

A NEW SPECIES OF THE GENUS *DIAPHANOPTERA* (CARYOPHYLLACEAE) FROM IRAN

F. Fadaie

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Diaphanoptera gharehbilensis is described as a new species from North-Khorasan Province, NE of Iran. It is closely related to *D. stenocalycina* from NE Iran, *D. transhyrcana* from Turkmenistan, and *D. lindbergii* from Afghanistan. The new species is distinguished from the related species by having dense puberulent and 13-14 mm length calyx, bracteoles leaf-like, frequently longer than pedicels, and spatulate lamina. An illustration of the new species, images of its natural habitat, and some information about the habitat are provided. Furthermore, an identification key to the species is presented, and the conservation status of *D. gharehbilensis* is assessed.

Fatemeh Fadaie (correspondence <fadaie572@yahoo.com>), Golestan Agricultural and Natural Resources Research and Education Center, AREEO, Gorgan, Iran.

Keywords: conservation status; *Diaphanoptera*; endemic species; Iran; new species

گونه‌ی جدیدی برای جنس *Diaphanoptera* (Caryophyllaceae) از ایران

فاطمه فدائی: عضو هیات علمی بخش تحقیقات جنگلها، مراتع و آبخیزداری مرکز تحقیقات و آموزش کشاورزی و منابع طبیعی گلستان، گرگان، ایران

در مقاله حاضر *Diaphanoptera gharehbilensis* به‌عنوان گونه‌ای جدید از استان خراسان شمالی، در شمال شرقی ایران، شرح داده می‌شود. این گونه به گونه‌های *D. stenocalycina* در شمال شرق ایران، *D. transhyrcana* در غرب ترکمنستان و *D. lindbergii* در شمال افغانستان نزدیک است. گونه جدید با داشتن کاسه گل به طول ۱۳ تا ۱۴ میلی‌متر با پوشش کرکی متراکم، و برگ‌های برگ مانند که اغلب بلندتر از دمگل‌ها هستند و پهنک گلبرگ قاشقی شکل، از گونه‌های مرتبط متمایز می‌شود. یک کلید شناسایی برای گونه‌ها ارائه شده است. تصاویر گیاه در رویشگاه طبیعی و نقاشی از آن، همچنین مشخصات رویشگاه و جایگاه حفاظتی گونه *D. gharehbilensis* ارائه می‌گردد.

INTRODUCTION

The genus *Diaphanoptera* Rech.f. (Caryophyllaceae, Silenoideae) is exclusively limited to some localities in Irano-Turanian region, most species are known only from one habitat or from a very limited area. The genus includes six species, *Diaphanoptera khorasanica* Rech.f. and *D. stenocalycina* Rech.f. & Schiman-Czeika grow in the northeast of Iran, *D. transhyrcana* (Preobr.) Rech.f. & Schiman-Czeika grows in the west of Turkmenistan, and *D. lindbergii* Hedge & Wendelbo, *D. afghanica* Podlech, and *D. ekbergii* Hedge & Wendelbo grow in

north and northeast of Afghanistan (Rechinger & Schiman-Czeika, 1988). *Diaphanoptera* species are usually cushion-form herbaceous chamaephytes growing in different habitats, including moderately saline soils, gypsum soils, and from low mountain steppes up to high mountain stony slopes (Kiani & al. 2012). The genus *Diaphanoptera* with six species including two endemics in Iran was introduced as a sub-endemic genus for the country (Memariani & al. Feb.2016). *Diaphanoptera stenocalycina* as the closest species to the new species (Table 1) is a local endemic, known only in a small area in the easternmost parts of

the Golestan National Park (Akhani 1998) and is restricted to the eastern margin of the park (Fadaie 2021).

MATERIALS AND METHODS

During the study of endemic species of Golestan Province and the adjacent areas, a specimen of *Diaphanoptera* with different characteristics from the known species was collected. A detailed study using Flora Iranica (Rechinger and Schiman-Czeika, 1988) and also comparing it with a specimen of *D. stenocalycina* collected from the type locality revealed that it is different from the so far known species of the genus and was identified as a new species. The herbarium specimens of the new species and *D. stenocalycina* are deposited in the herbaria of the Golestan Agricultural and Natural Resources Research and Education Center and the Research Institute of Forests and Rangelands (TARI).

RESULTS AND DISCUSSION

New species

Diaphanoptera gharehbilensis F. Fadaie, sp. nov.
(Figs. 1 & 2).

Herbaceous perennial, well-branched from the base, ca. 25 cm high. Stems moderately fleshy, and leafy,

with divergent opposite branches at the base, often with leafy sterile branches in lower parts, covered with hairs, grayish. Leaves linear or linear-suboblanceolate, 10-25(-28) mm long and 1-4.5 mm broad; upper leaves 12-19 mm long. Terminal cymes with 1-3 flowers. Bracteoles leaf-like, longer than or equaling to the pedicels. Pedicels thick, not slender, 6-15 mm long. Calyx (13-) 13.2-14 mm long and 3.2-4 mm broad, subturbinate to turbinate, cuneate at the base, slightly widening upward constricted below the calyx teeth, densely pubescent. Calyx teeth unequal, 1.8-2.5 mm long, and 1.1-1.4 mm broad, triangular, acute, acuminate, or pungent mucronate. Petals 1.7-1.85 cm long; lamina 2.3-2.5 mm wide, spathulate, rounded or obtuse at the apex. Stamens 10, \pm equaling the petals. Ovary \pm 5 mm long, elliptic, stipitate; placentation free central; ovules 14. Styles 2, exserted from the calyx, shorter than the petals. Capsule with 4 valves, dehiscent, cartilaginous. Seeds reniform.

Typus: Iran, North Khorasan, North of Robat-e-Gharehbil (near the eastern margin of Golestan National Park), N: 37° 21', E: 56° 20', 1323 m, 27.05.2020, F. Fadaie 072F. (holotypusTARI: isotypus 072F. in herbarium of Golestan Agricultural and Natural Resources Research and Education Center).

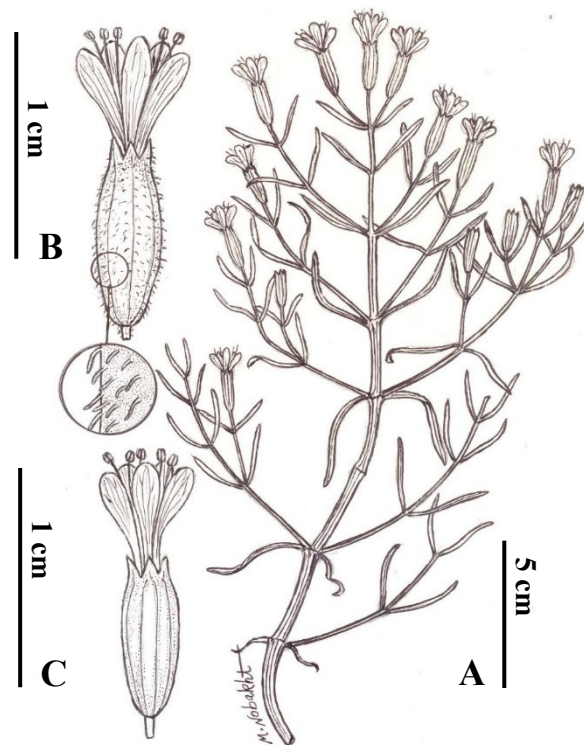


Fig. 1. *Diaphanoptera gharehbilensis*; A, plant habit; B, flower; C, flowers of *D. stenocalycina*.

The new species is closely related to *Diaphanoptera stenocalycina*, *D. lindebergii*, and *D. transhyrcana*. There is a variation in calyx indumentum in these species. In the new species, *D. trashyrcana* and *D. lidebergii* calyx are densely pubescent. In *D. stenocalycina* calyx is said to be shortly puberulent, but there is a specimen (Fadaie 175F.) from the type locality of *D. stenocalycina* with a quite glabrous calyx. Other characters separating these species are overlapped. Therefore, it might be that the characters used to separate these species are only inter-population variations. Further studies are needed to clarify this. In a phylogenetic paper by Pirani et al. (2014) some species of the genus *Diaphanoptera* including *D. stenocalycina* are nested within the genus *Acanthophyllum* C.A.Mey., later Pirani & al. (2020) suggested the reduced status for these *Diaphanoptera* species as a section of *Acanthophyllum*, but as the type of the genus *Diaphanoptera* has not been included in the studies, it is preferred to put the new species in the genus *Diaphanoptera* until the taxonomic situation of the group stabilized.

Distribution: *Diaphanoptera gharehbilensis* is a narrow endemic in the north of Robat-e-Gharehbil Village in North-Khorasan Province, near the east edge of the Golestan National Park. The locality of the species is in the Irano-Turanian floristic region and the habitat is with moderately saline soils at an altitude of 1323 meters above sea level (Fig. 1). The climate of the

locality is semi-desert temperate (Mahdizadeh & al. 2011).

Conservation assessment: *Diaphanoptera gharehbilensis* occupies a small area in the north of Robate-e-Gharehbil Village. Thereby based on the IUCN criteria and categories, with an area of occupancy (AOO) of about 0.3 square kilometers, being in only one location, and a very small population size, is classified as critically endangered (CR) (IUCN, 2017), the same conservation status as *D. stenocalycina*, the nearest species to it (Fadaie & al. 2021).

Etymology: The name of the new species is based on "Robat-e-Gharehbil", the name of the village in the south of its locality.

Identification key to the new species and the three related taxa

1. Calyx glabrous or puberulent on the nerves
.....*D. stenocalycina*
- Calyx densely pubescent 2
2. Bracteoles of the lateral flowers far distant from the calyx, frequently longer than or equal to the pedicels ..
.....*D. gharehbilensis*
- Bracteoles of the lateral flowers near the calyx..... 3
3. Bracteoles of the lateral flowers leaf-like, shortly below or close to the calyx, plant up to 10 cm high
.....*D. transhyrcana*
- Bracteoles of the lateral flowers, not leaf-like, close to or at the base of the calyx, plant up to 25 cm high
..... *D. lindbergii*

Table 1. Comparison between *Diaphanoptera gharehbilensis* and three related taxa by diagnostic characters.

No.	Taxa				
	Characters	<i>D. gharehbilensis</i>	<i>D. stenocalycina</i>	<i>D. lindbergii</i>	<i>D. transhyrcana</i>
1	Plant height (cm)	25	35	25	10
2	Leaf length (mm)	10 – 25 (-28)	10 – 23 (-25)	15 – 22 (-28)	15-20
3	Leaf width (mm)	1 – 4.5	1 – 4.5	2 - 5	1 - 3
4	Bracteoles shape	leaf-like	not leaf-like	not leaf-like	leaf-like
5	Bracteoles size	longer than pedicels	shorter than pedicels	-	-
6	Calyx length (mm)	(13-) 13.2 – 14	11-12 (13)	10 – 11	8 - 9
7	Calyx width (mm)	3.2 - 4	2.8 – 3 (3.2)	3 - 4	2.5 - 3
8	Calyx teeth length (mm)	2.5 – 3	2 – 3.5	± 2	1 - 2.5
9	Calyx indumentum	covering with semi-dense hairs	minutely pubescent on the nerves or glabrous	± glabrous	dense hairy-pubescent
10	Lamina shape	spathulate	narrowly lanceolate	narrowly obovate	narrowly obovate
11	Lamina width (mm)	2.3 – 2.5	± 2	2 – 2.5	± 2



Fig. 2. A & B, *Diaphanoptera gharehbilensis* in its natural habitat in Robot-e-Gharehbil; C, a close-up image.

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