

New records of eight plant species in the United Arab Emirates

by Mohammad Shahid and N.K. Rao

Abstract

During botanical explorations between 2013 and 2015 in the United Arab Emirates (UAE), eight previously-undocumented plant species, belonging to six different plant families, were found growing in different parts of the country. *Bromus diandrus*, *Lolium multiflorum* (Gramineae) and *Diplotaxis eruroides* (Cruciferae) were recorded from the emirate of Abu Dhabi. *Alternanthera sessilis*, *Amaranthus lividus* (Amaranthaceae) and *Commelina benghalensis* (Commelinaceae) from Dubai and *Kickxia elatine* (Scrophulariaceae) and *Cyperus eremicus* (Cyperaceae) from the emirates of Fujairah and Ra's al-Khaimah respectively. All the reported species are considered in the Emirates, although all have previously been reported from at least one other country in the Arabian peninsula. They represent about 1% of the recorded wild flora of the UAE.

Introduction

The United Arab Emirates (UAE) is situated in the south-east of the Arabian Peninsula with an area of 83,600 square km. The country is mostly desert with massive sand dunes and scattered oases, although the Hajar Mountain range is found in the north-east. The desert in the south and west of the country is part of the vast sand sea known as the Rub al-Khali or Empty Quarters. The Hajar Mountains rise at some points to over 1,700 metres. The climate of the country is very arid (Boer, 1997). Rainfall in the UAE is low and irregular, averaging less than 120 mm annually in most areas.

Soils are generally poor in nutrients and are found in four main landforms: sand, salt flat, gravel and mountains. Keeping in view the size and nature of its habitats, the UAE has a wide diversity in its flora, which has evolved to survive in the existing harsh environment.

It is difficult to ascertain the exact number of the wild plant species that grow in the UAE. In the first book on the UAE wild flora, Western (1989) described 501 species found in the country. The next book (Jongbloed, 2003) on the same topic illustrated close to 680 vascular plant species. Karim and Fawzi (2007) added around 70 additional taxa, although many species that had been described earlier were omitted in their book. Feulner (2011) discussed the number of UAE plant species thoroughly and estimated it to be around 789. Later work by the authors and other researchers revealed the presence of twelve more flowering plant species in the UAE (Shahid, 2014; Shahid and Rao, 2014a; Shahid and Rao, 2014b; Mahmoud, 2015; Shahid and Rao, 2015a; Shahid, 2015b) bringing the number recorded to 801.

Materials and Methods

Botanical expeditions to different parts of the UAE were carried out during 2013 and 2015. Apart from collecting specimens of plant species, data on their population and habitats were also recorded, while a Garmin GPS 72H was used to record geographical coordinates. Relevant literature (Chaudhary, 1989; Kukkonen, 1995; Chaudhary, 1999; Chaudhary, 2001a; Chaudhary, 2001b) was used for species identification.

Results and Discussions

1. *Alternanthera sessilis* (L.) R.Br. ex DC., Cat. Pl. Horti Monsp. 77. 1813 (Figs. 8 & 9)

A perennial herb. Stems prostrate to semi-erect, creeping, much branched, covered with white hairs, 10-70 cm long, rooting at nodes, cylindrical. Leaves simple, narrowly oval or oblong to almost linear, opposite, glabrous, flat margins, shortly petiolate, light green 3-7 x 1-2 cm; petioles 1-5 mm long, apex acute to blunt; bracts shiny white, ovate concave, c. 1 mm, persistent. Inflorescence dense, sessile white cluster of tighten spikes in the leaf axis, c. 12 x 12 mm. Sepals 2-3 mm long, shiny white or light purple, green base, glabrous. Fruits indehiscent, flattened utricle, c. 2.5 mm long, shiny light-beige yellow. Seeds glossy, dark brown to black, c. 1 mm diameter.

Alternanthera sessilis is native to Africa, Asia and Australia, while in the Arabian peninsula it has been recorded from Saudi Arabia (Chaudhary, 1999) and Yemen (Wood, 1997). In the UAE, the species was found by the authors at Dubailand (25°05' 740 N, 055°23' 408 E), a neighbourhood in Dubai. Around 20 plants were seen in a wet place close to a building. *A. pungens*, another species of the same genus, has previously been recorded.

2. *Amaranthus lividus* L., Sp. Pl. 1: 990. 1753(Figs. 10 & 11)

Annual herb. Stems erect or ascending, slender, 5-20 cm, simple to significantly branched from the base, light green, glabrous. Leaves on long, slender petioles, occasionally as long as blades. Lamina 1-5 cm long, 0.5- 4 cm wide, green, ovate, notched apex, base cuneate. Inflorescence a terminal spike with small lateral spikes in upper axils; terminal spikes 5-50 x 3-15 mm; male and female flowers mingle together all through; bracts white, oblong-ovate, acute, with green keel; Perianths 3, c. 1 mm long, oblong, apex acute, keel green; stigmas erect, 2-3. Fruits indehiscent, sub-globular compressed capsule, smooth, upon maturity wrinkled, somewhat bigger than tepals, 1-2.5 mm.

Seeds round, 1-1.5 mm diameter, dark brown to black.

Amaranthus lividus is found in all six inhabited continents. In the Arabian peninsula, the species has been recorded in the wild from Kuwait (Omar, 2000) and Saudi Arabia (Chaudhary, 1999), while in Yemen it is grown as a vegetable (Wood, 1997).

In the UAE, *A. lividus* was noted in an irrigated lawn at the International Centre for Biosaline Agriculture (25°05.740 N, 055°23.408 E), Dubai where about 30 plants were growing close to one another. Five species of the genus *Amaranthus* have been earlier described from the Emirates (Jongbloed, 2003; Karim and Fawzi, 2007).

3. *Bromus diandrus* Roth, Bot. Abh. Beobacht. 44. 1787. (Figs. 1 & 2)

Annual. Culms single or tufted, erect or ascending, 25-75 cm, 2-5 nodes. Leaf sheaths, with stiff hair. Ligule, 2-5 mm long, jagged, no hairs. Lamina 3-20 cm long, 3-6 mm wide, surface rough, covered with hairs. Inflorescence loose, nodding, 10-20 cm long; primary panicle branches dangling, undivided, 2-7 cm long, with 1-2 fertile spikelets; other panicle branches bending. Spikelets contain 5-8 fertile florets, wedge shaped, 20-40 mm long. Glumes shorter than spikelets, persistence; upper glumes 20-45 mm, lanceolate, apex acute; lower glumes 15-30 mm, linear, apex acuminate. Lemma 20-40 mm, lanceolate, without keel, surface rough, apex dentate; single awn, 30-70 mm; palea 15-30 mm. Anthers 2-3, c. 1 mm. Fruit with sticky pericarp, apex fleshy, pubescent.

The natural range of *Bromus diandrus* is the Mediterranean region, but it is also found in other parts of Europe, Asia and Africa. In the Arabian Peninsula, Saudi Arabia is the only other country where it has been recorded (Chaudhary, 1989).

The species was observed along a road (24°35' 338 N, 055°44' 351 E) near Al Hayer, a village in the Al Ain region of Abu Dhabi Emirate. There were around 25 plants of *B. diandrus* growing close to one another in the same place. Three species of the genus *Bromus* have been previously reported from the UAE (Jongbloed, 2003; Karim and Fawzi, 2007)..

4. *Commelina benghalensis* L., Sp. Pl. 41. 1753(Figs. 12 & 13)

An annual or perennial herb. Stems trailing to ascending, 10-30 cm long. Leaves alternate, ovate or elliptic, 3-5 cm long, 1.5-2 cm wide, pale green, completely glabrous or sparsely pubescent at apex, margins significantly undulate; sheaths closed, 10-30 mm long, sparsely pilose, mouth ciliate. Flowers cleistogamous in 1-2 terminal or leaf-opposed spathes, petals purple; sepals free; bisexual staminate; stamens lateral, filaments compressed, anther cruciform, yellow. Spathes solitary, funnel shaped, pubescent, longer hairs near base. Capsules 3-chambered, up to 5 seeded. Seeds kidney shaped, 5 x 2 mm, dark brown.

Commelina benghalensis is native to Africa and Asia and has been introduced to Australia. In Arabia, the species has been previously recorded in two countries, Saudi Arabia (Chaudhary 2001) and Yemen (Wood, 1997).

The species was recorded in the downtown Dubai area of Deira, where four plants were recorded growing alongside a road (25°15' 949 N, 055°18' 630 E). Only one species of genus *Commelina* has been previously reported from the country (Jongbloed, 2003).

5. *Cyperus eremicus* Kukkonen, Ann. Bot. Fenn. 32: 159. 1995 (Figs. 16 & 17)

A perennial, 30-100 cm, rhizomatous, tufted. Stems 2-4 mm diameter, upper triangular, lower cylindrical, grey green. Leaves as long as stems; sheaths 5-15 cm, yellowish brown to dark brown; blades 30-70 cm long, 2-6 mm wide, green. Inflorescence a multiple spike or anthelodium, 5-20 cm; bracts 3-5 foliose, longer than inflorescence, 10-30 cm; primary branches 1-10, 5-10 cm; spikes 1-15, linear, 10-60 mm long, 3-5 mm wide, 30-70 tightly closed glumes; glumes lanceolate c. 7 mm, yellow to brown. Stamens 3, stigmas 3. Nuts ellipsoid, brown, c. 4 x 3 mm.

Cyperus eremicus is native to south west Asia where it is found in the deserts from Saudi Arabia to Afghanistan (Kukkonen, 1995). Saudi Arabia is the only country in the Arabian Peninsula where the species has been previously reported (Chaudhary, 2001b).

A population of more than 50 plants of the species were noted by the authors in Ra's al-Khaimah city (25°46' 932 N, 055°55' 829 E) close to the Arabian Gulf shoreline. They were growing with spiny plants of *Alhagi graecorum*. Six species of the genus *Cyperus* have previously been described from the UAE.

6. *Diploaxis erucooides* (L.) DC., Syst. Nat. 2: 631. 1821 (Figs. 5, 6 & 7)

Annual, branched herb. Stems erect, 20-60 cm long, covered with dense hairs. Basal leaves 2-10 cm long, 1-4 cm wide, elliptic to obovate, with petiole to sub-sessile, margins sinuate to pinnately lobed, 2-5 lobes each side, both surfaces pubescent. Upper leaves sessile, blade margins similar to basal leaves, base wedge shaped to broad. Flowers white; sepals erect spreading, 4-5 mm, pubescent; petals 10-12 x 4-5 mm, with obovate-elliptical limb; filament 4-6 mm; anther 1-2 mm. Fruits erect-spreading, flattened, 22-35 x 1-2.5 mm; terminal segment c. 2 mm long, contains 1-2 seeds. Seeds bi-seriate, c. 1.2 x 0.8 mm

Diploaxis erucooides is native to West Asia, North Africa and South Europe. In the Arabian Peninsula, the species has been reported previously from Oman (Ghazanfar, 1992), Saudi Arabia (Chaudhary, 1999) and Yemen (Wood, 1997).

The authors found six plants of *D. erucooides* in a location (24°35' 333 N, 055°44' 352 E) close to Al

Hayer. Apart from *D. eruroides*, only one other species of the genus *Diplotaxis* has been recorded from the UAE.

7. *Kickxia elatine* (L.) Dumort., Fl. Belg. 35. 1827(Figs. 14 & 15)

Annual herb. Stems prostrate or ascending, hairy, much branched, up to c. 40 cm. Leaves alternate, spear-shaped, pubescent, green to deep green, lobed in lower half, upper part entire; short-petiolate, petiole up to 5 mm. Flowers 7-10 mm, axillary, solitary; petals 5, upper 2 yellow, lower 3 white; sepals 5, green; stamens 4; spurs densely pubescent, white, c. 5 mm long, horizontal to perianth, straight or curved. Pedicel slender, pubescent, 7-15 mm long. Fruits spherical capsules, c. 5 mm diameter, smooth. Seed small, oval, brown.

Kickxia elatine is native to Asia and Europe but is naturalised in other continents. In the Arabian peninsula it has been reported from Saudi Arabia (Chaudhary, 2001a) and Yemen (Wood, 1997).

In the UAE, a few plants of the species were seen growing on a flooded stream bank at Wadi Wurayah National Park, Fujairah (25°23'48.2 N, 56°16'10.4 E). This type of habitat has not been reported elsewhere for the species. This is the fifth species of the genus *Kickxia* to be recorded in the UAE.

8. *Lolium multiflorum* Lam., Fl. Franç. 3:621. 1778 (Figs. 3 & 4)

Annual, tufted. Culms erect, 20-70 cm long. Leaf sheath hairless, split, overlapping; auricle curved; ligules 1-2 mm, lacking hairs. Leaf blades 5-20 cm long, 3-8 cm wide, light green, keeled, upper surface ridged, lower surface smooth, hairless. Inflorescence solitary spike, 5-30 cm long, 5-25 alternatively arranged spikelets attached to rachis. Spikelets 5-30 mm long, composed of 5-15 florets. Floret 2-7 mm, attached to rachilla. Terminal spikelets with 2 glumes, other spikelets lack inner glume. Glumes shorter than spikelets; upper glume lanceolate, without keel, surface smooth, apex obtuse. Lemma oblong, 5-8 mm, leathery, without keel, apex dentate. Awn 5-10 mm long. Palea keels rough. Stamens 3. Stigma 2. Ovary glabrous. Fruit linear.

The native range of *L. multiflorum* is Europe, North African and West Asia (Hubbard, 1968). In Arabia, the species is found in Kuwait (Omar, 2000), Saudi Arabia (Chaudhary, 1989) and Yemen (Wood, 1997).

In the UAE, the taxa was identified at Al Hayer (24°35'35.4 N, 055°44'34.4 E), where four plants were growing. It is the fourth species of the genus *Lolium* to be reported from the country, three having been described earlier (Jongbloed, 2003; Karim and Fawzi, 2007).

Conclusions

All of the newly-reported species have been recorded only from a single location (Table-1). Thus all of them are rare in the UAE and look vulnerable.

Of particular interest, *Kickxia elatine* was growing on a part of a stream bank that was at the time under water. The species has not been previously reported in such habitat. Only a few plants of this Scrophulariaceae species were found at the location, within the protected area of Wadi Wurayah National Park. Special attention is required.

The small population of *Cyperus eremicus* was found in a corner surrounded by private properties about 50 m from the coast of the Arabian Gulf. Due to the location, it is not safe there as development may threaten its survival.

The three species found at Al Hayer, viz. *Bromus diandrus*, *Diplotaxis eruroides* and *Lolium multiflorum* are annuals and depend on timely rain. During 2013-14 when there was good rain in the area, all the species grew well, while in 2014-15 the species failed to appear as there was no rain before or during their growing season. On the other hand, *Alternanthera sessilis*, *Amaranthus lividus* and *Commelina benghalensis* are found either in moist or irrigated places, and for that reason, they fare relatively better.

All eight species have previously been reported from at least one other country, in the Arabian peninsula, Saudi Arabia, with six having been reported from Yemen.

With this report the documented wild flowering plant species in the UAE are now 809. Further exploration in this field may result in finding more taxa that have yet not been described from the country.



Fig. 1 A small population of *Bromus diandrus* near Al Hayer, Abu Dhabi



Fig. 2 A spike of *Bromus diandrus*



Fig. 3 A *Lolium multiflorum* plant at Al Hayer, Abu Dhabi



Fig. 4 Spike of *Lolium multiflorum*



Fig. 5 A single plant of *Diplotaxis erucooides* growing at Al Hayer, Abu Dhabi

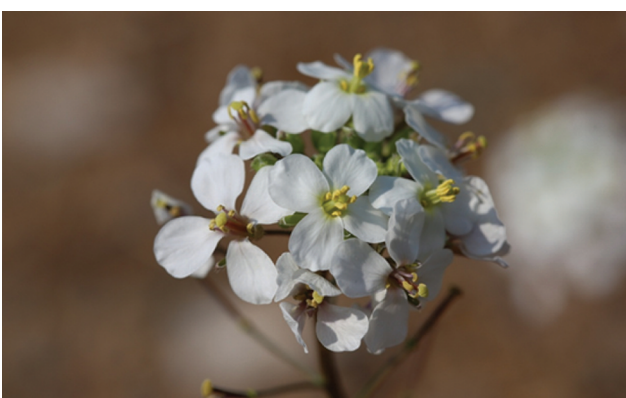


Fig. 6 Flowers of *Diplotaxis erucooides*



Fig. 7 Fruits of *Diplotaxis erucooides*



Fig. 8 *Alternanthera sessilis* plants growing in Dubai



Fig. 9 Inflorescence of *Alternanthera sessilis*



Fig. 10 *Amaranthus lividus* plants in a lawn in Dubai



Fig. 11 Inflorescence of *Amaranthus lividus*



Fig. 12 A small *Commelina benghalensis* plant in Dubai



Fig. 13 Two flowers of *Commelina benghalensis* emerging from spathe



Fig. 14 A *Kickxia elatine* plant growing in stream at Wadi Wurayah, Fujairah



Fig. 15 Flowers of *Kickxia elatine*



Fig. 16 Plants of *Cyperus eremicus* near coast of Arabian Gulf at Ras al Khaimah

Table 1. Scientific names, families of the undocumented plant species of the United Arab Emirates along with places, emirates and coordinates from where they were found

S.N.	Species	Family	Place	Emirate	GPS coordinates	
					N	E
1	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	Dubailand	Dubai		
2	<i>Amaranthus lividus</i> L.	Amaranthaceae	ICBA	Dubai	25°05.740	055°23.408
3	<i>Bromus diandrus</i> Roth	Poaceae	Al Hayer	Abu Dhabi	24°35.333	055°44.352
4	<i>Commelina benghalensis</i> L.	Commelinaceae	Deira	Dubai	25°15.949	055°18.630
5	<i>Cyprus eremicus</i> Kukkonen	Cyperaceae	Ras al Khaimah	Ras al Khaimah	25°46.932	055°55.829
6	<i>Diptotaxis eruroides</i> (L.) DC.	Cruciferae	Al Hayer	Abu Dhabi	24°35.354	055°44.344
7	<i>Kickxia elatine</i> (L.) Dumort.	Scrophulariaceae	Wadi Wurayah	Fujairah	25°23.482	56°16.104
8	<i>Lolium multiflorum</i> Lam.	Poaceae	Al Hayer	Abu Dhabi	24°35.338	055°44.351



Fig. 17 Inflorescence of *Cyperus eremicus*

References

- Boer, B. 1997. An introduction to the climate of the United Arab Emirates. **Journal of Arid Environments** **35**:3-16.
- Chaudhary, S.A. 1989. *Grasses of Saudi Arabia illustrated*. National Agriculture and Water Research Centre, Riyadh, Saudi Arabia.
- Chaudhary, S.A. 1999. *Flora of the Kingdom of Saudi Arabia illustrated. Vol. 1*. National Agriculture and Water Research Centre, Riyadh, Saudi Arabia.
- Chaudhary, S.A. 2001a. *Flora of the Kingdom of Saudi Arabia illustrated. Vol. 3*. National Agriculture and Water Research Centre, Riyadh, Saudi Arabia.
- Chaudhary, S.A. 2001b. *Flora of the Kingdom of Saudi Arabia illustrated. Vol. 2 (2)*. National Agriculture and Water Research Centre, Riyadh, Saudi Arabia.
- Feulner, G.R. 2011. The Flora of the Ru'us al-Jibal - the Mountains of the Musandam Peninsula: An Annotated Checklist and Selected Observations. **Tribulus** **19**: 4-153.
- Ghazanfar, S.A. 1992. *An annotated catalogue of the vascular plants of Oman and their vernacular names. Vol. 2*. National Botanic Garden of Belgium, Meise, Belgium.
- Hubbard, C.E. 1968. *Grasses*. 2nd Edition. Harmondsworth, UK: Penguin Books.
- Jongbloed, M. 2003. *The comprehensive guide to the wild flowers of the United Arab Emirates*. Environmental Research and Wildlife Development Agency, Abu Dhabi, UAE.
- Karim F.M. and Fawzi N.M. 2007. *Flora of the United Arab Emirates*. United Arab Emirates University, Al Ain, UAE.
- Kukkonen, I. 1995: New taxa, new combinations and notes on the treatment of Cyperaceae for Flora Iranica. - **Ann. Bot. Fenn.** **32**: 153 -164
- Mahmoud, T., Gairola S., El-Keblawy A. 2015. *Parthenium hysterophorus* and *Bidens pilosa*, two new records to the invasive weed flora of the United Arab Emirates. **J. New Biological Reports** **4(1)**: 26-32
- Omar S.A.S. 2001. *Vegetation of Kuwait: A comprehensive illustrative guide to the flora and ecology of the desert of Kuwait*. Kuwait Institute for Scientific Research, Kuwait.
- Shahid, M. 2014. New records for two alien Asteraceae species in the United Arab Emirates. **J. New Biological Reports** **3(2)**: 115-119
- Shahid, M. and N.K. Rao. 2014. New records of two species of Caryophyllaceae in the flora of the United Arab Emirates. **Tribulus** **22**: 66-68
- Shahid, M. and N.K. Rao. 2014. *Datura ferox* and *Oldenlandia corymbosa*: New record to the UAE flora. **J. New Biological Reports.** **3(3)**: 170-174
- Shahid, M. and N.K. Rao. 2015a. First record of the two Asteraceae species from the United Arab Emirates. **J. New Biological Reports**. Accepted
- Shahid, M. and N.K. Rao. 2015a. New records for the two Fabaceae species from the United Arab Emirates. **J. New Biological Reports.** (Accepted)
- Western A.R. 1989. *The flora of the United Arab Emirates: An introduction*. United Arab Emirates University, Al Ain, UAE.
- Wood J.R.I. 1997. *A handbook of the Yemen flora*. Royal Botanic Gardens, Kew, UK.

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