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New record of *Argemone ochroleuca* Sweet (Papaveraceae) for the flora of Libya

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Abstract. *Argemone ochroleuca* Sweet, Brit. Fl. Gard. Ser.1 3(2): pl. 242 (1828) of the family Papaveraceae is reported here for the first time from Libya. This species is native to Mexico. Flowering specimens of *A. ochroleuca* were collected from the region Ariggiba (26°35'11.8"N 13°29'24.8"E), 110 km southwest of the city of Sabha, which lies about 700 km south of Tripoli. It is presented with updated nomenclature, taxonomic description, geographical distribution, key to genera, location in Libya, and colour photographs taken in the field. The voucher specimens are deposited in the Herbarium of Botany Department (ULT), University of Tripoli, Libya.

Key words: *Argemone ochroleuca*, Ariggiba region, herbarium specimens, Mexican poppy, Sabha, Libya

1. Introduction

The genus *Argemone* L., Sp. Pl. 1: 508 (1753) of the family Papaveraceae includes 32 species (Karnawat & Malik 2011), which are native to arid and semi-arid areas in North and Central America (Rios-Carrasco & Vázquez-Santana 2022). Its native range encompasses southern regions of the United States, including Texas, New Mexico, and Arizona, extending southward through Mexico and down to Central America. Nowadays widely distributed also in many other tropical and subtropical countries (Ibrahim & Ibrahim 2009). These habitats are characterized by harsh environmental conditions, such as limited rainfall, intense sunlight, and well-drained soils, which have influenced its physiological adaptations.

This paper presents the first Libyan record of *Argemone ochroleuca* and of the genus *Argemone* Sweet (242: 1829). The family Papaveraceae in Libya previously included 4 genera and 9 species (Jafri 1977), so now it represented by 5 genera and 10 species.

2. Material and methods

Plant specimens were collected in the Ariggiba region, 110 km southwest of the city of Sabha, which lies about 700 km south of Tripoli (26°35'11.8"N, 13°29'24.8"E) (Fig. 1). The collected specimens were preserved with ordinary herbarium techniques (pressing, drying, mounting, labelling). After critical investigations, using data from several sources (Wu *et al.* 1994; Almeida 1998; Reddy & Pattanaik 2007; Bhuktar & Sardesai 2009; Watson *et al.* 2012), the plant was identified as *Argemone ochroleuca* Sweet. The voucher specimens were deposited in the herbarium of Botany Department, Faculty of Science, University of Sabha, Libya. The plant species was given voucher number 024051N. The voucher specimens were deposited in the same herbarium, with a duplicate sent to the herbarium of the Botany Department, Gharyan University, Gharyan, Libya.

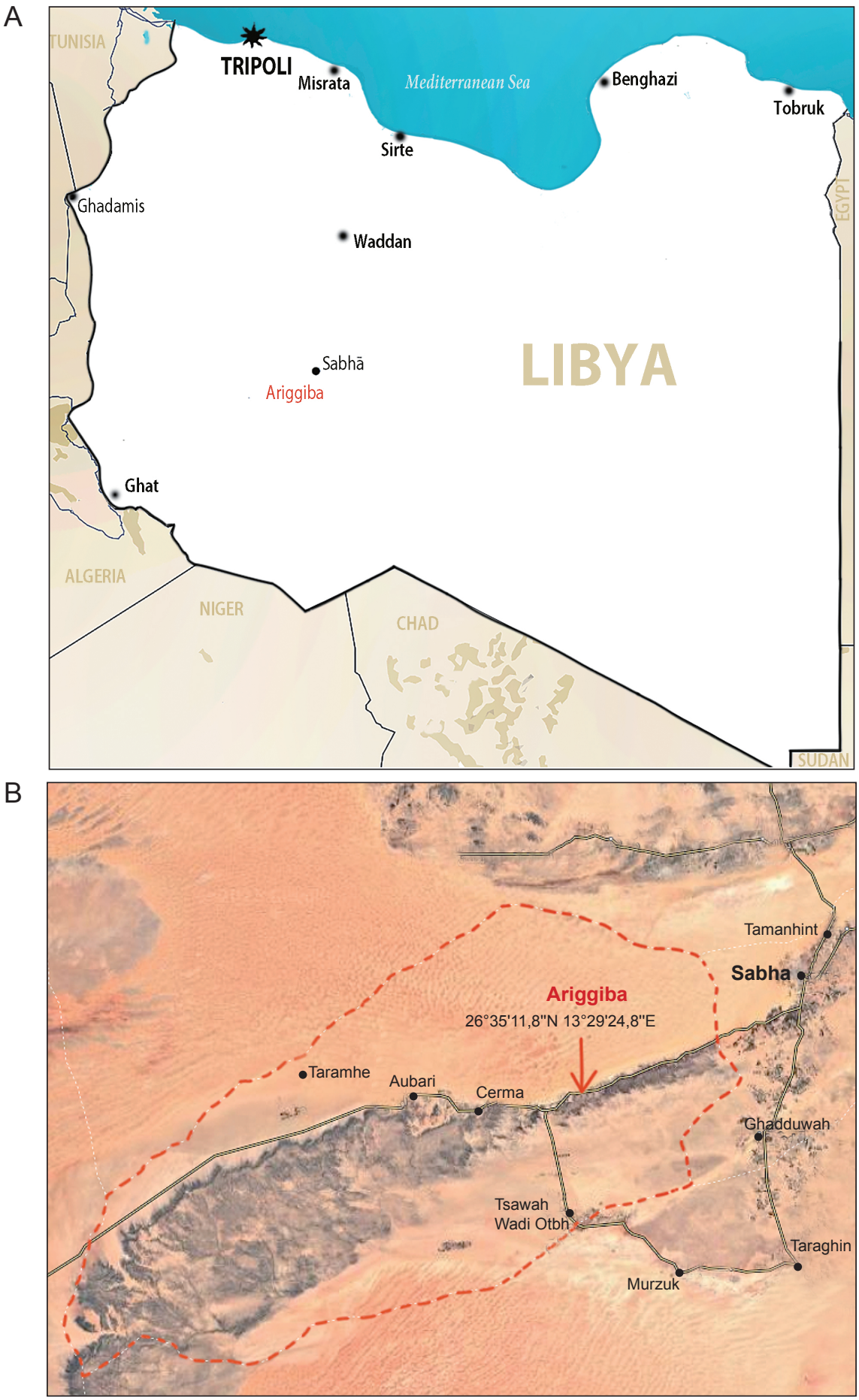

Fig. 1. Map of Libya (A) and detailed map of the Sabha District (B), showing the locality where *Argemone ochroleuca* was collected, with its longitude and latitude in the decimal system

3. Taxonomic description

Accepted name: *Argemone ochroleuca* Sweet, Brit. Fl. Gard. Ser.1 3(2): pl. 242 (1828).
Synonyms: *Argemone mexicana* var. *ochroleuca* (Sweet) Lindl.; *Argemone ochroleuca* var. *stenophylla* (Prain) Shinners
English common names: Mexican poppy, prickly poppy, devil's fig, golden thistle of Peru, biniguy thistle, white thistle, yellow poppy, Mexican thistle, Mexican prickle poppy
Description: Annual herb, up to 100 cm high. Stems branching out in upper parts; mostly smooth, except for occasional sparse, spreading, straw-coloured spines, up to 9 mm long (Moussa *et al*. 2012). Basal leaves with short petioles, cauline leaves sessile, upper leaves subamplexicaul (partly clasping stems). Leaf shape obovate to elliptic or ovate, pinnatilobed, c. 10-30 cm long, 4-10 cm wide; upper leaves progressively smaller. Leaf surface smooth, but sparse spines along veins on abaxial side. Flower buds oblong, up to 1.8 cm in length; sparsely covered in spines. Petals broadly obovate, usually 2.8-3.0 cm long and 1.5-1.8 cm wide, with a smooth apex. Stamen filaments about 7 mm, while anthers 1.5-2.0 mm long. Ovary ovoid, about 8-10 mm long, covered in spines (Moussa *et al*. 2012). Style around 1 mm long, stigma dark red, divided into 4-6 lobes (Figs. 2-3).
Flowering and fruiting: November-June (with a peak in February-May) and April-June, respectively (van der Westhuizen & Mpedi 2011).
Distribution: Native to Mexico, naturalized in Australia, tropical Africa, New Zealand, and some oceanic islands with warm climates (Webb & Gornall 2006).
Habitat: Growing in a wide range of soil types: from clayey, dry soils, to deep alluvial soils with shallow groundwater level; tolerating semiarid conditions (Reddy & Pattanaik 2007).
Chromosome number: Predominantly tetraploid (2n = 56) (van der Westhuizen & Mpedi 2011; Otto & Verloove 2016).
Voucher specimen: Collected from colonies of this plant species near dried water bodies and wastelands of the Ariggiba region (26°35'11.75"N, 13°29'24.81"E), located about 110 km southwest of the Sabha region of Libya and about 700 km south of Tripoli S. El-Ahamir & K. Salem (Sabha University, Gharyan University!) (Fig. 3).

4. Results and discussion

Understanding the natural regeneration of plant communities requires knowledge about regrowth patterns following disturbances. In this study, *Argemone ochroleuca* is reported for the first time from the Sabha region (Ariggiba) of Libya. This finding is also the first record of the genus *Argemone* in the Libyan flora. The absence of previous mentions of this plant in earlier studies (Keith 1965; Jafri 1977) confirms its novelty in the Libyan flora, establishing it as a new addition to the plant species documented in Libya.

Argemone ochroleuca Sweet is native to the southern regions of the United States, including Texas, New Mexico, and Arizona. From there, its distribution extends southward through Mexico to Central America (Bhuktar & Sardesai 2009). Beyond its native range, the species has a remarkably wide global distribution, with documented occurrences across Africa, Asia, Europe, and Oceania (Webb & Gornall 2006). It is an adaptable species that can thrive in diverse soil and climatic conditions. In Europe it has successfully established populations in Mediterranean countries, parts of Eastern Europe, and even as far north as the British Isles (Martínez-Delgado *et al.* 2022).

The wide distribution of *A. ochroleuca* can be attributed to several factors. Firstly, intentional introductions through botanical gardens, seed exchanges, and the use of the plant for its medicinal and ornamental properties have contributed to its spread to new regions (Maheswari 1963; Sharma & Kachroo 1993; Reddy & Pattanaik 2007). Additionally, seeds of this species have been unintentionally dispersed to new areas through global trade networks, often as contaminants in agricultural products. The remarkable adaptability of *A. ochroleuca*, coupled with its ability to thrive in diverse habitats, has also facilitated its establishment in many parts of the world. Despite its medicinal uses, all parts of the plant are toxic to animals and humans, and it has been listed as a noxious weed in South Africa and the state of Western Australia due to its harmful characteristics (Wilson 1997; Henderson 2001).

In the Mediterranean basin, it is found in countries like Spain, Italy, Greece, and Turkey (Pignatti 2005). The plant in this region has invaded various habitat types, including agroecosystems, fallow lands, roadsides, wastelands, wetlands, and gravelly and sandy plains in the southwest of Saudi Arabia.

The first record of *A. ochroleuca* in the Sabha region of Libya, located about 700 km south of Tripoli, raises questions about its mode and time of introduction to Libya. The exact means of its arrival remains unknown, but it is possible that the plant was introduced naturally or as a seed contaminant, considering its presence in both natural vegetation and cultivated fields there. The species is easily recognizable due to its conspicuous spines, erect stems, alternate leaves, delicate pale yellow to cream petals with numerous bright yellow stamens, and a purple stigma. The fruits are spiny, oblong capsules that open from the top, releasing numerous small seeds.

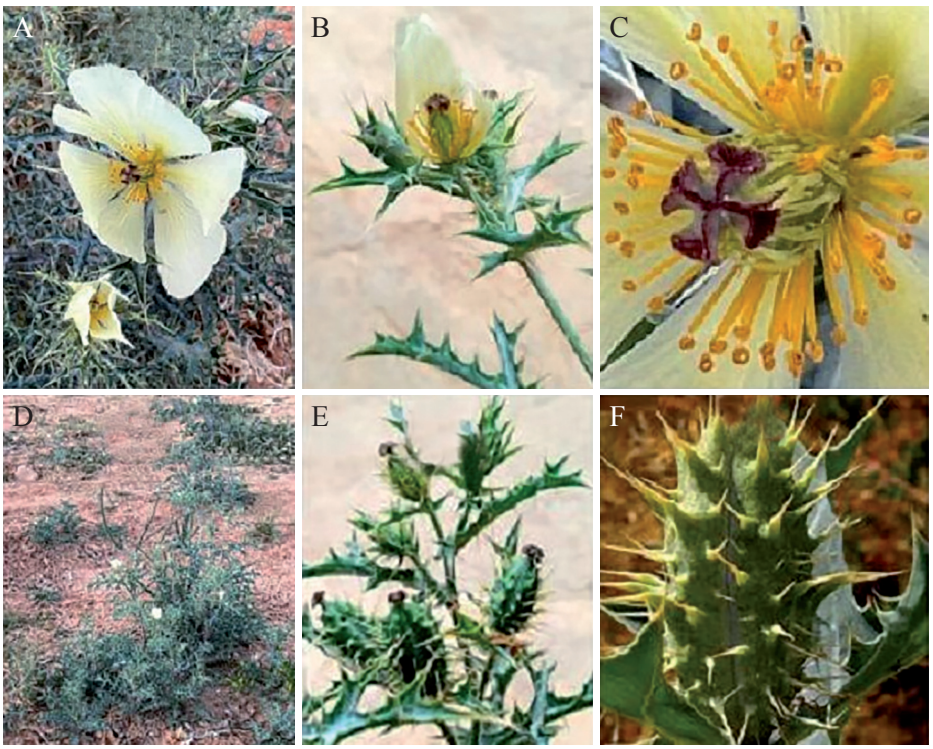

Fig. 2. *Argemone ochroleuca* in a natural habitat of Ariggiba in the Sabha District of Libya

Explanations: A – shoot with flowers, B – bright yellow stamens and a purple stigma, C – plant habit, D – shoot with immature fruits, E – immature plant (capsule), F – capsule

Fig. 3. Herbarium specimen of *Argemone ochroleuca* collected from Ariggiba, 110 km west-southwest of Sabha

Key to genera

Since the Flora of Libya previously contained 4 genera of the family Papaveraceae, and this research adds a 5th genus, it is necessary to reformulate the classification key to the genera of this family.

Plants with straw-coloured prickles up to 1 cm long, throughout. Leaves glaucous green with pale markings on venation above ..... ***Argemone***
Plants glabrous to setose, but not prickly **2**
Fruit semiglobose or oblong, less than 5 times as long as broad, dehiscent by apical pores ..... ***Papaver***
Fruit linear, usually at least 10 times as long as broad **3**
Latex watery. Calyx detached, forming a hood over petals in opening flowers ..... ***Eschscholzia***
Latex yellow. Calyx not forming a hood as above **4**
Stigmas 2, conical. Fruit 2-valved, usually with 2 apical horns ..... ***Glaucium***
Stigmas 3-4, capitate. Fruit 3-4-valved, without apical horns ..... ***Roemeria***

5. Conclusions

The identification of *Argemone ochroleuca* in the Sabha region of Libya represents a novel addition to the country's flora. The widespread distribution of this species across different regions can be attributed to various factors, such as trade, human migration, and intentional introductions. Further research is needed to uncover the exact means and timeline of its introduction to Libya and its impact on native ecosystems.

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Research concept and design: Khaleefah Salem Imohammed
Collection and/or assembly of data: Khaleefah Salem Imohammed
Data analysis and interpretation: Sh-Hoob Mohamed El-Ahamir
Writing the article: Sh-Hoob Mohamed El-Ahamir
Critical revision of the article: Sh-Hoob Mohamed El-Ahamir
Final approval of article: Sh-Hoob Mohamed El-Ahamir

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