MARINE ALGAE OF THE INDIAN RIVER. I. SPECIES OF THE ALGAL DRIFT COMMUNITY COLLECTED FROM APRIL 1974 TO APRIL 1975[1]

N. J. Eiseman

M. C. Benz

Technical Report No. 1.

The Harbor Branch Foundation, Inc.

1975

[1]

MARINE ALGAE OF THE INDIAN RIVER. I.

SPECIES OF THE ALGAL DRIFT COMMUNITY COLLECTED FROM APRIL 1974 TO APRIL 1975

N. J. Eiseman and M. C. Benz

Abstract

Thirty-one species of unattached, free-drifting marine algae were collected from 6 stations in the Indian River. There was 1 Cyanophyta, 5 Chlorophyta, 8 Phaeophyta and 17 Rhodophyta. Most of the species were collected as part of quantitative benthic samples. Species of Graciliaria, Hypnea, Acanthophora, Bryothamnion, and Spyridia form the base of this community.

The macroalgae of estuaries, bays, and lagoons may be divided into four ecological groups based on the growth habits of the plant: 1) sea-grass epiphytes 2) those attached to solid substrata 3) those anchored in unconsolidated substrata, and 4) those which typically occur in an unattached, free-drifting condition, with their associated epiphytes. The first three of these groups will be considered in subsequent numbers of this series.

The drift algal community is based on relatively large forms which begin their existence attached to tenuous substrates, being broken loose after attaining a certain size. These algae subsequently become substrata for numerous smaller species. To date no permanently drifting forms have been found in the Indian River, although loss of polarity in larger specimens is common.

In sandy bays and estuaries with little solid substrata the drift algal community may often be the dominant algal community in terms of

biomass. This community plays a similar role in the ecosystem as other macrobenthic plants, production of oxygen, provision of food, provision of secondary space for attachment of other organisms, and protection among the branches for small mobile organisms. Although often overlooked in ecological studies, this community is of considerable importance in determining the overall production of the locality.

METHODS

Seven stations in the Indian River were sampled, five on an approximately monthly basis, the other two irregularly, from April 1974 to April 1975. These stations and the abbreviations used for them in the annotated species list are:

Haulover Cove (HC)

South Banana River (BR)

Sebastian Inlet (SI)

Link Port (LP)

Nuclear Power Plant (NP)

Nuclear Power Plant, west side of river (NPW)

St. Lucie Inlet (SL)

The general features of these areas have been described previously (Eiseman, 1974). Sampling was done with a quantitative sampler operated on the principle of a post hole digger, in conjunction with a seasonal biomass survey of the seagrass Halodule wrightii. This sampler has also been described elsewhere (Young et al., 1974). Sampling was stratified. The area with the greatest density of Halodule was chosen, assuming this to represent the maximum productive potential of this species at

a given location. Since the algal collections were incidental to the Halodule sampling no attempt at quantification of the algae was made. Temperature and salinity were measured at the time of each sampling. In February 1975 additional hand collections were made at the Haulover Cove, Banana River and St. Lucie Inlet stations. The specimens were preserved in 5% seawater-formalin and returned to the laboratory for analysis.

RESULTS

Thirty-one species of free-drifting marine algae were collected between April 1974 and April 1975, including 1 Cyanophyta, 5 Chlorophyta, 8 Phaeophyta, and 17 Rhodophyta. An annotated species list follows. Tables 1-6 give the species, months of collection, and temperature and salinity for each collection at each station.

ANNOTATED SPECIES LIST

DIVISION CYANOPHYTA

Order Nostocales

Family Oscillatoriaceae

Microcoleus lyngbyaceus (Kützing) Crouan. (NPW) Collected once in spring where large masses were growing as epiphytes on Syringodium.

DIVISION CHLOROPHYTA

Order Ulvales

Family Ulvaceae

Enteromorpha compressa (Linnaeus) Greville. (HC) winter. More commonly found as an epiphyte on Halodule and Spartina.

Enteromorpha lingulata J. Agardh. Inside enclosure (LP). May have been detached from Halodule during sampling.

Ulva lactuca Linnaeus. (HC) Hand collected, winter.

Order Siphonocladales

Family Cladophoraceae

Chaetomorpha brachygona Harvey. (LP) Collected once in spring.

Family Valoniaceae

Cladophoropsis membranacea (C. Agardh) Børgesen. (LP) spring and winter. Hand collected, winter (HC).

DIVISION PHAEOPHYTA

Order Ectocarpales

Family Ectocarpaceae

Giffordia conifera (Børgesen) Taylor. (SL) winter; (SI) spring. Epiphytic on coarse drift algae. A common epiphyte on Halodule.

Giffordia mitchellae (Harvey) Hamel. (LP) winter. A common epiphyte on Halodule.

Identification of the above Ectocarpales is based on sporangia.

Order Dictyotales

Family Dictyotaceae

Dictyopteris delicatula Lamouroux. Winter (SL), hand collection.

Dictyota bartayresii Lamouroux. (NP) Collected once, spring.

Dictyota dichotoma (Hudson) Lamouroux. Winter (HC), hand collection.

Spatoglossum schroederi (C. Agardh) Kutzing. Winter (SL), hand collection.

Order Dictyosiphonales

Family Punctariaceae

Myriotrichia subcorymbosa (Holden) Blomquist. (SI) spring, epiphytic on Hypnea musciformis. Most commonly found as an epiphyte on Halodule in winter and/or spring.

Rosenvingia intricata (J. Agardh) Børgesen. (SI, LP) late fall and winter, inside enclosures. Small plants found epiphytic on Halodule in late fall and early winter.

DIVISION RHODOPHYTA

Order Cryptonemiales

Family Corallinaceae

Corallina cubensis (Montagne) Kützing. (HC) winter, hand collection.

Jania capillacea Harvey. (NP, NPW) spring.

Order Gigartinales

Family Gracilariaceae

Gracilaria compressa (C. Agardh) Greville. Spring (NP) and in late summer (BR). Hand collected in winter (BR).

Gracilaria foliffera (Forsskal) Børgesen. Collected twice in the spring (LP) and once in fall (SI).

Gracilaria foliifera v. angustissima (Harvey) Taylor (BR, SI, LP, NP). Collected primarily during spring and summer as drift. Often found attached to shells and rocks just below the low tide level. Cystocarpic in February (LP), when attached.

Gracilaria verrucosa (Hudson) Papenfuss. Most common Gracilaria in the river. Collected at all stations except Haulover Cove. Present in all seasons in some part of the range. Cystocarpic in Feb. and March (SI).

Gracilaria "A". Medulla cells 125-215 um diam., largest toward the center. Cortex 2-3 cell layers. Outer cells of the cortex 19-23 um diam., inner cells 35-58 um diam. Habit "G. verrucosa-like". Texture firmly fleshy. Branches .5-1.5 mm diam. Essentially alternately branched, somewhat second along the main axes, slightly constricted at

the base of the plant, branches tapering toward the tips. Herbarium specimen #000465. (SI, LP) late winter and early spring.

Family Hypneaceae

Hypnea cervicornis J. Agardh. (SI, LP, NP, SL) collected mostly during winter and spring.

Hypnea musciformis (Wulfen) Lamouroux. Collected at all stations except Haulover Cove. Present in all seasons in some part of the range. Small plants found epiphytic on Halodule. Once found as an epiphyte of Acanthophora spicifera (SI - March).

Family Solieraceae

Solieria tenera (J. Agardh) Wynne and Taylor. (SL, SI) late winter.

Order Ceramiales

Family Ceramiaceae

Ceramium fastigiatum f. flaccida H. E. Petersen. The one time found unattached, probably broken off from Halodule blade during sampling. A common epiphyte of Halodule. Collected once attached to Polysiphonia havanensis that was considered adrift at time of collection.

Spyridia filamentosa (Wulfen) Harvey. Collected at all stations except (BR) and (SI). Found most times of the year as drift except late summer and early fall. Often found attached to Halodule and on one occasion to Rosenvingia intricata.

Wrangelia argus Montagne. Hand collected once (SL) in late winter, tetrasporic.

TABLE 1. Indian River Drift Algae

Apr. 1974-Apr. 1975

HAULOVER COVE (HC)

SPECIES	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.*	Mar.	Apr.
CHLOROPHYTA (3)													
Cladophoropsis membranacea											×		
Enteromorpha compressa											×		
Ulva lactuca											×		
PHAEOPHYTA (1)													
Dictyota dichotoma											×		
RHODOPHYTA (6)													
Ceramium fastigiatum v. *flaccida*												×	
Corallina cubensis											×		
Laurencia obtusa													
Polysiphonia havanensis												×	
Solieria tenera													×
Spyridia filamentosa											×	×	×
Water temperature °C	-	-	34.0	31.0	32.5	-	23.5	16.0	11.0	-	17.0	19.0	21.0
Salinity °/••	-	-	42.0	32.0	24.0	-	22.0	28.0	26.5	-	32.0	33.0	36.0

* Includes hand-collected material.

Table 2. Indian River Drift Algae

Apr. 1974-Apr. 1975

BANANA RIVER (BR)

SPECIES	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.*	Mar.	Apr.
PHAEOPHYTA (1)													
Giffordia mitchellae													x
RHODOPHYTA (4)													
Gracilaria compressa					x						x		
Gracilaria foliifera v. *angustissima*					x								
Gracilaria verrucosa				x	x						x	x	x
Hypnea musciformis				x									
Water temperature °C	-	-	35.0	38.5	32.0	-	24.0	20.0	15.0	-	21.5	22.5	26.0
Salinity °/..	-	-	40.5	23.0	22.0	-	18.0	18.0	20.0	-	19.0	19.0	22.0

* Includes hand-collected material.

Table 3. Indian River Drift Algae

Apr. 1974-Apr. 1975

SEBASTIAN INLET (SI)

SPECIES	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
PHAEOPHYTA (2)													
Giffordia conifera											x	x	
Myriotrichia subcorymbosa												x	
RHODOPHYTA (8)													
Acanthophora spicifera							x		x			x	x
Ceramium fastigiatum v. *flaccida*											x		
Hypnea cervicornis			x										
H. musciformis			x				x		x		x	x	x
Gracilaria "A"											x	x	x
G. foliifera							x						
G. foliifera v. *angustissima*			x						x				x
G. verrucosa			x						x		x	x	
Water temperature °C	-	-	29.5	29.0	-	-	23.0	23.0	14.0	-	18.0	19.0	22.0
Salinity °/..	-	-	35.0	26.0	-	-	26.0	34.0	25.0	-	32.0	35.0	36.0

Table 4. Indian River Drift Algae

Apr. 1974-Apr. 1975

LINK PORT (LP)

SPECIES	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
CHLOROPHYTA (3)													
Chaetomorpha brachygona	x												
Cladophoropsis membranacea	x												
Enteromorpha lingulata									x				
PHAEOPHYTA (2)													
Giffordia mitchellae									x				
Rosenvingia intricata								x	x		x		
RHODOPHYTA (8)													
Acanthophora spicifera	x					x			x			x	
Gracilaria "A"											x	x	x
G. foliifera	x												
G. foliifera v. angustissima	x					x							
G. verrucosa	x							x	x				x
Hypnea cervicornis	x					x		x	x				
H. musciformis								x			x		
Spyridia filamentosa								x	x		x		
Water Temperature °C	17.5	-	-	-	-	31.5	27.5	23.5	18.5	-	21.0	24.0	25.0
Salinity °/..	34.0	-	-	-	-	29.0	26.0	25.0	30.0	-	35.0	33.0	38.0

Table 5. Indian River Drift Algae

Apr. 1974-Apr. 1975

NUCLEAR POWER PLANT (NP)

SPECIES	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
CYANOPHYTA (1)													
Microcoleus lyngbyaceus		x											
PHAEOPHYTA (1)													
Dictyota bartayresii		x											
RHODOPHYTA (10)													
Acanthophora spicifera		x											
Bryothamnion seaforthii F. *disticha*		x											
Gracilaria compressa		x		x									
G. foliifera		x											
G. foliifera v. *angustissima*		x		x									
G. verrucosa		x		x									
Hypnea cervicornis		x											
H. musciformis		x											
Jania capillacea		x											
Spyridia filamentosa		x		x									
Water temperature °C	-	24.5	-	27.5	-	-	-	-	-	-	-	-	-
Salinity °/$_{oo}$	-	36.	-	23.5	-	-	-	-	-	-	-	-	-

Table 6. Indian River Drift Algae

Apr. 1974-Apr. 1975

ST. LUCIE INLET (SL)

SPECIES	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.*	Mar.	Apr.
PHAEOPHYTA (4)													
Dictyopteris delicatula											×		
Giffordia conifera											×		
Rosenvingia intricata								×					
Spatoglossum schroederi											×		
RHODOPHYTA (8)													
Acanthophora spicifera									×			×	
Bryothamnion seaforthii F. *disticha*											×		
Gracilaria verrucosa									×				
Hypnea cervicornis									×				
H. musciformis									×				
Solieria tenera											×		
Spyridia filamentosa											×		
Wrangelia argus											×		
Water temperature °C	-	-	-	31.0	-	30.0	26.5	19.5	20.0	-	20.5	22.5	23.0
Salinity °/..	-	-	-	32.0	-	33.0	32.0	32.0	34.0	-	34.0	35.0	36.0

* Includes hand-collected material.

DISCUSSION

Although the above does not represent a complete list of species which may occur as drift material, since almost any species may be found in the drift community at some time, the dominant species of the drift algal community in the Indian River are clearly indicated. At least one of four Gracilaria species, Graciliaria species "A", G. compressa, G. verrucosa, and G. foliifera v. angustissima, is usually present in those samples in which drift algae were collected. Hypnea musciformis is commonly present but the plants are usually very small and present in small amounts. Spyridia filamentosa may be the dominant drift algal species where present. Acanthophora spicifera often dominated at the most southerly stations. In the southern part of the Indian River large masses of Bryothamnion seaforthii f. disticha were often observed but sampled infrequently. Hypnea cervicornis was locally abundant. The smaller filamentous species reported above occur primarily as epiphytes on the larger species. Most of these are also common as seagrass epiphytes in this area.

Phillips (1961) reported 123 taxa of marine algae from the area of St. Lucie Inlet. Fifty-nine were found as drift material. Phillips' observations on the relative abundance of the larger drift species is in accord with those reported above, not only for St. Lucie Inlet but for the rest of the Indian River as well.

There are a number of differences between the drift algal flora found in this study and that found by Hamm and Humm (1974) for the Anclote estuary on the Florida west coast. They found 66 species of algae in the drift community, including most of the species reported

here. However, they report Laurencia and Sargassum species as the dominant dirft algae, with Diginea simplex constituting about 5% of the total. Only one plant of Laurencia (L. obtusa) and no Sargassum or Diginea have been found in the Indian River in this study. Drift algae from Tampa Bay (Eiseman, unpubl. data) are similar to the drift algae from the Indian River, but there is still a difference in the dominant species. In Tampa Bay Graciliaria foliifera is also a dominant, but G. armata, which we have not found, may at times be very abundant. Much of the year Hypnea musciformis is the dominant member of the drift algal community in Tampa Bay. In the Indian River this species is usually present but in small amounts.

The differences in drift algae between the Indian River and the Anclote estuary are probably due in part to a greater abundance of solid substrata in the Anclote estuary for initial attachment of the larger species. Also, the increase in water movement associated with a tidal river such as the Anclote estuary as opposed to a bay or lagoon would tend to favor a greater species richness. Data for Tampa Bay are not sufficiently complete for a comparison of the drift flora with that of the Indian River, but the difference in dominant species is clear, although the reasons for the difference are not readily apparent.

The inventory is continuing. In addition quantitative collections are being taken monthly and growth rate studies will be made on dominant drift species. These data will be presented in a later number in this series.

Literature Cited

Eiseman, N. J. 1974. Studies on the benthic and shoreline plants of the Indian River Region. In: Young, D. K., R. M. Avent, L. I. Briel, N. J. Eiseman, R. H. Gore, R. S. Jones, G. A. Kerr, H. H. Seibert, O. von Zweck, and J. R. Wilcox Indian River Study, Annual Report 1973-1974. Harbor Branch Consortium, Ft. Pierce, Fla., pp. 256-292.

Hamm, D. C., and H. J. Humm 1974. Benthic algae. In: Baird, R. C., K. L. Carder, T. L. Hopkins, T. E. Pyle, H. J. Humm, N. J. Blake, and L. J. Doyle Anclote Environmental Project Report 1973. Dept. of Marine Science, Univ. South Florida, St. Petersburg, pp. 81-104.

Phillips, R. C. 1961. Seasonal aspect of the marine algal flora of St. Lucie Inlet and adjacent Indian River, Florida. Quart. J. Fla. Acad. Sci. 24(2): 135-147.

Young, D. K., R. M. Avent, L. I. Briel, N. J. Eiseman, R. H. Gore, R. S. Jones, G. A. Kerr, H. H. Seibert, O. von Zweck, and J. R. Wilcox 1974. Indian River Study, Annual Report 1973-1974. Harbor Branch Consortium, Ft. Pierce, Fla., 385 pp.