

DISTRIBUTION OF SEAWEEDS IN THE QATARI ARABIAN GULF.

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ABSTRACT

The seaweeds in the Qatari Arabian Gulf are more productive during the time of low water temperature. Within their vegetation period, November 1986 - April 1987, the Qatari seaweeds were surveyed at 12 sites along the coasts of the Qatari Peninsula. In spite that the Qatari water represents only 15 % of the Arabian Gulf, the 68 taxa identified in the area formed 50 % of the total algal flora found in the whole Arabian Gulf.

The Qatari algal flora was composed of 19 chlorophyceae, 21 phaeophyceae, 28 rhodophyceae, besides 3 spermatophytes. Twenty four species were restricted in their occurrence to the Qatari coasts, while 21 species were found to be widely distributed in the Arabian Gulf. The distribution of the algae showed significant differences among the different parts of the Arabian Gulf. A similarity between the algal species in the Arabian Gulf and the Red Sea was observed and it was greater than that noticed between the Arabian Gulf and the Arabian Sea.

INTRODUCTION

The coast line of Qatari Peninsula extends about 700 km. Significant part of the intertidal zone along the coast is occupied by intensive growth of marine seaweeds. Few papers have been published dealing with the distribution of seaweeds in different localities in the Arabian Gulf (Endlicher and Diesing, 1845; Newton, 1955 a & b; Nizamuddin and Gessner, 1970; Basson, 1979 a & b and Jones, 1986), but none of these papers tackled the seaweeds along the Qatari Coasts. Recently, Mshigeni and Dorgham (1987), surveyed the Qatari algae during the cold season from November 1986 to February 1987, where they listed 66 species with illustrating photographs.

The geographic position of Qatari Peninsula, on the mid-western coast line of the Arabian Gulf, indicates its ecological importance as it includes several localities differing in their ecological characteristics. Undoubtedly, the impact of such characteristics should be reflected on the occurrence and distribution of seaweeds in the study area.

In this paper, the author tried to highlights on the distribution and abundance of marine seaweeds in the Qatari water during their most productive period with reference to the ecological conditions prevailing in the area. Furthermore, geographical distribution of the algal species in the Arabian Gulf as well as in the adjacent seas was also considered.

Qatari peninsula can be divided ecologically into two main parts; the eastern side and western side (Gulf of Salwa). The eastern side extends tens of kilometers in width and is mostly characterized by sandy or sandy-muddy bottom with patches of limestone/marble or sandstone bed rocks. Along a great part of the coast line, rocky platform covers significant area of the intertidal zone, which in places is covered with thin layer of sand. The majority of the intertidal platform is nearly bare. However, at the high tide marks several rocky pools are found containing big stones with relatively rich algal vegetation. Furthermore, the lower intertidal habitats, which are periodically subjected to wave splash and spray, and the upper sublittoral zone were found to support quite rich algal flora, especially in the rocky areas with a moderate degree of wave action. Sea grass beds were also found, particularly on the sandy-muddy areas. The great part of the eastern side of the Qatari Peninsula had depths less than 10 m.

The western side of the Peninsula is very shallow extending for few kilometers westward with an average depth of 4 m. A wide rocky platform is also present in the intertidal zone, which is mostly bare, but in some places significant parts were densely covered with the brown alga, *Hormophysa triquetra*.

The water temperature in both sides of the Peninsula, during the period of investigation, varied between 13 and 22°C, but at the time of low tide the water in the intertidal zone increased 2-3°C due to the effect of the high sunshine on the very shallow water at that time.

Salinity showed significant variations between the eastern and western sides. In the eastern side, salinity in the intertidal zone ranged from 42 to 43 ‰, while in the same area of the western side, it varied between 55 and 60 ‰.

Nutrients were also different in the two sides of the Qatari Peninsula. In the eastern side, the variation ranges of the nitrate, phosphate and dissolved silicon were 0.07-0.32 $\mu\text{g at l}^{-1}$, 0.06-0.32 $\mu\text{g at l}^{-1}$ and 0.59-6.08 $\mu\text{g at l}^{-1}$ respectively. In the Gulf of Salwa, nitrate varied between 0.23 and 0.50 $\mu\text{g at l}^{-1}$, phosphate : 0.16-0.31 $\mu\text{g at l}^{-1}$ and the dissolved silicon : 3.89-5.09 $\mu\text{g at l}^{-1}$.

MATERIAL AND METHODS

According to the continuous field observations, the period chosen for the present study was the most suitable for sample collection, as the algal vegetation attains its maximum growth. During the period from November 1986 to April 1987 monthly collection of benthic marine algae was carried out at 12 sites along the Qatari coasts (Fig. 1)

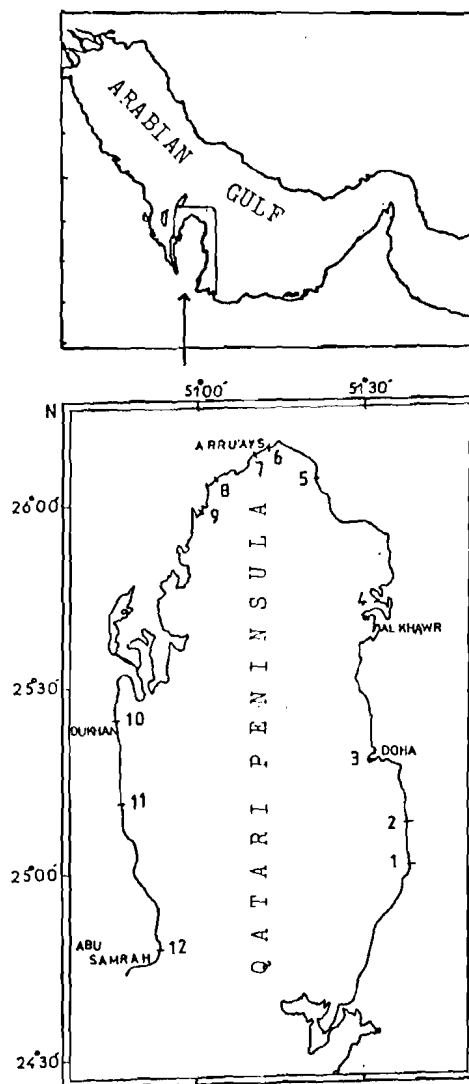


Fig. 1

The study area and the sites of collection.

Apart of the collected samples was preserved in 4 % formalin seawater and the other part was pressed onto herbarium, using standard procedures (Abbott and Dawson, 1978).

Field observations were made to follow the abundance, extension of the algal distribution on the sea bottom, water level during the time of collection as well as, the nature of the bottom.

Taxonomic identifications of the various specimens were done following several authors cited by Mshigeni and Dorgham (1987), who gave photographs of the representative taxa. Geographical distribution of the species was based on Borgesen (1934); Jassund (1976); Aleem (1978 a,b,c and 1981); Basson (1979 a & b); Natour et al. (1979 a & b) and Jones (1986).

RESULTS

The period of investigation coincided with the flourishing time of the majority of macroalgae in the study area. The total number of the taxa (68 spp.) identified throughout the period of study, in addition to 20 unidentified species form about 60 % of the algal flora recorded previously in the Arabian Gulf (Newton, 1955 a & b; Nizamuddin and Gessner, 1970; Basson, 1977 a & b and Jones 1986). Most of the unidentified species belong to cyanophytes and crustose red algae. The identified species comprised : 19 Chlorophyceae, 21 Phaeophyceae, 28 Rhodophyceae, in addition to 3 species of Spermatophyta.

The distribution of the algal species in Qatari water as well as their geographical distribution in the Arabian Gulf and other seas were involved. The arrangement of the species within the taxonomic groups follows the alphabetical system regardless their position in the groups.

I- Chlorophyceae

Acetabularia calyculus Quoi et Gaimard.

Attached in dense growth to small stones at the high tide mark near the shore line; found during February and March only in the western side of the Peninsula, particularly at St. 10.

Geographical distribution: Arabian Gulf, Arabian Sea, Red Sea, West Coast of Australia, China Sea, Mauritius and West Indies.

Boodlea composita (Harv. et Hook. fil) Brand.

Very rare, occasionally observed in December at the northwestern end of the Peninsula (St. 6).

Geogr. dist. : Arabian Sea, Red Sea, Indian Ocean and Pacific Ocean.

Caulerpa nummularia (Harv.) Reink.

Very rare, recorded once in the midwestern side (St. 10).
Geogr. dist.: Red Sea.

Chaetomorpha aerea (Dillwyn) Kutzing.

The most widespread species of the Genus *Chaetomorpha* in the study area. Collected from several stations on both sides of Qatari Peninsula. It was abundant during the coldest period (February), and usually covers the stones in areas subjected to wave action.

Geogr. dist. : Widespread in the Arabian Gulf, Red Sea and Cosmopolitan.

Chaetomorpha indica Kutzing.

Less frequently observed on the western side (St. 10) on stones, often associated with other algae.

Geogr. dist. : Arabian Gulf, Red Sea and Indian Ocean.

Chaetomorpha linum (Muller) Kutzing.

Frequent at some sites, particularly at the eastern side.

Geogr. dist. : Arabian Gulf, Arabian Sea, Red Sea and Cosmopolitan.

Cladophora koiei Borgesen.

Frequently recorded on both sides, mostly in small quantities, associated with other algal species at the high tide mark.

Geogr. dist. : Arabian Gulf and Tanzania.

Cladophora patentiramea (Mont.) Kutz. f. *longiarticulata* Reinbold.

Observed from November to February, mostly on the western side. It was abundant in February at St. 11, particularly in the exposed area.

Geogr. dist. : Tanzania.

Cladophora sericoides Borgesen.

The most common species of this genus in Qatari Peninsula is wide-spread in the intertidal zone of both sides.

Geogr. dist.: Arabian Gulf, Arabian Sea and Tanzania.

Cladophoropsis sundanensis Reinbold.

Recorded during several months along the Peninsula coasts, but often less frequent, usually associated with other algae near the shore.

Geogr. dist.: Arabian Sea and Indian Ocean.

Cladophoropsis zollingeri (Kutzing) Borgesen.

Usually present in the cold months (December-February) but not common; epiphytic or attached to rocks in the upper intertidal zone.

Geogr. dist.: Widely distributed in the Arabian Gulf, Arabian Sea, Red Sea and Malaysia.

Dictyosphaeria cavernosa (Forsskal) Borgesen.

Common alga on Qatari Coasts, usually less frequent to rare on the eastern side. It was observed as green hollow or nearly spherical sessile masses scattered in the intertidal zone.

Geogr. dist.: Arabian Gulf, Red Sea, Indian Ocean and Pacific Ocean.

Enteromorpha clathrata (Roth) J. Agardh.

One of the most common algae in Qatari marine habitat forming a thick mat-like growth on the exposed rocks and stones at the high tide marks; more dense in the eastern side, particularly during February.
Geogr. dist.: Widespread in the Arabian Gulf and Cosmopolitan.

Enteromorpha flexuosa (Wulfen ex Roth) J. Agardh

Usually rare to less frequent, attached to stones or animal shells near the shore.
Geogr. dist.: Arabian Gulf, Red Sea and Cosmopolitan.

Enteromorpha intestinalis (Linnaeus) Link.

Observed mostly on the eastern side from February to April. It was abundant in April.
Geogr. dist.: Arabian Gulf, Arabian Sea, Red Sea and Cosmopolitan.

Enteromorpha kylinii Bliding sensu Dawson.

Usually associated with other algae or attached to small rocks or stones in the exposed areas; most abundant in February on both sides of the Peninsula.
Geogr. dist.: Tanzania.

Enteromorpha ramulosa (J.E. Smith) Hooker.

Limited in occurrence, recorded only on the eastern side (Sts. 1 & 2).
Geogr. dist.: Tanzania.

Rhizoclonium kochianum Kutzing.

Epiphytic on several filamentous algae as *Cladophora*, *Chaetomorpha*, *Ectocarpus* and others but often not common.
Geogr. dist.: Arabian Gulf, Arabian Sea, Red Sea, West Indies, Atlantic Ocean and Malayan Archipelago.

Ulva pertusa Kjellman.

Very rare in the whole study area, recorded only in February on the northwestern side.
Geogr. dist.: Tanzania.

II- Ohaephyceae

Colpomenia sinuosa (Mertens ex Roth) Derbes et Solier.

Common alga throughout the period of investigation on both sides of the Peninsula. Usually is rare on the western side. It was more frequent in the southeastern part, particularly on the sandy bottom of the midlittoral and near shore areas with maximum diameter of the hollow sphere algae of 15 cm.

Geogr. dist.: Common in the Arabian Gulf, Red Sea and Widespread in all warm waters.

Cystoseira myrica (Gmelin) C. Agardh.

Widely distributed in the study area but not abundant. Observed in the near shore area on rocks, stones, and in rocky pools, where it sometimes form dense growth and more abundant in the western side.

Geogr. dist.: Widely distributed in the Arabian Gulf, Arabian Sea, Red Sea and Tropical seas.

Cystoseira trinodis (Forsskal) C. Agardh.
Common in the whole area during the period of investigation. Most abundant during the cold months (December-February). Widely distributed in the midlittoral zone at depths up to 1m at the low tide water.
Geogr. dist.: Arabian Gulf, Red Sea and Indian Ocean.

Dicytyota cervicornis Kutzing, Jassund.
Widespread on the eastern side, particularly in the midlittoral area at depth range 1-2 m. The alga attains its maximum growth during February-April. It was rarely observed on the western side.
Geogr. dist.: Red Sea and Tanzania.

Dictyota divaricata Lamouroux.
Rare in the whole area, occasionally recorded on the western side (St. 10), especially on the sheltered part of the exposed rocks.
Geogr. dist.: Arabian Gulf, Arabian Sea, Red Sea and West Indies.

Giffordia indica (Sonder) n. Comb.
Epiphytic with *Sphacelaria* sp. on large algae as *Sargassum*, *Cystoseira trinodis* or rocky shores, usually frequent to common.
Geogr. dist.: Arabian Gulf, Red Sea, Indian Ocean and Atlantic Ocean.

Giffordia mitchellae (Harvey) Hamel.
Widespread on the rocky shores forming smooth mucous brownish layer in the exposed areas. Found also attached to other algae.
Geogr. dist.: Common in the Arabian Gulf, Arabian Sea, Red Sea, Indian Ocean and Atlantic Ocean.

Giffordia rallsiae (Vickers) Taylor
Recorded one time at St. 2 associated with other algae.
Geogr. dist.: Tanzania.

Hormophysa triquetra (C. Agardh) Kutzing.
One of the most dominant algae in the whole area throughout the period of study. It covers a great part of the rocky midlittoral area forming a forest-like growth. The growth density of this alga was significantly heavier along the western coasts. In general, it occupies the second order of abundance in the study area after *Sargassum boveanum*.
Geogr. dist.: Widely distributed in the Arabian Gulf, found in the Red Sea, Indian Ocean and Pacific Ocean.

Nematocystus decipiens (Suringar) Kuckuck.
Attached to *Sargassum*, particularly in the sublittoral zone, usually common.
Geogr. dist.: Arabian Gulf and Indian Ocean.

Sargassum angustifolium (Turner) J. Agardh

Rarely recorded in the western side.

Geogr. dist.: Arabian Gulf and widely distributed in the tropical seas.

Sargassum aquifolium (Turner) Agardh.

Less frequent in the area and found only on the eastern coasts.

Geogr. dist.: Red Sea, Indian Ocean, Malayan Archipelago and Polynesia.

Sargassum binderi Sonder.

Very common along all the Qatari Coasts during the whole period of study, most abundant in winter, particularly in February. It was usually found in the sublittoral zone attached to the rocky bottom.

Geogr. dist.: Common in the Arabian Gulf and recorded also in the Indian Ocean.

Sargassum boveanum J. Agardh.

The most dominant species in all parts of the study area. It was permanently observed from November to April with maximum density in March. Often dominated in the sublittoral zone and also found in the midlittoral area together with *Cystosera trinodis*. It was sometimes observed drifted in large masses at the offshores. After a stormy weather great quantities (heaps) of *Sargassum*, *Hormophysa* and *Cystoseira trinodis* were observed along the coasts.

Geogr. dist.: Very abundant in the Arabian Gulf and Red Sea.

The variety *Sargassum boveanum* v. *aterrimum* Grunow which is common in the Arabian Gulf was also observed in the area associated with the species itself.

Sargassum crassifolia J. Agardh.

Rarely recorded at few stations among the drifting algae.

Geogr. dist.: Arabian Gulf, Red Sea, Australia, Philippines, Japan and Indian Ocean.

Sargassum denticulatum (Forsskal) Borgesen.

Observed drifted on the sea shore and usually rare.

Geogr. dist.: Red Sea.

Sargassum heteromorph J. Agardh.

Very common alga on the two sides of the Qatari Peninsula, abundant in the sublittoral and midlittoral zones and more abundant during February.

Geogr. dist.: Arabian Gulf.

Sphacelaria furcigera Kutzing.

Frequently recorded associated with other algae such as *Sargassum*, *Hormophysa*, *Cystoseira trinodis*.

Geogr. dist.: Arabian Gulf, Red Sea, Mediterranean Sea, Atlantic Ocean, Indian Ocean and Pacific Ocean.

Padina gymnospora (Kutzing) Vickers.

Common only on the eastern coasts, particularly on rocky bottom covered with sand in the midlittoral zone and most abundant in April, when the water temperature begins to rise.

Geogr. dist.: Widely distributed in the Arabian Gulf and tropical and subtropical waters.

III- Rhodophyceae

Acanthophora spicifera (Vahl) Borgesen.

Observed in significant quantities in the rocky pools, usually associated with *Chondria* sp. It was restricted to the eastern coasts.

Geogr. dist.: Widespread in the Arabian Gulf and Indian Ocean.

Amphiroa fragilissima (L.) Lamour

Recorded only in April in significant quantities in the form of clumps in the intertidal zone.

Geogr. dist.: Arabian Gulf, Red Sea and Indian Ocean.

Centroceras clavulatum (C. Agardh) Mont.

Rarely found, epiphytic on other algae.

Geogr. dist.: Common in the Arabian Gulf and Cosmopolitan.

Ceramium luetzelburgii Schmidt

Attached to other algae and less frequent.

Geogr. dist.: Arabian Gulf and warm waters.

Ceramium masonii Dawson

Very rare and recorded drifting among plankton samples in December.

Geogr. dist.: Tanzania.

Chondria collinsiana Howe.

Less frequent, sometimes abundant (St. 6) and found in rocky pools.

Geogr. dist.: Tanzania.

Chondria dasyphylla (Woodward) C. Agardh.

Observed during the whole period of investigation. Widely distributed on rocks and stones in rocky pools found in the near shore of both sides, it was sometimes recorded in dense growth.

Geogr. dist.: Common in the Arabian Gulf, tropical waters.

Digenia simplex (Wulfen) C. Agardh.

Very common in the study area all round the period of investigation, found attached to the dead corals in the intertidal zone and more abundant in the western coasts.

Geogr. dist.: Red Sea and warm waters.

Herposiphonia secunda (C. Agardh) Ambronn.

Grows as red crust on the exposed rocks near the shoreline. Recorded only in the western side.

Geogr. dist.: Tanzania.

Hypnea cornuta (Kützinger) J. Agardh.

Usually less frequent, found in the midlittoral to eulittoral areas and mostly in the eastern side.

Geogr. dist.: Well known from the Arabian Gulf, warm waters.

Hypnea valentiae (Turner) Montagne.

Very rarely recorded.

Geogr. dist.: Arabian Gulf and Indian Ocean.

Jania adherens Lamouroux.

Frequently observed in the intertidal zone attached to the other algae such as *Hormophysa*.

Geogr. dist.: Red Sea, Japan, Tanzania and West Indies.

Jania pumila Lamouroux.

Less frequently observed attached to Sargassum.

Geogr. dist.: Red Sea, West Indies, Canary Islands and Indian Ocean.

Jania rubens (L) Lamour.

Very common in the study area, particularly in the midlittoral zone, where it was found either attached to other algae as *Digenia* or forming widely distributed clumps.

Geogr. dist.: Widespread in the Arabian Gulf, Red Sea, Atlantic Ocean and Indian Ocean.

Laurencia elata (C. Agardh) Harvey

Frequent to common in February on both sides of the Qatari Peninsula, observed also in November and usually attached to the sheltered parts of the exposed rocks.

Geogr. dist.: Tanzania.

Laurencia intermedia Yamada.

Occasionally recorded at St. 6 on the rocky bottom of the eulittoral area.

Geogr. dist.: Tanzania.

Laurencia obtusa (Huds.) Lamouroux.

Very common during March and April in all coasts. Widely distributed in the rocky pools and on rocks in the eulittoral zone.

Geogr. dist.: Arabian Sea, Red Sea, Mediterranean Sea and Atlantic Ocean.

Laurencia paniculata (C. Agardh) J. Agardh.

Usually less frequent, sometimes abundant (St. 8) and observed on both sides associated with other species on the same genus.

Geogr. dist.: Common in the Arabian Gulf and Mediterranean Sea.

Laurencia papillosa (Forsskal) Greville.

Common in the crevices of the exposed rocks, usually associated with *Cystoseira myrica* and common to abundant in February and March.

Geogr. dist.: Well known in the Arabian Gulf, Red Sea, Mediterranean sea, Atlantic Ocean, Indian Ocean and Pacific Ocean.

Laurencia poitei (Lamx.) Howe
Rarely observed in the midlittoral area.
Geogr. dist.: Tanzania.

Polysiphonia broadiae (Dillwyn) Greville
Common to abundant in the western coasts, widely distributed in the form of tufts on stones and rocks on the sandy bottom of the eulittoral zone.
Geogr. dist.: Arabian Gulf and widespread in tropical waters.

Polysiphonia coacta Tseng
Widespread on the western coasts, particularly in February and common on exposed rocks near the shore.
Geogr. dist.: Tanzania.

Polysiphonia crassicollis Borgesen
The most common *Polysiphonia* species in the study area, abundant in March on both sides and found attached to rocks and stones in the eulittoral zone.

Geogr. dist.: Common in the Arabian Gulf, Red Sea and Indian Ocean.

Polysiphonia ferulacea Suhr (ex J. Agardh)
Recorded only on the eastern coasts during April but with significant quantities (St. 10).
Geogr. dist.: Arabian Gulf and Tanzania.

Polysiphonia kampsaxii Borgesen
Restricted to mangrove habitat, where it densely grows, particularly in March.
Geogr. dist.: Arabian Gulf and Arabian Sea.

Polysiphonia platycarpa Borgesen
Frequently recorded during several months, common in February at St. 6 and usually found near the shore.
Geogr. dist.: Tanzania.

Spyridia filamentosa (Wulfen) Harvey
Common in the whole area from November to April, abundant on rocks in rocky pools and more frequent in March and April.
Geogr. dist.: Well known in the Arabian Gulf and widespread in tropical waters.

Wurdemannia miniata (Draparnand) Feldmann et Hamel
Very rare and found attached to other algae.
Geogr. dist.: Arabian Gulf and Tanzania.

IV- Spermatophyta

Halophila ovalis (R. Br.) Hook
Less frequently found in the sublittoral area on the sandy bottom.
Geogr. dist.: Arabian Gulf.

Halophila stibulace (Forsskal) Aschars
Common in the sublittoral area attached to the sandy-muddy
bottom.

Geogr. dist.: Arabian Gulf.

Halodula uninervis (Forsskal)

Very common in the whole area, but more abundant on the eastern side where it covers large areas of the sandy bottom in the sublittoral and midlittoral zone.

Geogr. dist.: Widespread in the Arabian Gulf and Indian Ocean.

DISCUSSION

The distribution of the algal flora along the coasts of the Qatari Peninsula showed very interesting pattern. From the quantitative point of view, the brown algae were the most abundant, while the red algae were the most diversified.

As regards to their zonal distribution in the study area, the green algae were found mostly at the upper intertidal zone near the shore, the red algae were widely distributed in the rocky pools or in the eulittoral zone, and the brown algae were concentrated in the midlittoral and sublittoral areas.

The general observations made on the three algal divisions showed that, among the chlorophyceae, Chaetomorpha, Cladophora and Enteromorpha were the dominant genera in the whole area, while Dictyosphaeria cavernosa was abundant on the western coasts. The Phaeophyceae included several species found in large quantities. The dominant species comprised Sargassum, Cystoseira trinodis, Hormophysa triquetra, Colpomenia sinuosa, Padina gymnospora and less so Dictyota cervicornis. The red algae; Chondria, Digenia simplex, Laurencia, Jania and Polysiphonia were the most conspicuous members of this division.

It is noteworthy that throughout all the shores surveyed, the dominant colour of the various macrophytic red algae seen with the naked eye, (Chondria, Hypnea, Centroceras clavulatum, Laurencia papillosa) were yellowish, or straw colour. Such phenomenon may be apparently related to the relatively high content of carotenoids in the Qatari algae compared to those found in the corresponding species in East Africa, which are more greenish red (Mshigeni and Dorgham, 1987).

Some species (Digenia simplex, Polysiphonia coacta, Hormophysa triquetra, Dictyosphaeria cavernosa, Acetabularia calyculus, Cladophora patentiramea f. longiarticulata) were restricted to the western coasts or were found there more frequent than in the eastern coasts. Such observations may indicate the tolerance of these species to both high

salinity and high temperature prevailing the western coasts, where the water depth at the high tide reaches 1 m. On the other hand, *Dictyota cervicornis*, *Colpomenia sinuosa* were more abundant on the eastern side that may reflect their susceptibility to the high salinity and temperature.

Comparing with the algal species recorded in other parts of the Arabian Gulf (Nizamuddin and Gessner, 1970; Basson, 1979 a & b; Jones, 1986), 24 species were restricted to the Qatari shores (Table 1). The majority of those species were not recorded in the Arabian Sea or in the Red Sea (Borgesén, 1934; Aleem, 1978 a, b & c, 1981; Natour et al., 1979 a & b). Otherwise, 21 species of the Qatari algae were observed to be widely distributed in the Arabian Gulf (Table 2).

Table 1.

The algal species restricted to the Qatari Coasts.

<u>Chlorophyceae:</u>	<u>Rhodophyceae:</u>
<i>Boodlea composita</i>	<i>Ceramium masoni</i>
<i>Cladopora patentiramea</i>	<i>Chondria collinsiana</i>
f. <i>longiarticulata</i>	<i>Digenia simplex</i>
<i>C. sundanensis</i>	<i>Herposiphonia secunda</i>
<i>Caulerpa nummularia</i>	<i>Jania adherens</i>
<i>Enteromorpha kylinii</i>	<i>J. pumila</i>
<i>E. romulosa</i>	<i>Laurencia elata</i>
<i>Ulva pertusa</i>	<i>L. intermedia</i>
	<i>L. obtusa</i>
	<i>L. poitei</i>
<u>Phaeophyceae:</u>	<i>Polysiphonia coacta</i>
<i>Dictyota cervicornis</i>	<i>P. platycarpa</i>
<i>Giffordia indica</i>	
<i>G. rallsiae</i>	
<i>Sargassum aquifolium</i>	
<i>S. denticulatum</i>	

The fresh water flowing into the Arabian Gulf from Shatt et-Arab at its northern extremity and from the seasonal filled small rivers on the Iranian Coasts seems to impact the distribution of the algal flora in the Arabian Gulf. *Enteromorpha compressa*, *Cladophora nitellopsis*, *Ectocarpus cryptophilus*, *Dictyota indica*, *Liagora distenta* and *Gracilaria foliifera* were recorded in both Iranian and Kuwaiti Coasts, where the sea water is more or less affected by the influx of freshwater.

Table 2.

The algal species common to the Arabian Gulf.

<u>Chlorophyceae:</u>	<u>Rhodophyceae:</u>
<i>Cladophora koiei</i>	<i>Acanthophora spicifera</i>
<i>C. sericoides</i>	<i>Centroceras clavulatum</i>
<i>Enteromorpha clathrata</i>	<i>Ceramium luetzelburgii</i>
<i>E. intestinalis</i>	<i>Hypnea cornuta</i>
	<i>Polysiphonia broadiae</i>
<u>Phaeophyceae:</u>	<i>P. crassicolis</i>
<i>Colpomenia sinuosa</i>	<i>P. ferulacea</i>
<i>Dictyota divaricata</i>	<i>P. kampsaxii</i>
<i>Giffordia mitchellae</i>	<i>Wurdemanennia minita</i>
<i>Padina gymnospora</i>	
<i>Sargassum angustifolium</i>	
<i>S. boveanum</i>	
<i>S. crassifolium</i>	
<i>Spacellaria furcigera</i>	

A total of 138 macroalgal species were recorded in the Arabian Gulf (Nizamuddin and Gessner, 1970; Basrah, 1970; Jones, 1986; Mshigeni and Dorgham, 1987). Sixty of these taxa were found also in the Red Sea while only 27 taxa were observed in the algal flora in both Arabian Gulf and the Red Sea. The difference between the Arabian Gulf and the Arabian Sea. The algal community in the Red Sea was more diversified and it comprised 215 species while each of the Arabian Gulf and the Arabian Sea included 138 species.

Compared to other tropical regions, the Qatari flora showed significant differences. Thus, Chlorophyceae as a whole appeared to be notably poorer in Qatari water than that found in East Africa (Mshigeni and Dorgham, 1987). Some species like *Ulva simplex* and *Hormophysa triquetra* were found in the study area in quantities significantly higher than those observed in East Africa, Mauritius and Seychelles (Mshigeni and Dorgham, 1987). On the other hand, many of the typically common tropical genera were either rarely recorded or completely absent in Qatari water. Among them were the chlorophytes: *Halimeda*, *Caulerpa*, *Codium*, *Boergosenia*, *Chlorodesmia*; the phaeophytes: *Turbinaria*, *Spatoglossum*, *Stoehospermum*, *Dictyopteris*, *Pocockiella*, and the rhodophytes: *Eucheuma*, *Halymenia*, *Sarconema*, *Solieria* and *Amansia*. These genera are usually abundant in tropical

areas (Mshigeni, 1982 and 1983). The absence of the above mentioned genera from Qatari shores may be related to its higher salinity.

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