

THE COMMUNITIES OF *LAURENCIA* (RHODOMELACEAE, RHODOPHYTA) AT THE CAPE VERDE ISLANDS

By J. OTERO-SCHMITT¹

With 2 figures and 2 tables

ABSTRACT. The communities of *Laurencia* LAMOUROUX are predominant among the dendroid algal communities of the Cape Verde Islands. These are found all around the islands; the most abundant species are *Laurencia majuscula* (HARVEY) LUCAS and *L. intermedia* YAMADA, specially common on shallow waters: the first predominates at exposed shores and rocky bottoms, while *L. intermedia* is also found at the intertidal region of very exposed shores.

INTRODUCTION

The communities of *Laurencia* LAMOUROUX are found at most marine habitats of the Cape Verde Islands, in the intertidal region, as well as in shallow waters, on sandy rock bottoms, muddy bottoms and even on colonies of *Millepora* spp. and *Ciderastrea* sp. (OTERO-SCHMITT, 1993). Although most of these communities are dominated by *Laurencia majuscula* (HARVEY) LUCAS, which develops in dendroid communities, or by *Laurencia intermedia* YAMADA, which develops in turf or a little dendroid communities, these 2 species were not recorded by ASKENASY (1896).

There is an high number of species within this genus, many of them still with taxonomic problems to be solved, which difficult the right determination of the species and, therefore, the characterization of their communities: at this respect, YAMADA (1931) comments about his description of *Laurencia intermedia* that the same could be included in a complex of species quite similar, *L. paniculata* J. AGARDH and *L. papillosa* GREVILLE.

Besides, these communities use to be subordinate of other communities, like the Coelentera bottoms or the belt of *Sargassum vulgare* C. AGARDH and, so the same are not

¹ Departamento de Biología Vegetal, Facultad de Biología, Universidade de Santiago, 15706 Santiago de Compostela, Spain.

always well delimited.

As most works dealing with the seaweeds of the Cape Verde Islands are floristic (PRUD'HOMME VAN REINE, 1984), in this work a contribution to seaweed communities is carried out.

MATERIAL AND METHODS

During May 1987, several samples of the communities of *Laurencia* were taken at 12 localities of the islands of Sal, Santiago, San Vicente and Brava (Cape Verde Islands). Inventories, using the scales of cover and sociability of BRAUN-BLANQUET (1979), were carried out. Because most *Laurencia* species have many taxonomic problems, all these inventories were limited to those communities in which *L. majuscula* or *L. intermedia* are the dominant species.

RESULTS

Although 7 species of *Laurencia* were found at the Cape Verde Islands (OTERO-SCHMITT, in press), only *L. intermedia* and *L. majuscula* are abundant enough and widespread around the islands, so they can develop their own communities (Fig. 1). Besides, some of the other species need to be properly checked.

The communities which are dominated by *L. intermedia* (Table 1) are typically found at the intertidal level and shallow waters, where these grow mainly on sandy-rocky bottoms; *Heterosiphonia crispella* (C. AGARDH) WYNNE is typically found in the community, among the turf strata of *Jania adhaerens* LAMOUROUX with *Hypnea cervicornis* J. AGARDH. At most exposed places, there is a great amount of filamentous seaweeds, like *Herposiphonia secunda* f. *tenella* (C. AGARDH) WYNNE and *Platysiphonia delicata* (CLEMENTE) CREMADES; at more sheltered shores, *Dictyota dichotoma* (HUDSON) LAMOUROUX and *Lyngbya* spp. are specially abundant. *Fosliella farinosa* (LAMOUROUX) HOWE is a typical epiphytic seaweed of this species.

The most homogeneous patches of this community are those found at sandy shores, quite exposed to waves, like those which are found at Palhona (Sal Island) and South of Tarrafal (Santiago Island), usually at the low littoral fringe.

The communities which are dominated by *L. majuscula* (Table 2) have a clear stratification because of the habit of this species, with a turf strata and an epiphytic strata: *Fosliella farinosa* is a typical epiphytic seaweed of this species (Fig. 2). Although most species are common to both communities, specially epiphytic species, there is a greater

percentage of turf species in the communities of *Laurencia intermedia*. With regard to its floristic composition, the main difference between both communities, is the lack of *Heterosiphonia crispella* and *Jania capillacea* in the community of *L. majuscula*; both species are common in the community of *L. intermedia*. However, the epiphytic composition is quite similar to both species (OTERO-SCHMITT & SANJUAN, 1992).

DISCUSSION

The difficulties involved in the determination of the species within genus *Laurencia* avoid the right characterization of their communities, (specially of other turf species). Nevertheless, these are not so widespread like those of *Laurencia majuscula* and *Laurencia intermedia* and, therefore, the number of inventories carried up is fewer and their species composition is much more variable because the great differences among the habitats in which these grow.

The cover of *Millepora* sp. and *Ciderastrea* sp. is only occasionally found in the communities dominated by *Laurencia majuscula*: these communities are, in fact, found among the belt dominated by Coelenterata; in those places where the turf strata is most developed, the community doesn't have a clear stratification.

The community of *L. intermedia* is greatly widespread in Tropical West Africa (LAWSON & JOHN, 1987), and is found in similar habitats to those of the Cape Verde Islands. On the other hand, the community of *L. majuscula* is also found as well-developed plants in the shallower sublittoral (LAWSON JOHN, 1987).

The communities of *Laurencia* which predominate at the Canary Islands are mainly composed by *L. hybrida* (DE CANDOLLE) LENORMAND ex duby, with some *L. perforata* Montagne fronds; these are commonly found growing in great midlittoral pools (GIL-RODRIGUEZ & WILDPRET DE LA TORRE, 1980), while at the Cape Verde Islands predominate in the infralittoral region; the main difference with the *Laurencia* communities of the Cape Verde Islands is the abundance of *Ceramium* and of some seaweeds like *Rhodymenia pseudopalmata* (LAMOUROUX) SILVA and *Gymnogongrus cymolnodiae* BÖERGESEN, which are rare at the Cape Verde Islands.

At the Azores Islands, the only similar community is that of *L. obtusa* (HUDSON) LAMOUROUX (SCHMIDT, 1931), although it develops on the intertidal region, and not just like an infralittoral belt.

It seems clear that these both *Laurencia* species have tropical affinities, and this is one of the floristic differences among the Cape Verde Islands flora and that of other Macaronesian Islands; PRUD' HOMME VAN REINE & HOEK (1990) have already described the relative isolation of the Cape Verde Islands in relation to other Macaronesian Islands.

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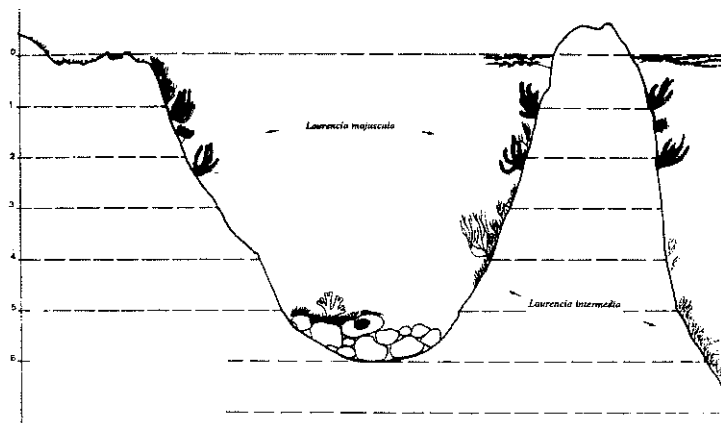


Figure 1 - Diagrammatic representation of algal belts at an exposed shore of Brava Island; the communities of *Laurencia majuscula* develop at shallow and exposed places, while those of *L. intermedia* grow at deeper areas. Figure from OTERO-SCHMITT (1993).

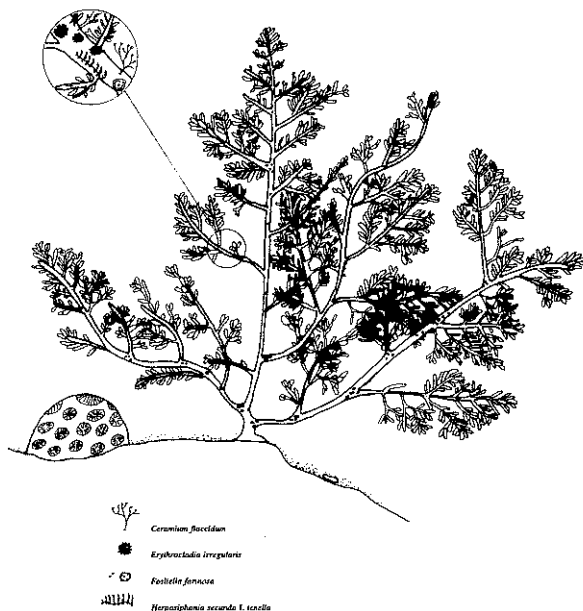


Figure 2 - Detail of the community of *Laurencia majuscula*, showing its two most abundant epiphytes. It develops on sandy bottom with *Ciderastrea sp.*

Abbreviations used on the Tables

Localities

- Cal: Calhau, San Vicente I.
Cas: Praia do Cascalho, Sal I.
Fur: Baia da Furna, Brava I.
Pal: Palhona, Sal I.
Pra: Praia, Santiago I.
Ped: Baia da Pedrinha, Brava I.
PPr: Ponta Preta, Sal I.
RXu: Rabo de Xunco, Sal I.
Sal: Salamansa, San Vicente I.
SNe: Serra Negra, Sal I.
StM: Santa Maria, Sal I.
TaS: Tarrafal (South), Santiago I.

Exposition degree:

- E: Exposed
LS: Low sheltered
QE: Quite exposed
QS: Quite sheltered
SE: Semiexposed
VE: Very exposed

Substrate:

- e: epiphyte
C-S: Sandy bottom with corals
M: Muddy bottom
P: Pebbles
P-M: Muddy bottom with pebbles
R: Rocky bottom
R-C: Rocky bottom with corals
R-P: Rocky bottom with pebbles
R-S: Rocky bottom with sand
S: Sandy bottom
S-M: Muddy sand bottom

TABLE 1 - *Laurencia intermedia* community.

Inventory number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Locality	Pal	TaS	Cal	Pal	Pal	Cas	Cas	Cas	Fur	Pal	Ped	Fur	Pal	Fur	TaS	Sai	Sai	Cas	
Date	3-V	14-V	16-V	3-V	3-V	0-V	20-V	20-V	7-V	3-V	9-V	8-V	3-V	9-V	14-V	7-V	17-V	0-V	
Substrate	R	R	R-S	R	R-P	R-S	R-S	R-S	R	P	R	R	R	R	R	M	S-M	R	
Exposition degree	QE	E	QE	E	SE	E	E	QS	QS	E	SE	LS	E	VE	E	QE	QE	E	
Depth (m)	0	-2	-4	-1	-1.5	-3	-7	-5	-4	-3	-2	-3	-1	-2	-2	-2	-3	-6	
Inclination (%)	0	10	10	5	0	5	20	0	5	5	0	15	5	20	5	5	5	0	
Aspect	NE	SO	SE	N	N	NO	SO	SO	SE	ENE	SE	N	0	S	N	N	0	0	
Area (dm2)	2	2	2	2	1	4	2	2	2	2	2	2	2	4	2	4	2	2	
Cover	85	80	90	75	95	95	90	90	90	95	90	100	90	95	100	80	85	95	
Number of species	2	6	5	4	9	6	13	10	9	10	11	16	11	14	18	14	12	9	
<i>Laurencia intermedia</i>	3.5	3.5	4.5	4.5	2.3	4.5	3.4	4.5	3.5	3.2	3.4	2.3	2.2	3.4	4.5	3.5	3.4	2.3	
<i>Heterosiphonia crispella</i>	.	.	.	+	+	.	1.2	+	.	.	+	.	+	+	+	+	1.2	.	
<i>Hypnea cervicornis</i>	.	.	.	.	.	.	.	+	.	+	1.2	3.4	1.2	+	1.2	+	1.3	2.3
<i>Dictyota dichotoma</i>	.	.	.	.	.	+	+	.	+	+	+	.	.	.	.	+	1.3	+
<i>Lyngbya</i> sp.	.	+	.	.	+	+	.	.	+	+	1.2	+	.	.	.	.	.	+
<i>Jania adhaerens</i>	.	.	.	.	.	.	.	.	1.2	1.4	.	1.3	1.3	1.2	1.2	+	.	.
<i>Jania capillacea</i>	.	.	.	.	.	.	1.2	1.2	.	.	1.2	2.3	.	.	.	.	.	.
<i>Fosliella farinosa</i>	+	.	.	+	.	.	.	+	.	.	.	+	+	.	.	.	.	.
<i>Herposiphonia secunda</i> f. tenell	.	.	+	.	.	.	.	.	.	.	.	.	.	1.4	+	+	+	+
<i>Platysiphonia delicata</i>	.	.	.	.	.	+	+	.	.	.	.	+	.	+	.	.	.	+
<i>Centroceras clavulatum</i>	.	+	.	.	.	+	.	.	.	+	.	+	.	.	.	.	.	.
<i>Spyridia hypnoides</i>	.	.	+	.	.	.	.	.	.	1.1	.	.	1.2	.	.	+	.	+
<i>Polysiphonia subtilissima</i>	.	+	.	.	.	.	.	.	1.1	.	.	.	.	.	.	+	+	+
<i>Ceramium flaccidum</i>	.	.	.	.	2.4	.	.	.	.	.	.	.	+	.	.	+	+	.
<i>Spirulina</i> sp.	.	.	.	+	.	.	.	.	+	+	.	.	.	.	.	+	.	.
<i>Lithophyllum</i> sp.	.	1.2	.	.	.	.	.	.	.	.	.	.	1.2	1.2	.	.	.	.
<i>Erythrocladia irregularis</i>	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Callithamnion</i> cf. <i>roseum</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+
<i>Colpomenia sinuosa</i>	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.
<i>Champia parvula</i>	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	+	.
<i>Ceramium nitens</i>	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+
<i>Polysiphonia ferulacea</i>	.	.	.	.	.	.	.	.	.	1.3	+	.	+	.	.	.	.	.
<i>Cladophora vagabunda</i>	.	+	.	1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Symploca hydroides</i>	.	.	.	.	1.3	.	1.2	.	.	.	.	.	.	.	.	.	.	.
<i>Laurencia intricata</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
<i>Cotoniella filamentosa</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.
<i>Laurencia majuscula</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+
<i>Anabaena</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+
Animals																			
<i>Cidaris</i> sp.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	+	.	.	.
<i>Parazoanthus</i> sp.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.

Accidental species {Species Inventor number, cover.sociability}: *Hypoglossum hypoglossoides* (7 +), *Bryopsis myosuroides* (7,11 +), *Galaxaura lapidescens* (8 +), *Asparagopsis armata* (8, 9 +), *Botryocladia botryoides* (8, 18+), *Hypnea flagelliformis* (9, 1.1), *Leveringia brasiliensis* (5 +), *Sphacelaria cirrosa* (10 +), *Caulerpa racemosa* (10, +), *Callithamnion granulatatum* (11 +), *Anadyomene stellata* (11, +), *Stylonema alsidii* (12 +), *Halodictyon mirabile* (12 +), *Caulerpa webbiana* (12, +), *Sargassum vulgare* (13 +), *Lobophora variegata* (14 +), *Crouania attenuata* (14 +), *Gelidiella* sp. (14 +), *Scytonema* sp. (15 +), *Jania crassa* (15 +), *Peyssonnelia rosa-marina* (15 +), *Gulsonia ecorticata* (15 +), *Calothrix* sp. (16 +), *Spermothamnion gorgoneum* (16 +), *Halimeda discorda* (16 +), *Bryocladia cuspidata* (16 +), *Microdictyon calodictyon* (17 +), *Valonia utricularis* (17+), *Laurencia* cf. *galastoffii* (17 +).

TABLE 2 - *Laurencia majuscula* community.

Inventory number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Locality	PPr	Sal	Pra	SNe	RXu	StM	PPr	SNe	SNe	Cas	StM	StM	Pal	StM
Date	1-V	17-V	12-V	19-V	8-V	1-V	21-V	19-V	19-V	0-V	1-V	1-V	3-V	1-V
Substrate	R	P-M	R	R	R	C-S	R	P	R	R	S	S	R	R-S
Exposition degree	E	QE	E	SE	QE	SE	E	SE	SE	E	SE	SE	VE	SE
Depth (m)	-4	-3	-1	-4	-5	-2	-5	-2	-3	-6	-2	-5	0	-3
Inclination (%)	30	0	5	5	5	10	30	10	15	15	10	5	5	0
Aspect	ON	N	NE	E	NE	S	NO	ESE	E	0	S	S	N	S
Area (dm ²)	4	4	4	4	4	4	2	2	2	2	4	2	2	2
Cover	95	90	75	80	100	75	95	95	100	100	60	80	80	90
Number of species	7	11	9	6	12	11	8	11	6	10	12	6	5	8
<i>Laurencia majuscula</i>	4.5	2.4	3.5	2.2	4.4	2.3	2.2	3.4	2.1	4.5	2.2	2.4	1.2	4.5
<i>Fosliella farinosa</i>	1.1e	.	+e	+e	+e	+e	+e	+e	.	.	.	+e	+e	+e
<i>Ceramium flaccidum</i>	+e	+e	1.2	.	.	+e	+e	.	.	.	+e	.	+	+e
<i>Polysiphonia subtilissima</i>	1.3	.	.	.	.	+e	.	.	+e	+e	+e	+e	.	.
<i>Jania adhaerens</i>	.	+	+	.	1.2	1.2	+	+	3.5	+	.	.	.	.
<i>Dictyota dichotoma</i>	.	1.4	+	2.4	.	.	.	2.4	.	+	+e	.	.	.
<i>Hypnea cervicornis</i>	.	1.2	1.3	.	1.2	.	.	.	.	1.2	.	.	.	.
<i>Platysiphonia delicata</i>	.	.	.	.	1.2	.	1.3	+e	1.4	.	.	1.2	+e	.
<i>Cottoniella filamentosa</i>	.	+e	.	.	.	.	.	+	.	.	+	.	.	1.2
<i>Herposiphonia secunda f. tenell</i>	.	+	.	+e	.	.	.	+e	.	+	.	.	.	.
<i>Erythrocladia irregularis</i>	+e	.	.	.	+e	+e	.	.	.	.	.	.	.	+e
<i>Anabaena sp.</i>	.	.	.	1.2	.	.	.	1.2	+	.	.	.	.	.
<i>Spyridia hypnoides</i>	.	+	.	.	.	.	.	.	.	+e	1.3	.	.	.
<i>Champia parvula</i>	+	.	+e	.	.	.	.	.	.	.	+e	.	.	.
<i>Asparagopsis armata</i>	.	.	.	.	1.1	.	.	.	.	.	.	2.2	.	.
<i>Lyngbya spp.</i>	.	.	.	.	+	1.2	.	.	.	.	+	.	.	.
Animals														
<i>Millepora sp.</i>	.	.	.	.	.	1.4	.	.	.	.	+	+	.	+
<i>Ciderastrea sp.</i>	.	.	.	.	.	.	.	.	.	.	+	.	.	1.1

Accidental species {Species (inventor number, cover.sociability)}: *Callithamnion cf. corymbosum* (1 +e), *Laurencia cf. obtusa* (2 +), *Oscillatoria cf. laetevirens* (2 1.5), *Stylonema alsidii* (2 +e), *Callithamnion tetragonum* (3 +e), *Jania cf. rubens* (3 +), *Stigonema sp.* (4, 8+), *Gelidiopsis planicaulis* (5 +), *Nemastoma confusum* (5 +), *Anadyomene stellata* (5 +e), *Lithophyllum sp.* (5, 11, +), *Callithamnion sp.* (6, 7 +e), *Peyssonnelia polymorpha* (6 +), *Botryocladia botryoides* (7 2.5), *Polysiphonia ferulacea* (7 +e), *Caulerpa webbiana* (8 +), *Oscillatoria sp.* (8, 14 +e), *Callithamnion cf. roseum* (9, 1.1), *Udotea flabellum* (11, 1.1), *Laurencia nidifica* (11, +), *Levringia brasiliensis* (11 +), *Symploca hydroides* (12 +) *Sargassum cymosum* (13 1.3).