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EFFECT OF REPEATED HARVESTING ON THE GROWTH OF *GELIDIELLA ACEROSA* AND *GRACILARIA CORTICATA* VAR *CORTICATA* OCCURRING AT MANDAPAM COAST.

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Abstract

The effect of repeated harvesting on the growth of *Gelidiella acerosa* was studied for one year from August '87 to July '88 and *Gracilaria corticata* var. *corticata* for two years from July '87 to May '89. The growth of these agar yielding seaweeds depended on the harvesting season and the interval between successive harvests. The regrowth of these red algae continues as long as the basal rhizomatous portion is intact with the substratum. Hence harvest should be done by pruning the plants leaving the basal portions instead of plucking the whole plants. The commercial exploitation of *G. acerosa* should be made only during April to July and *G. corticata* var. *corticata* during April to June and September to November giving ample interval for their regrowth to harvestable size.

Introduction

During the recent years many agar industries have come up in India. These seaweed based industries depend on the raw material of *Gelidiella acerosa, Gracilaria edulis* and *G. crassa* exploited from the natural beds occurring around Mandapam area. In order to meet the raw material demand, these agar yielding seaweeds are harvested throughout the year in Mandapam coast without giving any interval for their regrowth. Studies were made on the effect of repeated harvesting on the growth of *Gelidiella acerosa* occurring at Veraval (Joshi and Chauhan, 1985). Although some works were carried out on the growth and agar content from these red algae of Mandapam coast (Umamaheswara Rao, 1972 and 1973; Thomas *et al.*,1975 a and 1975 b and Chennubhotla *et al.*, 1986), no information is available on the effect of repeated harvesting on their growth. Hence studies were undertaken on this aspect in *Gelidiella acerosa*

growing at Krusadai island and Kilakkarai and *Gracilaria corticata* var. *corticata* occurring at Pudumadam and the results obtained are presented in this paper.

Materials and Methods

The subtidal reef with unexploited population of *Gelidiella acerosa* (Forsskal) Feldmann et Hamel at Krusadai Island and Kilakkarai and the intertidal rocky area with thick growth of *Gracilaria corticata* var. *corticata* J. Agardh were selected for this study. In each place 11 numbers of one square meter permanent quadrats were marked randomly by fixing four iron pegs at the four corners of each one square meter area. While starting experiments in the month of July/August '87, the plants were harvested by hand picking, as practiced in commercial exploitation, from all the quadrats leaving about 1 cm long basal parts of plants on the substratum. To evaluate the effect of repeated harvests in consecutive months, the quadrats were systematically harvested as follows.

After one month from start of experiment, the first quadrat with one month regrown plants were harvested. In the second month, the first and second quadrats with one month and two months regrowth respectively were harvested. The same method of harvesting was followed for all other quadrats in the subsequent months. The fresh weight of harvested plants from each quadrat was taken after draining water from the samples. This study was made for a period of one year from August '87 to July '88 for *G. acerosa* and for 2 years from July '87 to May '89 for *G. corticata* var. *corticata.*

Results

The data collected on the regrowth and biomass of *G. acerosa* occurring at Krusadai Island and Kilakkarai for one year period from August '87 to July '88 are presented in Table 1 and 2 respectively. In the first month the biomass of *G. acerosa* harvested from 11 quadrats varied from 10 to 170 gm/m^2 and 20 to 155 gm/m^2 respectively from Krusadai Island and Kilakkarai. Other quadrats were systematically harvested in successive months from September to July. The quadrats harvested in succession during the seven months from September to March showed the effect of denudation with less biomass of seaweeds. All quadrats harvested for the first time and in succession from April to July produced 30 to 175 gm/m^2 and 15 to 120 gm/m^2 of biomass at Krusadai Island and Kilakkarai respectively.

Table - 1 Harvested biomass of *Gelidiella acerosa* from Krusadai Island

Month of harvest	Quadrat number and seaweed biomass (gm wet wt./m²)										
	1	2	3	4	5	6	7	8	9	10	11
August '87	140	170	150	90	40	20	50	30	20	10	50
September	200										
october	110	65									
November	Trace	Trace	25								
December	45	35	40	30							
January '88	95	35	35	60	20						
February	10	35	5	5	15	5					
March	20	20	15	15	Trace	10	20				
April	40	45	40	30	40	35	40	175			
May	95	65	100	55	95	95	65	45	110		
June	40	65	55	50	45	65	45	30	35	40	
July	50	80	50	30	Trace	Trace	40	65	55	95	130

Table - 2

Harvested biomass of *Gelidiella acerosa* from Kilakkarai

Month of harvest	Quadrat number and seaweed biomass (gm wet wt/m²)										
	1	2	3	4	5	6	7	8	9	10	11
August '87	95	120	30	20	55	70	60	90	65	155	110
September	45										
October	60	100									
November	45	40	40								
December	20	25	25	25							
January '88	8	8	6	8	8						
February	10	25	15	10	20	10					
March	10	15	Trace	Trace	Trace	10	20				
April	15	25	35	Trace	30	30	Trace	35			
May	65	80	105	60	45	10	120	90	45		
June	60	35	40	45	35	30	40	45	45	45	
July	70	120	90	70	70	75	110	70	60	55	65

Table - 3

Harvested biomass of *Gracilaria corticata* var. *corticata* from Pudumadam.

Month of harvest	Quadrat number and seaweed biomass (gm wet wt/m²)										
	1	2	3	4	5	6	7	8	9	10	11
July '87	335	990	1500	900	190	1725	1900	1475	600	1725	2000
August	155										
September	220	330									
October	100	210	3850								
November	100	90	675	900							
December	Trace	Trace	Trace	45	60						
January '88	40	75	270	380	165	835					
February	160	225	425	210	90	475	475				
March	18	90	125	45	100	125	225	220			
April	Trace	Trace	Trace	Trace	Trace	Trace	Trace	Trace	125		
May	Trace	35	Trace	Trace	Trace	Trace	Trace	150	390	660	
June	Trace	170	125	85	70	350	55	130	840	970	1870
July	55										
August	140	145									
September	155	420	1460								
October	30	35	170	70C							
November	25	150	65	260	390						
December	Trace	25	300	190	85	210					
January '89	Trace	30	150	90	250	100	850				
February	Trace	55	Trace	120	Trace	180	Trace	230			
March	Trace	40	Trace	Trace	Trace	Trace	220	175	480		
April	Trace	Trace	Trace	Trace	Trace	Trace	Trace	Trace	Trace	600	
May	Trace	95	170	70	Trace	Trace	80	Trace	Trace	Trace	700

The data obtained on the regrowth and biomass of *G. corticata* var. *corticata* are given in Table.3. The biomass from 11 quadrats in July '87 ranged from 190 to 2000 gm/m². The quadrats were systematically harvested for one year and repeated for another year from July '88 to May '89. The quadrats harvested for the first time during the months September to November and April to June had more biomass than the quadrats harvested for the first time in all other months. The biomass varied from 330 to 3850 gm/m² during April to June in two years period. In general the biomass of harvested material in successive months was less after the first harvest in all quadrats.

Discussion

The present investigation reveals that the regrowth of the population of *G. acerosa* and *G. corticata* var. *corticata* is dependant upon the interval between the successive harvests in the same area. *G. acerosa* harvested in August regained its original weight after about 7 months during the period April-July while *G.corticata* var. *corticata* harvested during the months June-July regained the maximum biomass after 3 months during September-November and again after 4 months during April-June. This shows that the rate of regrowth in G. corticate var. corticate is higher than in *G. acerosa*.

It is evident from the present study that the peak growth period for G. acerosa is from April to July and for *G. corticata* var. *corticata* from April- June and September-November. This is in conformity with the earlier findings on the growth behaviour of G. acerosa growing at Krusadai Island and Kilakkarai (Thomas *et al.*, 1975 a and 1975 b and Chennubhotla *et al.*, 1986) and *G. corticata* var. *corticata* occurring at Mandapam (Umamaheswara Rao, 1972). the harvest of these seaweeds should be done by pruning them leaving the basal portion for regeneration. The regrowth occurs as long as the basal rhizomatous branches forming the holdfasts of these plants remain undisturbed. From the results obtained on the pattern of regeneration in these two species, the best season for harvesting *G. acerosa* is found to be April to July and for *G. corticata* var. *corticata* during April - June and September - November.

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