18 hours old pathogenic cultures were sprayed over the petridishes (previously incubated with N_2 fixing cultures) with 0.5% agar containing nutrient broth, incubated for 48 hours to observe the inhibition zones on the plates.

Results and discussion

The antibacterial activity for N_2 fixing bacteria isolated from the Arabian Sea was observed as shown in Table 1, indicating the capacity of N_2 fixing marine isolates to excrete certain extracellular products in a concentration which is toxic/inhibitory to other bacteria, of terrestrial origin and of pathogenic characteristic. Culture numbers 1, 3, 4 and 5 show inhibition zone on plates against *Escherichia coli, Bacillus megaterium, Proteus vulgaris, Staphylococcus, Styphosa para A., S. typhosa para B*. The size of zone varies from 7 to 24 mm in diameter.

The ammonia fixed by the N_2 fixers excreted in the medium may be toxic to the pathogenic bacteria and, therefore, shows the inhibitory characteristic. The halo inhibitory zones are seen in Fig. 1 a and b.

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BIOCHEMICAL COMPOSITION OF SOME COMMON SEAWEEDS FROM LAKSHADWEEP

Abstract

Studies were made on protein, carbohydrate and lipid from 28 marine algae from Lakshadweep Islands. The protein content ranged from 0.1 to 18.9% in green algae, 4.6 to 12.2% brown algae and 2.7 to 13.1% in red algae. The carbohydrate content was from 0.5 to 15.8%, 1.5 to 13.0% and 2.0 to 29.4% in green, brown and red algae respectively. The lipid content varied from 2.6 to 13.8% in green algae, 2.2 to 8.3% in brown algae and 3.1 to 8.3% in red algae.

Introduction

In India much attention has been paid on commercially important seaweeds and very few studies were made on other biochemical composition such as protein, carbohydrate, lipid, etc. from seaweeds occurring at different localities along Indian Coast (Lewis, 1967; Tewari *et al.*, 1968; Murthy and Radia, 1978; Dhargalkar, 1979; Dhargalkar *et al.*, 1980; Sumitra Vijayaraghavan *et al.*, 1980; Solimabi

TABLE 1. *Protein, carbohydrate and lipid (dry weight) from seaweeds of Lakshadweep*

Name of alga	Place of collection	Protein (%)	Carbohydrate (%)	Lipid (%)
Chlorophyceae				
Enteromorpha tubulosa	Kavaratti	5.7	7.9	11.1
Ulva lactuca	Kavaratti	7.0	5.9	13.8
Chaetomorpha aerea	Kalpeni	8.3	8.9	4.6
C. linoides	—do—	18.9	8.3	8.8
—do—	Suheli	16.1	5.5	6.8
Cladophora fascicularis	—do—	10.9	9.3	5.3
Cladophora sp.	Kavaratti	7.0	0.5	6.7
Caulerpa racemosa var. macrophysa	Kalpeni	6.9	15.8	4.7
Halimeda favulosa	Androth	0.1	Nil	3.9
H. gracilis	—do—	2.6	0.5	6.1
—do—	Kavaratti	3.1	Nil	2.6
Phaeophyceae				
Padina boergesenii	Androth	7.5	2.4	8.3
—do—	Kalpeni	7.5	13.0	3.4
—do—	Minicoy	7.2	2.9	2.6
Rosenvingea intricata	Suheli	6.1	5.5	2.2
Chnoospora implexa	Kalpeni	7.0	4.5	4.8
Turbinaria conoides	—do—	10.5	5.0	5.8
T. ornata	Kavaratti	4.6	1.5	4.6
—do—	Kalpeni	6.9	4.9	3.8
—do—	Minicoy	12.2	4.6	2.3
Rhodophyceae				
Gelidiella acerosa	Kavaratti	9.2	18.0	4.5
—do—	Kalpeni	9.9	20.0	5.2
Chondrococcus hornemanii	Kavaratti	8.7	10.0	6.2
Amphiroa fragilissima	Minicoy	5.2	4.4	3.8
Jania capillacea	Suheli	2.7	4.6	3.3
Gelidiopsis variabilis	Kavaratti	10.9	15.5	4.3
Gracilaria edulis	—do—	7.0	29.4	3.1
—do—	Kalpeni	6.5	16.8	6.7
Hypnea pannosa	—do—	7.0	16.0	7.8
—do—	Suheli	10.2	15.5	8.3
H. valentiae	Kavaratti	12.7	18.2	4.3
Spyridia filamentosa	—do—	13.1	2.0	3.3
Acanthophora dendroides	Suheli	11.5	13.1	4.7
A. spicifera	Kalpeni	10.9	14.5	6.3
Chondria dasyphylla	—do—	6.9	7.8	3.3
Laurencia papillosa	Kavaratti	5.7	9.9	3.2
—do—	Kalpeni	3.5	7.8	6.8
L. poitei	Kavaratti	10.5	9.4	3.1
	Suheli	9.4	8.9	7.3

et al., 1980). Surveys conducted in Lakshadweep Islands (Anon., 1979; Kaliaperumal *et al.*, 1989) indicate the abundance of marine algal resources which can be used as food, feed or fertilizer. As no information is available on the biochemical composition of seaweeds growing at Lakshadweep, attempt has been made to study the protein, carbohydrate and lipid contents in seaweeds collected from Lakshadweep. The results obtained on these aspects are presented in this paper.

The authors wish to express their sincere thanks to Dr. P. S. B. R. James, Director, CMFR Institute Cochin for encouragement and guidance.

Materials and methods

Twentyeight species of seaweeds comprising 9 green algae, 5 brown algae and 14 red algae were collected from 5 islands namely Androth, Kavaratti, Kalpeni, Suheli and Minicoy during March 1987. The fresh plants were washed thoroughly with fresh water followed by distilled water to remove adhering impurities and epiphytes. The moisture was removed using blotting paper and dried in an oven at 70°C to a constant weight. Dried seaweeds were powdered using iron morter and pestle into a fine powder and used for different analysis. The protein content was determined by the method of Lowry *et al.* (1951). The total carbohydrate content was estimated following the method of Dubois *et al.* (1956). The crude lipid was extracted in soxhelt apparatus by using the mixture of chloroform and methanol (2 : 10/v) and estimated gravimetrically as described by Krishnamurthy *et al.* (1980).

Results

The portein content ranged from 0.1 to 18.9% in green algae, 4.6 to 12.2% in brown algae and 2.7 to 13.1% in red algae (Table 1). Among the twenty eight species studied, the protein value was minimum in *Halimeda favulosa* (0.1%) and maximum in *Chaetomorpha linoides* (18.9%). The carbohydrate content varied from 0.5 to 15.8%, 1.5 to 13.0% and 2.0 to 29.4% in green, brown and red algae respectively. The carbohydrate value was nil in *Halimeda favulosa* and *H. gracilis* collected from Androth and Kavaratti respectively. The minimum value of 0.5% carbohydrate was in *Cladophora* sp. and *H. gracilis* collected from Kavaratti and maximum value of 29.4% was in *Gracilaria edulis* collected from Kavaratti. The lipid content ranged from 2.6 to 13.8% in green seaweeds, 2.2 to 8.3% in brown seaweeds and 3.1 to 8.3% in red seaweeds. The minimum quantity of 2.2% lipid occurred in *Rosenvingea intricata* and maximum quantity of 13.8% occurred in *Ulva lactuca.*

Discussion

Considering the ever growing demand for proteinaceous food for human consumption and other purposes, it is necessary to properly utilise the algal protein from non-conventional seaweed resources. The present study reveals that some species of seaweeds such as *Enteromorpha, Ulva, Caulerpa, Gracilaria, Hypnea, Acanthophora* and *Laurencia* which are available in appreciable quantities in Lakshadweep Islands (Anon., 1979; Kaliaperumal *et al.*, 1989) could be used as additional source of protein and carbohydrate. Studies on the growth and monthly fluctuation in the biochemical composition of marine algae of Lakshadweep are necessary to assess the suitable period for obtaining maximum quantity of protein, carbohydrate and other biochemicals.

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ALLOMETRIC RELATIONSHIP IN THE HARD CLAM *MERETRIX MERETRIX* (LINNAEUS)

ABSTRACT

Length-weight and allometric relationship between different morphological parameters in the hard clam *Meretrix meretrix* (Linnaeus) were studied. In the present study analysis of variance revealed no significant difference between male and female clams. Significant difference were found between immature, mature, male and female. The correlation co-efficients (r) for immature, male and female are highly significant. Allometric relationship in all combinations are significantly related to each other.

THE HARD CLAM *Meretrix meretrix* contributes a considerable percentage of the clam resources in the Vellar Estuary and adjacent waters. Present study was carried out in the hard clam to understand the length-weight relationship and other allometric relationship between various morphological attributes.

Random samples of *M. meretrix* were collected from the mouth of Vellar Estuary. The length, height and breadth of the clams were measured by using vernier calipers to the nearest 0.1 mm. About 200 males and 200 females of various size groups and 30 young