberulous, sometimes also slightly pilose	Bracts of the female flowers transversely ovate, laciniate-fimbriate or fringed	Leaf-blade elliptic-ovate, 3–8 × 1.5–4 cm, acutely or subacutely caudate-acuminate, cuneate or rounded, crenate-serrate

***Euphorbia maculata* L.:** "UAE, Emirate of Fujairah, Al Dhaid-Masafi Road, environs of Masafi, 25°17'47.19"N, 56°07'28.25"E [point 358]: weed in Salman Nursery. – ОАЭ, Фуджейра, дорога Аль Даид-Мазафи, окр. Мазафи, 25°17'47.19"N, 56°07'28.25"E [точка 358]: сорняк в питомнике Салмана. 29 XI 2019. [Fl., fr.] V. V. Byalt, M. V. Korshunov. No. 1855 (field No. 358.527). Det. D. Geltman" (LE); "UAE, Fujairah Emirate, near village Bithna. Wadi with gardens. 25°11'19.00"N, 56°14'15.97"E, elevation 170 m. [point 724]: wadi

bank, weed in irrigation pit under tree cultivated near garden. 30 III 2020. [Fl., fr.] V. V. Byalt, M. V. Korshunov s. n." (LE 01229246). – Therophyte / annual. Xenophyte, ephemerophyte, euneophyte. North American. Propagated by seeds, autochorous, ballistochorous, anthropochore. Weed. New alien species in Fujairah and UAE (Fig. 4).

The native range of this species is from S. E. Canada to Belize, Cuba, Bahamas. It is an annual and grows primarily in the temperate biomes. It is used as a poison and in traditional medicine (POWO,



Fig. 3. Herbarium specimen of *Acalypha indica* L. collected in Al Qalamoon Nursery in the village of Al Bidiya in the Fujairah Emirate kept in LE (LE01229231, scan by D. Melnikov).

2023). Also it is recorded as introduced in 44 countries of the World (*Euphorbia maculata*, 2023) and it has become a common invasive species throughout the World, including Europe, Japan, Korea, Australia, and New Zealand (Pagard et al., 2020; Weber et al., 2020; Ikeda et al., 2021; Gollasch, 2022; Randall et al., 2022).

For the Arabian Peninsula, it was reported only for Kuwait on site GBIF (*Euphorbia maculata*, 2022) – observed in Kuwait by Mohammad Marafi (Creative Commons. URL: <http://creativecommons.org/licenses/by-nc/4.0/>).

A new alien species for the Emirate of Fujairah and the UAE as a whole.

It was found as a weed in a small number of individuals on sandy pathside on the territory of the private plant nursery in the environs of town Masafi and as weed in irrigation pit under cultivated tree *Tamarindus indicus* L. (Fabaceae s. l.) near garden on wadi bank in village Bithna.

Euphorbia maculata L. differs from the closely related species of annual *Euphorbia* in the following features, as indicated in Table 3.

Table 3

Comparative features of closely related species to *Euphorbia maculata* L.

Species	Gland appendages	Stem and internodes	Ovary	Leaf blade
<i>E. granualata</i> Forssk.	Gland appendage expanded, ca. 2–4 × as wide as gland	Stem and internodes conspicuous, glabrous or pilose	Ovary pilose or not Capsule 3-angular, ca. 1.5 × 1–1.5 mm, smooth, sometimes pilose	Leaves opposite; stipules persistent; petiole extremely short; leaf blade subelliptic, 3–6 × 2–4 mm, glabrous on both surfaces or subglabrous, base extremely obliquely auriculate, margin entire or serrulate, apex rounded
<i>E. prostrata</i> Ait.	Gland appendage not expanded, not wider than gland proper	Stem and internodes inconspicuous, densely pubescent along upper side	Ovary and capsule puberulent mainly along angles	Leaves opposite; stipules long triangular, easily fallen; petiole very short or sessile; leaf blade elliptic to obovate, 3–7(–8) × 2–4(–5) mm, adaxially green, sometimes with light red or red abaxially, margin entire or irregularly finely serrulate, apex rounded
<i>E. hispida</i> Boiss.	Gland appendage not expanded, not wider than gland proper	Stem and internodes inconspicuous, sericeous to sparsely pilose or hispid	Ovary and capsule uniformly pubescent or sparsely pilose	Leaves opposite; stipules divided into 2 or 3 linear lobes; petiole almost absent; leaf blade elliptic, both surfaces softly pilose, base obliquely rounded, margin sharply serrulate, apex obtuse
<i>E. thymifolia</i> L.	Gland appendage not expanded, not wider than gland proper	Stem and internodes inconspicuous, sericeous to sparsely pilose	Ovary and capsule uniformly pubescent or sparsely pilose	Leaves opposite; stipules lanceolate or linear, 1–1.5 mm, easily fallen; petiole ca. 1 mm; leaf blade rounded or cordate, margin usually finely serrulate, occasionally entire, both surfaces pubescent.
<i>E. maculata</i> L.	Gland appendage not expanded, not wider than gland proper	Stem and internodes inconspicuous, sericeous to sparsely pilose	Ovary and capsule uniformly pubescent or sparsely pilose	Leaves opposite; stipules forming prickles, ciliate; petiole ca. 1 mm; leaf blade long elliptic to reniform-oblong, 6–12(–30) × 2–4(–13) mm, adaxially green, often with an oblong purple spot in middle, abaxially light green or gray-green, purple spot easily seen when fresh, invisible when dry, both surfaces glabrous, base obliquely slightly attenuate-rounded, margin entire below middle, finely serrulate above, apex obtuse

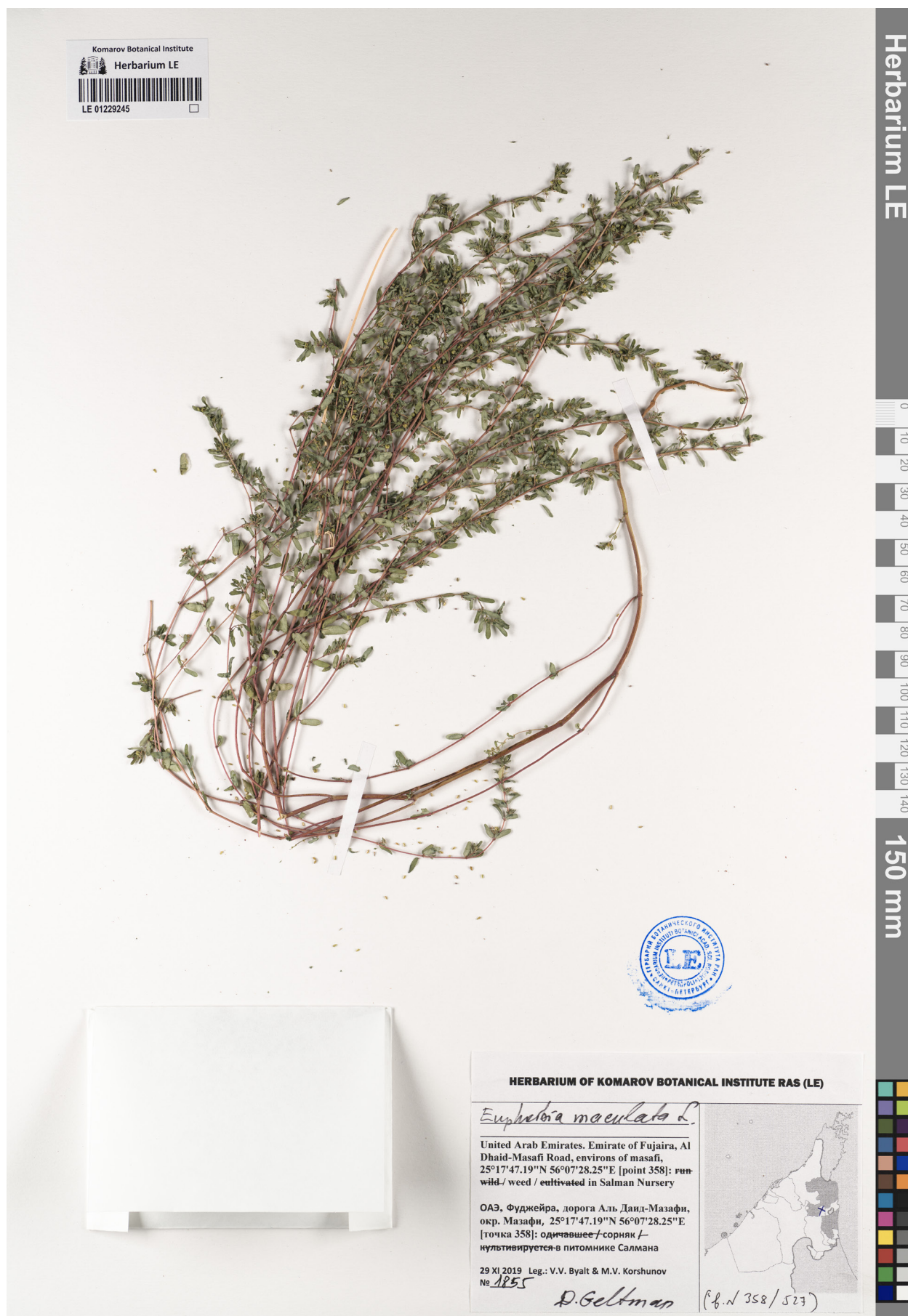


Fig. 4. Herbarium specimen of *Euphorbia maculata* L. collected in Salman Nursery in environs of Masafi town kept in LE (LE01229245, scan by D. Melnikov).

Gamochaeta pensylvanica (Willd.) Cabrera (*Gnaphalium pensylvanicum* Willd.) (Asteraceae): “UAE, Fujairah Emirate, Masafi Friday market, E88 Al Dhaid – Masafi road, 4 km to Masafi. 25°17'47.12"N, 56°7'26.88"E, elevation 380 m: weed in plant market and plant nursery, on wet sand. 23 III 2020. [Fl. juv.] V. V. Byalt, M. V. Korshunov. No. 988a” (LE). – Therophyte / Annual. American subtropical and tropical. Xenophyte, ephemerophyte, neophyte. Weed. Reproduction by seeds, autochorous, anemochorous, anthropochorous.

The native range of this species is Tropical and Subtropical America (Cabrera, 1978; Luteyn, 1999; Nesom, 2004; Jørgensen et al., 2014; Pruski, 2018; POWO, 2023). It is an annual and grows primarily in the seasonally dry tropical biomes (POWO, 2023) and is a widespread species and introduced into Eurasia, Africa, Australia, and North America (Nesom, 2006). Recorded as invasive in the USA (Kraus et al., 2020), Spain (Dana et al., 2022), Portugal (Mar-

chante et al., 2020), Japan (Ikeda et al., 2020), India (Sankaran et al., 2021), Australia (Randall et al., 2022). The *pensylvanica* epithet is a misnomer, as the plant is not native to Pennsylvania and only marginally naturalized there (Nesom, 2004; Pruski, 2018).

Gamochaeta pensylvanica was found earlier in the UAE at two different areas in Dubai Emirate. In Deira about 20 plants on a grass strip along a road (25°15'949"N, 055°18'630"E) were observed, while only a single plant was recorded in a lawn at the International Center for Biosaline Agriculture (25°05'686"N, 055°23'397"E) (Shahid, 2014). We managed to find this plant among several specimens on the territory of the Salman nursery in the environs of Masafi town in Fujairah. New alien species in the Fujairah Emirate and rare in the UAE (Shahid, 2014).

Gamochaeta pensylvanica differs from the closely related species of genus *Gamochaeta* in the following features, as indicated in Table 4.

Table 4

Comparative features of closely related species to *Gamochaeta pensylvanica* (Willd.) Cabrera

Species	Habit	Branching	Leaves	Bracts	Capitula
<i>G. pensylvanica</i> (Willd.) Cabrera	Annual herb	Plants usually branched	Basal leaves withering at anthesis. Leaves usually 3-veined, oblanceolate to spatulate	Bracts among capitula spatulate to oblanceolate, at least proximal ones surpassing glomerules	Capitula cupulate-campanulate, 3–3.5 mm long
<i>G. norvegica</i> (Gunnerus) Y. S. Chen et R. J. Bayer	Perennial herb	Plants usually unbranched	Basal leaves not withering at anthesis. Leaves usually 3-veined, lanceolate, upper ones sessile or subsessile, middle ones with attenuate base	Bracts among capitula lanceolate, at least proximal ones surpassing glomerules	Capitula narrowly campanulate, 5–8 mm long
<i>G. sylvatica</i> (L.) Fourr.	Perennial herb	Plants usually unbranched	Basal leaves not withering at anthesis. Leaves 1-veined, linear or linear-lanceolate	Bracts among capitula linear, at least proximal ones surpassing glomerules	Capitula cylindric or campanulate, 5–7 mm long

Verbesina encelioides (Cav.) Benth. et Hook. f. ex A. Gray (Asteraceae): “UAE, Sharjah Emirate, Khor-Fakkan, waste water channel on the north of Khor-Fakkan town, E99 Rugaylat road, near Oceanic Khor-Fakkan Resort & Spa. 25°22'30.68"N, 56°20'41.51"E, elevation 10 m. [point 763]: wasteland on the roadside near roundabout, in mass. 23 IV 2020. [Fl., fr.] V. V. Byalt, M. V. Korshunov. No. 2386” (FSH). – Therophyte / Annual. American. Xenoergasiophyte, colonophyte, euneophyte. Weed

or ruderal. Reproduction by seeds, anemochorus, anthropochorus.

The native range of this species is USA to Mexico, Caribbean, Ecuador to the southern part of South America (Pruski et al., 2018; Roskov et al., 2018; Knapp, Naczi, 2021). It is an annual and grows primarily in the temperate biome. It is used as a poison, a medicine and invertebrate food (Diazgranados et al., 2020; POWO, 2023).

Recorded as introduced in 29 countries of the World (Ghafoor et al., 2021; POWO, 2023; *Verbesina encelioides*, 2023), including some countries in Arabia (Saudi Arabia, Qatar). Invasive in Australia (Randall et al., 2022), South Africa (Foxcroft et al., 2020), Israel (Dufour-Dror et al., 2020), Saudi Arabia (Thomas Pandalayil et al., 2020), India (Sankaran et al., 2021), some countries in Western Europe (Hansen, 1976; Thevenot et al., 2022; etc.), etc.

Verbesina encelioides was found earlier in the UAE at two places along the roadside in Ras al-

Khaimah during a botanical expedition. Both places are located in Umm Urge area of the emirate. At one location (25°30'455"N, 055°59'328"E), there were about 70 plants, while the second place (25°30'572"N, 055°39'405"E) had 8 of them (Shahid, 2014). We have found a big ruderal population of this species in Khor-Fakkan town (Sharjah). Hundreds flowering and fruiting plants have grown behind a border of shrubs in the wasteland on roadside. Rare alien species in the UAE (Shahid, 2014) and new to Sharjah emirate.



Fig. 5. Naturalized *Verbesina encelioides* (Cav.) Benth. et Hook. f. ex A. Gray in Khor-Fakkan (photo by V. Byalt).

Conclusions

All recorded species – *Chenopodium ficifolium*, *Acalypha indica*, *Euphorbia maculata*, *Gamochaeta pennsylvanica* and *Verbesina encelioides* are alien to the UAE, and currently their populations are small. They are new records to the flora of Fujairah Emirate or the UAE at whole.

The important reason for registration of the new findings of alien species is their further monitoring. In fact, it is not very surprising that additional new species, particularly inconspicuous 'weed' species, may arrive along with intended imports of plants, animals, foodstuffs, etc. and may prosper at least temporarily in urban, suburban, horticultural or other artificial environments. Their advent should be presented as neither more nor less than what it is: a disruption of the long-term natural order, with consequences that should neither be cheered, nor feared a priori, but that should probably be regarded

with suspicion in the first instance as some of its can be invasive in future.

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