



Original article

Blepharis saudensis (Acanthaceae), a new species from Saudi ArabiaMohammed A. Basahi^a, Yahya S. Masrahi^b^a College of Science and Arts Sajir, Shaqra University, P.O. Box 33, Shaqra 11961, Saudi Arabia^b Department of Biology, College of Science, Jazan University, Jazan, Saudi Arabia

ARTICLE INFO

Article history:

Received 23 November 2018

Revised 20 December 2018

Accepted 6 January 2019

Available online 7 January 2019

Keywords:

Blepharis

Acanthaceae

New species

Saudi Arabia

Red sea islands

ABSTRACT

Blepharis saudensis, from small islands in the Red Sea of Jazan Province, Saudi Arabia, is described as a new species and illustrated. This species differs from other known species in this genus by having a combination of long stems, oblong-lanceolate to linear leaves with entire margins and pubescence.

© 2019 Production and hosting by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Southwestern Saudi Arabia has more than 80% of the total flora of the country (Thomas, 2011). This diversity is caused by variation in geomorphological characteristics, which includes islands, sand dunes, sandy plains, low rocky hills and high mountains, generating a varied climate ranging from hot-extra arid to hot-arid to relatively low temperature-humid (Masrahi, 2012). In the recent years, floristic explorations have resulted in the discovery of many new taxa and records in this part of Saudi Arabia (Al Farhan, 2000; Al-Turki et al., 2001, 2002, Al-Turki, 2003; Fayed and Al-Zahrani, 2007; Al-Zahrani and El-Karemy, 2007; Masrahi et al., 2010, 2012a; Thomas et al., 2014; Masrahi, 2015). *Blepharis* A. I. Juss. (Acanthaceae) is an herbaceous genus of c. 126 species in the old world tropics and subtropics (Vollesen, 2000). In Saudi Arabia, there are two known species of *Blepharis*, *B. edulis* (Forssk.) Pers. and *B. maderaspatensis* (L.) Roth (excluding the new species) (Chaudhary, 2000; Masrahi, 2012). During field work on the small islands between the Jazan coast and the Farasan archipelago, Jazan Province, southwestern Saudi Arabia, between 2013 and 2014, we found scattered populations of *Blepharis* A. I. Juss. Critical studies of specimens with the help of the relevant literature (Vollesen, 2000;

Boulos, 2002; Kelbessa, 2006) revealed that the newly collected specimens does not belong to any of the hitherto known species.

2. Taxonomy

Blepharis saudensis Y. Masrahi, & M. Basahi, **sp. nov.** (Figs. 2 and 3).

2.1. Diagnosis

Planta affinis *Blepharis edulis*, sed caulis usque 75 cm, foliis lanceolata-lineari, integerrimus, pubescence.

2.2. Type

Saudi Arabia, Jazan Province, Umm az zughaf island, 37.5 km E of Jazan coast, 16°35'N, 42°20'E, 1–2 m a.s.l., 22 February 2013, Y. Masrahi 5440 (Holotype: JAZUH); Al Ghuzah island, 38.7 km E of Jazan coast, 16°34'N, 42°21'E, 2–3 m a.s.l., 22 February 2013, Y. Masrahi & T. Al-Turki 5441, (Paratype: JAZUH).

2.3. Description

Annual or perennial herb, 10–75 cm high, stems erect (sometimes creeping), much-branched from the base, glabrous to pubescent. Leaves pubescent, 3.5–15.2 × 0.3–1.5 cm, oblong-lanceolate to linear, entire; spikes erect, 2.5–14 cm; peduncle 2–7 mm; bracts ovate, pubescent to dense pilose, 1.6–3.6 × 0.5–1 cm, margins with

Peer review under responsibility of King Saud University.



Production and hosting by Elsevier

<https://doi.org/10.1016/j.sjbs.2019.01.002>

1319-562X/© 2019 Production and hosting by Elsevier B.V. on behalf of King Saud University.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

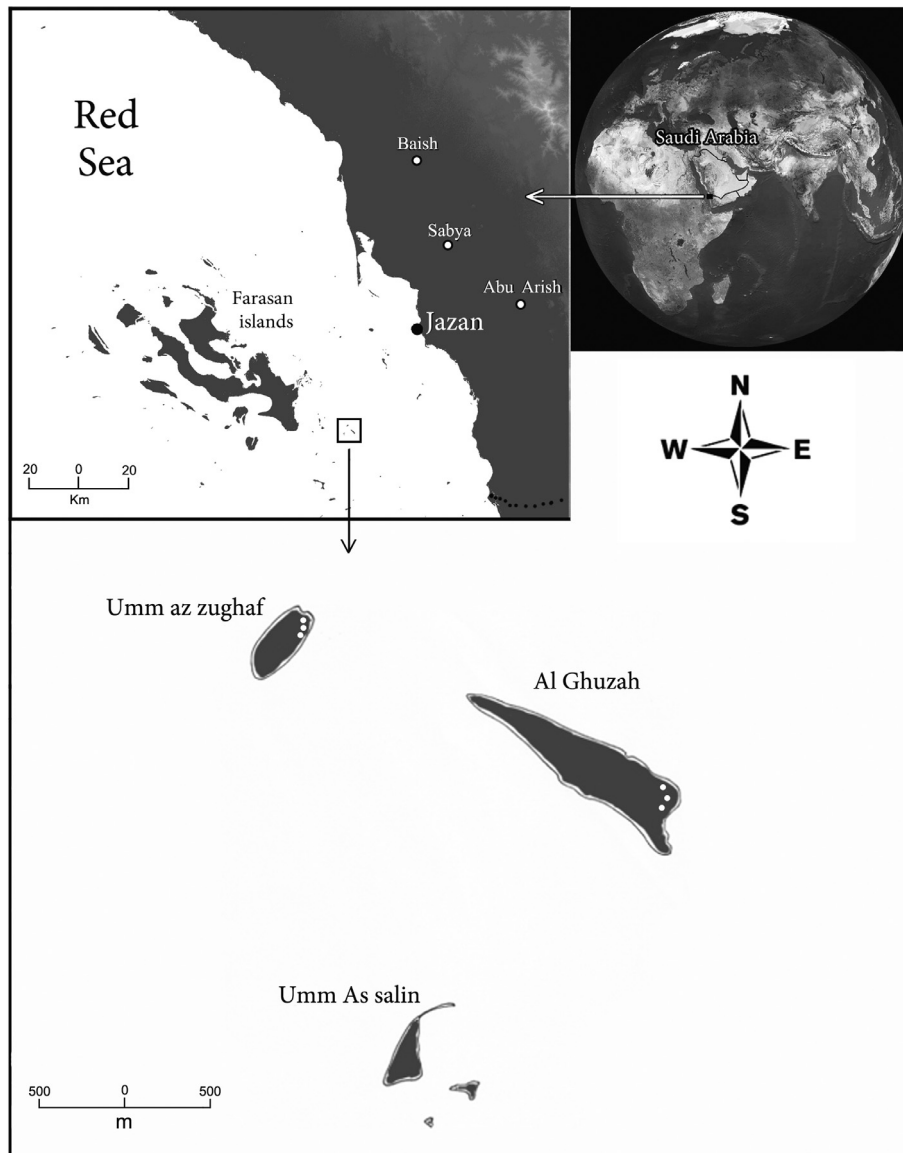


Fig. 1. Map of Jazan province, southwestern Saudi Arabia, showing the locations where new species were collected (white circles).

3–5 pairs of straight spines, 1–6 mm; bracteoles 10–12 mm, linear-subulate to lanceolate, pubescent; calyx pubescent, usually with longer pilose hairs, upper lobe 12–16 mm, ovate-elliptic, lower 9–11 mm, broadly ovate-elliptic; corolla dark blue with darker veins, pubescent, 15–17 mm long, limb 9–12 mm wide, 3-lobed; stamens 8–9 mm long, ovary 2 mm long, glabrous, style 6 mm long with some hairs in the base; capsule 8–9 mm; seeds 4–5.5 × 2.5–4 mm, covered with hygroscopic hairs.

Flowering and fruiting: Mostly December–February.

2.4. Conservation status

In view of its restricted known distribution and the small areas where it found, it should be regarded as Endangered (EN) as following the criteria of IUCN (2016).

2.5. Taxonomic remarks

B. saudensis is closely related to *B. edulis* (Forssk.) Pers., a species widely distributed from Western Africa to Iran, in desert and semi-desert bushland on sandy to stony soil. The new species differs

from *B. edulis* in particular by its tall stems (reach up to 75 cm) and entire leaf margins. In addition, the new species is restricted to saline habitats in calcareous sandy to fine sand soil, a few meters from sea water. Whereas *B. edulis* widely distributed in sandy to stony soil, 300–1600 m a.s.l. A morphological comparison between *B. saudensis* and *B. edulis* is given in Table 1.

3. Distribution and ecology

Blepharis saudensis is endemic to southwestern Saudi Arabia. The species is known only from some small islands between Jazan coast and Farasan archipelago, mainly on two islands with a relatively large community, Umm az zughaf and Al Ghuzah (Fig. 1). The species grows in saline habitats with calcareous sandy to fine sand soil. These islands are located within the harshest habitats in the Saudi Arabia, characterized by high temperature, high irradiance, high salinity and low rainfall (July–September) with a total annual precipitation of less than 160 mm (Masrahi, 2012). *B. saudensis* has C_4 photosynthetic pathway characters (Fisher et al., 2015). All species known to have C_4 photosynthesis are predominantly found in hot and/or arid habitats, achieving maximum pho-

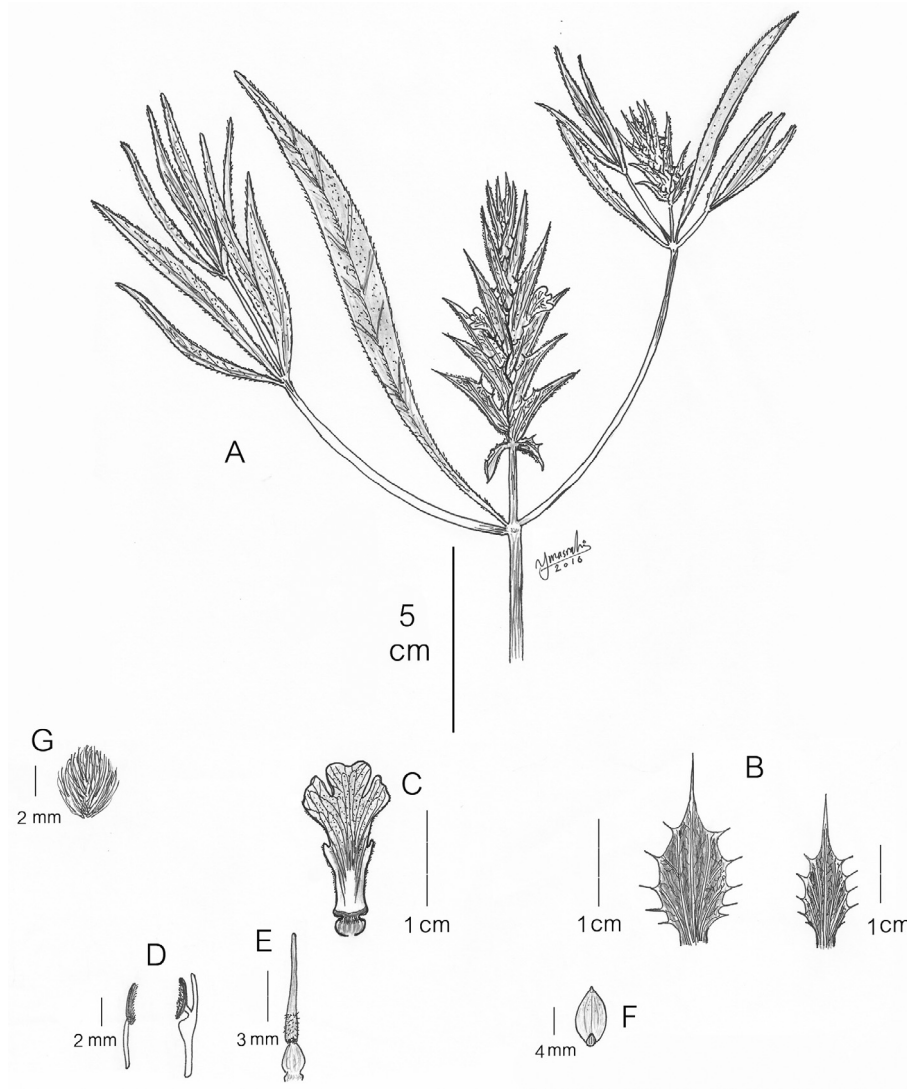


Fig. 2. *Blepharis saudensis* sp. nov. (A) habit, showing vegetative branch with spikes. (B) bracts. (C) corolla (stamens removed). (D) stamens. (E) ovary and style. (F) capsule. (G) seed.



Fig. 3. *Blepharis saudensis* sp. nov. in its natural habitat in calcareous sandy soil of Umm az zughaf island, Jazan Province, Saudi Arabia.

Table 1
Comparison of morphological characters in *B. saudensis* and *B. edulis*.

	<i>B. saudensis</i>	<i>B. edulis</i>
Stems	10–75 cm	15–50 cm
Leaves	Oblong-lanceolate to linear, pubescent, entire margins.	Lanceolate to ovate, glabrous to minutely pubescent, spinulose at the margins
Bract	1.6–3.6 cm	3–5 cm

tosynthetic rates at higher leaf temperatures and higher levels of irradiance than normal C₃ plants. These characteristics of the C₄ photosynthetic pathway are particularly advantageous in harsh habitats with limited water availability (Masrahi et al., 2011, 2012b).

References

- Al Farhan, A.H., 2000. An Account of the genus *Croton* L. in Saudi Arabia with a new record of *C. bonplandianus* Baill. Saudi J. Bio Sci. 7 (1), 39–45.
- Al-Turki, T.A., 2003. A new species of *Indigofera* (*Fabaceae*) from southwestern Saudi Arabia. Willdenowia 33, 337–340.
- Al-Turki, T.A., Omer, S., Ghafoor, A., 2001. Two new species of *Heliotropium* L. (*Boraginaceae*) from Saudi Arabia. Bot. J. Linn Soc. 137, 215–220.
- Al-Turki, T.A., Al-Olayan, H.A., Swarupnanandan, K., 2002. *Dianthus cyri* Fish. & Mey. (*Caryophyllaceae*): a new record. Arab. Gulf J. Sci. Res. 20 (4), 228–231.
- Al-Zahrani, D.A., El-Karemy, Z.R., 2007. A new succulent *Euphorbia* (*Euphorbiaceae*) species from the Red Sea coast and islands. Edinburgh J Bot. 64 (2), 131–136.
- Boulos, L., 2002. Flora of Egypt, vol. 3. Al Hadara Publishing, Cairo.
- Chaudhary, S.A., 2000. Flora of the Kingdom of Saudi Arabia, vol. 2 (3). Ministry of Agriculture & Water, Riyadh.
- Fayed, A.A., Al-Zahrani, D.A., 2007. Three new spiny *Euphorbia* (*Euphorbiaceae*) species from western Saudi Arabia. Edinburgh J. Bot. 64 (2), 117–129.
- Fisher, A.E., McDade, L.A., Kiel, C.A., Khoshravesh, R., Johnson, M.A., Stata, M., Sage, T. L., Sage, R.F., 2015. Evolutionary history of *Blepharis* (*Acanthaceae*) and the origin of C₄ photosynthesis in section *Acanthodium*. Int. J. Plant. Sci. 176 (8), 770–790.
- IUCN, 2016. Guidelines for Using the IUCN Red List Categories and Criteria, Version 12. Gland, Switzerland. Available online at http://www.iucnredlist.org/about/overview#redlist_criteria.
- Kelbessa, E., 2006. *Acanthaceae*. In: Hedberg, I., Kelbessa, E., Edwards, S., Demissew, S., Persson, E. (Eds.) Flora of Ethiopia and Eritrea, The National Herbarium, Addis Ababa, vol. 5, pp. 345–495.
- Masrahi, Y.S., 2012. The Illustrated Guide to the Wild Plants of Jazan Region. Published by Author, Jeddah.
- Masrahi, Y.S., 2015. A new species of *Leptadenia* (*Apocynaceae*) and two other new records from southwestern Saudi Arabia. Saudi J. Bio Sci. 22, 631–636.
- Masrahi, Y.S., Al-Turki, T.A., Sayed, O.H., 2010. *Wolffiella hyalina* (*Delile*) Monod (*Lemnaceae*) – a new record for the flora of Saudi Arabia. Feddes Repert. 121 (5–6), 189–193.
- Masrahi, Y.S., Al-Huqail, A.A., Al-Turki, T.A., Sayed, O.H., 2011. Differential altitudinal distribution and diversity of plants with different photosynthetic pathways in Arid Southern Saudi Arabia. Austral. J. Basic Appl. Sci. 5 (6), 36–43.
- Masrahi, Y.S., Al-Huqail, A., Al-Turki, T.A., Thomas, J., 2012a. *Odysea mucronata*, *Sesbania sericea*, and *Sesamum alatum* – new discoveries for the flora of Saudi Arabia. Turk. J. Bot. 36, 39–48.
- Masrahi, Y.S., Al-Turki, T.A., Sayed, O.H., 2012b. Geographical distribution and chorology of grasses in the Arabian Peninsula. Flora 207, 250–256.
- Thomas, J., 2011. Onward (continuously updated). Plant diversity of Saudi Arabia, King Saud University. Website: <<http://plantdiversityofsaudi-arabia.info/Biodiversity-Saudi-Arabia/Flora/Checklist/Checklist.htm>> (accessed 18.08.2016).
- Thomas, J., Sivadasan, M., Al-Ansari, A.M., Alfarhan, A., El-Sheik, M., Basahi, M., Alatar, A.A., 2014. New generic and species records for the flora of Saudi Arabia. Saudi J. Bio Sci. 21, 457–464.
- Vollsen, K., 2000. *Blepharis* A Taxonomic Revision. Royal Botanic Gardens, Kew.