

A survey of Marine Algae and Seagrasses of İstanbul, (Turkey)

İstanbul çevresinde deniz algleri ve deniz çayırları incelemesi

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Abstract

In this research, have been studied marine algae in the upper infralittoral zone of the Bosphorus coasts of İstanbul (including Bosphorus) . A total of 244 taxon have been determined. 11 of them belong to blue-green bacteria (*Cyanophyta*), 127 to red algae (*Rhodophyta*), 46 to brown algae (*Heterokontophyta*), 60 to green algae (*Chlorophyta*) and 2 to flowering plants (*Tracheophyta*).

Keywords: algae, İstanbul, Turkey.

Introduction

The first investigations of the İstanbul algae were carried out with 63 taxon recorded by Fritsch (1899). Drautziyan collected algae specimens (46 taxa) in Bosphorus shores in 1894-1895 but this work was revised and published by Öztüğ (1962) and Güven (1971) published a paper Additionally Güner (1973) studied distribution of marine algae (7 green algae, 16 brown algae, 20 red algae) on Bosphorus's islands and Aydın & Yüksek investigated on the macroscopic and epiphytic algae of the Golden Horn in

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1989-1990. Additionally Aysel & Erduğan (1995), Aysel & Güner (1979, 1980, 1982), Aysel & Sukatar (1987), Aysel *et al.* (1984, 1986, 1990, 1991, 1993, 1996, 1997, 1998, 2000a,b, 2002, 2004a,b, 2005, 2006a,b), Zeybek *et al.* (1983), Cirik (1989), Cirik & Cihangir (1987), Erduğan *et al.* (1996, 2002, 2003, 2004), Güner (1977, 1978), Güner & Aysel (1978, 1979, 1984, 1986), Güner *et al.* (1987), Okudan *et al.* (2002), Güven and Öztığ (1971), Güven *et al.* (1991), Özer & Köksal (1993), Öztığ (1957), Öztürk (1988), Skolka & Vasiliu (1986), Turna ve Ertan (2005), Zeybek (1976) who have performed floristic studies on Sea of Marmara and Black Sea coasts of Turkey. Aysel *et al.* (2006c) have been given to list of algae and seagrasses of Marmara sea and Bosphorus between 1986-1994.

Material and Methods

Collected specimens were fixed by using 4 % formaldehyde for preservation. Specimens belonging to *Rhodomelaceae* and *Corallinaceae* were exceptionally treated with 10 % HCl in identification procedures for specific cell wall properties.

The Bosphorus is strait between Europe and Asia connecting the Black Sea to the Sea of Marmara. It is about 31 km long and varies between one and 2.5 km wide. The narrowest place is 700 m between the fortresses of Rumeli and Anadolu. The average depth is 50 m. In the Bosphorus there are two currents; one on the surface from the Black Sea towards the Marmara Sea and one below the surface in the opposite direction. The Black Sea is 24 cm in higher than the Marmara and this causes the current on the surface. The other current is because of the changes of salt rates in the two seas. Of these, observation goes to prove that the wind has by far the greatest influence (Aysel *et al.*, 1991).

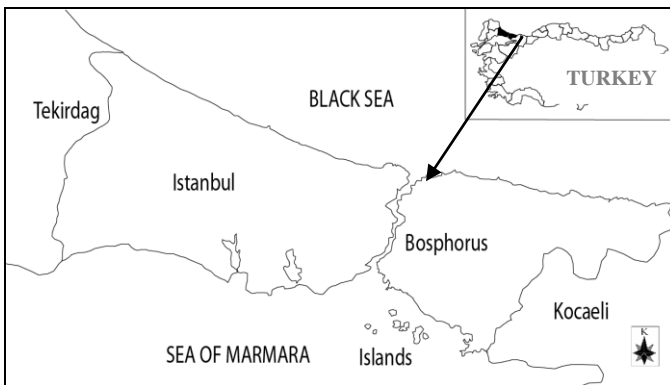


Figure 1. Map of İstanbul coasts.

Results

Taxa distributed in study area are listed in table 1. In this list, classes and upper categories were arranged according to Van den Hoek *et al.* (1997) and Guiry & Dhanncha (2005). Arrangement of lower categories, presented in the list were followed by specialists (Silva *et al.* (1996) for *Cyanophyta* and *Rhodophyta*, Stegenga (1985) for *Acrochaetiales*, Frederic & Hommersand (1989) for *Gracilariales*, Bressan & Babbini-Benussi (1995, 1996) for *Corallinales*, Gomez Garreta *et al.* (2001) for *Ceramiales*, Ribera *et al.* (1992) for *Fucophyceae*, Gallardo *et al.* (1993) for *Chlorophyceae*. Additionally, the studies of Barbara & Cremades (1996), Ballantine & Aponte (1997) and Hardy & Guiry (2003) were used to create an evolutionary list of taxa above genus level. Taxa in species or below species level are listed alphabetically.

Table 1. Taxa distributed on İstanbul coast of Turkey (IBS; İstanbul Black Sea coasts, BO; Bosphorus coasts, IM; İstanbul Sea of Marmara coasts, IMI; İstanbul Marmara Sea Islands).

CYANOPHYTA

CYANOPHYCEAE

CHROOCOCCALES

CHROOCOCCACEAE

Chroococcus dimidiatus (Kützing) Nägeli (BO)

MICROCYSTACEAE

Gloeocapsa compacta Kützing (IBS, BO)

MERISMOPEDIACEAE

GOMPHOSPHAERIOIDEAE

Gomphosphaeria aponina Kützing

OSCILLATORIALES

OSCILLATORIACEAE

Blennothrix lynghyacea Kützing *ex* Anagnostidis & Komárek (BO)

Lynghya aestuarii (Mertens) Liebmann (IBS, BO, IM)

L. confervoides C. Agardh ((IBS, BO)

NOSTOCALES

RIVULARIACEAE

Calothrix aeruginea (Kützing) Thuret (IBS, BO)

C. confervicola (Roth) C. Agardh (IBS, BO)

C. parasitica (Chauvin) Thuret (BO)

C. scopulorum (Weber-van Bosse & Mohr) C. Agardh (IBS, BO)

Rivularia atra Roth *ex* Bornet & Flahault (IMI)

RHODOPHYTA

RHODELLOPHYCEAE

STYLONEMATALES

STYLONEMATAACEAE

Stylonema alsidii (Zanardini) K. Drew (BO)

COMPSOPOGONOPHYCEAE

ERYTHROPELTIDALES

ERYTHROTRICHIACEAE

Erythrotrichia carnea (Dillwyn) J. Agardh (BO)

BANGIOPHYCEAE

BANGIOPHYCIDAE

GONIOTRICHIALES

GONIOTRICHACEAE

Chroodactylon ornatum (C. Agardh) Basson (IBS, BO)

BANGIALES

BANGIACEAE

Bangia atropurpurea (Roth) C. Agardh (BO)

Porphyra leucosticta Thuret in Le Jolis f. *leucosticta* (IBS, BO, IMI)

P. minor Zanardini (IBS)

P. umbilicalis (Linnaeus) Kützing (BO, IMI)

FLORIDEOPHYCEAE

HILDENBRANDIOPHYCIDAE

HILDENBRANDIALES

HILDENBRANDIACEAE

Hildenbrandia rubra (Sommerfelt) Meneghini (IM)

NEMALIOPHYCIDAE

ACROCHAETIALES

ACROCHAETIACEAE

Acrochaetium hallandicum (Kyllin) Hamel (BO)

A. mahumetanum Hamel (IBS, BO)

A. microscopicum (Nägeli ex Kützing) Nägeli (BO)

A. parvulum (Kyllin) Hoyt (IBS)

A. savianum (Meneghini) Nägeli (BO)

A. secundatum (Lyngbye) Nägeli (BO)

A. virgatulum (Harvey) Batters (BO)

COLACONEMATALES

COLACONEMATACEAE

Colaconema codicola (Børgesen), Stegenka, Bolton & Anderson (BO)

C. daviesii (Dillwyn) Stegenka (BO)

NEMALIALES

LIAGORACEAE

Liagora viscida (Forsskål) C. Agardh (IBS, BO)

RHODYMENIOPHYCIDAE

GELIDIALES

GELIDIACEAE

Gelidium corneum (Hudson) Lamouroux var. *corneum* (BO, IMI)

G. crinale (Hare ex Turner) Gaillon var. *crinale* (IBS, BO)

G. pulchellum (Turner) Kützing (IMI)

G. spinosum (Gmelin) Silva var. *spinosum* (IBS, BO, IM, IMI)

Pterocladella capillacea (Gmelin) Santelices & Hommersand

f. *capillaceae* (IBS, BO, IMI)

P. --- f. *crinita* (Hauck) Aysel, Erduğan, Dural-Tarakçı, Okudan, Şenkardeşler, Aysel (IBS)

GRACILARIALES

GRACILARIACEAE

Gracilaria bursa-pastoris (Gmelin) Silva (IMI)

G. gracilis (Stackhouse) M. Steentoft, L.M. Irvine & W.F. Farnham var. *gracilis* (IBS, BO, IM, IMI)

BONNEMAISONIALES

BONNEMAISONIACEAE

Bonnemaisonia asparagoides (Woodward) C. Agardh (IBS, BO, IMI)

Trilliella intricata Batters (Bonnemaisonia hamifera tetrasporofit evresi) (BO)

NACCARIACEAE

Naccaria wiggii (Turner) Endlicher (IMI)

CORALLINALES

CORALLINACEAE

CORALLINOIDEAE

CORALLINEAE

Corallina elongata Ellis & Solander (BO, IM, IMI)

C. panizoi Schnetter & U. Richter (IBS, BO, IMI)

JANIEAE

Haliptilon roseum (Lamarck) Garbary & Johansen var. *roseum* (IBS)

H. virgatum (Zanardini) Garbary & Johansen (IBS, BO, IMI)

Jania rubens (Linne) Lamouroux var. *rubens* (BO, IMI)

J. --- var. *corniculata* (Linnaeus) Yendo (IBS, BO)

MASTOPHOROIDEAE

Hydrolithon farinosum (Lamouroux) D. Penrose & Chamberlain (BO)

Spongites fruticulosus Kützing *sensu* Woelkerling (BO)

MELOBESIOIDEAE

Mesophyllum lichenoides (Ellis) Lemoine (IM)

Phymatolithon lenormandii (Areschoug) Adey (IBS, BO)

GIGARTINALES

FURCELLARIACEAE

Halarachnion ligulatum (Woodward) Kützing (IMI)

GIGARTINACEAE

Chondracanthus acicularis (Roth) Fredericq (IMI)

C. teedei (Mertens *ex* Roth) Kützing (IM)

KALLYMENIACEAE

Callophyllis laciniata (Hudson) Kützing (IMI)

PEYSSONNELICEAE

Peyssonnelia squamaria (Gmelin) Decaisne (IBS, BO)

PHYLLOPHORACEAE

Coccotylus truncatus (Pallas) Wynne & Heine f. *truncatus* (IBS)

Phyllophora crispa (Hudson) Dixon f. *crispa* (IBS, BO, IM, IMI)

SPHAEROCOCCACEAE

Sphaerococcus coronopifolius Stackhouse (BO, IMI)

WURDEMANNIACEAE

Wurdemannia miniata (Sprengel) Feldmann & Hamel (BO)

RHODYMENIALES

RHODYMENIACEAE

Botryocladia botryoides (Wulfen) Feldmann (IMI)

Rhodymenia ardissonaei J. Feldmann var. *ardissonaei* (IM)

R. pseudopalmata (Lamouroux) Silva (IMI)

LOMENTARIACEAE

Lomentaria clavellosa (Turner) Gaillon (IBS, BO)

L. verticillata Funk (BO)

PALMARIALES

PALMARIACEAE

Palmaria palmata (Linnaeus) Kuntze (IMI)

HALYMENIALES

GRATELOUPIACEAE

Grateloupia dichotoma J. Agardh (BO)

G. filicina (Lamouroux) C. Agardh (IMI)

HALYMENIACEAE

Acrodiscus vidovichii (Meneghini) Zanardini (IM)

SEBDENIACEAE

Sebdenia dichotoma Berthold (BO, IMI)

PLOCAMIALES

PLOCAMIACEAE

Plocamium cartilagineum Linnaeus (Dixon) (IMI)

CRYPTONEMIALES

CRYPTONEMACEAE

Cryptonemia lomation (Bertoloni) J. Agardh (BO)

CERAMIALES

CERAMIACEAE

CALLITHAMNIOIDEAE

CALLITHAMNIEAE

Aglaothamnion hookeri (Dillwyn) Maggs & Hommersand (BO)

A. tenuissimum (Bonnemaison) Feldmann-Mazoyer var. *tenuissimum* (BO)

Callithamnion corymbosum (Smith) Lyngbye (IBS, BO, IM, IMI)

C. granulatum (Ducluzeau) C. Agardh (IBS, BO)

PTILOTEAE

Ptilota gunneri Silva, Maggs & L.M. Irvine (IMI)

CERAMOIDEAE

ANTITHAMNIEAE

Antithamnion cruciatum (C. Agardh) Nägeli var. *cruciatum* (IBS, BO, IM)

A. densum (Suhr) Howe (BO)

A. tenuissimum (Hauck) Schiffner (BO)

CERAMIEAE

Ceramium ciliatum (Ellis) Ducluzeau var. *ciliatum* (IBS, BO)

C. --- var. *robustrum* (J. Agardh) Mazoyer (IBS, BO)

C. cimbricum Petersen f. *cimbricum* (BO, IM)

C. circinatum (Kützing) J. Agardh (IBS, BO)

C. deslongchampsii Chauvin ex Duby (IBS, BO, IMI)

C. flaccidum (Kützing) Ardissone (BO, IMI)

C. pseudostrictum Schiffner (BO)

C. rubrum auctorum var. *rubrum* (IBS, BO, IM, IMI)

C. --- var. *barbatum* G. Feldmann-Mazoyer (BO)

C. --- var. *implexo-concortum* (Solier) G. Feldmann – Mazoyer (IBS, BO)

C. secundatum Lyngbye (IBS)

C. siliquosum (Kützing) Maggs & Hommersand

var. *siliquosum* (IBS, BO, IM, IMI)

C. --- var. *decipiens* (Schiffner) *nov. nomen* (BO)

[=Basionym: *Ceramium diaphanum* var. *decipiens* Schiffner]

- C. ---* var. *elegans* (Roth) Furnari (IBS, BO, IMI)
C. --- var. *tenuissimum* (Lyngbye) Aysel, Dural-Tarakçı, Erduğan, Aysel, Türker, Tarakçı (IBS)
C. --- var. *zostericola* (Feldmann-Mazoyer) Furnari f. *zostericola* (IBS, BO)
C. --- var. *zostericola* f. *minusculum* (Feldmann- Mazoyer) Gomez-Garreta, Gallardo, Ribera, Cormaci, Furnari, Giaccone & Boudouresque (IBS, BO)
C. tenuicorne (Kützing) Waern (IBS)
COMPSOTHAMNIOIDEAE
COMPSOTHAMNIEAE
Compsothamnion thuyoides (J.E. Smith) Schmitz (IBS, BO)
SPERMOTHAMNIEAE
Ptilothamnion pluma (Dillwyn) Thuret (BO)
Spermothamnion strictum (C. Agardh) Ardissonne (IM, IMI)
SPONGOCLONIEAE
Pleonosporium borreri (J.E. Smith) Nägeli (IM)
DASYACEAE
Dasya baillouviana (Gmelin) Montagne var. *baillouviana* (IBS, BO)
D. hutchinsiae Harvey in W.J. Hooker
D. punicea (Zanardini) Meneghini ex Zanardini (BO)
Eupogodon planus (C. Agardh) Kützing (BO)
Heterosiphonia plumosa (Ellis) Batters (IMI)
Rhodoptilum plumosum (Harvey & Bailey) Kylin (BO)
DELESSERIACEAE
DELESSERIOIDEAE
APOGLOSSEAE
Apoglossum ruscifolium (Turner) J. Agardh (IBS, BO)
HYPOGLOSSEAE
Hypoglossum hypoglossoides (Stackhouse) Collins & Harvey (IBS, BO)
NITOPHYLLOIDEAE
NITOPHYLLEAE
Nitophyllum punctatum (Stackhouse) Greville var. *punctatum* (BO, IM)
RHODOMELACEAE
AMANSIEAE
Osmundaria volubilis (Linnaeus) R.E. Norris (IM)
CHONDRIEAE
Chondria boryana (De Notaris ex J. Agardh) De Toni (IBS, BO)
C. capillaris (Hudson) Wynne var. *capillaris* (BO, IMI)
C. --- var. *divergens* (Hauck) nov. comb. (BO)
[=Basionym: *Chondria tenuissima* f. *divergens* Hauck]
C. dasyphylla (Woodward) C. Agardh (IBS, BO, IM)
LAURENCIEAE
Chondrophyucus intermedius (Yamada) Garbary & Harper (BO)
C. paniculatus (C. Agardh) Furnari (BO)
C. papillosus (C. Agardh) Garbary & J. Harper (IBS, BO, IMI)
Laurencia obtusa (Hudson) Lamouroux var. *obtusa* (IBS, BO, IM, IMI)
Osmundea pinnatifida (Hudson) Stackhouse (IBS, BO, IMI)
O. spectabilis (Postels & Ruprecht) Nam (BO)
POLYSIPHONIEAE
Boergeseniella thuyoides (Harvey) Kylin (BO)
Herposiphonia secunda (C.Ag.) Ambronn f. *secunda*

Lophosiphonia obscura (C. Agardh) Falkenberg (IBS, BO)
Neosiphonia elongella (Harvey) M.S. Kim & I.K. Lee (IBS)
Polysiphonia brodiei (Dillwyn) Sprengel (IBS, BO)
P. denudata (Dillwyn) Greville *ex* Harvey (BO, IMI)
P. elongata (Hudson) Sprengel (IBS, BO, IMI)
P. fibrillosa (Dillwyn) Sprengel (IBS, BO)
P. fucooides (Hudson) Greville (IBS, BO)
P. nigrescens (Dillwyn) Greville (BO)
P. opaca (C. Agardh) Moris & De Notaris (IBS, BO)
P. paniculata Montagne (IBS)
P. sertularioides (Grateloup) J. Agardh (IBS)
P. subulifera (C. Agardh) Harvey (IMI)
P. tripinnata J. Agardh (IBS, BO)
P. urceolata (Lightfoot *ex* Dillwyn) Greville (IBS, BO, IM)
P. violacea (Roth) Sprengel (IBS, BO)

HETEROKONTOPHYTA

FUCOPHYCEAE

ECTOCARPALES

ECTOCARPACEAE

Ectocarpus siliculosus (Dillwyn) Lyngbye var. *siliculosus* (IBS, BO, IMI)
E. ---var. *dasyarpus* (Kuckuck) Gallardo (IBS, BO)
E. ---var. *hiemalis* (P.L. Crouan *ex* Kjellman) Gallardo (IBS, BO)
Feldmannia caespitula (J. Agardh) Knoepffler-Péguy var. *lebelii* (Areschoug *ex*
 P.L. Crouan) Knoepffler-Péguy (IBS)
F. irregularis (Kützing) Hamel (IBS, BO, IMI)
F. padinae (Buffham) Hamel (IBS, BO)
Pleurocladia lacustris Braun (BO)
Streblocladia sphaericum (Derbès & Solier) Thuret (IBS)

CHORDARIALES

MYRIONEMATACEAE

Myrionema strangulans Greville (BO)

CORYNOPHLAEACEAE

Corynophlaea umbellata (C. Agardh) Kützing (IBS, BO)
Myriactula arabica (Kützing) Feldmann (IBS, BO)

SPERMATOCHEANACEAE

Spermatochneus paradoxus (Roth) Kützing (IMI)
Stilophora nodulosa (C. Agardh) Silva (IBS, BO)
S. tenella (Esper) Silva (IBS, BO, IM, IMI)

CUTLERIALES

CUTLERIACEAE

Cutleria multifida (Turner) Greville (IBS, BO, IMI)
Zanardinia typus (Nardo) Furnari (IBS, BO)

SPHACELARIALES

SPHACELARIACEAE

Sphacelaria cirrosa (Roth) C. Agardh f. *cirrosa* (IBS, BO, IM, IMI)
S. rigidula Kützing (BO)

STYPOCAULACEAE

Halopteris scoparia Linnaeus Sauvageau (IBS, BO)

CLADOSTEPHACEAE

Cladostephus spongiosus (Hudson) C. Agardh f. *verticillatus* (Lightfoot)
 Prod'homme van Reine (IBS, BO, IM, IMI)

DICTYOTALES

DICTYOTACEAE

Dictyopteris polypodioides (De Candolle) Lamouroux (IBS, BO, IM, IMI)

Dictyota dichotoma (Hudson) Lamouroux var. *intricata* (C. Agardh) Greville (BO)

D. fasciola (Roth) Lamouroux var. *fasciola* (IBS, BO)

D. linearis (C. Agardh) Greville f. *linearis* (IBS)

D. ---f. divaricatus (Lamouroux) Aysel, Okudan, Erduğan (IBS)

D. menstrualis (Hoyt) Schmetter, Hornig & Weber-Peukert var. *menstrualis* (IBS, BO, IM, IMI)

Padina pavonica (Linnaeus) Thivy (IBS, BO, IM, IMI)

DICTYOSIPHONALES

MYRIOTRICHIACEAE

Myriotrichia clavaeformis Harvey (BO)

STRIARIAACEAE

Striaria attenuata (Greville) Greville f. *attenuata* (IBS, BO, IMI)

ASPEROCOCCACEAE

Asperococcus bullosus Lamouroux f. *bullosus* (IBS, BO, IMI)

A. fistulosus (Hudson) W.J. Hooker (IBS, BO, IMI)

PUCTARIALES

PUNCTARIAACEAE

Punctaria latifolia Greville (IMI)

P. plantaginea (Roth) Greville (IBS, BO)

LAMINARIALES

LAMINARIAACEAE

Laminaria rodriguezii Bornet (IMI)

SCYTOSIPHONALES

SCYTOSIPHONACEAE

Petalonia fascia (Müller) Kuntze (IMI)

Scytosiphon simplicissimus (Clemente) Cremades var. *simplicissimus* (BO, IM, IMI)

FUCALES

CYTOSEIRACEAE

Cystoseira barbata (Stackhouse) C. Agardh var. *barbata* (IBS, BO, IM, IMI)

C. compressa (Esper) Gerloff & Nizamuddin f. *compressa* (IBS, BO, IM, IMI)

C. corniculata (Turner) Zanardini var. *corniculata* (IBS, BO)

C. crinita (Desfontaines) Bory f. *crinita* (IBS, BO, IM, IMI)

C. ---f. bosphorica (Sauvageau.) Zinova & Kalugina (IBS, BO)

C. foeniculacea (Linnaeus) Greville (IBS, BO, IM)

C. ercegovicii Giaccone f. *ercegovicii* (BO, IM)

SARGASSACEAE

Sargassum acinarum (Linnaeus) Setchell (IBS, BO)

S. hornschurchii C. Agardh (IBS, BO, IMI)

S. vulgare C. Agardh var. *vulgare* (IBS, BO, IMI)

CHLOROPHYTA

CHLOROPHYCEAE

CHAETOPHORALES

CHAETOPHORACEAE

Pringsheimiella scutata (Reinke) Höhnelt ex Marchewianka (IBS, BO)

SPHAEROPLEALES Haeckel

SPHAEROPLEACEAE

Sphaeroplea braunii Kützing (IBS)

ULVOPHYCEAE

ULOTRICHALES

ULOTRICHACEAE

Ulothrix flacca (Dillwyn) Thuret *in* Le Jolis (IBS, BO, IM)

U. implexa (Kützing) Kützing (IBS, BO, IM)

ULVALES

ULVELLACEAE

Ulvella lens P. L. Crouan & H. M. Crouan (IBS, BO)

ULVACEAE

Blidingia marginata (J. Agardh) Dangeard *ex* Bliding (IBS, BO)

B. minima (Nägeli *ex* Kützing) Kylin (IBS, BO)

Enteromorpha ahleriana Bliding (IBS, BO)

E. clathrata (Roth) Greville (IBS, BO)

E. compressa (Linnaeus) Nees var. *compressa* (IBS, BO, IM, IMI)

E. coziana Dangeard var. *coziana* (BO)

E. ---var. *arcassonensis* Dangeard (BO)

E. flexuosa (Wulfen) J. Agardh subsp. *flexuosa* (IBS, BO)

E. intestinalis (Linnaeus) Nees var. *intestinalis* (IBS, BO, IM, IMI)

E. kylinii Bliding (IBS, BO)

E. linza (Linnaeus) J. Agardh var. *linza* (IBS, BO, IM, IMI)

E. ---var. *crispata* (Bertoloni) J. Agardh (BO)

E. ---var. *minor* Schiffner (BO)

E. muscoides (Clemente) Cremades (IBS, BO, IMI)

E. prolifera (Müller) J. Agardh subsp. *prolifera* (IBS, BO)

E. ---f. *simplex* Vinogradova (BO)

Ulva fasciata Delile (IBS, BO)

U. fenestrata Postels & Ruprecht (IBS, BO)

U. gigantea (Kützing) Bliding (BO)

U. rigida C. Agardh f. *rigida* (IBS, BO, IM, IMI)

U. ---f. *densa* d'el Jadida (BO)

Umbraulva olivascens (Dangeard) Bae & I.K. Lee (BO)

CLADOPHOROPHYCEAE

CLADOPHORALES

CLADOPHORACEAE

Chaetomorpha adrianii Feldmann (BO)

C. aerea (Dillwyn) Kützing (IBS, BO, IM, IMI)

C. linum (Müller) Kützing (BO)

Cladophora albida (Nees) Kützing (IBS, BO)

C. catenata (C. Agardh) Hauck (BO)

Cladophora echinus (Bisoletto) Kützing

C. fracta (Müller *ex* Vahl) Kützing (IBS, BO)

C. glomerata (Linnaeus) Kützing var. *glomerata* (IBS, BO)

C. ---var. *marina* Lyngbye (IBS, BO)

C. hutchinsiae (Dillwyn) Kützing (IBS, BO)

C. laetevirens (Dillwyn) Kützing (IBS, BO)

C. lehmanniana (Lindenberg) Kützing (IBS, BO)

C. pellucida (Hudson) Kützing f. *pellucida* (IBS, BO, IMI)

C. ---f. *rhizophora* Ercegovic (BO)

C. prolifera (Roth) Kützing (IBS, BO, IM, IMI)
C. rupestris (L.) Kützing (BO, IM, IMI)
C. sericea (Hudson) Kützing (IBS, BO, IMI)
C. trichotoma (C. Agardh) Kützing (IBS, BO)
Rhizoclonium riparium (Roth) Harvey (BO)
R. tortuosum (Dillwyn) Kützing (IBS, IMI)
SIPHONOCLADALES
VALONIACEAE
Valonia utricularis (Roth) C. Agardh (IMI)
BRYOPSIDOPHYCEAE
BRYOPSIDALES
BRYOPSIDACEAE
Bryopsis adriatica (J. Agardh) Meneghini (BO)
B. cupressina Lamouroux (IBS, BO)
B. duplex De Notaris (IBS, BO, IM)
B. feldmannii Gallardo & Furnari (BO)
B. flagellata Kützing (BO)
B. hypnoides Lamouroux var. *hypnoides* (IBS, BO, IMI)
B. pennata Lamouroux (BO)
B. plumosa (Hudson) C. Agardh var. *plumosa* (IBS, BO, IMI)
CODIALES
CODIACEAE
Codium dichotomum Stackhouse (IM, IMI)
C. tomentosum Stackhouse (IM, IMI)
CAULERPALES
UDOTEACEAE
Flabellia petiolata (Turra) Nizamuddin (IBS, BO)
HALIMEDALES
HALIMEDACEAE
Halimeda tuna (Ellis & Solander) Lamouroux (IBS, BO)
DASYCLADOPHYCEAE
DASYCLADALES Bessey
DASYCLADACEAE
Dasycladus vermicularis (Scopoli) Krasser (IMI)
TRACHEOPHYTA [=MAGNOLIOPHYTA]
ANGIOSPERMAE
LILIOPSIDA
ALISMATIDAE
ZOSTERALES
ZOSTERACEAE
Zostera marina Linnaeus (IM)
Z. noltii Homermann (IMI)

Discussion

246 taxa (244 algae and two seagrasses) have been found in the present study (Table 2).

Table 2. The number of algae species of İstanbul (TT: Total taxa).

Division	Regions				
	IBS	BO	IM	IMI	TT
<i>Cyanophyta</i> (Cy)	6	9	1	1	11
<i>Rhodophyta</i> (R)	58	92	20	41	127
<i>Heterokontophyta</i> (H)	35	38	10	22	46
<i>Chlorophyta</i> (C)	38	54	10	16	60
<i>Tracheophyta</i>	-	-	1	1	2
Total	137	192	42	80	246

Dominancy of taxa depending upon on provinces is summarized in Table 3.

Table 3. Dominancy in division level of İstanbul.

Ratio	Regions				
	IBS	BO	IM	IMI	TT
R/H	1,657	2,421	2,000	1,863	2,717
R/C	1,526	1,703	2,000	2,562	2,116
R/CY	9,666	10,222	20,000	41,000	12,500
H/C	0,921	0,703	1,000	1,375	0,766
H/CY	5,833	4,222	10,000	22,000	4,600
C/CY	6,500	6,111	11,000	17,000	6,100

In this table, R/H values are relatively close among all provinces and changes between 1.657 and 2.717. According to these data, it can be stated out that İstanbul shores of is not polluted heavily.

Özet

Bu çalışmada İstanbul'un (Karadeniz, Marmara denizi, Türkiye) üst infralittoral zonu çalışılmıştır. 244 alg, ve iki Deniz Çayırı tayin edilmiştir. Bunların 11 taksonu Mavi-yeşil bakterilere, 127 taksonu kırmızı alglere, 46 taksonu kahverengi alglere, 60 taksonu yeşil alglere ve iki taksonda deniz çiçekli bitkilerine aittir.

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