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Notes on the Flora of Bahrain: New Families, Genera and Species to the Flora of Bahrain

Abstract: Based on a recent plant collection from Bahrain, two families, five genera and fourteen species are newly recorded to the previous checklist of the flora of Bahrain. The families are Fumariaceae and Nyctaginaceae, while the new genera are *Commicarpus*, *Cynanchum*, *Fumaria*, *Halodule* and *Halophila*. The new species are *Amaranthus hybridus* (Amaranthaceae), *Cynanchum acutum* (Asclepiadaceae), *Capparis leucophylla* (Capparaceae), *Salsola drumondii* and *Salsola jordanicola* (Chenopodiaceae), *Calendula tripterocarpa* (Compositae), *Halodule uninervis* (Cymodoceaceae) *Euphorbia hirta* and *Euphorbia indica* (Euphorbiaceae), *Fumaria parviflora* (Fumariaceae), *Halophila ovalis* and *Halophila stipulacea* (Hydrocharitaceae), *Commicarpus plumbagineus* (Nyctaginaceae) and *Datura innoxia* (Solanaceae). Localities, dates of collection, collectors, number of specimens and the place of deposition are given. A map of distribution for the new taxa is given.

Key words: Bahrain, Flora, Families, Genera. New plant species.

Introduction:

Various authors have studied flora of Bahrain, through which a number of plant species has been recorded in each case. The most prominent of these is Phillips (1988), who recorded 284 species in an illustrated book. Cornes & Cornes (1989), recorded 246 species, again in an illustrated book. El-Oqlah & Abbas (1994) produced a checklist of vascular plants of Bahrain with a total number of 307 species

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مذكرات عن نباتات البحرين:

عائلات وأجناس وأنواع جديدة لنباتات البحرين

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المستخلص: اعتماداً على مجموعة حديثة من النباتات جمعت من البحرين، تم تسجيل عائلتين (فصليتين) وخمسة أجناس وأربعة عشر نوعاً جديداً إلى ما هو مسجل من قبل لنباتات البحرين. والعائلات المسجلة هي Fumariaceae و Nyctaginaceae أما الأجناس المسجلة فهي *Commicarpus*، *Cynanchum*، *Fumaria*، *Halodule*، *Halophila* أما الأنواع الجديدة فهي:

Amaranthus hybridus (Amaranthaceae), *Cynanchum acutum* (Asclepiadaceae), *Capparis leucophylla* (Capparaceae), *Salsola drumondii* and *Salsola jordanicola* (Chenopodiaceae), *Calendula tripterocarpa* (Compositae), *Halodule uninervis* (Cymodoceaceae) *Euphorbia hirta* and *Euphorbia indica* (Euphorbiaceae), *Fumaria parviflora* (Fumariaceae), *Halophila ovalis* and *Halophila stipulacea* (Hydrocharitaceae), *Commicarpus plumbagineus* (Nyctaginaceae) and *Datura innoxia* (Solanaceae)

هذا وقد تم إعطاء أماكن جمع النباتات وتاريخ جمعها واسم الجامع ورقم العينة ومكان حفظها وهو المتحف النباتي، جامعة الخليج العربي، المنامة، البحرين (AGU). وقد تم تجهيز خارطة للبحرين تبين أماكن توزيع العينات التي تم تسجيلها.

كلمات مدخلية: البحرين- نباتات، عائلات وأجناس جديدة

belonging to 54 families and 198 genera. This checklist has added 19 more species to what was previously recorded, however this checklist does not give specimen numbers or localities due to the nature of the publication.

So far, the flora of Bahrain has not been studied professionally in terms of systematic revision of taxa in relation to what is recorded in Bahrain and what is recorded in the neighboring countries in a diagnostic manner leading to keys of taxa, descriptions, illustration and finally a written flora.

In the process of preparation for biodiversity studies and flora of the States of the Arabian Gulf, a new collection of plant material has been started in late 1999. This collection is now deposited in the Herbarium, Desert and Arid Zones Sciences Programme, Arabian Gulf University, Manama

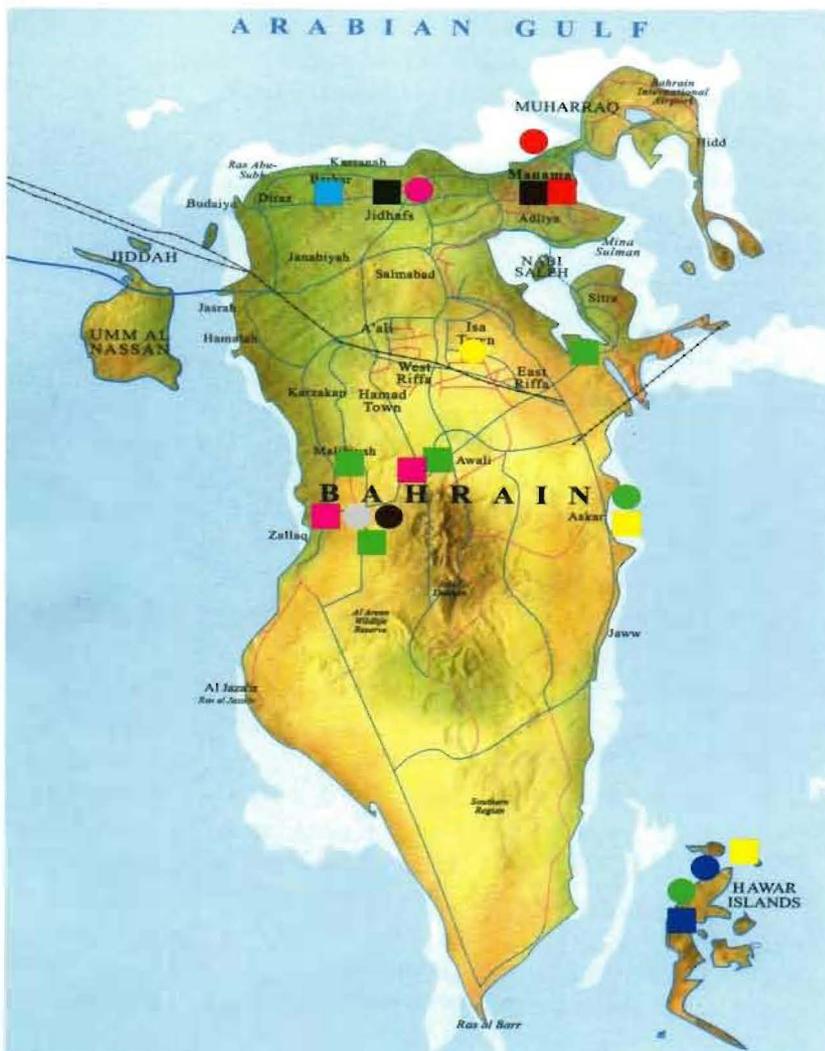
(AGU). Within this collection new taxa have been recorded for the first time in the flora of Bahrain. This confirms that both the distributions of species as well as the evolutionary processes are dynamic. Thus, continuous plant collection is always needed to monitor plant biodiversity changes as affected by various factors, particularly human impact from pollution, urbanization, loss of habitat and others.

In this paper new taxa at the family, genera and species levels are recorded for the first time in the flora of Bahrain. Verification of such recorded species was achieved by consultation of available floras or illustrated flower books. These were: Flora Palaestina (Zohary, 1966, 1972); Students' Flora of Egypt (Täckholm, 1974); Flora Palaestina (Feinbrun-Dothan, 1978, 1986); Ecology and Flora of Qatar (Batanony, 1981); List of Jordan vascular plants (Al-Eisawi, 1982); Flora of Kuwait (Daoud, 1985); Flora of Kuwait (Al-Rawi, 1987); Weed Flora of Kuwait (Boulos, 1988); Wild Flowers of Bahrain (Phillips, 1988); The Wild Flowers and Plants of Bahrain (Cornes & Cornes, 1989); Flora of Eastern Saudi Arabia (Mandaville, 1990); Wild

Flowers of Kuwait (Shuaib, 1995); Field Guide to the Wild Flowers of Jordan and Neighbouring Countries (Al-Eisawi, 1998); Wild Flowers of Saudi Arabia (Collenette, 1999); and Flora of the Kingdom of Saudi Arabia (Chaudary, 1999).

Materials and Methods

Plant specimens were collected from various localities in Bahrain on different dates. The specimens were taken to the laboratory in plastic bags, identified, numbered, pressed until drying, and poisoned for preservation against insects feeding on cellulose, using a mixture of mercuric chloride, ammonium chloride and alcohol, according to Täckholm (1974). The specimens were then mounted on thick sheets and filed according to their classification into genera and families. The specimens are all deposited in the Herbarium, Desert and Arid Zones Science Programme, College of Postgraduate Studies, Arabian Gulf University, Manama, Bahrain. Photographs of the new taxa are available as slides or electronic forms.



Map of Bahrain showing the distribution and localities of the newly recorded Taxa

- *Amaranthus hybridus*
- *Cynanchum acutum*
- *Capparis leucophylla*
- *Salsola drumondii*
- *Salsola jordanicola*
- *Calendula tripterocarpa*
- *Halodule uninervis*
- *Euphorbia hirta*
- *Euphorbia indica*
- *Fumaria parviflora*
- *Halophila ovalis*
- *Halophila stipulacea*
- *Commicarpus plumbagineus*
- *Datura innoxia*

Results and Discussion

Amaranthaceae

1. *Amaranthus hybridus* L.

This species belongs to the family Amaranthaceae where the genus *Amaranthus* is represented by two species *A. graecizans* and *A. viridis* (= *A. gracilis*). The record of *A. hybridus* is new to the flora of Bahrain. The previous workers dealing with the flora of Bahrain, Phillips (1988), Cornes & Cornes (1989), and El-Oqlah & Abbas (1994), did not record it. Mandaville (1990), Collenette (1998) and Chaudary (1999) recorded this species for Saudi Arabia, but Boulos (1988) did not record it for Kuwait.

Locality:

Bahrain: Manama; Segayah, near Salmaneyah, opposite Jazira store, irrigated field, 17/5/2000, Al-Eisawi, 20335 (AGU).

Asclepiadaceae

2. *Cynanchum acutum* L.

This species was not recorded in any literature cited for Bahrain. Batanony (1981) did not record it for Qatar. Boulos (1988), Daoud (1985) and Shuaib (1995) did record it for Kuwait. Both Mandaville (1990) and Collenette (1999) recorded it in the region for Saudi Arabia.

Locality:

Bahrain: northern Bahrain; farm near Bahrain Fort, close to Budayyi main road. 5/4/2000, Al-Eisawi, 20289 (AGU); Bahrain: Manama; Segayah, near Salmaneyah, opposite Jazira store, irrigated field. 17/5/2000, Al-Eisawi, 20333 (AGU).

Capparaceae

3. *Capparis leucophylla* DC.

In the three major references related to Bahrain *Capparis spinosa* is the recorded species. Mandaville (1990) recorded *C. spinosa* for Eastern Saudi Arabia. Collonete considered *C. spinosa* in Saudi Arabia in addition to *C. spinosa* var. *mucronifolia*, *C. siniaca* (= *C. cartilaginea*), *C. decidua* and *C. tomentosa*. Chaudary (1999) treated *C. aegytiaca*, *C. leucophylla*, *C. mucronifolia* and *C. elleptica* as synonyms to *Capparis spinosa*.

Batanony (1981) also considered *C. spinosa* for flora of Qatar. In Kuwait *Capparis spinosa* was not recorded by any of the authors Daoud (1985), Boulos (1988) and Shuaib (1995).

It is my opinion, based on field observation and the acceptance of six species in Jordan (Al-Eisawi, 1998), that there is no doubt that *Capparis spinosa*, a Mediterranean element occurring in Europe and the Mediterranean Basin, is a different species. Therefore, what occurs in Bahrain, Qatar and parts of Saudi Arabia (Saharo-Arabian region) should be called *C. leucophylla* DC.

Accordingly, *C. leucophylla* should be considered as the valid name in Bahrain. It differs from *C. spinosa* by having white flowers with the two upper petals always gathered in an overlapping position to form a keel-like structure, grayish leaf color due to the dense hairy indumentum and the smaller size of the fruits.

Locality:

Bahrain: Manama, Al Budayyi main road; next to Bahrain agriculture center. 4/4/2000, Al-Eisawi, 20284 (AGU).

It occurs also in and around irrigated fields and waste grounds in Budayyi, Manama, Rifa and others.

Chenopodiaceae

4. *Salsola drumondii* Ulbrich

This species was not recorded in the three major references related to the flora of Bahrain: Phillips (1988), Cornes & Cornes (1989), or El-Oqlah & Abbas (1994). It is recorded new to the flora of Bahrain as collected for the first time in 1999 from Hawar Island. This species comprises the dominant vegetation on the island. *Salsola drumondii* is recorded for Qatar by Batanony (1981) and recorded for the flora of Saudi Arabia by Mandaville (1990). It is not recorded in the flora of Kuwait by Daoud (1987), Boulos (1988) or Shuaib (1995).

Locality:

Bahrain: Hawar Island. 3/10/1999, Al-Eisawi, 20108 (AGU); Sawad South Island. 1/11/1999, Al-Eisawi, 20118 (AGU). More material was collected in Feb., 2001.

5. *Salsola jordanicola* Eig

The genus *Salsola* and *Chenopodiaceae* is found in general in arid lands. These are difficult groups and can be easily mixed. Accordingly, plant specimens can be misjudged and thus misidentified. Field observation and experience are very important for recognition and separation of taxa.

Phillips (1988), recognized *Salsola baryosma*, *S. brevifolia*, *S. imbricata* and *S. vermiculata* as occurring in Bahrain. Cornes & Cornes (1989) recognized only three species, *Salsola baryosma*, *S. imbricata* and *S. vermiculata*. El-Oqlah & Abbas (1994) recognized *S. cyclophylla*, *S. imbricata* (Syn.: *S. baryosoma*), *S. villosa* (Syn.: *S. vermiculata* and *S. brevifolia*). It is clear that the three authors have each recognized a different taxa. This indicates the difficulty of classifying this group, which has to be looked at in a regional perspective.

After review of literature for the region, it was decided that the collected material belongs to the species *Salsola jordanicola*. This species is closely related to *S. inermis* and *S. volkensii*, but differs in the size of fruit wings and indumentum (Zohary, 1966). Mandaville (1990) and Chaudary (1999) for Saudi Arabia confirm the occurrence of *Salsola jordanicola* in the region.

Locality:

Bahrain; Manama; southern Bahrain, As Sakhir, University of Bahrain campus, 15/10/1999, Al-Eisawi, 200454 (AGU); Midway between Al Zallaq and Al Jazair seashore (pelage), saline vegetation, 22/10/1999, Al-Eisawi, 20078 (AGU); Tubli Bay, along Sitra road, close to mangrove plants and concrete plant, 10/12/1999, Al-Eisawi, 20141 (AGU); As Sakhir, 100 m N of the University of Bahrain, Hamad City roundabout, eastern side of the road, 15/11/1999, Al-Eisawi, 20126 (AGU); Al-Malikiyah village, sandy soil, 17/12/1999, Al-Eisawi, 20149 (AGU).

Compositae

6. *Calendula tripterocarpa* Rupr.

Phillips (1988) recorded *Calendula arevnsis* in Bahrain, (photograph p.68). Cornes & Cornes (1989) also recorded *C. aegyptica* and *C. micrantha* with a photograph (No 109). El-Oqlah & Abbas (1994) recorded *C. arvensis* as a valid name with two synonyms *C. agyptiaca* and *C. micrantha*. From

the recently collected material and compared with the photographs given by the two authors, the species should be renamed as *C. tripterocarpa*. This species is a typical Saharo-Arabian element. This identification agrees with Mandaville (1990) in the flora of Eastern Saudi Arabia and Collenette (1999), Wild Flowers of Saudi Arabia. What was recorded in Kuwait (Al-Rawi, 1987) as *C. arvensis* needs further verification. Similarly, Batanony (1981) recorded both species *C. arvensis* and *C. tripterocarpa*. *C. arvensis* was photographed but the image of the fruits are not clear and thus cannot be judged.

Locality:

Bahrain: Az Zallaq road, 10/3/2000, Al-Eisawi, 20205(AGU); Bahrain: As Sakhir, 8/4/2000, Al-Eisawi, 20322 (AGU).

Cymodoceaceae

7. *Halodule uninervis* (Forssk.) Aschers.

This species is a well known sea grass occurring in the Arabian Gulf. Yet it was not recorded either by Phillips (1988) or by El-Oqlah & Abbas (1989). Cornes & Cornes however, recorded *Halodule wrightii* under the family Najadiaceae.

This species is recorded by Mandaville (1990) for Eastern Saudi Arabia, Al-Eisawi, (1982) and Feinbrun-Dothan (1986) for Flora of Jordan and Flora Palaestina.

Locality:

Bahrain: Southern Bahrain, Askar sea front, 28/10/1999, Al-Eisawi, 20094 (AGU); Hawar Island, 31/10/1999, Al-Eisawi, 20112 (AGU).

Euphorbiaceae

8. *Euphorbia hirta* L.

This is recorded for the first time to the flora of Bahrain. It was not recorded by the previous workers, Phillips (1988), Cornes & Cornes (1989), and El-Oqlah & Abbas (1994). Our specimen was collected accidentally during a visit to the conference center at a major Hotel. It was found as a vigorous weed spreading between the irrigated plants and within the tiles of the footpaths.

This species was recorded by Mandaville (1990) and Collenette for Saudi Arabia, Batanony (1981) for Qatar, Shuaib (1995) for Kuwait and Täckholm (1974) for Egypt.

Locality:

Bahrain: Manama; Gulf Hotel private gardens, irrigated lawns and flower beds, 30/10/2000, Al-Eisawi, 20339 (AGU).

9. *Euphorbia indica* Lam.

A tall plant up to 80 cm in height with opposite leaves and terminal small whitish flowers, it occurs in restricted areas where shade, irrigation and protection are available. The three main previous studies of Phillips (1988), Cornes & Cornes (1989), and El-Oqlah & Abbas (1994) did not record it. It was also not recorded by other references for the area except by Collenette (1999) who gave *E. glomifera* as a synonym. Täckholm (1974) recorded *Euphorbia hypericifolia* L as a valid name and treated *E. indica* Lam. as a synonym. Batanony (1981) also recorded it for Qatar as *Euphorbia hypericifolia* L.

Locality:

Bahrain: Manama; As Sakhir, University of Bahrain campus, 15/10/1999, Al-Eisawi, 20035.

Fumariaceae

10. *Fumaria parviflora* Lam.

This species was collected from As Sakhir, around one of the irrigated street trees. The record of this species will add to the Flora of Bahrain a new Family and a new genus. It is a common weed in the Middle East, and as such was recorded by Zohary (1966), Täckholm (1974) and Al-Eisawi (1982).

The three main previous studies, Phillips (1988), Cornes & Cornes (1989), and El-Oqlah & Abbas (1994), did not record it for Bahrain. Mandaville (1990), Collenette (1999) and Chaudary (1999) recorded it for Saudi Arabia. Boulos (1988) also recorded it for Kuwait, yet Daoud (1985), Al-Rawi (1987) and Shuaib (1995) did not record it for the same country. Batanony (1981) did not record it for Qatar.

Locality:

Bahrain: Manama; As Sakhir, University of Bahrain campus, 10/3/2000, Al-Eisawi, 20183 (AGU)

Hydrocharitaceae

11. *Halophila ovalis* (R. Br.) Hook. f.

12. *Halophila stipulacea* (Forssk.) Aschers.

These two species are well known in the waters of the Arabian Gulf. Although they were recorded and illustrated by Cornes & Cornes (1989), they were subsequently ignored and not recorded for the total number of the Checklist of the Vascular Plants of Bahrain by El-Oqlah & Abbas (1994). Accordingly, this recording will add one more genus and two more species to the total account of the flora.

Locality:

H. ovalis

Hawar Island, 31/10/1999, Al-Eisawi, 20110 (AGU).

Halophila stipulacea

Bahrain: southern Bahrain; Asker sea front, 28/10/1999, Al-Eisawi, 20093 (AGU); Hawar Island, 31/10/1999, Al-Eisawi, 20111 (AGU).

Plumbaginaceae

13. *Commicarpus plumbagineus*

Shrubby, perennial, many branched, hanging plant with white flowers in terminal clusters. Typical subtropical to tropical element occurs when humidity or irrigation is available. It was collected at the entrance of an irrigated field. The record of this species will add another new family and another new genus to the accounts of the flora of Bahrain.

The three main previous studies of Phillips (1988), Cornes & Cornes (1989), and El-Oqlah & Abbas (1994), did not record it for Bahrain. Batanony (1981), Daoud (1985), Al-Rawi (1987), Mandaville (1990), Boulos (1988) and Shuaib (1995) also did not record it. However, Zohary (1972), Al-Eisawi (1982) and Collenette (1999) have recorded this species.

Locality:

Bahrain: northern Bahrain; farm near Bahrain Fort, close to Budayyi main road. 5/4/2000. Al-Eisawi, 20289 (AGU).

Solanaceae

14. *Datura innoxia* L.

This species differs from the previously recorded species *D. fastuosa* by being a grayish-bluish plant

with hairy, non-oblique leaves and a very obvious large, highly spiny capsule with expanded sepals. This is in addition to the size and folding layers of flowers that differ in both species.

The three main previous studies of Phillips (1988), Cornes & Cornes (1989), and El-Oqlah & Abbas (1994), did not record it for Bahrain. Batanony (1981), Daoud (1985), Al-Rawi (1987) and Mandaville (1990), also did not record it. Boulos (1988), Shuaib (1995) and Collenette (1999) recorded it for Kuwait and Saudi Arabia.

Locality:

Bahrain: Isa Town, University of Bahrain campus, near the library. 11/10/2000, Al-Eisawi, 20338, (AGU); Isa Town, University of Bahrain campus, near the library. 28/11/2000, Al-Eisawi, 20340, (AGU);

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