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Three records of alien species new to the flora of the United Arab Emirates (UAE)

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Summary. The article presents new records for three alien species, previously unknown from the flora of the United Arab Emirates (UAE), or very rare in the country – *Trichodesma indicum* (Boraginaceae), *Tinospora cordifolia* (Menispermaceae) and *Solanum americanum* (Solanaceae). Some of them have been recorded for the first time from the emirate Fujairah in north-eastern part of the UAE and for the Arabian Peninsula. *Trichodesma indicum* is weedy on a stony slope under plant market and plant nursery, on a household trash under “Masafi Friday Market” on Al Dhaid – Masafi road, in 5.2 km to Masafi and on an abandoned land in nursery “Al Qalamoon Nursery” in Al Bidiya, *Tinospora cordifolia* is cultivated and an escape on an abandoned land with shrubs and trees near labour’s accommodation in the “Green Oasis Nursery” in Al Dibba town, *Solanum americanum* was found as weed in and between plastic pots with cultivated plants in the “Al Qalamoon Nursery” and “Desert Oasis Nursery Bidyah” in Al Bidiya village, near the wall of garden in the shady lane opposite to Al Bidiya market and as ruderal weed in Rul Dadhna. Nomenclature citation of 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 (ALTB, Barnaul, Russia) and the Scientific Herbarium of Fujairah (FSH, Wadi Wuraya national park, Fujairah, United Arab Emirates).

Три чужеродных вида, новых для флоры Объединённых Арабских Эмиратов (ОАЭ)

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Ключевые слова: Аравийский полуостров, география растений, Объединённые Арабские Эмираты, Фуджейра, хорология, чужеродные виды, Шаржа, Boraginaceae, Menispermaceae, Solanaceae.

Аннотация. В статье представлены новые находки трёх чужеродных видов, ранее неизвестных во флоре Объединённых Арабских Эмиратов (ОАЭ) или для Аравии в целом, – *Trichodesma indicum* (Boraginaceae), *Ti-*

nospora cordifolia (Menispermaceae) и *Solanum americanum* (Solanaceae). *Trichodesma indicum* была нами встречена в качестве сорняка на каменистом склоне под рынком растений и питомником растений, на бытовом мусоре под «Masafi Friday Market» на дороге Аль-Дхайд–Масафи, в 5,2 км от Масафи и на заброшенном участке в питомнике «Al-Qalamoon Nursery» в Аль-Бидии. *Tinospora cordifolia* культивируется и дичает на заброшенном участке с кустарниками и деревьями около жилья для рабочих в «Green Oasis Nursery» в городе Аль-Дибба. *Solanum americanum* в качестве сорняка встречается как в пластиковых горшках с выращиваемыми растениями, так и между ними, в питомниках растений «Al-Qalamoon Nursery» и «Desert Oasis Nursery Bidiyah» в деревне Аль-Бидия, а также около стены сада на тенистой дорожке напротив рынка Аль-Бидии и как рудеральный сорняк в Рул Дадне. Представлены номенклатурные цитаты видов, синонимы, распространение, местообитания и примечания по систематике видов с заметками по их отличию от наиболее близких таксонов, встречающихся на территории эмирата, а также список местонахождений. Гербарные материалы переданы в Гербарий Ботанического института им. В. Л. Комарова (LE, г. Санкт-Петербург, Россия), некоторые дубликаты – в Гербарий Алтайского государственного университета (ALTB, г. Барнаул, Россия) и Научный гербарий Фуджейры (FSH, Национальный парк «Вади Вурайя», Фуджейра, Объединённые Арабские Эмираты).

Introduction

The study of the processes of anthropogenic transformation of flora and the monitoring of alien species is an important part of regional floristic research (Pyšek et al., 2004; Baranova et al., 2018; Shabana et al., 2020). There is still insufficient information about the alien component of Fujairah flora represented by species that were accidentally introduced by escaping from cultivation (Byalt, Korshunov, 2018).

In the course of field research in 2017–2022 during 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, b), and as a result of study of herbarium specimens collected by the authors of this paper, information on the distribution of new adventive (alien) plant species in the territory of the Fujairah Emirate, the United Arab Emirates (UAE), was clarified (Byalt et al., 2020a–c, 2021a, b, 2022; Byalt, Korshunov, 2021a, b, 2022a–c; 2023; 2024; Korshunov, Byalt, 2022; etc.). Due to changes in the species composition of the flora caused by the active development of the infrastructure of the region, the growth of urban agglomerations, and an increase in the recreational load on natural ecosystems, there has been a noticeable increase in the number and distribution of alien plant species in the region. The article presents three new records for the Flora of the UAE.

Materials and Methods

During various botanical surveys in the UAE in 2017–2022, the specimens and / or photos of

Trichodesma indicum (L.) Sm. (Boraginaceae), *Tinospora cordifolia* (Willd.) Hook. f. et Thomson (Menispermaceae) and *Solanum americanum* Mill. [syn. *S. nigrum* var. *patulum* L.; *S. nodiflorum* Jacq.] (Solanaceae), were collected by the authors in several localities in the territory of the Emirate of Fujairah (UAE).

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 neighbouring countries (Batanouny, 1981; Collenette, 1985, 1999; Daoud, Al-Rawi, 1985, 2013; Al-Rawi, 1987; Phillips, 1988; Cornes C., Cornes M., 1989; Migahid, 1989, 1996; Ghazanfar, 1992, 2003, 2007, 2015; Shuaib, 1995; Miller, Cope, 1996; Wood, 1997; Chaudhary, 1999, 2001; Jongbloed et al., 2000, 2003; Omar, 2001, 2007; Miller, Morris, 2004; Norton et al., 2009; Checklist, 2011–2023; Mosti et al., 2012; Al-Khulaidi, 2013; Abdullah, Al-Dosari, 2022; Richer et al., 2022; etc.), websites “Flora of Qatar” (2013–2016, URL: <https://www.floraofqatar.com/indexf.htm>), “UAE Flora” (URL: <https://www.uaeflora.ae>; Alyammahi et al., 2023), “Flora of India” 2025 (URL: <https://indiaflora-ces.iisc.ac.in/search.php>), “Global Biodiversity Information Facility” (GBIF, 2025. URL: <https://www.gbif.org>), “eFloras” (2025, URL: <http://www.efloras.org>), “Flora of Israel” (2025, URL: <https://flora.org.il/en/plants/>), “Flora of North America” (2025, URL: <http://dev.floranorthamerica.org/>), etc.

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; etc.). However, because our observations were made only once, the alien species status that we give should be corrected in the future.

Specimens were deposited in the following herbaria (acronyms according to Thiers, 2025): the Herbarium Komarov Botanical Institute of the Russian Academy of Sciences (LE, St. Petersburg, Russia), the Herbarium of Altai State University (ALTB, Barnaul, Russia) and Wadi Wurayah National Park (FSH, not yet acronym).

A Garmin GPS 72H was used for the geographic coordinates of the collecting sites. The identification and corroboration were performed with different relevant floras. The location of the plants was determined by using a GPS receiver or Google Maps. All coordinates use the GSK 11 or WGS84 standards.

The locations of the study sites in the Emirate of Fujairah: Al Dibba town, Rul Dadnah, environs of Masafi and Al Bidiya village.

Abbreviations used: United Arab Emirates – UAE, spp. – species, fl. – with flowers, fr. – with fruits, veg. – in a vegetative state, juv. – young, underdeveloped. LE – Herbarium of BIN RAS, ALTB – Herbarium of Altai State University, FSH [not yet acronym] – Fujairah Scientific Herbarium (Byalt et al., 2020d). The labels are in English (and partly in Russian) 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 and Discussion

***Trichodesma indicum* (L.) Sm. (Boraginaceae):** “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 on slope under plant market and plant nursery, on household trash. 3 IV 2020. Fl., fr. V. V. Byalt, M. V. Korshunov. 1684” (LE 01193860); “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]: without irrigation on abandoned land in nursery. 15 V 2020. Fl., fr. V. V. Byalt, M. V.

Korshunov. 3012” (LE 01193859). – Xenophyte, epoecophyte, euneophyte. Distribution by seeds, autochorous, antropochorous (Figs. 1, 2A–D, 3).

The native range of this species is from Afghanistan to Thailand and Philippines – Afghanistan, Pakistan, Sri Lanka, India (incl. West Himalaya and Assam), Nepal, Bangladesh, Myanmar, Thailand, Philippines, as well as in Africa (Hara et al., 1982; Nowicke, Miller, 1991; Verdcourt, 1991; Kalkman et al., 1997; Ruengsawang, Chantaranonthai, 2009; Pasha, Uddin, 2013; Shaheen et al., 2014; POWO, 2026). In India (Matthew, 1983; Rao, Sreeramulu, 1986, 1986; Rao et al., 1986; Singh, 1988; Saxena, Brahmam, 1995; Pullaiah et al., 2011; Sasidharan, 2011; Kumar, 2012; Kotiya et al., 2020; Rao, Kumar, 2025a). It is an annual and grows primarily in the subtropical biome (POWO, 2026).

In Arabia, this species was not recorded by main regional floras and checklists (Collenette, 1985, 1999; Cornes C., Cornes M., 1989; Migahid, 1989, 1996; Chaudhary, 1999–2001; Ghazanfar, 1992, 2015; Wood, 1997; Jongbloed et al., 2000, 2003; Omar, 2001, 2013; Karim, Fawzi, 2007; Abdel Bary, 2012; Richard et al., 2022; etc.) and on sites GBIF (*Trichodesma indicum*, 2026), or POWO (2026).

Not previously reported for the UAE (see Western, 1989; Jongbloed et al., 2000, 2003; Karim, Fawzi, 2007; etc.). In Fujairah, it was accidentally introduced, and we observed it as ruderal weed. We found it on slope under plant market and plant nursery, on household trash under the “Masafi Friday Market” on Al Dhaid–Masafi road, in 5.2 km to Masafi (Fig. 1) and on an abandoned land without irrigation in the “Al Qalamoon Nursery” in Al Bidiya. Rare alien species in region. It is potentially invasive species, as can grow without irrigation in disturbed places. New alien species for Fujairah, UAE and Arabian Peninsula at all.

Trichodesma indicum differs from the closely related species of genus *Trichodesma* in the following features (Table 1).

***Tinospora cordifolia* (Willd.) Hook. f. et Thoms. (Menospermaceae):** “UAE, Fujairah Emirate, Al Dibba town, Green Oasis Nursery, 0.6 km South-West from Street Number 35, or 0.8 km North from Federal Electricity and Water Authority, 25°36'5.21"N, 56°15'45.67"E, elevation 10 m [point 769]: cultivated and running wild on abandoned land with shrubs near labour's accommodation. 3 V 2020. Veg. V. V. Byalt, M. V. Korshunov. 2685” (FSH); “UAE, Fujairah Emirate, Al Dibba town, Green Oasis Nursery, 0.6 km South-West from Street Number 35, or

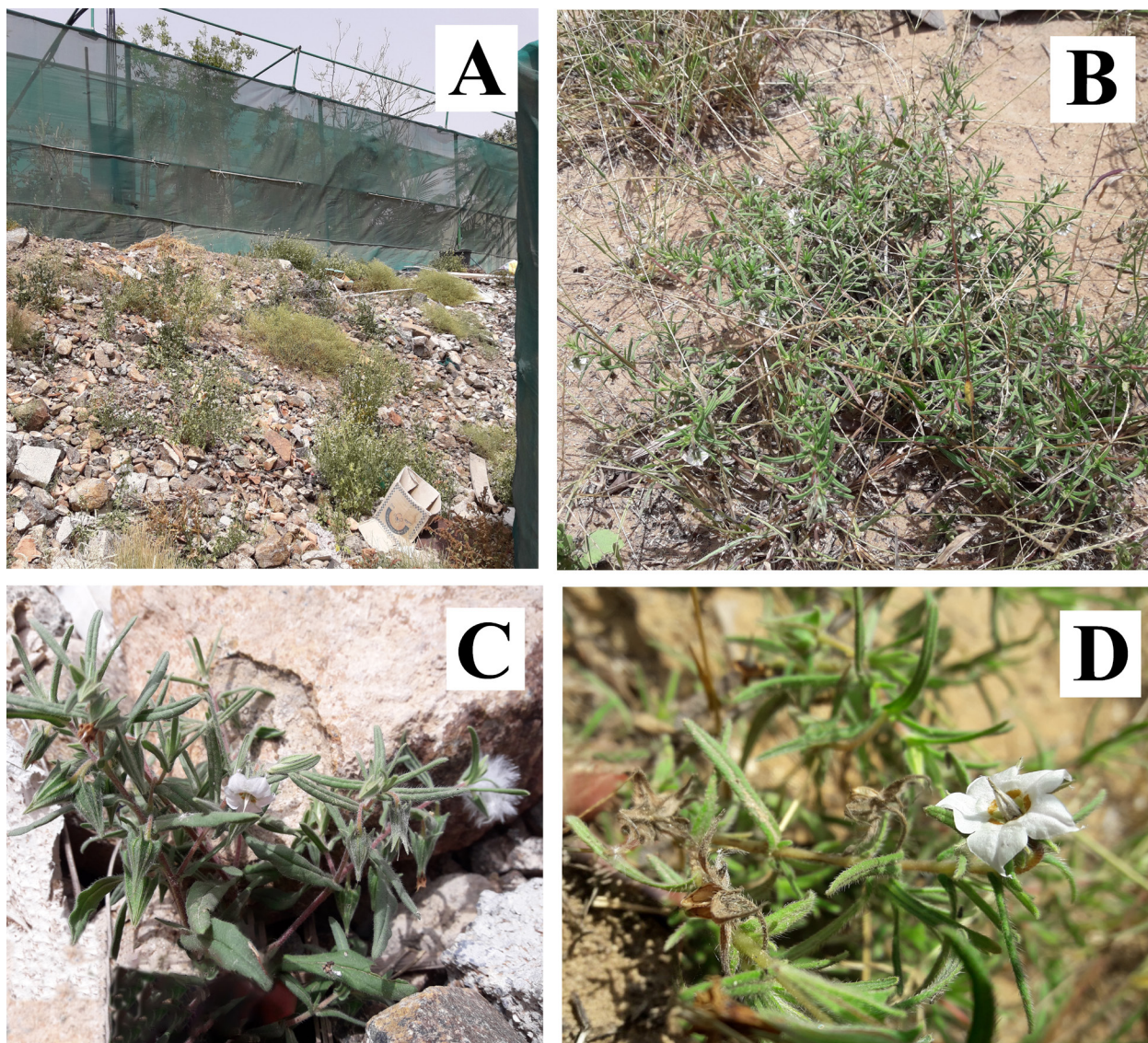


Fig. 1. *Trichodesma indicum* (L.) Sm. – a new alien species grows on waste place on slope under “Masafi Friday market” A–D (photos by M. V. Korshunov).

0.8 km North from Federal Electricity and Water Authority. 25°36'5.21"N, 56°15'45.67"E, elevation 10 m [point 769a]: cultivated in shade on stony wall near decorative pool. 3 V 2020. Veg., fr. V. V. Byalt, M. V. Korshunov. 2693" (FSH). – Ergasiophyte, colonophyte, euneophyte. Distributed by seeds. Autochorous, zoochorous, antropochorous (Figs. 1, 3A–C).

Tinospora cordifolia is ornamental liana, and its native range is Indian Subcontinent to Indo-China – Sri Lanka, India (incl. Assam, East Himalaya, Andaman Is., Nicobar Is.), Bhutan, Bangladesh, Maldives, Myanmar, Vietnam (Fosberg, 1957; Grierson, Long, 1984; Formann, 1995; Kress et al., 2003; Lê, 2003; Pandey, Dilwakar, 2008; Pasha, Uddin, 2013; Kotiya et al., 2020; Mao, Dash, 2020; POWO,

2026). It is very common in India, where it is widely distributed (Henry et al., 1983; Matthew, 1983; Ellis, 1987; Singh, 1988; Saxena, Brahmam, 1994; Pullaiah, Rao Muralidhara, 2002; Sasidharan, 2011; Barooah, Ahmed, 2014; Rao, Kumar, 2025b). It is a woody liana and grows primarily in the wet tropical biome (*Tinospora cordifolia*, 2025; POWO, 2026). In Pakistan, it is recorded as *T. malabarica* Miers (Siddiqi, 2005), which now is included in synonymics of *T. cordifolia* (DC.) Miers (POWO, 2026).

Tinospora cordifolia is cultivated on the Arabian Peninsula, very rarely in UAE (our data). The study of relevant literature revealed that it has not been reported as alien in other countries of the Arabian Peninsula (Collenette, 1985, 1999; Daoud, Al-Rawi, 1985; Phillips, 1988; Migahid, 1989; C. Cornes,



Fig. 2. Herbarium specimen of *Trichodesma indicum* (L.) Sm., collected in environs of Masafi town, kept in LE (LE 01193859, scan by A. Byalt).

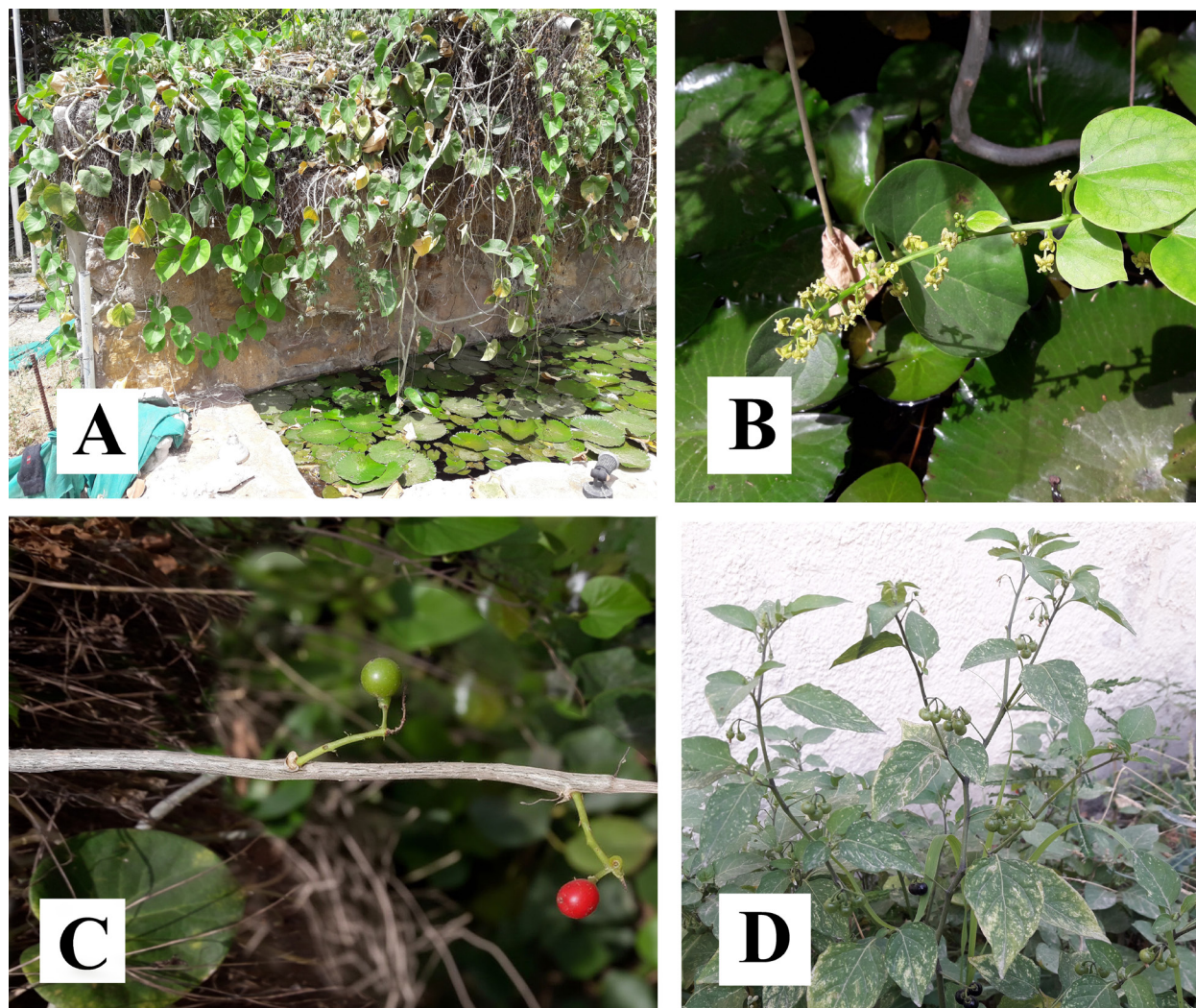


Fig. 3. *Tinospora cordifolia* (Willd.) Hook. f. et Thoms. – a new alien species grows in plant nursery in Al Dinna town A–C, and D – *Solanum americanum* L. – near wall on sideroad opposite to Al Bidiya market (photos by M. V. Korshunov).

Table 1. Comparative features of closely related annual species to *Trichodesma indicum* (L.) Sm.

Species	Leaves	Calyx	Nutlets	Corolla
<i>Trichodesma indicum</i> (L.) Sm.	Oblong-lanceolate, sessile, amplexicaule in base	10–12 mm long, lobes ovate, acuminate, hastate at base	Ovoid, smooth, white to bluish	White, lobes rounded, apiculate
<i>Trichodesma ehrenbergii</i> Schweinf.	Ovate to broadly ovate, base rounded to subcordate, pubescent between adpressed tubercule-based hairs	4–5 mm long, lobes truncate to subcordate at base	With white dentate glochidiate margins	Whitish or pale blue to violet with brown blotches in centre
<i>Trichodesma africanum</i> (L.) Sm.	Ovate-lanceolate to ovate-oblong to linear, base rounded to cuneate, spreading tubercule-based hairy	6–9 mm long, lobes truncate to subcordate at base	With whitish tuberculate margins	Whitish or bluish, sometimes with purple blotches in centre

M. Cornes, 1989; Western, 1989; Gazanfar, 1992, 2018; Shuaib, 1995; Wood, 1997; Chaudhary, 1999; Omar, 2000, 2007; Jongbloed et al., 2003; Karim, Fawzi, 2007; Norton et al., 2009, etc.). This liana is very rarely cultivated in the Fujairah emirate. We have found it once on territory of the “Green Oasis Nursery” at Dibba town. It is cultivated near decorative pool with *Nymphaea* spp. (Fig. 2) and runs wild in several places between shrubs and trees near labor’s accommodation, nursery office and close to nursery wall not far from a pool. We did not observe a large invasive potential of this plant as it is rarely cultivated. New rare alien species to the Fujairah, UAE and Arabian Peninsula at all.

Tinospora cordifolia differs from the closely related annual species of genus *Tinospora* in the following features (Table 2).

Solanum americanum Mill. [syn. *S. nigrum* var. *patulum* L.; *S. nodiflorum* Jacq.] (Solanaceae): “UAE, Fujairah Emirate, Al Bidya, villas and sideroad opposite to Al Bidiya market. 25°25′57.34″N, 56°21′6.57″E, elevation 10 m [point 752]: near the wall of garden in the shady lane. 14 IV 2020. Fl., fr. V. V. Byalt, M. V. Korshunov. 2136” (LE 01259651; FSH); “UAE, Fujairah Emirate, Al Bidiya, Al Qalamoon Nursery, 0.3 km East from Eid Prayer Ground Bidyah, 25°25′24.70″N, 56°20′18.77″E, elevation 22 m [point 781]: weed in and between plastic pots with cultivated plants. 15 V 2020. Fl., fr. V. V. Byalt, M. V. Korshunov. 2970 (2)” (LE 01259654, LE01259650; FSH); “UAE, Fujairah Emirate, Al Bidiya, Desert Oasis Nursery Bidyah, 0.7 km West from Bidyah Association for Culture and Folklore. 25°26′9.06″N, 56°20′17.72″E, elevation 14 m

[point 794]: weed in plastic pot and between pots with cultivated trees in nursery. 4 VI 2020. Fl., fr. V. V. Byalt, M. V. Korshunov. 3435” (FSH); “UAE, Fujairah Emirate, Rul Dadhna, 0.8 km by the unnamed road from E99 to Wadi Zikt dam and after 0.4 km to North by track-road, 25°31′20.73″N, 56°20′39.06″E, elevation 27 m [point 808]: weed in shady place under wall. 11 VII 2020, fl., V. V. Byalt, M. V. Korshunov. 4095 (2)” (LE 01259658; FSH). – Xenophyte, epoeophyte, euneophyte. Distribution by seeds. Autohorous, zoohorous, antropohorous. New species for Fugarah and UAE at all (Figs. 3D, 4).

This species is accepted in POWO (2026). The native range of this species is from W. Canada to Tropical and Subtropical America (Liogier, 1994; PBI Solanum Project, 2014–2025; Särkinen et al., 2018; Barthelat, 2019; Knapp, Naczi, 2021; *Solanum americanum*, 2023; POWO, 2026), but it is widespread in all tropical and temperate regions of the World (Särkinen et al., 2018; *Solanum americanum*, 2023; POWO, 2026). This species is recorded as introduced in 60 countries or islands of the World (Florence et al., 1995; Welsh, 1998; Kress et al., 2003; Newman et al., 2007; Sarder et al., 2018; Särkinen et al., 2018; Whistler, 2018, 2022; Aubriot, 2020, 2020; Bikandu et al., 2020; Tozhibaev et al., 2020; Rajbhandari et al., 2022; *Solanum americanum*, 2026; POWO, 2026), and sometimes naturalized and becomes invasive (*Solanum americanum*, 2026; POWO, 2026), as in India (states Kerala, Maharashtra, Uttar Pradesh) (Nayar et al., 2006; Sasidharan, 2011; Balkrishna, 2018; Rao, Kumar, 2025c), China – prov. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan (Wessely, 1960; Zhang et al., 1994; etc.), Australia (Randall, 2007), New Zealand,

Table 2. Comparative features of closely related annual species to *Tinospora cordifolia* (Willd.) Hook. f. et Thoms.

Species	Pubescence	Old branches	Inflorescences	Drupe
<i>Tinospora cordifolia</i> (Willd.) Hook. f. et Thoms.	Branches and leaves glabrous	Old branches fat and thick, without prominent blunt tubercles	Appearing before new leaves	Red, globose, 7 mm across
<i>Tinospora sinensis</i> (Loureiro) Merrill	Branches and leaves densely puberulent	Old branches fat and thick, without prominent blunt tubercles	Appearing when plant is leafless.	Red, subglobose, 7–9 mm ling, ca. 6 mm broad
<i>Tinospora crispa</i> (L.) J. D. Hook. f. et Thoms.	Branches and leaves glabrous	Old stems fleshy, with very prominent blunt tubercles	Appearing before new leaves	Orange, subglobose, to 2 cm across



Fig. 4. Herbarium specimen of *Solanum americanum* Mill. collected in “Al Qalamoon Nursery” in Al Bidiya village, kept in LE (LE 01259650, scan by A. Byalt).

South Africa, Western Europe and Africa (Särkinen et al., 2018; Bikandu et al., 2020; *Solanum americanum*, 2026; POWO, 2026).

It is an annual or perennial and grows primarily in the temperate biomes. It is used as animal food, a poison and a medicine, and for food (Zhang et al., 1994; POWO, 2026).

In Arabian Peninsula, *S. americanum* was recorded only for Saudi Arabia (Checklist, 2011–2024). Not previously reported for the UAE (Western, 1989; Jongbloed et al., 2000, 2003; Karim,

Fawzi, 2007; etc.). In Fujairah we found it as weed in and between plastic pots with cultivated plants in the “Al Qalamoon Nursery”, as well in the “Desert Oasis Nursery Bidyah” in Al Bidiya, near the wall of garden in the shady lane side roads, opposite to Al Bidiya market and as weed in shady place under wall in Rul Dadhna. This species is potentially invasive species on irrigated lands.

Solanum americanum differs from the closely related annual species of genus *Solanum* in the following features (Table 3).

Table 3. Comparative features of closely related annual species to *Solanum americanum* Mill.

Species	Fruits	Fruiting calyx	Corolla	Anthers
<i>Solanum americanum</i> Mill.	Black or rarely green, globose; less than 8 mm in diam.; berry shiny	Strongly reflexed	Less than 5 mm long	Less than 1.5 mm long
<i>Solanum nigrum</i> L.	Black or rarely green, globose; mostly more than 8 mm in diam.; berry dull black	Applied to berry	More than 5 mm long	More than 2 mm
<i>Solanum villosum</i> Mill.	Yellow, orange, or reddish, broadly ellipsoid	Applied to berry	More than 5–7 mm long	Ca. 2 mm long

Conclusions

The three recorded species – *Trichodesma indicum* (Boraginaceae), *Tinospora cordifolia* (Menospermaceae) and *Solanum americanum* (Solanaceae) are alien to the flora of the UAE, and currently their populations are small. They are new records to the flora of Fujairah Emirate and whole UAE. At the same time, *Trichodesma indicum* and *Tinospora cordifolia* are also new for Arabian Peninsula at all.

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.

During development of gardens, road planting, through importing plants and soil in plant nurseries, many plant species were introduced to the UAE and to the Emirate of Fujairah, and some of them escape (Korshunov, Byalt, 2025). However, alien plants are spreading here almost exclusively in anthropogenic habitats, disturbed habitats, plant nurseries, private gardens, on wastelands, irrigated lawns, near garden fences with water inflow and along roadsides. The processes of their naturalization in transformed habitats are not yet complete, and only several introduced plant species are found in the mountains, along recently built roads. In the Emirate of Fujairah, plant nurseries appear to be an important source of introduction of new alien species. These introductions have occurred in the last 10–15 years, as evidenced by the absence of inclusion of these species in the floras of the UAE (Jongbloed et al., 2000, 2003; Karim, Fawzi, 2007).

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REFERENCES / ЛИТЕРАТУРА

- Abdullah M. T., Al-Dosari M. E.** 2022. *Vegetation of the state of Kuwait*. Gland, Switzerland and Manma: Environmental Public Authority, Kuwait, State of Kuwait, IUCN. 258 pp.
- Al-Khulaidi A. W.** 2013. *Flora of Yemen*. Sana, Republic of Yemen: The sustainable natural resource management project (SNRMP II) EPA and UNDP. 179 pp.
- Aubriot X.** 2020. Solanaceae. In: M. S. M. Sosef et al. (eds.). *Flore du Gabon*. Vol. 55. Commelinaceae, Solanaceae. Miese: Botanic Garden. Pp. 89–135.
- Balkrishna A.** 2018. *Flora of Morni Hills (Research and Possibilities)*. Divya Prakashan: Divya Yoga Mandir Trust. 581 pp.
- Baranova O. G., Shcherbakov A. V., Senator S. A., Panasenko N. N., Sagalaev V. A., Saksonov S. V.** 2018. The main terms and concepts used in the study of alien and synanthropic flora. *Phytodiversity of Eastern Europe* 12, 4: 4–22. [In Russian] (**Баранова О. Г., Щербakov А. В., Сенатор С. А., Панасенко Н. Н., Сагалаев В. А., Саксонов С. В.** Основные термины и понятия, используемые при изучении чужеродной и синантропной флоры // Фиторазнообразии Восточной Европы, 2018. Т. 12, № 4. С. 4–22). <https://doi.org/10.24411/2072-8816-2018-10031>
- Barooah C., Ahmed I.** 2014. *Plant diversity of Assam. A checklist of Angiosperms and Gymnosperms*. Guwahati, India: Assam science technology and environment council. 599 pp.
- Barthelat F.** 2019. *La flore illustrée de Mayotte. Biotope éditions*. Paris: Muséum National d'Histoire Naturelle. 687 pp.
- Batanouny K. H.** 1981. *Ecology and Flora of Qatar*. Oxford: Alden Press Ltd., on behalf of SARC, University of Qatar. 245 pp.
- Bikandu B., Lukoki F., Habari J. P.** 2020. *Flore d'Afrique Centrale (Zaire-Rwanda-Burundi) Solanaceae*. Miese: Jardin Botanique National de Belgique. 162 pp.
- Byalt V. V., Korshunov M. V.** 2018. Adventive and invasive plant species in the flora of the United Arab Emirates. In: *Actual Issues of Biogeography: Proceedings of International conference (9–12 October 2018, St. Petersburg, Russia)*. St. Petersburg: St. Petersburg State University. Pp. 73–76. [In Russian] (**Бялт В. В., Коршунов М. В.** Адвентивные и инвазивные виды растений во флоре Объединённых Арабских Эмиратов // Актуальные вопросы биogeографии: Материалы Междунар. конф. (Санкт-Петербург, Россия, 9–12 октября 2018 г.). СПб.: Изд-во Санкт-Петербург. гос. ун-та, 2018. С. 73–76).
- Byalt V. V., Korshunov M. V.** 2020a. A new record of the fern *Actiniopteris semiflabellata* Pic. Serm. (Pteridaceae) in the United Arab Emirates. *Skvortsovia* 4, 2: 41–46.
- Byalt V. V., Korshunov M. V.** 2020b. New alien species of flowering plants to the flora of the Arabian Peninsula. *Novosti Sist. Vyssh. Rast.* 51: 118–124.

- Byalt V. V., Korshunov M. V.** 2020c. New woody ergasiophygophytes of the flora of Fujairah Emirate (UAE). *Bull. Moskovsk. Obshch. Isp. Prir., Otd. Biol.* 125, 6: 56–62.
- Byalt V. V., Korshunov M. V.** 2020d. Preliminary list of cultivated plants in the Fujairah Emirate (UAE). *Vestnik of Orenburg State Pedagogical University. Electronic Scientific Journal* 4(36): 29–116. [In Russian] (**Бялт В. В., Коршунов М. В.** Предварительный список культурных растений эмирата Фуджейра (Объединенные Арабские Эмираты) // Вестник Оренбургского государственного педагогического университета. Электронный научный журнал, 2020. № 4(36). С. 29–116). <https://doi.org/10.32516/2303-9922.2020.36.3>
- Byalt V. V., Korshunov M. V.** 2021a. New records for the flora of Fujairah Emirate (United Arab Emirates). *Turczaninowia* 24, 1: 98–107. <https://doi.org/10.14258/turczaninowia.24.1.12>
- Byalt V. V., Korshunov M. V.** 2021b. New records of alien species of the family Urticaceae in the Fujairah Emirate (UAE). *Turczaninowia* 24, 1: 108–116. <https://doi.org/10.14258/turczaninowia.24.1.13>
- Byalt V. V., Korshunov M. V.** 2022a. Flora of Fujairah Emirate (UAE): new herbaceous and woody species of ergasiophygophytes in Emirate. Part 4. *Vavilovia* 5, 3: 1–25. <https://doi.org/10.30901/2658-3860-2022-3-01>
- Byalt V. V., Korshunov M. V.** 2022b. Review of cultivated and wild species of the family Convolvulaceae s. l. in the Emirate of Fujairah (UAE). *Vestnik of Orenburg State Pedagogical University. Electronic Scientific Journal* 4(44): 1–76. [In Russian] (**Бялт В. В., Коршунов М. В.** Обзор культивируемых и дикорастущих видов семейства Convolvulaceae s. l. в эмирате Фуджейра (Объединенные Арабские Эмираты) // Вестник Оренбургского государственного педагогического университета. Электронный научный журнал, 2022. № 4(44). С. 1–76). <https://doi.org/10.32516/2303-9922.2022.44.1>
- Byalt V. V., Korshunov M. V.** 2022c. Several records of alien species new to the flora of the United Arab Emirates (UAE). *Turczaninowia* 25, 4: 169–179. <https://doi.org/10.14258/turczaninowia.25.4.19>
- Byalt V. V., Korshunov M. V., Korshunov V. M.** 2020. The Fujairah Scientific Herbarium – a new Herbarium in the United Arab Emirates. *Skvortsovia* 6(3): 7–29.
- Byalt V. V., Korshunov V. M., Korshunov M. V., Melnikov D. G.** 2022. Records of new and rare native species of flowering plants in Fujairah (United Arab Emirates). *Skvortsovia* 8(2): 1–24. https://doi.org/10.51776/2309-6500_2022_8_2_1
- Chaudhary S. A.** 1999. *Flora of the Kingdom of Saudi Arabia illustrated*. Vol. 1. Riyadh, Saudi Arabia: National Agriculture and Water Research Centre. 691 pp.
- Checklist of Flora of Saudi Arabia*. 2011–2024. In: *Plant Diversity in Saudi Arabia*. URL: <http://plantdiversityofsaudi-arabia.info/Biodiversity-Saudi-Arabia/Flora/Checklist/Checklist.htm>
- Collenette Sh.** 1985. *An illustrated guide to the flowers of Saudi Arabia*. London: Scorpion Publishing Ltd. 514 pp.
- Collenette Sh.** 1999. *Wildflowers of Saudi Arabia*. Riyadh: National Commission for Wildlife Conservation and Development (NCWCD), Kingdom of Saudi Arabia. 799 pp.
- Cornes C. D., Cornes M. D.** 1989. *The Wild Flowering plants of Bahrain*. London: IMMEL Publishing. 272 pp.
- Daoud H. S., Al-Rawi A.** 1985. *Flora of Kuwait*. Vol. 1: Dicotyledoneae. London: KPI Limited and University of Kuwait. 284 pp.
- Egorov A., Byalt V., Pismarkina E.** 2016. Alien plant species in the north of western Siberia. In: *UArctic Congress 2016*. St. Petersburg, Russia. P. 105.
- Ellis J. L.** 1987. *Flora of Nallamalais*. Vol. 1. Flora of India (Series 3). Calcutta: Imprinta, Botanical Survey of India. 220 pp.
- Flora of India* [2025]. URL: <https://indiaflora-ces.iisc.ac.in/search.php> (Accessed 11 December 2025).
- Flora of Israel* [2025]. URL: <https://flora.org.il/en/plants/> (Accessed 10 October 2025).
- Flora of North America* [2025]. URL: <http://dev.floranorthamerica.org/> (Accessed 10 October 2025).
- Flora of Qatar*. 2013–2016. URL: <https://www.floraofqatar.com/indexf.htm> (Accessed 15 December 2025).
- Florence J., Waldren S., Chepstow-Lusty A. J.** 1995. The flora of the Pitcairn islands: a review. *Biol. J. Linn. Soc.* 56: 79–119.
- Formann L. L.** Menispermaceae. In: Dassanayake (ed.). *A Revised Handbook to the Flora of Ceylon*. Vol. 9. New Delhi, Calcutta: Oxford and IBH Publishing Co. PVT. LTD. Pp. 301–319.
- Fosberg F. R.** 1957. The Maldiv Islands, Indian Ocean. *Atoll Research Bull.* 58: 1–37.
- Galasso G., Conti F., Peruzzi L., Ardenghi N. M. G., Banfi E., Celesti-Grapow L., et al.** 2018. An updated checklist of the vascular flora alien to Italy. *Plant Biosystems* 152(3): 556–592.
- GBIF [2025]. *Global Biodiversity Information Facility*. URL: <https://www.gbif.org/> (Accessed 10 April 2025).
- Ghazanfar S. A.** 1992. An annotated catalogue of the vascular plants of Oman and their vernacular names. In: *Scripta Botanica Belgica*. Vol. 2. Meise, Belgium: National Botanic Garden of Belgium. 152 pp.
- Ghazanfar S. A.** 2003. Flora of the Sultanate of Oman. Vol. 1. Piperaceae – Primulaceae. In: *Scripta Botanica Belgica*. Vol. 25. Meise, Belgium: National Botanic Garden of Belgium. 262 pp.
- Ghazanfar S. A.** 2007. Flora of the Sultanate of Oman. Vol. 2. Crassulaceae – Apiaceae. In: *Scripta Botanica Belgica*. Vol. 36. Meise, Belgium: National Botanic Garden of Belgium. 220 pp.

- Ghazanfar S. A.** 2015. Flora of the Sultanate of Oman. Vol. 3. Loganiaceae – Asteraceae. In: *Scripta Botanica Belgica*. Vol. 55. Meise, Belgium: National Botanic Garden of Belgium. 386 pp.
- Gosline G., Bidault E., van der Burgt X., Cahen D., Challen G., Condé N., et al.** 2023. A taxonomically-verified and vouchered checklist of the vascular plants of the Republic of Guinea. *Nature Scientific data* 10, Article number: 327: [1]–[12].
- Grierson A. J. C., Long D. G.** 1984. *Flora of Bhutan*. Vol. 1 (pt. 2). Edinburgh: Royal Botanic Gardens. Pp. 189–462.
- Hara, H., Stearn W. T., Williams H. J.** 1982. *An Enumeration of the Flowering Plants of Nepal*. Vol. 3. London: Trustees of British Museum. 226 pp.
- Harrap S.** 2013. *Harrap's Wild Flowers*. Bloomsbury (UK): Bloomsbury Wildlife. 416 pp.
- Henry A. N., Kumari G. R., Chithra V.** 1983. *Flora of Tamil Nadu, India*. Vol. 1. Analysis (Series 1). Kolkata, India: Botanical Survey of India. 86 pp.
- Jongbloed M., Feulner G., Boer B., Western A. R.** 2003. *The Comprehensive Guide to the Wild Flowers of the United Arab Emirates*. Abu Dhabi, UAE: E.R.W.D.A. Abu Dhabi. 576 pp.
- Jongbloed M., Western R. A., Boer B.** 2000. *Annotated check-list of plants in the U.A.E*. Dubai: Zodiac Publishing. 91 pp.
- Kalkman C., Stevens P. F., Kirkup D. W., de Wilde W. J. J.O., Nootboom H. P.** 1997. *Flora Malesiana*. Vol. 13. Djakarta: Noordhoff-Kolff N.V. 454 pp.
- Karim F. M., Fawzi N. M.** 2007. *Flora of the United Arab Emirates*. 2 vols. Al-Ain: United Arab Emirates University Publications. Vol. 1. 444 pp.; Vol. 2. 502 pp.
- Knapp W. M., Naczi R. F. C.** 2021. Vascular plants of Maryland, USA. A comprehensive account of the state's botanical diversity. *Smithsonian Contr. Bot.* 113: 1–151.
- Korshunov M. V., Byalt V. V.** 2022. New records of the five alien species from the flora of United Arab Emirates. *Turczaninowia* 25, 2: 125–136. <https://doi.org/10.14258/turczaninowia.25.2.12>
- Korshunov M. V., Byalt V. V.** 2025. Planting of greenery and landscaping as the main sources of alien flora in the Emirate of Fujairah, United Arab Emirates (UAE). In: *Problems of studying the vegetation cover of Siberia: Proceedings of the VIII International conference, dedicated to the 140th anniversary of the P. N. Krylov Herbarium, 145th anniversary of Siberian Botanical Garden and 175th anniversary of P. N. Krylov (Tomsk, September 24–27, 2025)*. I. I. Gureyeva (ed.). [Electronic resource]. Tomsk: Tomsk State University Publishers. Pp. 107–109. [In Russian] (**Коршунов М. В., Бялт В. В.** Озеленение и ландшафтная архитектура как основные источники чужеродной флоры в эмирате Фуджейра, Объединенные Арабские Эмираты (ОАЭ) // Проблемы изучения растительного покрова Сибири: труды VIII Междунар. науч. конф., посвящ. 140-летию Гербария им. П. Н. Крылова, 145-летию Сибирского ботанического сада и 175-летию со дня рождения П. Н. Крылова (Томск, 24–27 сентября 2025 г.). Ред. И. И. Гуреева. [Электронный ресурс]. Томск: Изд-во Томского гос. ун-та, 2025. С. 107–109). <https://doi.org/10.17223/978-5-908040-01-3-2025-25>
- Kotiya A., Solanki Y., Reddy G. V.** 2020. *Flora of Rajasthan*. Rajasthan: Rajasthan state biodiversity board. 769 pp.
- Kress W. J., DeFilipps R. A., Farr E., Kyi D. Y. Y.** 2003. A checklist of the trees, shrubs, herbs and climbers of Myanmar. *Contr. U.S. Natl. Herb.* 45: 1–590.
- Kumar S.** 2012. Herbaceous flora of Jaunsar-Bawar (Uttarkhand), India: enumerations. *Phytotaxonomy* 12: 33–56.
- Lê T. C.** 2003. *Danh lục các loài thực vật Việt Nam [List of Vietnamese Plant Species]*. Tap 2. Hà Nội: Nhà xuất bản Nông nghiệp. 1203 pp. [In Vietnamese]
- Liogier A. H.** 1996. *Flora de la Española*. Vol. 8. Santo Domingo: Instituto Tecnológico de Santo Domingo. 588 pp. [In Spanish]
- Mao A. A., Dash S. S.** 2020. *Flowering Plants of India an Annotated Checklist (Dicotyledons)*. Vol. 1. Kolkata, India: Botanical Survey of India. 970 pp.
- Matthew K. M.** 1983. *The Flora of Tamil Nadu Carnatic*. Vol. 3 (pt. 1). Madras: Diocesan Press. 2154 pp.
- Migahid A. M.** 1996. *Flora of Saudi Arabia*, ed. 4. Vol. 1. Riyadh: King Saud University Press. 252 pp.
- Miller A. G., Cope T. A.** 1996. *Flora of the Arabian Peninsula and Socotra*. Vol. 1. Edinburgh: Edinburgh University Press. 586 pp.
- Miller A. G., Morris M.** 2004. *Ethnoflora of Soqatra Archipelago*. Edinburgh: The Royal Botanic Gardens. 759 pp.
- Mosti S., Raffaelli M., Tardelli M.** 2012. Contributions to the flora of central-southern Dhofar (Sultanate of Oman). *Webbia* 67: 65–91.
- Nayar T. S., Rasiya Beegam A., Mohanan N., Rajkumar G.** 2006. Flowering plants of Kerala. A handbook. Palode, Kerala: Tropical Botanic Garden and Research Institute. 1079 pp.
- Newman M., Ketphanh S., Svengsuksa B., Thomas P., Sengdala K., Lamxay V., Armstrong K.** 2007. *A checklist of the vascular plants of Lao PDR*. Edinburgh: Royal Botanic Gardens. 394 pp.
- Norton J. A., Abdul Majid S., Allan D. R., Al Safran M., Boer B., Richer R.** 2009. *An Illustrated Checklist of the Flora of Qatar*. Doha: Unesco office in Doha. 95 pp.
- Nowicke J. W., Miller J.** 1991. Boraginaceae. In: Dassanayake (ed.) *A Revised Handbook to the Flora of Ceylon*. Vol. 7. New Delhi, Calcutta: Oxford and IBH Publishing Co. PVT. LTD. Pp. 34–108.

- Omar S. A. S.** 2001. *Vegetation of Kuwait: A comprehensive illustrative guide to the flora and ecology of the desert of Kuwait*. Kuwait: Kuwait Institute for Scientific Research. 159 pp.
- Pandey R. P., Dilwakar P. G.** 2008. An integrated check-list flora of Andaman and Nicobar Islands, India. *J. Econ. Taxon. Bot.* 32: 403–500.
- Pasha M. K., Uddin S. B.** 2013. *Dictionary of plant names of Bangladesh. Vascular Plants*. Chittagong, Bangladesh Janokalyan Prokashani. 434 pp.
- Patzelt A., Harrison T., Knees S. G., Hartley L. A.** 2014. Studies in the flora of Arabia: XXXI. New records from the Sultanate of Oman. *Edinburgh J. Bot.* 71: 161–180.
- PBI Solanum Project** (2014–continuously updated). 2025. Solanaceae Source: a global taxonomic resource for the nightshade family. URL: <http://www.solanaceaesource.org> (Accessed 15 December 2025).
- Pickering H., Patzelt A.** 2008. *Field guide to the wild plants of Oman*. Kew, Richmond, Surrey: Royal Botanic Gardens; Kew Publishing. 281 pp.
- POWO** [2026]. *Plants of the World Online*. Kew: Facilitated by the Royal Botanic Gardens. URL: <http://www.plant-softheworldonline.org/> (Accessed 10 April 2026).
- Pullaiah T., Rao Muralidhara D.** 2002. *Flora of Eastern Ghats. Hill Ranges of South east India*. Vol. 1. Regency Publications. 346 pp.
- Pullaiah T., Sandhya Rani S., Karuppusamy S.** 2011. *Flora of Eastern Ghats. Hill Ranges of South east India*. Vol. 4. New Delhi: Regency Publications. 670 pp.
- Pyšek P., Richardson D. M., Rejmanek M., Webster G. L., Williamson M., Kirschner J.** 2004. Alien plants in check-lists and floras: towards better communication between taxonomists and ecologists. *Taxon* 53: 131–143.
- Rajbhandari K. R., Rai S. K., Chhetri R.** 2022. *A Handbook of the Flowering Plants of Nepal*. Vol. 4. Kathmandu, Nepal: Department of Plant Resources, Thapathali. 522 pp.
- Rao R. S., Sreeramulu S. H.** 1986. *Flora of Srikakulam District, Andhra Pradesh, India*. Meerut: Indian Botanical Society. 640 pp.
- Rao R. S., Venkanna P., Appi Reddy T.** 1986. *Flora of West Godavari District, Andhra Pradesh, India*. New Delhi, India: Dept. of Science and Technology, Indian Botanical Society. 520 pp.
- Rao S. K., Kumar D.** 2025a. *Trichodesma indicum*. In: *India Flora Online*. URL: [http://indiafloraonline-ces.iisc.ac.in/plants.php?name=Trichodesma indicum](http://indiafloraonline-ces.iisc.ac.in/plants.php?name=Trichodesma+indicum) (Accessed 31 March 2025).
- Rao S. K., Kumar D.** 2025b. *Tinospora cordifolia*. In: *India Flora Online*. URL: [http://indiafloraonline-ces.iisc.ac.in/plants.php?name=Tinospora cordifolia](http://indiafloraonline-ces.iisc.ac.in/plants.php?name=Tinospora+cordifolia) (Accessed 31 March 2025).
- Rao S. K., Kumar D.** 2025c. *Solanum americanum*. In: *India Flora Online*. URL: [http://indiafloraonline-ces.iisc.ac.in/plants.php?name=Solanum americanum](http://indiafloraonline-ces.iisc.ac.in/plants.php?name=Solanum+americanum) (Accessed 31 March 2025).
- Ruengsawang K., Chantaranonthai P.** 2009. A revision of Boraginaceae subfamily *Boraginoideae* in Thailand. *Thai Journal of Botany* 1: 89–101.
- Sarder N. U., Hassan M. A. Md M., Kamrul I., Imam H., Neamur K., Jahid H., Maminur H.** 2018. *Vascular flora of Chittagong and the Chittagong Hill Tracts*. Vol. 3. Dhaka: Bangladesh National Herbarium. 978 pp.
- Särkinen T., Poczar P., Barboza G. E., van der Weerden G. M., Baden M., Knapp S.** 2018. A revision of the Old World black nightshades (Morelloid clade of *Solanum* L., Solanaceae). *PhytoKeys* 106: 1–223.
- Sasidharan N.** 2011. *Flowering plants of Kerala*. Peechi, India: Kerala Forest Research Institute (KFRI). electr. optic. Disk (DVD-ROM). Ver. 2.
- Saxena H. O., Brahmam M.** 1995. *The Flora of Orissa*. Vol. 2: Rosaceae to Martyniaceae. Orissa Forest Development Corporation. 688 pp.
- Shabana H. A., Gairola S., Mahmoud T.** 2020. *Tridax procumbens* L. (Asterales Asteraceae), a new record to the flora of the United Arab Emirates. *Biodiversity Journal* 11(4): 889–896. <https://doi.org/10.31396/Biodiv.Jour.2020.11.4.889.896>
- Shaheen H., Qureshi R., Akram A., Gulfranz M., Potter D.** 2014. A preliminary floristic checklist of Thal desert Punjab, Pakistan. *Pakistan Journal of Botany* 46: 13–18.
- Siddiqi M. A.** Menispermaceae. *Flora of Pakistan*. Pt. 212. Karachi: Pakistan Agricultural Research Council. URL: http://www.efloras.org/florataxon.aspx?flora_id=5&taxon_id=10561
- Sikarwar R. L. S.** 2014. Angiosperm diversity assessment of Chitrakoot the legendary place of Vindhyan range, India. *Journal of Economic and Taxonomic Botany* 38: 563–619.
- Singh N. P.** 1988. *Flora of Eastern Karnataka*. Vols. 1–2. New Delhi: Mittal Publications. 794 pp.
- Solanum americanum* Mill. [2026]. In: O. Bánki, et al. *Catalogue of Life* (2026-07-17 XR). Catalogue of Life Foundation, Amsterdam, Netherlands. <https://doi.org/10.48580/dgykv>
- Thiers B.** 2025. *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. URL: <http://sweetgum.nybg.org/ih/> (Accessed 23 March 2025).
- Tinospora cordifolia* (Willd.) Miers [1925]. In: *GBIF Secretariat* (2023). GBIF Backbone Taxonomy. Checklist dataset <https://doi.org/10.15468/39omei> accessed on 31 March 2025 via GBIF.org. URL: <https://www.gbif.org/species/7520328>

Tozhibayev K. Sh., Beshko N. Yu., Batoshov A. R., Azimova D. E., Yusupov Z., Deng T., Sun H. 2020. *Flora of the Dzhizak Province, Uzbekistan*. Kunming: China Forestry Publishing House. 523 pp.

Tozhibayev K. Sh., Beshko N. Yu., Esankulov A. S., Batoshov A. R., Azimova D. E. 2021. *Kadastr flory Uzbekistana: Dzhizakskaya oblast* [Cadastr of the flora of Uzbekistan: Jizzakh region]. Tashkent: Zamin nashr. 368 pp. [In Russian] (**Тожибаев К. Ш., Бешко Н. Ю., Эсанкулов А. С., Батошов А. Р., Азимова Д. Э.** Кадастр флоры Узбекистана: Джизакская область. Ташкент: Zamin nashr, 2021. 368 с.).

Trichodesma indicum (L.) R. Br. [1926]. In: *GBIF Secretariat (2023). GBIF Backbone Taxonomy*. Checklist dataset <https://doi.org/10.15468/39omei> accessed via GBIF.org on 2026-06-02. URL: <https://www.gbif.org/species/8139855>.

UAE Flora [2025]. URL: <https://www.uaeflora.ae>. (Accessed on 10 March 2025).

Verdcourt B. 1991. *Flora of Tropical East Africa. Boraginaceae*. Kew: Royal Botanic Gardens, Kew. 124 pp.

Welsh S. L. 1998. *Flora Societensis*. Utah: E.P.S. Inc. Utah. 420 pp.

Wessely I. 1960. Die mitteleuropäischen Sippen der Gattung *Solanum* Sektion *Morella*. *Feddes Repert. Spec. Nov. Regni Veg.* 63, 290–321: 293–296.

Western A. R. 1989. *The flora of the United Arab Emirates: an introduction*. Al Ain: United Arab Emirates University. 188 pp.

Whistler A. 2018. *Flora of Tokelau*. Honolulu: Isle Botanica. 126 pp.

Whistler W. A. 2022. *Flora of Samoa Flowering Plants*. Washington: Smithsonian National Museum of Natural History (US) and National Tropical Botanical Garden. 930 pp.

Wood J. R. I. 1997. *A handbook of the Yemen flora*. Kew, UK: Royal Botanic Gardens. 434 pp.

Zhang Z.-Y., Lu A., D'Arcy W. G. 1994. Solanaceae. In: C. Y. Wu, P. Raven (eds.). *Flora of China*. Vol. 17 (Verbenaceae through Solanaceae). Beijing: Science Press, and St. Louis: Missouri Botanical Garden Press. Pp. 300–332.