

Plant Life along the Saudi Red Sea Coast Islands 1. Tawila Archipelago and Ghurab Island

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ABSTRACT. Tawila Archipelago consists of four islands. It lies west of Al Leith city, between the coordinates: Latitudes 20°09' and 20°15'N, Longitudes 40°00' and 40°15'E. Ghurab island is situated south of Jeddah (Latitude 21°35'N and longitude 39°10'E). The mangrove species *Avicennia marina* occupies the eastern sides of Sharifa and Tawila islands, whereas the swampy areas of Ghurab and Tawila islands are occupied by *Urochondra setulosa* grass. *Limonium cylindrifolium* is recorded from the inland parts of Sharifa and Tawila islands, while species such as *Anabasis ehrenbergii*, *Taverniera lappacea* and *Cyperus conglomeratus* inhabit the elevated parts of the latter island. Obvious stratification of vegetation occurs in the Sharifa island. A plant community dominated by *Limonium cylindrifolium* and *Anabasis ehrenbergii* was recognised in Tawila island.

The impact of high salinity, extreme aridity and the scanty rains affect greatly the number of species encountered in the area of study. Only 17 species, representing 11 families of vascular plants, of which 14 perennials were recorded.

Introduction

Studies on the plant life in the Saudi Red Sea coast islands are very rare, however information on the mangroves of Saudi Arabia is very recent (Fery *et al.*, 1984; Khafajii *et al.*, 1988; Mandura and Khafajii, 1993; Mandura *et al.*, 1987, 1988; Migahid, 1996; Saifullah, 1996; Saifullah *et al.*, 1989; Vessey-Fitzgerald, 1955; 1957; Zahran *et al.*, 1983).

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Plant life in the Saudi Red Sea coast islands will be represented in a series of papers. The first paper deals with Tawila Archipelago (west of Al Leith city) and Ghurab island (south of Jeddah).

Area of Study

The area of study comprises some of the Red Sea islands namely Tawila Archipelago and Ghurab island.

Tawila Archipelago is situated about 4 km west of Al Leith city, ca. 2 km from the seashore. It lies between the coordinates: Latitude, 20°09' and 20°15'N, Longitudes 40°00' and 40°15' (Fig. 2). The Archipelago composed of about 4 islands, extending nearly north-west orientation, where Tawila (= long) is the major island of the Archipelago (hence its name). Tawila island extends for more than 16 km, with breadth not exceeding 1.5 km, while the rest of the islands of the Archipelago, are very small, hardly larger than few kilometers length: Sharifa has a length of approximately 2.5 km, while its maximum breadth is about 1.4 km; Halhala island is a very small one (ca. 1.6 × 0.8 km) which extends nearly east-west orientation.

Ghurab island is situated south of Jeddah, in the central part of the eastern Red Sea coast line. It lies about 1.5 km from the seashore between the coordinates: Latitude 21°35'N and Longitude 39°10' (Fig. 2).

The climatic conditions over the area of study are illustrated by the meteorological data of stations at Jeddah and Gizan (Anon, 1979). Jeddah and Gizan showed almost similar climatic conditions (Table 1).

TABLE 1. Annual means of some meteorological data of Jeddah and Gizan over the period from 1970 to 1979.

Climatic elements	Jeddah	Gizan
Total precipitation (mm)	70.4	62.9
Temperature, daily (°C)		
Maximum	33.5	35.4
Minimum	23.1	26.1
Mean	28.0	30.3
Relative humidity (%)		
Maximum	100	100
Minimum	3	3
Mean	61	66

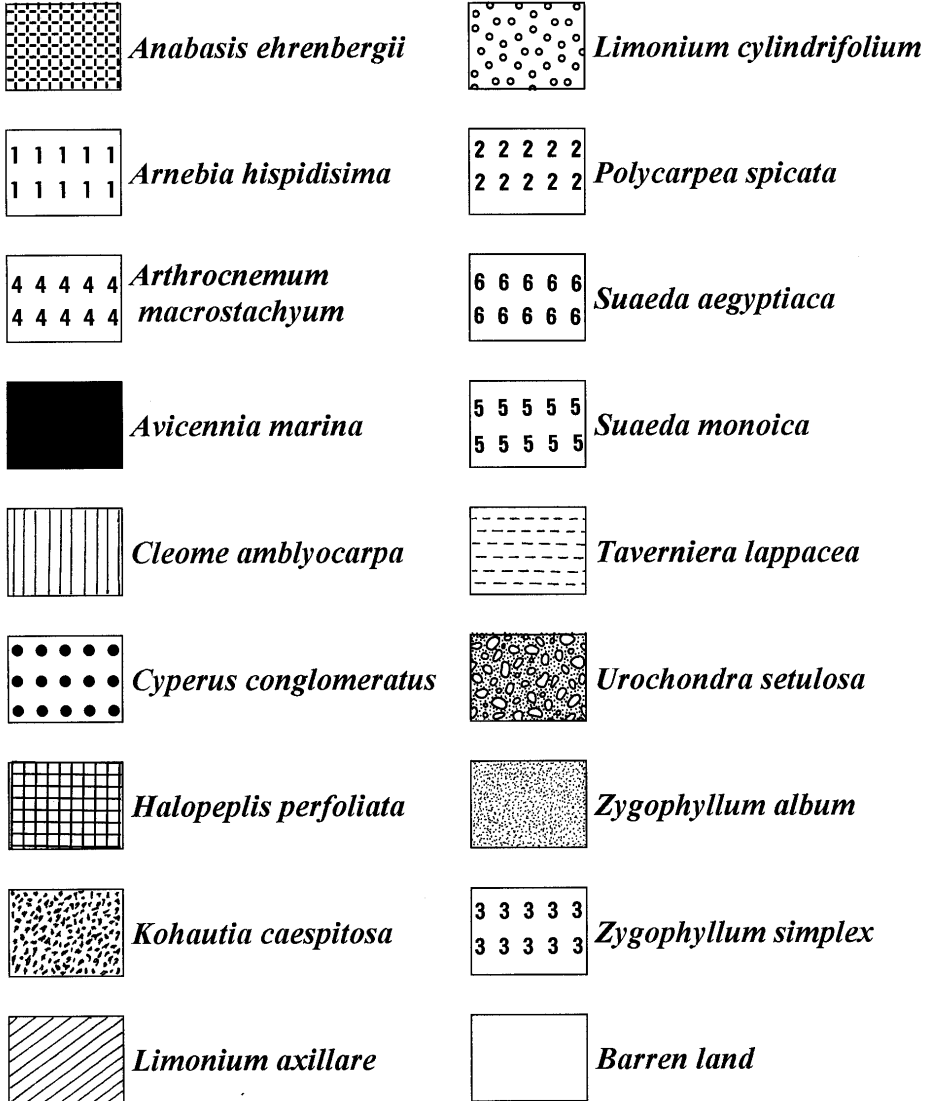


FIG. 1. Key for the species recorded in the study area.

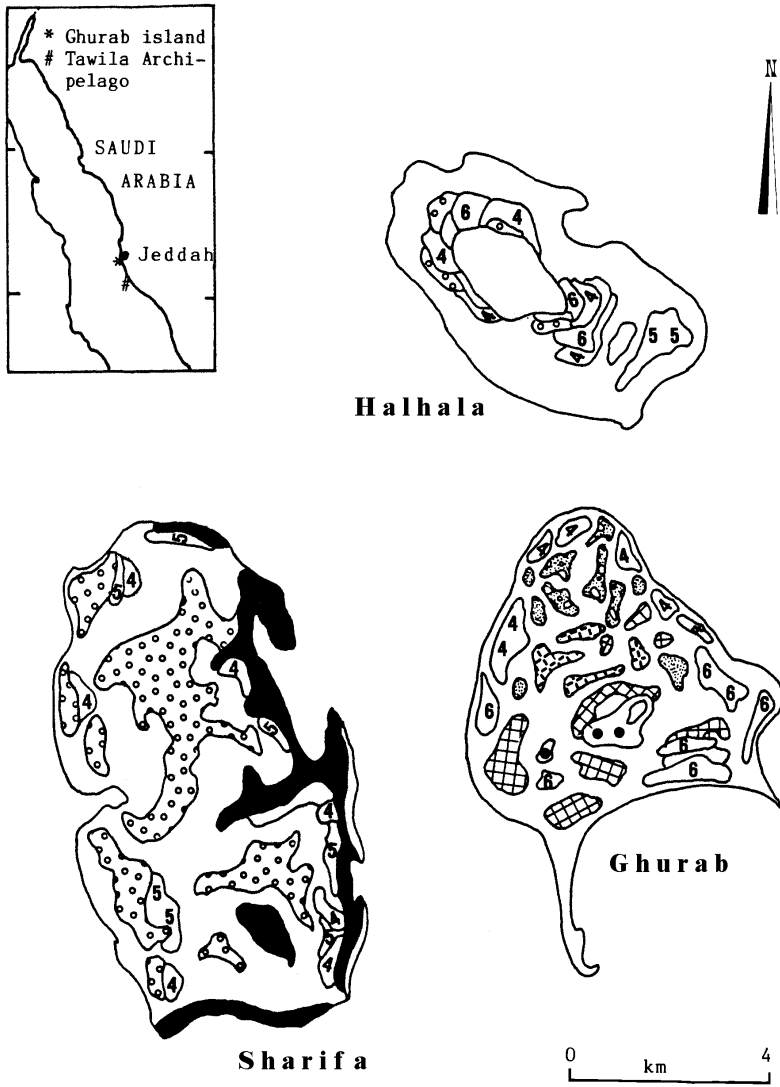


FIG. 2. Geographical situation of the study area and vegetation maps of Halhala, Sharifa and Ghurab islands.

The tidal amplitude is low (about 0.5 m), and the mean sea level increase during the winter season (Edwards, 1987).

Methods and Techniques

No topographical maps are known for the study area. The study, therefore, is based on the topographical maps prepared by the authors. The vegetation has been studied along the required transects for each island either E/W or S/N direction through the whole length of the islands. The system used here for describing the plant community is that of Braun-Blanquet (1964).

Plant collections were mainly identified in the herbarium of Cairo University and Assiut University (Egypt). Duplicates of the collections are kept in the Herbarium of King Abdulaziz University (Jeddah, Saudi Arabia), in addition to the above mentioned Herbaria. Identification was done according to Chaudhary (1989, 1999), Collenette (1998), Migahid (1996) and Miller & Cope (1996).

In this paper; P = presence value in %; AB = combined scale value, according to Braun-Blanquet (1964).

Results

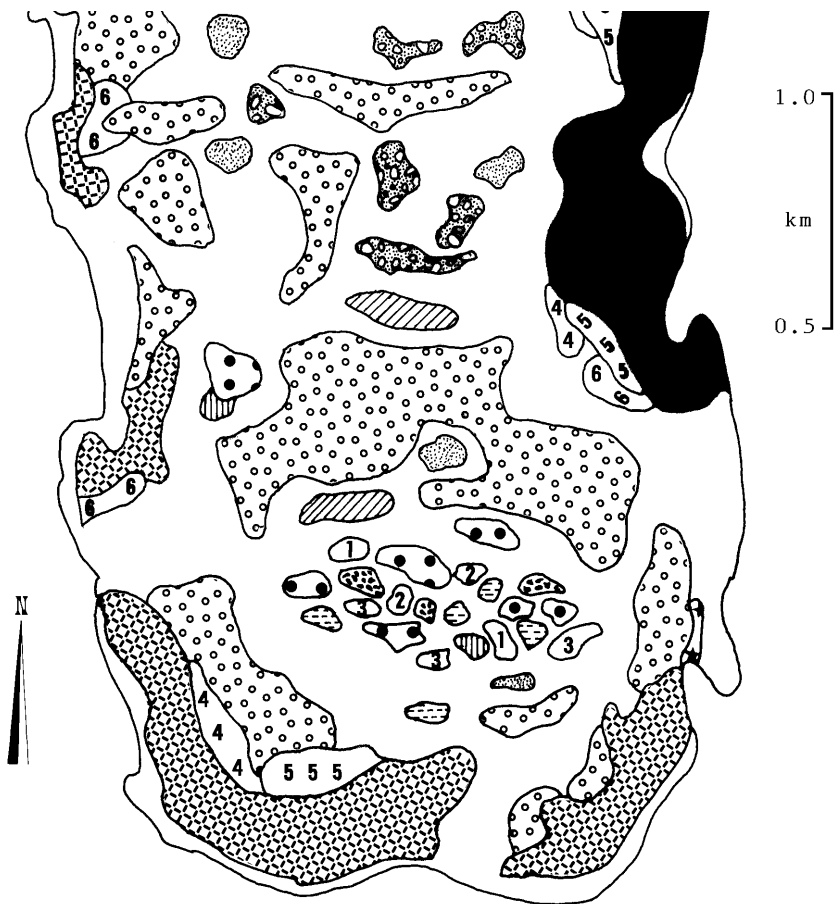
1. Tawila Archipelago

1.1 Tawila island

The soil varies between sandy-muddy to loose and covered with thin layer of salt crust. This habitat supports the growth of the mangrove species *Avicennia marina* (Fig. 3, 4) towards the land (compared also Mandura & Khafajii, 1994 and Saifullah, 1996). On the other hand swampy areas were occupied by *Urochondra setulosa* (Trin.) C.E. Hubb. (= *Vilfa setulosa* Trin.), which is a shortly rhizomatous, tussocky, perennial grass. It is the only species in a monotypic genus.

Limonium cylindrifolium – *Anabasis ehrenbergii* community.

Species	P (%)	AB
a. Tree layer		
Not represented		
b. Shrub layer		
<i>Avicennia marina</i> (Forssk.) Vierh.	10	+ .4
<i>Limonium cylindrifolium</i> (Forssk.) Verdc. (Fig. 6)	100	2.3
<i>Suaeda monoica</i> Forssk. ex J.F. Gmel.	10	1.2
<i>Suaeda aegyptiaca</i> (Hasselq.) Zoh.	10	1.2



Tawila

FIG. 3. Vegetation map of the studied sector of Tawila island.



FIG. 4. Two stands showing the luxurious vegetation, with obvious stratification of Sharifa island (A) and almost pure stand of *Limonium cylindrifolium* in the vegetation of Tawila island (B).



FIG. 5. Mosaic pattern of vegetation: Ghurab island (A) and Halhala island where the vegetation is interrupted by a small lagoon (B).



FIG. 6. Flourishing species in the vegetation of the study area: *Anabasis ehrenbergii* (A) and *Limonium cylindrifolium* (B).

Limonium (Contd.)

Species	P (%)	AB
b. Dwarf shrubs and perennial herbs		
<i>Anabasis ehrenbergii</i> Schweinf. (Fig. 6)	100	2.5
<i>Urochondra setolosa</i> (Trin.) C.E. Hubb.	10	1.2
Species	P (%)	AB
<i>Taverniera lappacea</i> DC.	10	1.2
<i>Kohautia caespitosa</i> Schnitzl.	10	1.2
<i>Limonium axillare</i> (Forssk.) O. Kuntze (Fig. 6)	10	+ .1
<i>Arthrocnemum macrostachyum</i> (Moric.) K. Koch	10	+ .1
<i>Cyperus conglomeratus</i> Rottb.	10	+ .1
<i>Zygophyllum album</i> L. f.	10	+ .1
<i>Cleome amblyocarpa</i> Barr. & Murb.	10	+ .1
d. Ephemerals		
<i>Arnebia hispidissima</i> (Lehm.) DC.	10	+ .1
<i>Polycarpaea spicata</i> Wight & Arn.	10	+ .1
<i>Zygophyllum simplex</i> L.	10	+ .1

1.2 Sharifa island

This island is more elevated in its western parts (Fig. 2, 4). The soil is sandy-muddy and remarkably rich in organic matter. Elevation above sea level ranges from 0 to 4 meter.

Sharifa island is characterized by its luxurious vegetation as compared with other studied sites. Plant cover reaching 80%, with obvious stratification of the vegetation. This could be recognized as follows:

a. Shrub layer (up to 4 m high): This layer is represented by *Avicennia marina* (P = 100), which grows about sea level. This mangrove species contribute about 30% of the total plant cover of the island.

b. Undershrub layer (not exceeding 2 m high): Two halophytes represents this layer, namely *Limonium cylindrifolium* (P = 100) and *Suaeda monoica* (P = 60). The former species (*L. cylindrifolium*) is characterized by its very narrow almost cylindrical leaves (hence its specific name). It abounds on the drier areas about 1 m above sea level and occupies most of the central parts of the island. This species contributes about 40% of the total plant cover. On the other hand *Suaeda monoica* grows in the relatively wet habitats, about 70 cm above sea level close to the mangrove species near the seashore.

c. Ground layer (30-80 cm): This layer is represented by *Arthrocnemum macrostachyum* (P = 40) which is characterized by its cylindrical jointed dark

green stems. It grows about 1 m above sea level forming scattered patches near the borders of the island.

1.3. Halhala island

This island is made up of dead coral reefs. The vegetation is restricted to a central stripe interrupted by two small lagoons (Fig. 2, 5). Plant cover ranges between 15 and 20% of the total area of the island. The vegetation takes a mosaic pattern composed of four species, namely *Limonium cylindrifolium* (P = 50), *Arthrocnemum macrostachyum* (P = 40), *Suaeda aegyptiaca* (P = 40) and *Suaeda monoica* (P = 20). *Suaeda monoica* was found to occupy the most elevated parts of the island towards the land.

2. Ghurab Island

This island takes the shape of a triangle (ca. 1 km base and 1.3 km height), with a southern very narrow extension (Fig. 2, 5). It is more elevated in the southern parts, this elevation decreases gradually northwards.

The vegetation of Ghurab island shows a mosaic pattern (Monod, 1954). Only two species were recorded in the southern elevated parts namely *Halopeltis perfoliata* (P = 40), and *Suaeda monoica* (P = 50). The marginal parts, especially the western side, was occupied by *Arthrocnemum macrostachyum* (P = 60), whereas the central sector supports the growth of *Anabasis ehrenbergii* (P = 10). The swampy areas of the low-laying northern parts of the island were found occupied by *Urochondra setulosa*. Associated species include *Zygophyllum album* (P = 10), *Cyperus conglomeratus* (P = 10) and *Zygophyllum simplex* (P = 10).

Discussion

The most striking marine plants of the study area are the mangrove species *Avicennia marina*. This species were not widespread in the study area, since it is found only in Sharifa and the studied sector of Tawila island. According to Saifullah (1996), the mangroves of Saudi Arabian Red Sea coast are unique in the sense that they thrive in the most unfavourable conditions. *Avicennia marina* is known to occur as long as the habitat is sheltered and depositional. It is a pioneer species in mangrove succession (Macnae, 1968). It also shows zonation in the study area, where it is found to occur towards the land (compare also Mandura & Khafajii, 1993).

There is a clear correlation between elevation above sea level, soil texture and the distribution of the different plant species: Low-laying areas, about sea level, where the soil is sandy-muddy to loose and covered with thin layer of salt

crust, support the growth of species such as *Avicennia marina*, *Suaeda aegyptiaca*, *Arthrocnemum macrostacyum* and swampy areas are occupied by *Urochondra setulosa* grass. On the other hand the inland parts (over 1 m above sea level) are remarkably drier and more saline due to water evaporation. This habitat supports the growth of *Limonium cylindrifolium*. Elevated sites, with drier and coarser soil, are characterized by species such as *Anabasis ehrenbergii*, *Taverniera lappacea*, *Kohautia caespitosa*, *Cyperus conglomeratus* and *Arnebia hispidissima*. Stratification of vegetation is obvious, especially in Sharifa island: Shrub layer, undershrub layer and ground layer.

The impact of salinity, extreme aridity and the scanty rains in the area of study is quite clear from the poverty of species encountered, where only 17 species, of which 14 perennials were recorded.

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حياة النبات في جزر ساحل البحر الأحمر السعودي ١ - أرخبيل الطويلة وجزيرة غراب

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المستخلص. تناول الدراسة الحالية حياة النبات في أرخبيل الطويلة (جزر الشريفة ، حلحلة والقطاع الجنوبي من جزيرة الطويلة) بالإضافة إلى جزيرة غراب وذلك كبدائية لسلسلة من الدراسات عن جزر ساحل البحر الأحمر السعودي . ويقع أرخبيل الطويلة على بعد حوالي ٤ كم غرب مدينة الليث بينما تقع جزيرة غراب جنوب مدينة جدة . ولقد وجد أن الارتفاع عن مستوى سطح البحر وطبيعة التربة تؤثر بشكل مباشر على توزيع النباتات في منطقة الدراسة. وأهم ما استلقت النظر، في الغطاء النباتي لتلك الجزر، توزيع نبات الشورى (*Avicennia marina*) حيث سجل في الأماكن المنخفضة والمحمية والتي تواجه الشاطئ في كل من جزر الشريفة والطويلة ، ولقد صاحب ذلك نمو أنواع نباتية أخرى : *Suaeda aegyptiaca* ، *Arthrocnemum macrostachyum* تميزت مناطق المستنقعات بنمو نبات *Urochondra setulosa* في حين أن المناطق المرتفعة نسبياً والتي تميزت التربة فيها بوجود طبقة من الأملاح نظراً لتبخر مياه البحر انتشر فيها نبات *Limonium cylindrifolium* . أما الأماكن الأكثر ارتفاعاً ذات التربة الجافة فلقد ظهر بها أنواع نباتية أخرى : *Taverniera Kohautia caespitosa* ، *lappacea* . كما تم تسجيل عشيرة نباتية في جزيرة الطويلة يسودها *Limonium cylindrifolium-Anabasis ehrenbergii* . كان لتأثير الظرف السائد في منطقة الدراسة (الملوحة العالية، الجفاف الشديد، ندرة الأمطار، ارتفاع درجات الحرارة) أثر واضح على العدد الكلي للأنواع النباتية التي تم حصرها في المنطقة ولم يتعد هذا العدد ١٧ نوعاً من النباتات الوعائية منها ١٤ من الأنواع المعمرة.

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