



New record and addition to the flora of Yemen *Cleome glaucescens* DC (Cleomaceae)

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Abstract

Based on plant collections made in Abyan governorate (southern of Yemen), one new species (*Cleome glaucescens* DC.), belonging to Cleomaceae that has not previously been recorded in Yemen's flora was discovered. The survey was conducted between March 2020 and June 2022. Within the Arabian Peninsula, this species was recorded only from Oman and Saudi Arabia. Brief descriptions and explanations of the phylogeography of the taxon are given. The location of the plant species was mapped using geographic information systems (GIS).

Keywords: flora, new records, Abyan, Yemen

Introduction

The importance of discovering new plants in nature is that it expands the list of plants as well as the opportunities to use these plants in treatment and other economic uses that will benefit the country. Yemen is one of the few countries where plants have not been extensively explored, as there are several areas that botanists have not visited, particularly those located in security-sensitive or inaccessible geographical areas.

Cleome is a flowering plant genus in the Cleomaceae family, also known as spider flowers, spider plants (Steve L. O'Kane, Jr. [20]). A number of books and papers on the flora and vegetation of Yemen as a whole have been published. As an example, most consider the following publication: (Miller and Cope, [18]; Wood, [22]; Miller and Morris, [17]; Al-Khulaidi, [3] none of the previous studies recorded the species in Yemen. The study of natural plant species and the discovery of new plants both enrich and protect a country's plant life. If these plants are economically significant, the local economy will benefit as well.

The goal of this study is to document new records and novel taxa additions to Yemen's flora.

Many new plants were added recently to the Yemeni flora (Kilian, [13]; Kilian & Miller, [12]; Kilian, *et al.*, [14]; Kilian, *et al.*, [15]; Kilian, & Hein, [11]; Al-Howshaby, *et al.*, [1]; Al-Howshaby, [2]. In Yemen, the Cleomaceae family contains 21 plants, including 11 species belong to the genus *Cleome*. Two of these species are endemic to Yemen (*Cleome hadramautica* Thulin and *Cleome socotrana* Balf. f.) and one is endemic to the Arabian Peninsula (*Cleome omanensis* (Chamb. & Lamond) Thulin), that have only been recorded from Oman (Ghazanfar, [9], and Yemen (Al-Khulaidi, [3],

and there is one species regionally endemic plant (*Cleome ramosissima* Parl. ex Webb) that has been recorded in Saudi Arabia (Collenette, [5] and East Africa, such as Sudan, Djibouti, Eritrea, Ethiopia, and Somalia (Darbyshire, *et al.*, [6]; Edwards, *et al.*, [7]; Thulin, [21] in addition to Yemen (Wood, [22]; Al-Khulaidi, [3].

The native range of *Cleome glaucescens* is Iraq, Lebanon-Syria, Pakistan, Turkiye, Afghanistan, Iran and Oman (Eric, [8]. In the Arabian Peninsula the plant is only recorded from Oman (Ghazanfar, [9] and Saudi Arabia (Mandaville, [16].

Materials and Methods

The study area

The study area is located in the villages of Al-Mihwery adjacent to Wadi Yabraq in the district of Al-Wade'e, Abyan Governorate, Yemen and cover about 2785 square Km (Figure 1), at latitude between 13.920573 and 13.517228, and longitude between 46.047728 and 46.684208, the altitude range between 70 and 1250 meters above sea level, the southern mountain ranges in the region overlook the Gulf of Aden. The temperature ranges between 18.2 and -52.7 °C (Al-Najashi, 2019). The prevailing direction of the wind is affected by its general direction from northeast to east in winter and spring, and south to southwest in summer and autumn. The maximum wind speed is in winter (January) (1.92 m/s), while in spring the wind speed is High, as it reached a maximum in March (1.79 m/s) (Hussein, [10]. The annual rain fall ranges between 140 and 190 mm/ and most of the rain falling in the medium and high altitude areas occurs in the season between June and September, due to the southwest monsoon winds (Al-Mansiri [4],

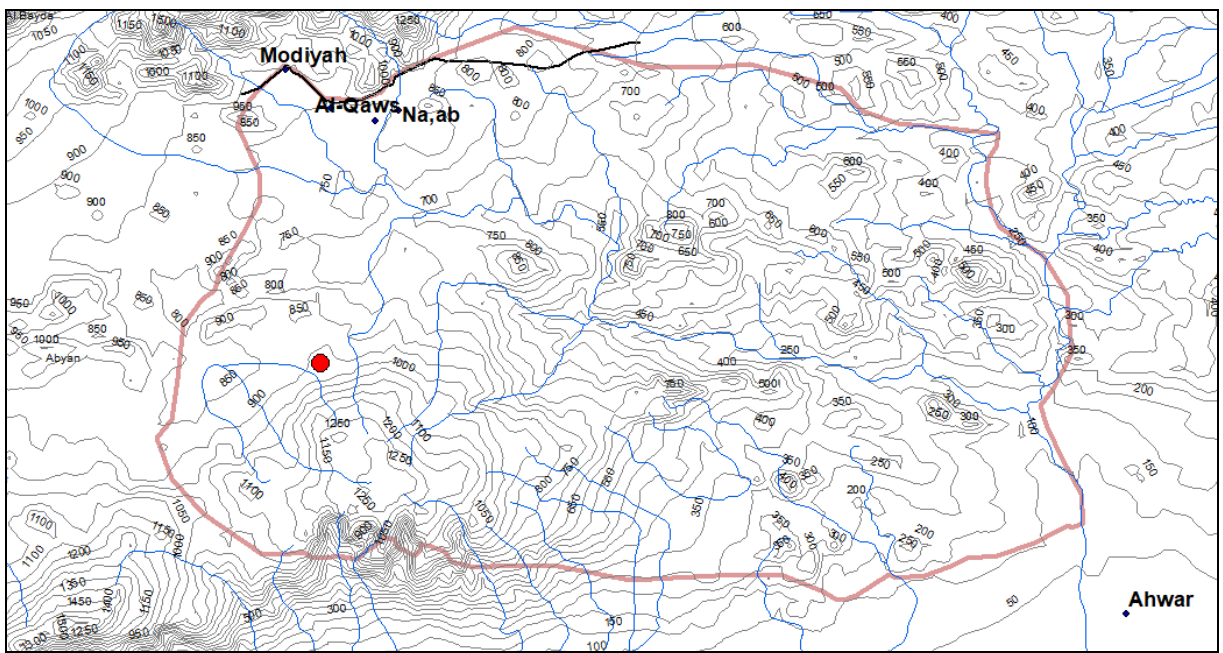
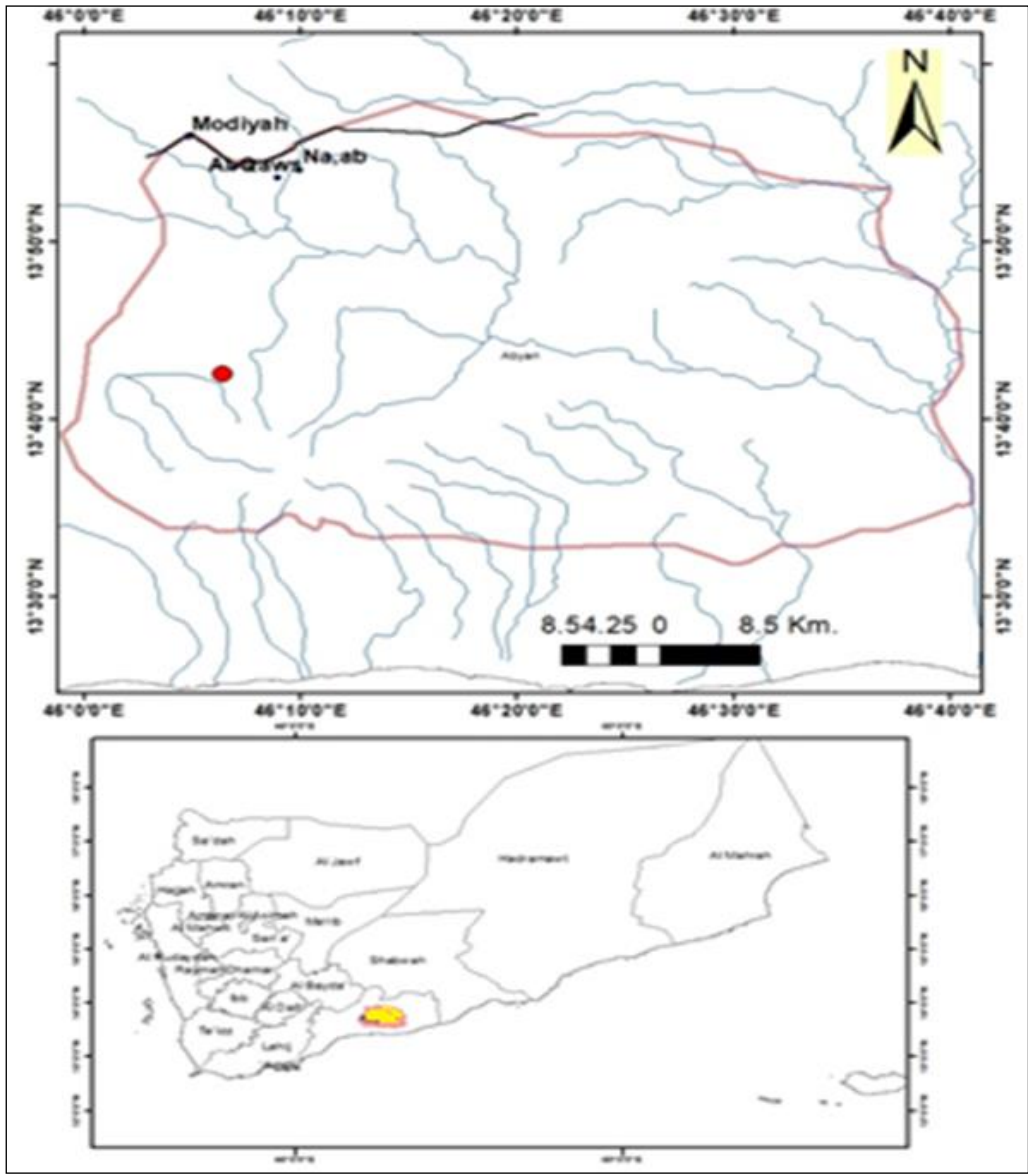




Fig 1: The location of the investigated area, the red dote is the location of the plant

Field Work

Between March 2020 and June 2022, a number of field works were completed. The plant sample was collected in the village of Farida, near Wadi Yabraq in the Al-Wade'e district of Abyan governorate.

All of the plant's parts were collected, examined, and measured. It was identified by comparing it to the references that were available. A herbarium sample of the plant was created, which included all of its parts, the collected specimens were kept and deposited in the herbarium of Faculty of Science, of University of Aden, Yemen

Result Discussion

Name: *Cleome glaucescens* DC. (*Cleomaceae*)

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Type: In Bagdad and Mossul, *Olivier and Bruguier s.n.* (holotype: G-DC barcode G00207175

Heterotypic synonyms: *Cleome glauca* Candolle (1824: 239). Type: Arabia, *Olivier s.n.* (holotype: P barcode P 00741828! isotype: P barcode P 00741827!).

Cleome kotschyana Boissier (1867: 413). Type: Iraq.Kurd.: Mosul: Inter Pesh Khabur et Bawart, *Kotschy 402*

Description

Perennial much branched herb, up to 30 cm height. The stem covered by hairs. Leaves up to 3 cm. obovate, entire, petioles, the apex sharp, veining is triangular. Flower, yellow, up to 1.4 cm. Fruits glandular, up to 2 cm.

Locality

Rocky slope adjacent to wadi, at altitude of 930 meters, between latitude 13.708500 and longitude 46.106700.

The following table summarizes difference in shapes of the plant between samples found in Abyan (Yemen), Saudi Arabia and Oman

Table 1: A comparison between the specimens found in Abyan (Yemen), Saudi Arabia and Oman

	specimen in Yemen	specimen in Saudi Arabia (Mandaville, 2016)	specimen in Oman (Ghazanfar, 1992)
height of the plant (cm)	15-30	15-40	20-50
leaves	2-3cm long and 2-25 wide	1-3cm long and 0.5-1.5 cm wide	No data
flower	1.4 cm yellow and purple	Yellowish and brownish-red	Yellowish and brownish-red purple
fruits	2..5-3.5 long and 1.5-1.3 wide	20-50Mm long and 4-8mm wide	3-6x4-7 mm

This plant species has been discovered for the first time in Yemen, in the governorate of Abyan. The plant was previously recorded in the Arabian Peninsula from neighboring country Oman and Saudi Arabia. This discovery is considered a new addition to Al- Khulaidi's Flora (Al-Khulaidi, (3) of Yemen list, and brings the total number of recorded species of the genus *Cleome* to twelve.

Because of its scarcity and limited geographical distribution, it is critical to preserve and propagate this plant. It is also recommended to conduct additional surveys in Abyan Governorate and neighboring areas such as Shabwa and Hadramout to determine whether or not this plant is present. The present work will support in the evaluation of the plant conservation status in Yemen in particular rare and endangered species.

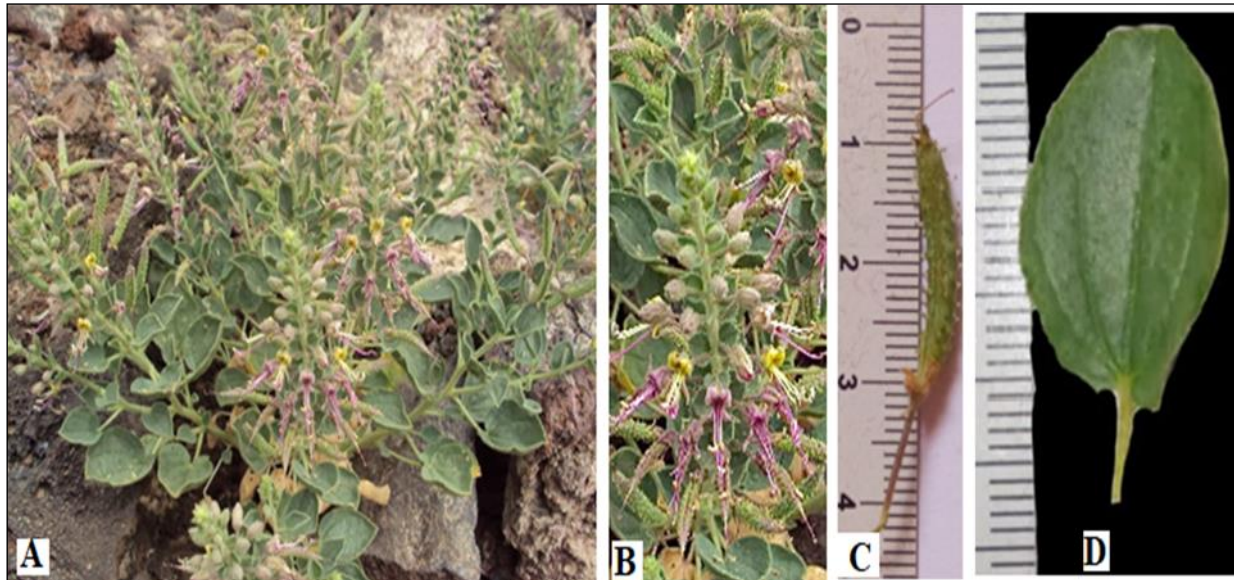


Fig 2: A. life form; B. The inflorescences; C. The leaf; D. The fruit

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