A new species of *Leptadenia* (Apocynaceae) and two other new records from southwestern Saudi Arabia

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Received 4 November 2014; revised 27 January 2015; accepted 1 February 2015

Available online 9 February 2015

**KEYWORDS**

Apocynaceae; *Leptadenia*; New species; Fabaceae; *Canavalia*; Scrophulariaceae; *Craterostigma*; New records; Saudi Arabia; Jazan

**Abstract**

*Leptadenia jazanica* Y. Masrahi from the province of Jazan, southwestern Saudi Arabia is described as a new species and illustrated. The species differs from the other known nearest species of the genus, *Leptadenia pyrotechnica*, by decumbent to scrambling habit of stems and persistent leaves. In the same province also two new records belonging to the genera *Canavalia* (Fabaceae) and *Craterostigma* (Scrophulariaceae) were collected; they were identified as *Canavalia virosa* (Roxb.) Wight & Arn. and *Craterostigma plantagineum* Hochst. © 2015 The Author. 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 is remarkable for its comparably high species diversity. This diversity is caused by variety in geomorphological characteristics, which includes islands, sand dunes, sandy plains, low rocky hills and high mountains (Masrahi, 2012). In the recent years, the floristic explorations have resulted in reporting of many new taxa and records in this part of Saudi Arabia (Alfarhan, 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, 2012).

During field works in Jazan province, southwestern Saudi Arabia, between 2011 and 2014, three interesting species were collected (Fig. 1). One of them is described as a new species of *Leptadenia* (Apocynaceae-Asclepiadoideae) from Tihama and rocky habitats east of Tihama, which cannot be matched with any of the previously known species. And two others (*Canavalia virosa* - Fabaceae and *Craterostigma plantagineum* - Scrophulariaceae) described as new records, from eastern Tihama and Tallan mountain, respectively.

2. Materials and methods

The materials of new species and one of new record (*Canavalia virosa*) were collected from area between Sabya and Abu Arish, whereas another new record (*Craterostigma plantagineum*) was collected from Tallan Mountain, NE of Faifa (Fig. 1). The New species was compared with fresh specimens of its affinity *Leptadenia pyrotechnica*. In addition, relevant literature...
Bullock, 1955; Chaudhary, 2001; Goyder, 2003) was examined. Voucher specimens are deposited in the Jazan U.H. and MUZ.

3. Results and discussion

3.1. New species

*Leptadenia jazanica* Y. Masrahi, sp. nov. (Figs. 2 and 3).

Type: Saudi Arabia, Jazan province, Al-Ghaidania, 20 km NE of Al’ Aridha, 17° 05′ N, 43° 00′ E, 200 m. a.s.l., 23.1.2013. Y. Masrahi 5426,5427 (Holotype: Jazan U.H.; Iso-type MUZ).

Diagnosis: Planta affinis *Leptadenia pyrotechnica*, sed habitu decumbente (non erecto); rami foliifer; foliis linearis.

Description: Leafy shrub with decumbent to scrambling stems to other supports, 1.3-4 m, stems much-branched, terete, green; latex light green to yellowish green; leaves 3-11.7 × 0.3-0.85 cm, opposite, entire, linear to (rarely) linear-lanceolate, the apex acute, the base attenuate, upper surface glabrous to slightly pubescent, lower surface slightly pubescent; petiole 2.2-7.5 mm. Flowers numerous (to 18) in axillary umbel-like cymes; peduncle 3.5-6 mm; pedicel 3-6 mm; sepals 1.2 × 0.6 mm, ovate to deltate, pubescent; corolla cream to yellow, lobes 1 × 2.5 mm, densely pubescent on both surfaces apart from a glabrous, non-fleshy triangle at the base of the lobes within; corolla lobes sinuses with squat, fleshy, coralline corona lobes c. 0.5-0.7 × 0.4 mm with an apical tuft of erect hairs. Gynostegium c. 1 mm long. Pollinia obtriangular shaped, c. 0.1 × 0.1 mm. Follicle 5.5-12 × 0.5-0.7 cm, narrowly fusiform, terete, glabrous; seeds flattened, smooth, 6 × 2 mm, with silky coma 2.5-3 cm.

Distribution: *L. jazanica* is endemic to southwestern of Saudi Arabia. The species is known only from two different habitats: rocky area east of Tihama, Jazan province at c. 200 m. a.s.l., in open woodland dominated by *Acacia ehrenbergiana*, *Acacia tortilis* and *Dobera glabra* (type locality); and Tihama (at 58 m. a.s.l.), in two locations of sandy plain dominated by *A. ehrenbergiana*, *A. tortilis*, *Panicum turgidum* and *Capparis decidua* (16° 55′ N, 42° 50′ E and 17° 05′ N, 42° 42′ E). So far only 4 individuals were seen in all localities. The name of species *jazanica* after Jazan province, where the species were found.

Flowering time: January - August.

Conservation status: In view of its restricted known distribution and the small number of plants seen, it should be regarded as Endangered (EN) (IUCN categories of red list, Marinelli, 2004).

Taxonomic remarks: *L. jazanica* is closely related to *L. pyrotechnica* (Forssk.) Decne, a species widely distributed from Africa to India, in sandy desert plains and wadis. The new species is readily separated in contrast to *L. pyrotechnica* by its characteristic habit: the plant is decumbent, stems are soft and leafy. *L. jazanica* is rare in Tihama extending to rocky habitats east of Tihama, whereas *L. pyrotechnica* widely distributed in low elevation of sandy habitats. A morphological comparison between *L. jazanica* and *L. pyrotechnica* is given in Table 1.

**Table 1**

| Species               | Distribution                                                                 |
|-----------------------|-----------------------------------------------------------------------------|
| *L. pyrotechnica*     | Decumbent to scrambling or twining shrubs with persistent leaves             |
| *L. jazanica*         | Twining shrubs with broad leaves                                             |
| *L. hastata*          | Corolla-lobes 4-5 mm. long; calyx longer than the corolla-tube              |
| *L. arborea*          | Calyx shorter than the corolla-tube                                          |
| *L. reticulata*       |                                                                            |

**Bullock (1955)** gives the brief review of *Leptadenia* genus and key for species recognition. Formerly 4 species are known, bordering the Sahara and extending eastward to Arabia, the Indian subcontinent and Madagascar. After discovery of new species, the following key serves for species-recognition:
3.2. New records

3.2.1. *Canavalia* DC.

Climbing robust herbs or woody lianas. This genus comprises about 50 species distributed in tropics and subtropics, mainly American (Thulin, 1983). To date only one species, *C. virosa*, is recorded from the Arabian Peninsula (Yemen) and Socotra. In Yemen, this species appears to have become rare since there are only two records in the past century: Bayt al Faqih and the wadi above Alujah, J. Raymah (Wood, 1997).

*Description: Canavalia virosa* (Roxb.) Wight & Arn. (1834).

Illust.: Thulin, Leguminosae of Ethiopia, Opera Bot., 68: 127, Fig. 30.1. (Figs. 4 and 5).

Robust climbing perennial, several m in long (−15 m). Leaves pinnately 3-foliolate, leaflets ovate (6–15 × 4–12 cm), usually acuminate to a short blunt tip, sparsely pubescent to

Figure 2  *Leptadenia jazanica* sp. nov. (A) habit, showing vegetative branch with inflorescences. (B) Inflorescence. (C) Leaf, upper surface (above) and lower surface (below). (D) Detail of flower. (E) Pollinarium. (F) Follicle. (G) Seed.
± glabrous on both surfaces. Inflorescence a long pedunculate axillary raceme, to 20 cm long; calyx-tube 6–9 mm long, corolla mauve or pale purple, 2.5–3 cm long. Pod linear, 10–20 × 2.5–3 cm, with longitudinal ribs close to the upper margin. Seeds 1.5–2 cm long, brown; hilum 11–15 mm long.

A rare species, recorded only in Dhamad (up to now), in wadi Dhamad and around fields, between 200 and 800 m. Widespread in tropical Africa, Socotra, India, rare in Yemen.

Specimens examined: Saudi Arabia, Jazan province, Dhamad area (17° 06’ N, 42° 47’ E), 75 m. a.s.l., 30.5.2004. Y. Masrahi 029 (Jazan U.H.)

### 3.2.2. Craterostigma Hochst.

Craterostigma Hochst. is a herbaceous genus, comprising 9 species distributed in tropical and Southern Africa, Southern Arabian Peninsula, and India (Blundell, 1987; Fischer, 2006). In the Arabian Peninsula, Wood (1997) described two species from northern Yemen, namely: Craterostigma pumilum Hochst. and C. plantagineum Hochst., while in Saudi Arabia, one species only was described C. pumilum Hochst. (Collenette, 1985, 1999; Chaudhary, 2001). Therefore, C. plantagineum Hochst. represents a new record for the flora of Saudi Arabia. This species was collected during botanical expedition to the Tallan Mountain, Jazan province.

**Description:** Craterostigma plantagineum Hochst. (1841); Torenia plantaginea (Hochst.) Benth. (1846); T. nana Benth. (1846); Craterostigma nanum (Benth.) Engl. (1895). Illust.: Fischer, Scrophulariaceae in Fl. Eth. & Erit., 5:269, Fig. 160.24,1. (Figs. 6 and 7).

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**Figure 3** Leptadenia jazanica sp. nov., vegetative branch and inflorescence (in the frame).

**Table 1** Comparison of morphological characters in L. jazanica and L. pyrotechnica.

|                | L. jazanica         | L. pyrotechnica      |
|----------------|---------------------|----------------------|
| Habit and      | Decumbent to scrambling shrub | Erect shrub, with stout stems |
| Stems          | with soft stems     |                      |
| Leaves         | Present             | Absent               |
| Peduncle       | 3.5–6 mm            | 2.5–12 mm            |
| Pedicel        | 3–6 mm              | 1–2.3 mm (to nearly sessile) |

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**Figure 4** Canavalia virosa, (A) branch with leaflets and inflorescence. (B) Fruit.

**Figure 5** Canavalia virosa, habit and inflorescence (in the frame).

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Perennial herb, 5–9 cm high, with subterranean orange–red coloured rhizome and roots. Leaves broadly ovate to elliptic, 3.1–4.6 × 1.9–3 cm, narrow petiole-like at base, venation of the upper surface not clear, almost glabrous or sparsely pubescent, often only margin pubescent, lower surface always hairy with prominent veins, often tinged with purple. Peduncle 3.5 cm long; bracts lanceolate, 1.2–1.7 cm long, pedicel 1.8–3.4 cm long. Calyx 5-lobed, campanulate. Corolla white 2-lipped with violet to blue blotches on upper and lower lip, the
upper lip small, the lower broad and spreading, 3-lobed, with glandular hairs on inner side. Stamens 4, didynamous, style filiform, stigma 2-lobed. Fruit a capsule, oblong to 10 mm.

Flowering time: After summer rains, July–September.

C. plantagineum Hochst. Differs from the other species C. pumilum, in Saudi Arabian southwestern mountains, in having short pedicel (as long or twice as long as bract) and venation of the upper surface of leaves almost not clear. Whereas C. pumilum have long pedicel (at least 3–4 times as long as bract) and venation of the upper surface of leaves is clear.

Specimens examined: Saudi Arabia, Jazan province, Tallan Mountain, 17° 23’ N, 43° 09’ E, 1665 m. a.s.l., 10.8.2012, Masrahi 4572, 4578, 4593 (Jazan U.H.).

Ecology: C. plantagineum grows at elevations between 1500 and 2000 m. a.s.l. The species was found in shallow soils of terraces in Tallan Mountain. It grows in association with Microchloa kunthii. In northern Yemen, Wood (1997) mentioned that the species is often associated with Ophioglossum polyphyllum and Microchloa kunthii, and like those species, comes into flower rapidly after the onset of the rains.

Remarks: C. plantagineum survives the dry season as poikilohydric (resurrection plant). In fact, this species represents one of very rare examples of resurrection plants in Dicot Angiosperms, which is capable of surviving desiccation throughout its vegetative tissue (up to 96% loss of its relative water content) and recovers within several hours from such extreme dehydration (Furini et al., 1997; Alpert, 2000; Jones and McQueen-Mason, 2004). This character of C. plantagineum enables it to adapt to protracted dry seasons prevailing in southwestern Saudi Arabia.

Acknowledgment

The author is indebted to Prof. Swarupanandan and Prof. Turki A. Al-Turki for valuable notes. The author also grateful to Mr. Hassan Jom’aan and Mr. Ali Jom’aan, for their support and generosity during field trips to Tallan Mountain.

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