



Onopordum arenarium (Desf.) Pomel (Asteraceae), a Noteworthy Record from Egypt

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DURING the fieldwork in the Mediterranean coastal region in the north of Egypt, *Onopordum arenarium* (Desf.) Pomel was newly discovered. This exotic species is native to North Africa (Algeria, Libya, Morocco, and Tunisia). *O. arenarium* flowering specimens were gathered from the El-Salloum plateau and the Mediterranean coastal region in the Matrouh Governorate of Egypt, 60 km east of El-Salloum. The taxon was reported for the first time in Egypt, which makes a new addition and significant contribution to the flora of Egypt. The paper includes a taxonomic description, an updated nomenclature, a geographical distribution, occurrence in Egypt, field-colored photographs, a comparison with closely related species, and an updated dichotomous artificial key to the *Onopordum* species in Egypt.

Keywords: Asteraceae, Egypt, Mediterranean, New record, *Onopordum arenarium*.

Introduction

Asteraceae Bercht. & J. Presl is the largest and most diverse family of flowering plants in the Eudicots, with 13 subfamilies and 45 tribes. The family comprises nearly 1600–1700 genera and 25,000–33,000 species (Mandel et al., 2017). Presently, Susanna et al. (2020) recognized 16 subfamilies and 50 tribes. In Egypt, the family Asteraceae is represented by 234 species in 98 genera grouped into two subfamilies: Tubuliflorae and Liguliflorae (Täckholm, 1974; Boulos, 2002, 2009).

The genus *Onopordum* L. (Asteraceae, Cardueae) is represented by approximately 60 taxa worldwide, which are mainly distributed across western and central Asia, Europe, northern Africa, and the Canary Islands (Susanna & Garcia-Jacas, 2007) introduced into America and Australia. According to the latest checklist of *Onopordum*, the genus is represented by 60 accepted species distributed worldwide (POWO, 2022).

In northern Africa, Fennane (2014) listed seven species of *Onopordum* in the flora of Morocco, namely, *O. acaulon* L., *O. dissectum* Murb., *O. dyris* Maire, *O. wallianum* Maire, *O. arenarium* (Desf.) Pomel, *O. mesatlanticum* Emb. & Maire, and *O. macracanthum* Schousb., whereas in Algeria, six species of this genus were reported, viz., *Onopordum acanthium* L., *Onopordum acaulon* L., *Onopordum algeriense* (Munby) Pomel, *Onopordum ambiguum* Fresen., *O. arenarium* (Desf.) Pomel, and *Onopordum macracanthum* Schousb (Gordo & Mostafa, 2021). Pottier-Alapetite (1981) listed eight species in the flora of Tunisia: *O. acaule* Willd., *O. macracanthum* Schousb., *O. abbreviatum* (DC.) Pau, *O. mesatlanticum* Emb. & Maire, *O. Dyris* Maire, *O. alexandrinum* Boiss., *O. arenarium*, and *O. dissectum* Murb. Later, Alavi (1983) reported four species for the flora of Libya: *O. confusum* Pamp., *O. cyrenaicum* Maire & Weiller, *O. arenarium* (Desf.) Pomel, and *O. espiniae* Coss. In Egypt, the genus *Onopordum* is represented by two species, viz., *O. alexandrinum* Boiss.

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and *O. ambiguum* Fresen., distributed mainly in the Mediterranean coastal region and the Sinai Peninsula, respectively (Täckholm, 1974; Boulos, 2002, 2009).

During field surveys conducted in the Mediterranean coastal belt, in the northern part of Egypt, especially in El-Salloum, and the El-Salloum plateau, Matrouh Governorate, several observations were directed at *Onopordum* populations growing in the dune of these areas. Two distinct *Onopordum* species were found to coexist in these populations after close examination. The first corresponds to *O. alexandrinum* Boiss., whereas the second remains unidentifiable by the taxonomic keys available in the flora of Egypt (Täckholm, 1974; Boulos, 2002). With the aid of floras of neighboring countries, namely, Libya, Tunisia, Algeria, and Morocco (Pottier-Alapetite, 1981; Alavi, 1983; Fennane, 2014; Gordo & Mostafa, 2021), the specimens were identified as *O. arenarium* (Desf.) Pomel. This taxon had not been previously recorded in Egypt.

This paper provides supplementary data for *O. arenarium* as a new record so that it can be formally recognized in Egypt and provide an updated identification key for all *Onopordum* species occurring in Egypt.

Materials and Methods

The plant specimens were collected from

the Mediterranean coastal region during two expeditions (April 2021 and March 2022). The plant materials were collected from Matrouh Governorate, 60 km east of El-Salloum, Lat. 31°31'11.5"N 25°39'27.3"E, Alt. 36m above sea level, and the El-Salloum plateau, Lat. 31°33'09.6"N 25°09'36.2"E, Alt. 19m (Fig. 1). The digital photos of the plant in its natural habitat were taken to confirm the identification. Plant materials were pressed, dried, and kept as herbarium specimens.

Plant specimens of the new record were collected and deposited at the Herbaria of Cairo University (CAI), Sohag (SHG), and South Valley at Qena (Herbarium acronyms follow Thiers, 2020). Floras of nearby countries and related literature were reviewed to identify the plant specimens (Pottier-Alapetite, 1981; Alavi, 1983; Fennane, 2014; Gordo & Mostafa, 2021).

Results

Phytogeographic considerations

Here, *O. arenarium*, which is known from the Mediterranean coast, 60 km east of El-Salloum, and the El-Salloum plateau in Matrouh Governorate, Egypt, is newly documented for the flora of Egypt (Fig. 1). The species is native to North Africa, specifically Algeria, Libya, Morocco, and Tunisia (POWO, 2021). Consequently, it is more likely to occur in Egypt.



Fig. 1. Distribution of *O. arenarium* in Egypt

Taxonomic treatment

O. arenarium (Desf.) Pomel, *Nouv. Mat. Fl. Atl.* 20 (1874).

Basionym: *Carduus arenarius* Desf., *Fl. Atlant.* 2: 247 (1799).

= *O. arenarium* var. *arenarium*

= *O. arenarium* var. *ramosum* Pomel

= *Onopordum sibthorpiatum* var. *arenarium* (Pomel) Durand & Baratte

Type: Described from Algeria.

Phenology: Flowering March–May and fruiting May–June.

Identification key to the species of Onopordum in Egypt

1a. Plant up to 120 cm high, green, or slightly cobwebby; middle cauline leaves pinnatisect.....
.....*O. alexandrinum*

1b. Plant height less than 90 cm high, densely white-cobwebby; middle cauline leaves scarcely lobed or pinnatifid.....2

2a. Leaf blade adaxial surface smooth; cauline leaves pinnatifid with subtriangular lobes; outer phyllaries ovate, longer than inner phyllaries; pappus 1.5–1.7 cm long; achenes polymorphic.....
.....*O. arenarium*

2b. Leaf blade adaxial surface rugose; cauline leaves scarcely lobed; outer phyllaries linear-lanceolate, shorter than the inner phyllaries; pappus 1.8–2cm long; achenes uniform.....*O. ambiguum*

Discussion

The expansion of the distribution of this species in Egypt was not surprising because it also grows in nearby countries, such as Libya, Algeria, Tunisia, and Morocco. *O. arenarium* is very similar to *O. alexandrinum* and *O. ambiguum*. However, there are some morphological differences between them: *O. arenarium* differs from *O. alexandrinum* in having densely white-cobwebby and middle cauline leaves scarcely lobed or pinnatifid (Fig. 2). Also, *O. arenarium* differs from *O. ambiguum* in having smooth surface adaxial, pinnatifid cauline

leaves with subtriangular lobes, outer phyllaries ovate and longer than inner phyllaries, pappus 1.5–1.7cm long, and achenes that are polymorphic (Fig. 3). Table 1 shows the distinctions between the three species.

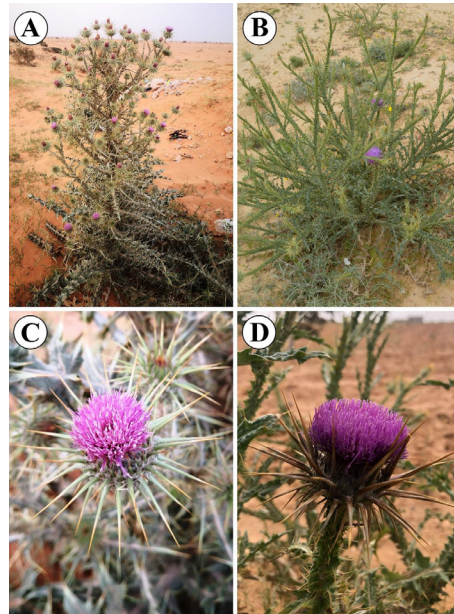


Fig. 2. Habits, vegetative growth, and capitula of *O. arenarium* (A, C) and *O. alexandrinum* (B, D) [Photos by MO Badry & A Elkordy]

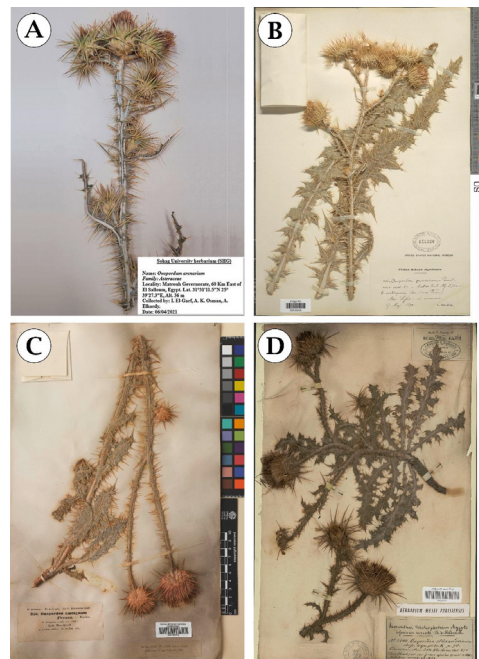


Fig. 3. Herbarium specimens of the *Onopordum* species showing the morphological differences: (A) *O. arenarium* [from Egypt], (B) *O. arenarium* [US550336], (C) *O. ambiguum* [E00460972], (D) *O. alexandrinum* [P00570250]

TABLE 1. Distinguishing morphological features between *O. alexandrinum*, *O. ambiguum*, and *O. arenarium* species collected from Egypt

| Taxon | <i>O. alexandrinum</i> | <i>O. ambiguum</i> | <i>O. arenarium</i> |
|------------------------|--|--|---|
| Character | | | |
| Stem surface | Winged, the wings all along the stem, triangular connected lobes, Covered with long spines | Winged, the wings slightly lobed, Covered with yellow spines | Winged up to the apex, wings strongly sinuate-toothed; teeth spiny, tomentose |
| Basal leaves shape | Lanceolate | Broadly elliptic | Broadly lanceolate |
| Basal leaves margins | Pinnatifid, incised-toothed, teeth spiny | Shallowly lobed, spiny | Narrow, Pinnatifid to pinnatisect, incised-toothed, teeth spiny |
| Cauline leaves margins | Narrow, Pinnatifid, incised-toothed, teeth spiny | Scarcely lobed, spiny | Pinnatifid, with lobes subtriangular, incised-toothed, teeth spiny |
| Capitula position | Single On long-winged peduncles | Single, on long-winged peduncles | Two or more terminal or subterminal aggregate, subsessile |
| Involucre shape | Abruptly narrowed into 40mm long | Broadly ovoid | Abruptly narrowed into 20mm long |
| Pappus length | 1–1.2cm | 1.8–2cm | 1.5–1.7cm |

Conclusion

For the first time, *O. arenarium* was discovered in Egypt through this study. As a result of this new record, Egypt now has three different species of *Onopordum*. To make it easier for plant taxonomists to precisely identify *O. arenarium* in the Egyptian flora, additional traits were introduced.

Competing interests: The authors report no conflicts of interest regarding this work.

Authors' contributions: Conceptualization, A.E. I.G.; methodology, A.E. and M.B.; software, A.E. and M.B.; data curation, A.O., and N.A.; investigation, A.E., N.A., and A.O.; resources, A.E., I.G, M.B, and A.O.; writing original draft preparation, A.E.; writing review and editing, A.E., A.O., M.B., and N.A.; funding acquisition, A.E., A.O., M.B., and N.A. All authors have read and agreed to the published version of the manuscript.

Ethics approval: Not applicable.

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تسجيل اونوبورديوم اريناريوم (الفصيلة المركبة) كنوع جديد جدير بالملاحظة من مصر

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تم تسجيل نوع *Onopordum arenarium* (Desf.) Pomel لأول مرة في مصر خلال العمل الميداني في المنطقة الساحلية للبحر الأبيض المتوسط في شمال مصر. يستوطن هذا النوع منطقة شمال وغرب إفريقيا (الجزائر وليبيا والمغرب وتونس). جمعت العينات المزهرة لنبات *O. arenarium* من الحزام الساحلي للبحر الأبيض المتوسط على بعد 60 كم شرق السلوم وكذلك من هضبة السلوم بمحافظة مطروح. تم تسجيل هذا النوع لأول مرة في مصر، مما يجعل هذا العمل إضافة جديدة ومساهمة كبيرة للفلورا المصرية. يتضمن البحث وصفاً تصنيفياً، وتسمية محدثة، وأماكن انتشاره في مصر، وصور فوتوغرافية ملونة ميدانية، ومقارنة بين الأنواع ذات الصلة الوثيقة، ومفتاح اصطناعي ثنائي التفرع محدث لأنواع *Onopordum* في مصر.