AGAR, ALGIN AND MANNITOL FROM SOME SEAWEEDS OF LAKSHADWEEP

ABSTRACT

Studies were made on the yield and physical properties of agar from *Gelidiella acerosa*, *Gracilaria arcuata* and *G. edulis* and algin and mannitol from *Padina boergesenii*, *Chnoospora implexa*, *Sargassum duplicatum*, *Turbinaria conoides* and *T. ornata* growing in eight islands of Lakshadweep. The yield of agar ranged from 16.9 to 43.1% and gel strength from 42 to 278 gm/cm^2 in *G. acerosa*, *G. arcuata* and *G. edulis*. Algin varied from 4.4 to 27.3%and mannitol from 1.4 to 9.5% in the brown algae studied. The agar and algin yielding seaweeds can be exploited from Lakshadweep Islands as an additional resource of raw material to the Indian seaweed industries.

IN INDIA there are several agar and algin industries situated in different maritime States. All these seaweed industries depend on the raw material collected from the natural seaweed beds occurring in the southeast coast of Tamil Nadu mainly from Mandapam area. Indiscriminate harvest of the agarophytes throughout the year from the natural beds has resulted in the denudation of the crop and the agar industries could not procure the required quantity of raw material. Studies were made by many workers on the phycocolloid contents of various seaweeds occurring at different localities of Indian Coast (Anon., 1987). Although some information is available on the seaweed resources of Lakshadweep (Anon, 1979; George *et al.*, 1986; James *et al.*, 1986, 1987; Kaliaperumal *et al.*, 1987), no study was made on the agar and algin contents of seaweeds. Seaweed and seagrass resources survey of Lakshadweep was carried out during January-March 1987 by Central Marine Fisheries Research Institute. During this survey, samples of agarophytes and alginophytes were collected from different islands to study their agar, algin and mannitol contents. The results obtained on these aspects are presented in this paper.

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Materials and methods

Plants of *Gelidiella acerosa* (Forsskal) Feldmann *et* Hamel, *Gracilaria arcuata* Zanardini and *G. edulis* (Gmelin) Silva were collected from four islands and *Padina boergesenii* Allender *et* Kraft, *Chnoospora implexa* (Hering) J. Agardh, *Sargassum duplicatum* Agardh, *Turbinaria conoides* (J. agardh) Kuetzing and *T. ornata* J. Agardh from eight islands. Collection of these seaweeds was made from Bitra, Agatti and Bangarum during February 1987 and from Androth, Kavaratti, Kalpeni, Suheli and Minicoy during March 1987. The yield of agar from *G. acerosa*, *G. arcuata* and *G. edulis* was determined following the method given by Kaliaperumal and Umamaheswara Rao (1981). The gel strength of agar was determined using a gelometer described by Funaki and Kojima (1951). The gelling and melting temperature of agar were found with a thermometer following the movement of glass beads in the setting and melting gels. For estimation of algin and mannitol from *P. boergesenii*, *C. implexa*, *S. duplicatum*, *T. conoides* and *T. ornata*, the fresh plants were washed thoroughly with seawater, sun dried and powdered. Extraction of algin was made by the method outlined by

Suzuki (1955). The periodic acid method of Cameron *et al.* (1948) was followed for estimating the mannitol content. Three replicates were used to estimate the agar, algin and mannitol contents and also the physical properties of agar.

TABLE 1. *Yield and physical properties of agar from some red algae of Lakshadweep*

Species	Name of the island	Yield (%)	Gel strength (gm/cm^2) 1.5% conc.	Gelling temp. (C) 1.5% conc.	Melting temp. (C) 1.5% conc.
Gelidiella acerosa ..	Agatti	33.0	278	47	99
	Kavaratti	16.9	207	48	99
	Kalpeni	36.3	153	46	99
Gracilaria arcuata ..	Bangaram	37.8	67	52	89
G. edulis ..	Agatti	42.8	42	48	96
	Kavaratti	43.1	77	49	99
	Kalpeni	42.8	46	48	98

Results

Data obtained on the yield and physical properties of agar from *G. acerosa*, *G. arcuata* and *G. edulis* are given in Table 1. The yield of agar ranged from 16.9 to 43.1% in these three red algae. The yield of agar was more in *G. edulis* than in *G. acerosa* and *G. arcuata*. The gel strength of 1.5% agar solution varied from 42 to 278 gm/cm^2 in these three species. The gel strength was higher in *G. acerosa* than in *G. arcuata* and *G. edulis*. The gelling and melting temperature of 1.5% agar solution ranged from 46 to 52°C and 89 to 99°C respectively among these three seaweeds.

Data collected on algin and mannitol contents from *P. boergesenii*, *C. implexa*, *S. duplicatum*, *T. conoides* and *T. ornata* are shown in Table 2. The yield of algin varied from 4.4 to 27.3%. The minimum value was obtained in *P. boergesenii* and maximum value in *T. conoides*. The algin content was comparatively high in *S. duplicatum*, *T. conoides* and *T. ornata* when compared with *P. boergesenii* and *C. implexa*. The mannitol content ranged from 1.4. to 9.5% with the minimum value in *T. conoides* and maximum value in *P. boergesenii*.

TABLE 2. *Yield of algin and mannitol from some brown algae of Lakshadweep*

Species	Name of the island	Algin (%)	Mannitol (%)
Padina boergesenii	Agatti	9.2	5.2
	Bangaram	4.4	9.5
	Androth	4.5	3.1
	Kalpeni	6.6	5.8
	Suheli	8.0	3.0
	Minicoy	4.6	3.1
Chnoospora implexa	Kalpeni	10.6	5.1
Sargassum duplicatum	Suheli	19.1	2.6
Turbinaria conoides	Kalpeni	27.3	1.4
T. ornata	Bitra	26.1	4.8
	Agatti	24.1	5.3
	Bangaram	23.3	4.6
	Androth	22.4	2.8
	Kavaratti	25.1	4.2
	Kalpeni	24.4	6.0
	Suheli	19.1	2.6
	Minicoy	22.4	5.2

Discussion

Seasonal variation in the yield of agar from *G. acerosa* and *G. edulis* (Chennubhotla *et al.*,

1986) and algin from *P. gymnospora* (Chennubhotla *et al.*, 1977), *T. conoides* (Umamaheswara Rao, 1969), *T. ornata* (Umamaheswara Rao and Kalimuthu, 1972) and species of *Sargassum* (Umamaheswara Rao, 1969 ; Kalimuthu, 1980 ; Chennubhotla *et al.*, 1982) growing around Mandapam was investigated. Though seasonal variation in the yield of agar and algin was not studied from the seaweeds of Lakshadweep, the values obtained in the present study can be compared with the values obtained for the seaweeds of Mandapam area. *G. acerosa, G. drcuata, G. edulis, S. duplicatum, T. conoides* and *T. ornata* growing in Lakshadweep could be exploited as an additional source of raw-material to the Indian seaweed industries. Studies on the seasonal aspects of growth, fruiting and phycocolloid contents of economically important seaweeds of Lakshadweep are necessary to know the suitable period for commercial harvesting of seaweeds.

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