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Silver Jubilee Issue
New plant records for the flora of Saudi Arabia

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Abstract: Our goal was to find and record new plants that had not previously been recorded for the flora of Arabian Peninsula, particularly for Saudi Arabia. Collections were made in several ecologically important areas of Saudi Arabia, particularly in Faifa region. It was revealed that eight new vascular plant species and one liverwort (Bryophyte) belonging to eight families were recorded for the first time. The investigation was done between January 2021 and May 2022.

Keywords: Al-Balace, Al-Lawz, biodiversity, Arabian Peninsula, Faifa region, new records.
New plant records of Saudi Arabia

INTRODUCTION

According to estimates made by Gatti et al. (2022) and Pimm & Joppa (2015), 400,000 of the estimated 15 million species on the planet are vascular plants. Discovering new species aids in their conservation. Furthermore, new plant species enrich a country’s flora and its economy if these plants are economically significant. The inventory of Saudi’s flora is far from complete, and more work is needed to document the country’s missing floristic knowledge, particularly in less explored areas like southwestern highland regions, and thereby improve the conservation of its floristic wealth and reap the economic benefits.

Several new species or records, published in various papers and books, have been added in the past to the flora of Saudi Arabia (e.g., Mandaville 1990; Alfarhan et al. 1997; Chaudhary 1999; Collenette 1999; Chaudhary 2000, 2001; Al-Turki 2004; AlFarhan et al. 2005; Fayed & Alzahrani 2007; Al-Surour 2018; El-Shaboury et al. 2018; Al-Gifri et al. 2020; Alzahrani 2022).

In previous trips, authors discovered several plants that recorded for the first time for the flora of Saudi Arabia, such as Celtis toka (Forssk.) Hepper & J.R.I.Wood (Al-Surour 2020), Aspilia kotschyi (Sch.Bip. ex Hochst.) Oliv. (Al-Khulaidi et al. 2021), Alysicarpus vaginalis (L.) DC., Commiphora schimperi (O.Berg) Engl., Maerua angolensis DC. ssp. angolensis (Schum. & Thonn.) Vatke. var. pentandrus (Sw.) Christenh., Hemionitis calomelanos (Sw.) Christenh., Pentodon pentandrus (Schum. & Thonn.) Vatke. var. pentandrus, and Zornia glochidiata Rchb. ex DC.

In this study, a botanical exploration was carried out in this framework between January 2021 and May 2022 in different parts of Saudi Arabia. All the collected specimens are deposited in the herbarium (MUZ) of King Abdulaziz City for Science and Technology (KACST).

RESULTS

This study adds eight new vascular plant species and one liverwort (bryophyte) belonging to eight families, of which five species are angiosperms and three are pteridophytes to the Saudi Arabian flora, namely: Asplenium dalhousiae Hook., Bolanthus hirsutus (Labill.) Barkoudah, Heminotis viridis (Forssk.) Christenh., Grewia flavescens Juss. var. flavescens, Nicandra physalodes (L.) Gaertn., Oxymitra incrassata (Brot.) Sérgio & Sim-Sim, Hemionitis calomelanos (Sw.) Christenh., Pentodon pentandrus (Schum. & Thonn.) Vatke. var. pentandrus, and Zornia glochidiata Rchb. ex DC.

1. Asplenium dalhousiae Hook., Icon. Pl. 2: t. 105. 1837 (Aspleniaceae) (Figure 2 & Image 1)

A perennial tufted fern. Frond simple, pinnatifid, up to 15 cm high, glabrous above, scaly below; sori linear; petiole brown. Pinnae alternate, triangular-ovate to oblong, up to 17 mm long.

Specimen examined: Faifa Region, on moist shady crevices, 17.264667° N, 43.110083° E, 1,695 m, March 2021. M. AlFaifi, MUZ-20235 (KACST).

2. Bolanthus hirsutus (Labill.) Barkoudah Wentia 9: 168 (1962) (Caryophyllaceae) (Figure 3 & Image 2)

Perennial herb, up to 20 cm high, glandular-pubescent, cushion-forming; leaves 1—1.5 x 0.2—0.5 cm, elliptic to linear, apex acute, base obtuse, margin entire; calyx tubular, 3—4 mm long, 5-toothed; flowers white with purple veins, short-pedicellate.

Specimen examined: Jabal Al-Lawz, Tabuk Region, in crevices of granite, 28.735095° N, 35.338322° E, 1,900 m, 17.vii.2021, A. Alzahrani 301, MUZ-20230 (KACST).

MATERIALS AND METHODS

Floral studies and atlas of the Arabian Peninsula and other countries (e.g., Post 1932; Miller 1996; Wood 1997; Collenette 1999; Chaudhary 1999, 2000, 2001; Kürschner 2000; Miller & Morris 2004; Al-Khulaidi 2013) were used to identify and search for the newly recorded plants along with the researchers’ own experiences. ArcMap version 10.8 software was utilized to prepare the distribution maps of the plants.
Figure 1. A—areas investigated during the present study (Tabuk, Asir and Jazan) | B—distribution of the plants within Jazan region | C—distribution of the plants within Faifa district.


3. *Hemionitis viridis* (Forssk.) Christenh., Global Fl. 4: 22. 2018 (Pteridaceae) (Figure 4 & Image 3)

Rhizomes short, creeping. Fronds tufted, erect to arching, up to 60 cm high; stipe dark brown to blackish, glabrous or with hair-like scales, up to 20 cm long; lamina herbaceous, 2-pinnate, lanceolate to ovate; pinnules green to dark green, variable, glabrous, ovate to triangular, apex obtuse, base rounded to hastate,
margins minutely crenate; sori marginal.

*H. viridis* is reported for the first time from two locations in southwest Saudi Arabia, where it is growing under dense shade along terraces of Jabal Faifa and in shady crevices of Raidah Sanctuary, near Abha city.

### Table 1. The plant species with their number of individuals, habitat information and world distribution.

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Longitude</th>
<th>Plant name</th>
<th>Individuals</th>
<th>Altitude (m)</th>
<th>World distribution</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.26467</td>
<td>43.11008</td>
<td>Asplenium dalhousiaeae Hook.</td>
<td>17</td>
<td>1,695</td>
<td>Afghanistan, Arizona, East Himalaya, Eritrea, India, Mexico, Nepal, Pakistan, western Himalaya, Yemen</td>
<td>wall terraces</td>
</tr>
<tr>
<td>17.26538</td>
<td>43.11392</td>
<td>Asplenium dalhousiaeae Hook.</td>
<td>13</td>
<td>1,663</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.73514</td>
<td>35.33832</td>
<td>Bolanthus hirsutus (Labill.) Barkoudah</td>
<td>2</td>
<td>2,009</td>
<td>Syria, Palestine, and Egypt</td>
<td>in crevices of granite</td>
</tr>
<tr>
<td>17.24330</td>
<td>43.08645</td>
<td>Hemionitis viridis (Forssk.) Christenh.</td>
<td>50</td>
<td>1,300</td>
<td>Yemen, South Africa, eastern tropical Africa, Cape Verde, the Comoro Islands</td>
<td>shady crevices</td>
</tr>
<tr>
<td>17.24810</td>
<td>43.12120</td>
<td>Grewia flavescens var. flavescens</td>
<td>2</td>
<td>1,330</td>
<td>Yemen, tropical Africa, South Africa to India</td>
<td></td>
</tr>
<tr>
<td>17.26030</td>
<td>43.09730</td>
<td>Grewia flavescens var. flavescens</td>
<td>2</td>
<td>1,250</td>
<td>slope</td>
<td></td>
</tr>
<tr>
<td>17.24900</td>
<td>43.11170</td>
<td>Grewia flavescens var. flavescens</td>
<td>2</td>
<td>1,340</td>
<td>slope</td>
<td></td>
</tr>
<tr>
<td>17.24790</td>
<td>43.11220</td>
<td>Grewia flavescens var. flavescens</td>
<td>2</td>
<td>1,327</td>
<td>road side</td>
<td></td>
</tr>
<tr>
<td>17.24776</td>
<td>43.11244</td>
<td>Grewia flavescens var. flavescens</td>
<td>2</td>
<td>1,327</td>
<td>road side</td>
<td></td>
</tr>
<tr>
<td>17.25680</td>
<td>43.10390</td>
<td>Nicandra physaloide (L.) Gaertn.</td>
<td>3</td>
<td>1,530</td>
<td>Yemen, South America (Peru to northwestern Argentina), widespread in the world</td>
<td>terraces</td>
</tr>
<tr>
<td>17.25790</td>
<td>43.10480</td>
<td>Nicandra physaloide (L.) Gaertn.</td>
<td>2</td>
<td>1,553</td>
<td>terraces</td>
<td></td>
</tr>
<tr>
<td>17.07410</td>
<td>43.13640</td>
<td>Nicandra physaloide (L.) Gaertn.</td>
<td>1</td>
<td>1,116</td>
<td>rocky slope</td>
<td></td>
</tr>
<tr>
<td>16.62932</td>
<td>42.88751</td>
<td>Nicandra physaloide (L.) Gaertn.</td>
<td>3</td>
<td>1,689</td>
<td>rocky slope</td>
<td></td>
</tr>
<tr>
<td>19.08217</td>
<td>41.86146</td>
<td>Oxymitra incrassata (Brot.) Sérigio &amp; Sim-Sim</td>
<td>10</td>
<td>1,996</td>
<td>Texas, Mexico, Europe and northern Africa</td>
<td>beneath rocks</td>
</tr>
<tr>
<td>17.25179</td>
<td>43.11077</td>
<td>Hemionitis calomelanos (Sw.) Christenh.</td>
<td>1</td>
<td>1,400</td>
<td>Eastern and southern Africa</td>
<td>shady crevices</td>
</tr>
<tr>
<td>17.60190</td>
<td>42.93360</td>
<td>Pentodon pentandrus (Schum. &amp; Thonn.) Vatke, var. pentandrus</td>
<td>2</td>
<td>1,257</td>
<td>Yemen, Oman, tropical Africa, South Africa, and Madagascar</td>
<td>wadi</td>
</tr>
<tr>
<td>17.60220</td>
<td>42.93350</td>
<td>Pentodon pentandrus (Schum. &amp; Thonn.) Vatke, var. pentandrus</td>
<td>4</td>
<td>1,252</td>
<td>wadi</td>
<td></td>
</tr>
<tr>
<td>17.24660</td>
<td>43.11070</td>
<td>Zornia glochidiata Rchb. ex DC.</td>
<td>5</td>
<td>1,276</td>
<td>Yemen, tropical Africa, South Africa, and Madagascar</td>
<td>road side</td>
</tr>
<tr>
<td>17.24680</td>
<td>43.11050</td>
<td>Zornia glochidiata Rchb. ex DC.</td>
<td>2</td>
<td>1,270</td>
<td>road side</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Plant name</th>
<th>Leaves</th>
<th>Flowers</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grewia villosa Willd.</td>
<td>Orbicular cordate up to 120 mm</td>
<td>Reddish-brown</td>
<td>Unlobed</td>
</tr>
<tr>
<td>Grewia tembensis Fresen.</td>
<td>Ovate to elliptic, up to 140 mm</td>
<td>White with pink filament</td>
<td>3–4 lobed</td>
</tr>
<tr>
<td>Grewia tenax (Forssk.) Fiori</td>
<td>Orbicular, up to 15 mm</td>
<td>White with white filament</td>
<td>2–4 lobed</td>
</tr>
<tr>
<td>Grewia erythraea Schweinf.</td>
<td>Obovate to elliptic, up to 30 mm</td>
<td>White with white filament</td>
<td>2–4 lobed</td>
</tr>
<tr>
<td>Grewia flavescens Juss.</td>
<td>Oblong to lanceolate, up to 80 mm</td>
<td>White with yellow to golden filament</td>
<td>Single, or 2–4 lobed</td>
</tr>
<tr>
<td>Grewia gillettii Sebsebe &amp; B.Mathew</td>
<td>Obovate to oblanceolate, up to 40 mm</td>
<td>Yellow with yellow filament</td>
<td>2 lobed or unlobed</td>
</tr>
<tr>
<td>Grewia velutina (Forssk.) Lam.</td>
<td>Obovate, up to 60 mm</td>
<td>Yellow</td>
<td>Unlobed</td>
</tr>
<tr>
<td>Grewia triochocarpa Hochst. ex A.Rich.</td>
<td>Ovate, up to 70 mm</td>
<td>Yellow</td>
<td>Unlobed</td>
</tr>
</tbody>
</table>

A small bushy tree with deeply grooved four-angled stems. Leaves alternate oblanceolate, up to 80 mm long. Inflorescence solitary with two or three bright yellow flowers in axillary cyme, with yellow to golden colour filament. Fruits single, or 2–4-lobed, covered with rough white hairs.

Widespread throughout tropical Africa. The species has been recorded in Yemen in the Arabian Peninsula only. We did not find a published paper mentioning the occurrence of this plant species in Saudi Arabia, except on the KEW site Plants of the World Online (POWO 2023), which is likely to be based on a study of the plant specimen collected from Sudan

**Specimen examined:** Faifa Region, on rocky slope, 17.2481° N, 43.1121° E, 1,330 m, 25.v.2021, E. AlFaifi MUZ-20220 (KACST).

5. *Nicandra physalodes* (L.) Gaertn., Fruct. Sem. Pl. 2: 237, t. 131, f. 2. 1791 (Solanaceae) (Figure 6 & Image 5).

Annual herb, up to 20 cm high. Leaves alternate,
ovate to elliptic, margins toothed and undulated or almost lobed. Flowers solitary, axillary, bell-shaped, c. 4 cm in diam., blue-purple. Fruit spherical, with swollen and winged calyx.

Introduced species, found on terraces and rocky slopes, probably has also long been cultivated as an ornamental plant, besides Faifa region, the plant found in Jabal Al-Qahar at an elevation of 1,689 m, between latitude 17.6293 and longitude 42.8875. 135 Km. SE Abha, Saudi Arabia. The plant is recorded in some countries as a weed in many types of crops as well as in disturbed sites, roadsides, rangelands (Holm et al. 1997; CABI 2011), and may become invasive with time.

Specimen examined: Faifa Region, on terraces, 17.2568° N, 43.1039° E, 1,530 m, 28.ix.2021, E. AlFaifi MUZ 20215 (KACST), 6.

Oxymitra incrassata (Brot.) Sérgio & Sim-Sim, J. Bryol. 15: 662. 1989 (Oxymitraceae) (Figure 7 & Image 6)

Thalli 5–10 mm long, dark green to greyish, simple or in branching rosettes; epidermal pores prominent, with a deep midline; with hyaline, narrowly acuminate ventral scales extending beyond thallus edges.

Specimen examined: Near Jabal Al-Balace, Asir Region, in shallow soil beneath rocks, 19.828173° N, 41.861464° E, 1,996 m, 27.ii.2022, A. Alzahrani 304, MUZ-20234 (KACST),
7. *Hemionitis calomelanos* (Sw.) Christenh. Global Fl. 4: 11. 2018. (Pteridaceae) (Figure 8 & Image 7).

Rhizomes erect or shortly creeping, c. 6 mm in diam. Frond pinnate; Lamina ovate-lanceolate to narrowly triangular, blue-green to light green, glaucous, with pale-brown margins and shiny black rachis; the upper with (1–)2-pinnate, often the lower pinnae 2- or 3-pinnate; pinnae opposite to slightly alternate; sori borne on a continuous ridge along the margins.

**Specimen examined:** Faifa, in crevices of granite, 17.251785° N, long. 43.110767° E, 1,400 m, 18.xii.2021,
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Mohamed Alfaifi MUZ-20219 (KACST).

8. **Pentodon pentandrus** (Schumach. & Thonn.) Vatke Oesterr. Bot. Z. 25: 231. 1875, var. *pentandrus* (Rubiaceae) (Figure 9 & Image 8).

Annual herb. Stem soft, succulent, shiny, glabrous. Leaves simple, opposite-decussate, sessile, linear-lanceolate, margins entire. Flowers on long peduncle in axillary panicle, 6–13-flowered. Flowers pedicelled, pale blue or mauve. Calyx with lobed sepals, narrowly extended with five triangular teeth. Corolla usually small, up to 3 mm long, cylindrical, with five stamens.

**Specimen examined**: Faifa Region, on wadi, 17.6019° N, 42.9336° E, 1,257 m, 26.iii.2021, M. AlFaifi MUZ-20211.
9. *Zornia glochidiata* Rchb. ex DC., Prodr. 2: 316. 1825 (Fabaceae) (Figure 10 & Image 9)

Annual, erect herb. Leaves 2-foliolate, with two asymmetrical leaflets at the end of a long petiole; upper leaflets lanceolate, up to 40 mm long, acute, sparsely and obscurely glandular beneath, especially near margins. Flowers enclosed between two hairy leaf-like bracts, shorter than the bracts. Petals yellow, with red markings. Pods of constricted segments, covered in spiny bristles.

**Specimen examined:** Faifa Region, on roadsides, 17.2466° N, 43.1107° E, 1,276 m, 20.viii.2021, M. AlFaifi MUZ-20217.

**DISCUSSION**

Recently, new plant records have been documented in the Saudi flora, and the number of these plants is estimated to be 17 new records and five new taxa (Fayed & Alzahrani 2007; Thomas et al. 2014; El-Shaboury et al. 2018; Basahi & Masrahi 2019; Alzahrani et al. 2022; Al-Khulaidi et al. 2021; Al-Robai et al. 2022; Al-Khulaidi et al. 2023). The number of new records is relatively low compared to the number of new taxa discovered in Africa. The low number discovered in Saudi Arabia may be related to the lack of studies and surveys in the field of plants, and perhaps the lack of specialists in botany. Some of the plants listed in this paper are widely recognized as weeds, so we advise treating them with caution and making an effort to stop their spread so they do not establish themselves as invasive weeds in the area, and pose a challenge to control or eradicate them in the future.
In Arabian Peninsula, *Asplenium dalhousiae* were previously recorded from Yemen only (Wood 1997). The genus *Bolanthus* (Ser.) Rchb. belongs to the tribe Caryophyllaceae (Bittrich 1993). *Bolanthus hirsutus* is native to Syria, Palestine, and Egypt (Post 1932; Boulos 1999). For the Arabian Peninsula the plant is only known from Jabal Al-Lawz, northwestern Saudi Arabia. *Hemionitis viridis* is a native species of South Africa, tropical East Africa, Cape Verde, the Comoro Islands, Madagascar, and the Mascarene Islands (Roux 2009). In addition to Yemen in Arabian Peninsula (Miller 1996; Wood 1997). The species *Nicandra physalodes* is so far, recorded as an introduced species in Soqotra Island, Yemen (Miller & Morris 2004). The genus *Oxymitra* Bisch. ex Lindenb., comprises two species: *O. cristata* Garside and *O. incrassata* (Brot.) Sérgio & Sim-Sim (Söderström et al. 2016). *Oxymitra cristata* is found in southern Africa (Perold, 1993), whereas *O. incrassata* is widely distributed (Kürschner 2003). In fact, in the Arabian Peninsula, *O. incrassata* was recorded only from Yemen by Kürschner (2000). The species is documented for the first time in Saudi Arabia, where it is found in shallow soil beneath rocks near Jabal Al-Balace, Asir Region. In the Arabian Peninsula, the plant *Pentodon pentandrus* is recorded only from Yemen (Wood 1997) and Oman (Ghazanfar 2007; Patzelt et al. 2014). The plant occurs in Tanzania as a weed, as well as in some countries of the world (Burkill 1997). In the Arabian Peninsula, *Zornia glochidiata* is recorded only from Soqotra Island, Yemen (Miller & Morris 2004). The plant is recorded as weed in some parts of the world (Ekeleme & Chikoye 2003).

**CONCLUSION**

The recorded plant species suggest that further botanical study is necessary in the Faifa region and other unexplored regions farther north of the country (e.g., Tabuk and Al-Ula). The study areas’ proximity to Yemen, Sinai (Egypt), and Jordan might also have helped some plants spread to nearby areas, such as Tabuk and Faifa. Some of the species observed, like *Nicandra physalodes*, are aggressive and well-known weeds worldwide. Over time, they may establish themselves in Saudi Arabia as invasive species. The results of this study and the previous studies that have been mentioned have added...
new plants to the Saudi Arabia’s flora, and enriched it.

REFERENCES


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