Marine algal flora of Santa Maria Island, Azores

Ana I Azevedo Neto‡, Manuela I. Parente§, Eva Cacabelos*l‡, Ana Cristina Costa§, Andrea Zita Botelho§, Enric Ballesteros§, Sandra Monteiro§, Roberto Resendes#, Pedro Afonso®, Afonso C. L. Prestes‡, Rita F. Patarrai,a, Nuno V. Álvaro*, David Mila-Figuera, Raul M. A. Neto*, José M. N. Azevedo‡, Ignacio Moreu‡

‡ cE3c - Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group, Faculdade de Ciências e Tecnologia, Departamento de Biologia, Universidade dos Açores, 9500-321 Ponta Delgada, Açores, Portugal
§ CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBiO Laboratório Associado, Pólo dos Açores, Universidade dos Açores, Faculdade de Ciências e Tecnologia, Departamento de Biologia, 9500-321 Ponta Delgada, Açores, Portugal
| MARE – Marine and Environmental Sciences Centre, Agência Regional para o Desenvolvimento da Investigação Tecnologia e Inovação (ARDITI), Edif. Madeira Tecnopolo, Piso 2, Caminho da Penteada, Funchal, Madeira, Portugal
‡ § |,‡ §
§ ¶ § #
¶ Centre d’Estudis Avançats de Blanes-CSIC, , Acc. Cala Sant Francesc 14, 17300 Blanes, Girona, Spain
# Faculdade de Ciências e Tecnologia, Departamento de Biologia, Universidade dos Açores, 9500-321 Ponta Delgada, Açores, Portugal
| IMAR/Okeanos, Departamento de Oceanografia e Pescas, Universidade dos Açores, Rua Prof. Doutor Frederico Machado, 9901-862 Horta, Açores, Portugal
« Expolab - Ciência Viva Science Centre, Avenida da Ciência - Beta, n.º 8, Lagoa, São Miguel, Açores, Portugal
» CCMMG (Centro do Clima Meteorologia e Mudanças Globais) & IITA-A (Instituto de Investigação e Tecnologias Agrárias e do Ambiente), Universidade dos Açores, Faculdade de Ciências Agrárias, Rua Capitão João d’Ávila – Pico da Urze, 9700-042 Angra do Heroísmo, Açores, Portugal
* N/A, Ponta Delgada, Portugal

Corresponding author: Ana I Azevedo Neto (ana.im.neto@uac.pt)

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Abstract

Background

The algal flora of the Island of Santa Maria (eastern group of the Azores archipelago) has attracted interest of researchers on past occasions (Drouët 1866, Agardh 1870, Trelease 1897, Schmidt 1931, Ardré et al. 1974, Fralick and Hehre 1990, Neto et al. 1991, Morton and Britton 2000, Amen et al. 2005, Wallenstein and Neto 2006, Tittley et al. 2009,
Wallenstein et al. 2009a, Wallenstein et al. 2010, Botelho et al. 2010, Torres et al. 2010, León-Cisneros et al. 2011, Martins et al. 2014, Micael et al. 2014, Rebelo et al. 2014, Ávila et al. 2015, Ávila et al. 2016, Machín-Sánchez et al. 2016, Uchman et al. 2016, Johnson et al. 2017, Parente et al. 2018). Nevertheless, the Island macroalgal flora is not well-known as published information reflects limited collections obtained in short-term visits by scientists. To overcome this, a thorough investigation, encompassing collections and presence data recording, was undertaken at both the littoral and sublittoral levels down to a depth of approximately 40 m, covering an area of approximately 64 km². The resultant taxonomic records are listed in the present paper which also provides information on species ecology and occurrence around the Island, improving, thereby, the knowledge of the Azorean macroalgal flora at both local and regional scales.

New information

A total of 2329 specimens (including some taxa identified only to genus level) belonging to 261 taxa of macroalgae are registered, comprising 152 Rhodophyta, 43 Chlorophyta and 66 Ochrophyta (Phaeophyceae). Of these, 174 were identified to species level (102 Rhodophyta, 29 Chlorophyta and 43 Ochrophyta), encompassing 52 new records for the Island (30 Rhodophyta, 9 Chlorophyta and 13 Ochrophyta), 2 Macaronesian endemics (Laurencia viridis Gil-Rodríguez & Haroun; and Millerella tinerfensis (Seoane-Camba) S.M.Boo & J.M.Rico), 10 introduced (the Rhodophyta Acrothamnion preissii (Sonder) E.M.Wollaston, Antithamnion hubbsii E.Y.Dawson, Asparagopsis armata Harvey, Bonnemaisonia hamifera Hariot, Melanothamnus harveyi (Bailey) Diaz-Tapia & Maggs, Scinaia acuta M.J.Wynne and Symphyocladia marchantioides (Harvey) Falkenberg; the Chlorophyta Codium fragile subsp. fragile (Suringar) Hariot; and the Ochrophyta Hydroclathrus tilesii (Endlicher) Santiañez & M.J.Wynne, and Papenfussiella kuromo (Yendo) Inagaki) and 18 species of uncertain status (11 Rhodophyta, 3 Chlorophyta and 4 Ochrophyta).

Keywords

Macroalgae, Azores, Santa Maria Island, new records, endemic, native, uncertain, introduced, occurrence data.

Introduction

The marine algal flora of the isolated mid-Atlantic Azores archipelago is considered cosmopolitan, with species shared with Macaronesia, North Africa, the Mediterranean Sea, Atlantic Europe and America (Tittley 2003, Tittley and Neto 2006, Wallenstein et al. 2009b) and relatively rich when compared to that of other remote oceanic Islands (Neto et al. 2005, Tittley and Neto 2005, Wallenstein et al. 2009b). Amongst the Atlantic archipelagos, Azores, with 405 species, comes second in species richness after the Canary Islands, with 689 species and is followed by Madeira (396), Cabo Verde (333) and Selvagens (295...
species) (Freitas et al. 2019). The latter authors, based on extensive analysis encompassing data on coastal fishes, brachyurans, polychaetes, gastropods echinoderms and macroalgae, suggested that the Azores should be a biogeographical entity on its own and proposed a re-definition of the Lusitanian biogeographical province, in which they consider four ecoregions: the South European Atlantic Shelf, the Saharan Upwelling, the Azores ecoregion and a new ecoregion they named Webnesia, which comprises the archipelagos of Madeira, Selvagens and the Canary Islands.

It should be noted that the paper by Freitas et al. (2019) reflects data from only a few of the nine Islands, since not all data were available to them. São Miguel, with 260 algal species cited at the moment (Table 1), is the Island with the greatest amount of research dedicated to the subject. To overcome this situation and with the aim of providing a better knowledge of the archipelago’s seaweed flora, research has been conducted over the past three decades on all the Islands. Data on the Islands of Corvo and Flores, Graciosa, Pico and Terceira are already available on the recently-published papers by Neto et al. (2020a), Neto et al. (2020b), Neto et al. (2020c), Neto et al. (2020e). Table 1 summarises the current available information.

| Phylum       | Santa Maria | São Miguel | Terceira | Graciosa | São Jorge | Pico | Faial | Flores | Corvo |
|--------------|-------------|------------|----------|----------|-----------|------|-------|--------|-------|
| Rhodophyta   | 68          | 168        | 73       | 126      | 35        | 142  | 59    | 120    | 30    |
| Chlorophyta  | 20          | 39         | 24       | 31       | 17        | 41   | 16    | 35     | 9     |
| Ochrophyta   | 28          | 53         | 16       | 38       | 10        | 42   | 8     | 41     | 17    |
| Total        | 116         | 260        | 113      | 195      | 62        | 225  | 83    | 196    | 56    |

The present paper presents both physical and occurrence data and information gathered from macroalgae surveys undertaken on Santa Maria Island mainly by the Island Aquatic Research Group of the Azorean Biodiversity Centre of the University of the Azores (Link: https://ce3c.ciencias.ulisboa.pt/sub-team/island-aquatic-ecology), the BIOISLE, Biodiversity and Islands Research Group of CIBIO- Açores at the University of the Azores (Link: https://cibio.up.pt/research-groups-1/details/bioisle) and the OKEANOS Centre of the University of the Azores (Link: http://www.okeanos.uac.pt). In these surveys, particular attention was given to the small filamentous and thin sheet-like forms that are often short-lived and fast-growing and usually very difficult to identify in the wild, without the aid of a microscope and specialised literature in the laboratory.

The paper aims to provide a valuable marine biological tool for research on systematics, diversity and conservation, biological monitoring, climate change, ecology and more applied studies, such as biotechnological applications, for academics, students, government, private organisations and the general public.
General description

Purpose: In this paper we present taxonomic records of macroalgae for Santa Maria Island and provide general information on their occurrence and distribution. By doing this, we are addressing several biodiversity shortfalls (see Cardoso et al. 2011, Hortal et al. 2015), namely the need to catalogue the Azorean macroalgae (Linnean shortfall) and improve the current information on their local and regional geographic distribution (Wallacean shortfall), as well as on species abundance and dynamics in space (Prestonian shortfall).

Project description

Title: Marine algal flora of Santa Maria Island, Azores

Personnel: Collections were conducted and occurrence data recorded during several years (1989 - 2019). Main collectors were Abel Sentíes, Afonso C. L. Prestes, Ana Cristina Costa, Ana I Neto, André Amaral, Andrea Cunha, Andrea Z. Botelho, Camille Fontaine, Catarina Santos, Cláudia Lopes, Daniela Gabriel, David Milla-Figuereas, Dinis Geraldes, Edgar Rosas-Alquicira, Edward Hehre, Emanuel Xavier, Enric Ballesteros, Eunice Nogueira, Eva Cabacelos, Francisco Wallenstein, Heather Baldwin, Joana Michael, Joana Pombo, João Brum, João Ferreira, João Monteiro, José Baptista, José M. N. Azevedo, Linda Beiroldi, Luís Resendes, Marco Enoch, Manuela I. Parente, Maria Ana Dionísio, Maria Machín-Sánchez, Maria Manuel, Marlene Terra, Mutue Toyota Fujii, Nuno Vaz Álvaro, Patrícia Madeira, Paulo Torres, Pedro Monteiro, Raquel Torres, Ricardo Cordeiro, Richard Fralick, Rita F. Patarra, Ruben Couto, Rui Sousa, Sandra Monteiro, Sérgio Ávila, Tarso Costa, Tito Silva, Valeria Cassano and Viegas Pinto.

Preliminary in situ identifications were done by: Abel Sentíes, Ana I. Neto, Andrea Z. Botelho, Daniela Gabriel, David Milla-Figuereas, Edgar Rosas-Alquicira, Edward Hehre, Enric Ballesteros, Eva Cabacelos, Francisco Wallenstein, Heather Baldwin, Manuela I. Parente, Maria Machín-Sánchez, Marlene Terra, Mutue Toyota Fujii, Nuno Vaz Álvaro, Raquel Torres, Richard Fralick, Ruben Couto and Valeria Cassano.

Abel Sentíes, Ana I. Neto, Andrea Z. Botelho, David Milla-Figuereas, Edgar Rosas-Alquicira, Edward Hehre, Enric Ballesteros, Eva Cabacelos, Francisco Wallenstein, Heather Baldwin, Manuela I. Parente, Maria Machín-Sánchez, Marlene Terra, Mutue Toyota Fujii, Richard Fralick and Valeria Cassano were responsible for the final species identification.

Voucher specimen management was mainly done by Afonso C.L. Prestes, Ana I. Neto, Andrea Z. Botelho, David Milla-Figuereas, Eunice Nogueira, Manuela I. Parente, Natália Cabral, Rita Patarra and Roberto Resendes. Vouchers are deposited at the AZB Herbarium Ruy Telles Palhinha and the LSM - Molecular Systematics Laboratory at the Faculty of Sciences and Technology of the University of the Azores.

Study area description: Isolated in the mid-Atlantic Ocean and emerging from the Azores Plateau and located above an active triple junction between three of the world's largest
tectonic plates (the North American Plate, the Eurasian Plate and the African Plate, Hildenbrand et al. 2014), the Azores archipelago (38°43′49″N, 27°19′10″W, Fig. 1) comprises nine Islands and several islets spread over 500 km in a WNW direction. The Island of Santa Maria (in black in Fig. 1), approximately 97 km², is the easternmost one of the archipelago (37°1′1″N, 25°11′6″W, Fig. 2), located approximately 430 km east of the Mid-Atlantic Ridge within the boundary that divides the Eurasian and African Plates (Hildenbrand et al. 2014). The western part of the Island is flat and has extensive wave-cut platforms reaching altitudes of 250 m above sea level. The eastern part is very irregular and has its highest point around 450 m (Neto et al. 2008c). There are no indications of recent volcanism and the last eruptions occurred during the Upper Pliocene. It is the only Island of the archipelago where marine fossiliferous deposits are known, which have been studied since the 19th century (see, for example, Amen et al. 2005, Neto et al. 2008c, Rebelo et al. 2014, Ávila et al. 2015, Ávila et al. 2016, Uchman et al. 2016).

The climate is characterised by regular rainfall, medium levels of relative humidity and persistent winds, mainly during the winter and autumn seasons (Morton et al. 1998). As in the remaining Azorean Islands, the tidal range is small (< 2 m), the coastal extension is restricted, with deep waters occurring within a few kilometres offshore and coasts are subjected to swell and surge most of the year (see Hidrográfico 1981).

The Island coastline is approximately 63 km long and the coastal morphology results from the effect of the wave action, responsible for the predominance of erosive formations and from the Island antiquity and, also, the fact that it has been frequently submerged. As a consequence, several agglomerations of marine sedimentary rocks occur (e.g. marine conglomerates, fossiliferous calcarenites and arenites) distributed through cliffs and headlands, providing a special geological value to this Island that is not present elsewhere in the archipelago (Neto et al. 2008c). The north and east coasts are characterised by discontinuous and mixed geological forms, with abrupt headlands between which lengths of large boulder and cobbles occur. At São Lourenço high cliffs give rise to narrow high-tide
platforms and low headlands generally less than 10 m high, that allow the establishment of cobble beaches and marine deposition that creates the local sandy beach. The northwest coastline of the Island is characterised by the occurrence of marine deposition and agglomerations of small cobbles, while the northeast coast is sculpted by plunging cliffs. Boulders and cobbles are commonly present. The west and south coasts of the Island have predominantly steep slopes, characterised by the occurrence of plunging cliffs that vary in height, abrupt headland segments and occasional high-tide platforms covered by boulders and cobbles. Praia Formosa has a different configuration with a smooth typology that facilitates seasonal marine deposition processes that alternate between a sandy beach in summer and a cobble beach during the rest of the year (Neto et al. 2008c).

Along the coastline of the Island, the bottom is dominated by irregular rocky beds, with compact bedrock dominating over boulder and cobble ones. Only two sand basins occur, Praia Formosa (south coast) and São Lourenço on the east coast (Neto et al. 2008c). On both beaches, bedrock patches emerge from the sediment bed. This mixed substrate is common to several other places around Santa Maria, at variable depths down to 30 m (e.g. Baía do Salto de Cães and Ilhéu das Lagoinhas on the north coast, Baía do Aveiro and Baía da Maia on the east coast). Shore slope and topography show substantial variation along the shoreline. Western and northern shores are usually flatter, with depths of 30 m occurring about 500 m offshore. Eastern shores are steeper: depths of 30 m can be reached less than 200 m away from the coast. Southern shores are intermediate in this respect. The area that comprises the Praia Formosa presents a slope that is similar to that of the north side of the Island, while the one between Ponta da Malbusca and Ponta do Castelo is steeper (Neto et al. 2008c). Submerged or semi-submerged caves, arches and tunnels of small amplitude and reduced length are common. As depth increases, the slope decreases, although the bottom is still rocky and uneven (Neto et al. 2008a). The sediment floor covering the deepest areas is stable, generally composed of medium and/or coarse sand (Neto et al. 2008a). Along the coastline, natural sheltered habitats (arches and semi-submerged caves, tide pools) create favourable conditions for the growth and the occurrence of a considerable diversity and abundance of macroalgae, macroinvertebrates

Figure 2. doi
Santa Maria Island showing the sampling locations (by Nuno V. Álvaro).
(Neto et al. 2008a, Neto et al. 2008b) and pelagic and benthic coastal fish (Azevedo et al. 2008).

As on the other Islands of the archipelago, intertidal communities of Santa Maria Island are, in part, dominated by algal vegetation, which exhibits a distribution pattern in mosaic and/or bands, with a predominance of algal turfs, covering the rocks as a carpet (Neto et al. 2008c). This turf-growing form is a taxonomically complex mixture of small algae, recruits and juveniles of larger algae, in which the thalli intertwine and re-attach to one another and are adapted for vegetative spread using such multiple attachments to the substratum and adjacent thalli for anchorage (Wallenstein et al. 2009a). The compact mat retains water and provides a suitable habitat for admixed algae and other organisms. A very distinct horizontal pattern of species occurrence characterises the Azorean intertidal shores. In Santa Maria Island three major zones are commonly found (Neto et al. 2008c): the uppermost is dominated by littorinids (Fig. 3); the mid-level zone is characterised by chthamalid barnacles, sometimes limpets (Fig. 4) and dominated by algal turf (Fig. 5); and the lowest zone, representing the transition to the sublittoral fringe, is characterised by various species of frondose algae growing in bands (e.g. the Macaronesian endemic Laurencia viridis, Fig. 6), as epiphytes or forming patches amongst and over turf species (e.g. Ellisolandia elongata (J.Ellis & Solander) K.R.Hind & G.W.Saunders, Fig. 7). The mid-shore level zone on bedrock or boulder shores sometimes exhibits patches of the brown alga Fucus spiralis Linnaeus and the red agarophyte Gelidium microdon Kützing (Fig. 8) and/or the occasional occurrence of the red algae Porphyra/Pyropia and/or Nemalion elminthoides (Velley) Batters, this latter commonly growing in patches with the brown crust Nemoderma tingitanum Schousboe ex Bornet (Fig. 9). In spring and summer, considerable amounts of the introduced red alga Asparagopsis armata can be seen at the lower intertidal level.

Figure 3. doi
Littorinids, a characteristic species of the Azorean high intertidal level (by the Island Aquatic Ecology Subgroup of cE3c-ABG).
Figure 4. Chthamalid barnacles, algal turf and limpets on Santa Maria mid intertidal level (by the Island Aquatic Ecology Subgroup of cE3c-ABG).

Figure 5. Mid-shore intertidal level, dominated by algal turf. Patches of the red algae Nemalion elminthoides can be seen in the image first plan (by the Island Aquatic Ecology Subgroup of cE3c-ABG).
Figure 6. The Macaronesian endemic *Laurencia viridis* at the low-shore intertidal level (by the Island Aquatic Ecology Subgroup of cE3c-ABG).

Figure 7. The erect calcareous frond of *Ellisolandia elongata* growing epiphytically on the algal turf at the low intertidal level (by the Island Aquatic Ecology Subgroup of cE3c-ABG).
Important features and habitats at the shore level are rock pools, occurring in different shapes and sizes and often recreating a shallow subtidal habitat which contains a rich

Figure 8. doi
The mid-level zone on bedrock shores showing patches of the brown alga *Fucus spiralis* and the red agarophyte *Gelidium microdon* (by the Island Aquatic Ecology Subgroup of cE3c-ABG).

Figure 9. doi
Patches of the red algae *Nemalion elminthoides* and the brown crust *Nemoderma tingitanum* at the mid-shore level of bedrock shores (by the Island Aquatic Ecology Subgroup of cE3c-ABG).
diversity of marine life (Neto et al. 2008b). There is a gradient in the proportion of different algal groups in pools at different shore levels. Green algae dominate the upper shore while red and brown algae dominate rock pools lower on the shore. Similarly, faunal diversity in rock pools is greater at lower intertidal levels. Species diversity and richness are lower in upper shore rock-pools where climatic conditions are more stressful (Neto et al. 2008b).

The rocky bottoms in the submerged zone are covered by more frondose macrophytes (Neto et al. 2008a), such as the brown algae *Dictyota* spp. (Fig. 10), *Halopteris filicina* (Grateloup) Kützing (Fig. 11), *Halopteris scoparia* (Linnaeus) Sauvageau and *Zonaria tournefortii* (J.V. Lamouroux) Montagne; and the red species *Plocamium cartilagineum* (Linnaeus) P.S. Dixon and *Sphaerococcus coronopifolius* Stackhouse (Fig. 12). The brown species *Padina pavonica* (Linnaeus) Thivy (Fig. 13) can be locally common. At this level, the edible barnacle *Megabalanus azoricus* (Pilsbry, 1916) and/or the limpet *Patella aspera* Röding, 1798 are concentrated in the first subtidal meters. Other conspicuous invertebrates are the cephalopod *Octopus vulgaris* Cuvier, 1797, the fan worm *Sabella spallanzanii* (Gmelin, 1791), the sea urchins *Sphaerechinus granularis* (Lamarck, 1816) and *Arbacia lixula* (Linnaeus, 1758) and the sea stars *Marthasterias glacialis* (Linnaeus, 1758) and *Ophidiaster ophidianus* (Lamarck, 1816) (Neto et al. 2008a). Frequent fish species at this level are the blue wrasse *Symphodus caeruleus* (Azevedo, 1999) or the ornate wrasse *Thalassoma pavo* (Linnaeus, 1758) in shallow rocky areas and the morays, *Muraena helena* Linnaeus, 1758 or the forkbeards *Phycis phycis* (Linnaeus, 1766), mainly hidden in crevices during the day. The parrotfish *Sparisoma cretense* (Linnaeus, 1758), the salemas *Sarpa salpa* (Linnaeus, 1758) and the white sea bream *Diplodus sargus* (Linnaeus, 1758) roam amongst rocky reefs (Azevedo et al. 2008).
Figure 11. *Halopteris filicina* at the subtidal level (by the Island Aquatic Ecology Subgroup of cE3c-ABG).

Figure 12. *Sphaerococcus coronopifolius* growing in association with the brown algae *Zonaria tournefortii* and *Dictyota* at the deepest level sampled (by the Island Aquatic Ecology Subgroup of cE3c-ABG).
Design description: The sampling referred to in this paper was performed across littoral and sublittoral levels down to approximately 40 m on the Island of Santa Maria. Each sampling location was visited several times and, on each occasion, a careful and extensive survey was undertaken to provide a good coverage of the area. Both physical collections and presence recording were made by walking over the intertidal shores during low tides or by SCUBA diving. The specimens collected were taken to the laboratory for identification and preservation and the resulting vouchers were deposited at the AZB Herbarium Ruy Telles Palhinha and the LSM - Molecular Systematics Laboratory at the Faculty of Sciences and Technology of the University of the Azores.

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- Projects:
  - CAJFQ – “Characterization of the algal component of quaternary fossil deposits”, integrated in the project “Macaronésia 2000”, funded by the Autonomous Organism of Museums and Centers of Tenerife, Canary Islands (1999-2004);
  - PARQMAR – “Characterization, Planning and Management of Marine Protected Areas in Macaronesia - The cases of the Eco-Marine Park of Funchal (Madeira), Gran Canaria and Tenerife (Canary Islands) and Santa Maria (Azores)”, funded by INTERREG III B 2000 Community Initiative Program - 2006, Azores-Madeira-Canary Islands. 03/ MAC/ 4.2/ M9 (2004-2006);
  - RRASMA – “Removal of abandoned fishing nets off the island of Santa Maria”, funded by the Regional Government of the Azores, Environment Delegation of Santa Maria Island (2005-2007);
RCGO - “Coastal Waste of the Eastern Group (São Miguel and Santa Maria Islands; Formigas Islets): inventory, catalog, raise awareness”, funded by QUERCUS (2006);

CAMAG/ORI – “Characterization of coastal water bodies on the islands of Santa Maria and São Miguel”, funded by the Regional Government of the Azores, Regional Secretariat for the Environment and the Sea, Regional Directorate for Planning and Water Resources (2008-2012);

LAUMACAT - “Diversity and phylogenetic relationships on the benthic marine algae with pharmacological potential: the Laurencia complex (Rhodophyta) in Macaronesian archipelagos, tropical and subtropical Atlantic”, funded by the Ministerio de Ciencia e Innovación, Dirección General de Investigación y Gestión del Plan Nacional de R+D+i, Subdirección General de Proyectos de Investigación, Gobierno de España (2010 to 2013) and by the São Paulo State Research Support Foundation (FAPESP), Brazil, Proc. 2014 / 00012-1 (2013 a 2016);

ASMAS - Açores: Stop-over for Marine Alien Species?” Government of the Azores - Regional Secretariat for the Sea, Science and Technology (M2.1.2/ l/032/2011). 2012 – 2016;

PIMA – “Elaboration of the implementation program of the Marine Strategy Framework Directive - Marine Invasion Program in the Azores” (3/DRAM / 2015). Government of the Azores - Regional Secretariat for the Sea, Science and Technology, Regional Directorate for Sea Affairs (GRA / SRMCT-DRAM), 2015;

BALA – “Elaboration of the implementation program of the marine strategy framework directive - biodiversity of the coastal environments of the Azores” (2 /DRAM /2015). Government of the Azores - Regional Secretariat for the Sea, Science and Technology, Regional Directorate for Sea Affairs (GRA / SRMCT-DRAM), 2015;

“ACORES-01-0145-FEDER-000072 - AZORES BIOPORTAL – PORBIOTA. Operational Programme Azores 2020 (85% ERDF and 15% regional funds);

Scientific Expeditions and campaigns:

“SANTA MARIA E FORMIGAS/90”, organised by the Biology Department of the University of the Azores, Santa Maria Island, Azores, June 1990;

“Fossil deposits of Prainha and Lagoinhas” under the project CAJFQ-Macaronesia 2001

“Santa Maria 2002”, under the workshop ”Marine Fossils of the Azores: Perspectives for the future”, 2002;

“Santa Maria 2005”, under the project PARQMAR, 2005;

“Santa Maria Island (Azores) 2009”, organised by the Biology Department of the University of the Azores 2009;

“Laurencia/2011”, under the project LAUMACAT, 2011;

“Waitt Foundation”, under the projects BALA and PIMA, 2016;

“BALA/PIMA”, under the projects BALA and PIMA, 2018;
• “PORBIOTA/2019” under the project ACORES-01-0145-FEDER-000072 - AZORES BIOPORTAL – PORBIOTA, 2019;
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  ◦ ERDF funds through the Operational Programme for Competitiveness Factors – COMPETE;
  ◦ Portuguese Regional Funds, through DRCT - Regional Directorate for Science and Technology, within several projects, 2019 and 2020 and SRMCT /DRAM - Regional Secretariat for the Sea, Science and Technology, Regional Directorate for Sea Affairs;
  ◦ CIRN/DB/UAc (Research Centre for Natural Resources, Universidade dos Açores, Departamento de Biologia);
  ◦ CIIMAR (Interdisciplinary Centre of Marine and Environmental Research, Porto, Portugal).

Sampling methods

Study extent: The present paper includes sampling performed on a relatively large area, of approximately 64 km², covering littoral and sublittoral levels down to approximately 40 m around the Island (Table 2, Fig. 2).

Table 2.
Information and location of the sampling sites on Santa Maria Island.

| Location N0 | Location ID   | Municipality   | Locality                        | Latitude | Longitude   | Littoral zone |
|------------|--------------|---------------|---------------------------------|----------|-------------|---------------|
| 1          | SMA_VP_Aapem | Vila do Porto | Anjos | Atrás do porto | 37.004998 | -25.159629 | Intertidal    |
|            |              |               |       | Entre-marés     |          |             |               |
| 2          | SMA_VP_aaprs | Vila do Porto | Atrás do aeroporto | Ponta do Rochedo | 36.985484 | -25.187049 | Subtidal      |
|            |              |               |       | Subtidal       |          |             |               |
| 3          | SMA_VP_aas1  | Vila do Porto | Atrás do aeroporto | Subtidal 1 | 36.975484 | -25.181233 | Subtidal      |
| 4          | SMA_VP_aas2  | Vila do Porto | Atrás do aeroporto | Subtidal 2 | 36.973329 | -25.179014 | Subtidal      |
| 5          | SMA_VP_Abjls | Vila do Porto | Anjos | Banco João Lopes | 37.00946 | -25.18495 | Subtidal      |
| Location N° | Location ID | Municipality | Locality | Latitude  | Longitude  | Littoral zone |
|-------------|-------------|--------------|----------|-----------|------------|---------------|
| 6           | SMA_VP_Abs  | Vila do Porto| Aveiro | 36.949447 | -25.016892 | Subtidal      |
| 7           | SMA_VP_Afpis1 | Vila do Porto| Anjos | 37.006907 | -25.158392 | Subtidal      |
| 8           | SMA_VP_Afpis2 | Vila do Porto| Anjos | 37.005815 | -25.157587 | Subtidal      |
| 9           | SMA_VP_Ap fem| Vila do Porto| Anjos | 37.012072 | -25.146074 | Intertidal    |
| 10          | SMA_VP_ap grcn12s1 | Vila do Porto| Área protegida de | 37.01291 | -25.14428 | Subtidal      |
| 11          | SMA_VP_ap grcn12s2 | Vila do Porto| Área protegida de | 37.02289 | -25.08936 | Subtidal      |
| 12          | SMA_VP_ap grcs13s | Vila do Porto| Área protegida de | 36.94455 | -25.00806 | Subtidal      |
| 13          | SMA_VP_ap grpcm21s1 | Vila do Porto| Área Protegida de Gestão de Recursos da Ponta do Cintrão–Ponta da Maia (SMA21) | 36.92892 | -25.06439 | Subtidal      |
| 14          | SMA_VP_ap grpcm21s2 | Vila do Porto| Área Protegida de Gestão de Recursos da Ponta do Cintrão–Ponta da Maia (SMA21) | 36.92489 | -25.02421 | Subtidal      |
| 15          | SMA_VP_ap grpcm21s3 | Vila do Porto| Área Protegida de Gestão de Recursos da Ponta do Cintrão–Ponta da Maia (SMA21) | 36.93505 | -25.09226 | Subtidal      |
| 16          | SMA_VP_Apiem  | Vila do Porto| Anjos | 37.005173 | -25.157061 | Intertidal    |
| Location N0 | Location ID | Municipality | Locality | Latitude  | Longitude  | Littoral zone |
|------------|-------------|--------------|----------|-----------|------------|---------------|
| 17         | SMA_VP_brsem | Vila do Porto | Boca da Ribeira Seca | Entre-marés | 37.004435 | -25.16595 | Intertidal |
| 18         | SMA_VP_bss   | Vila do Porto | Baixa do Sul | Entre-marés | 36.924751 | -25.022099 | Subtidal |
| 19         | SMA_VP_CBpes | Vila do Porto | Calheta de Baixo | Ponta das Eirinhas | 36.933883 | -25.014702 | Subtidal |
| 20         | SMA_VP_crem  | Vila do Porto | Calhau da Roupa | Entre-marés | 36.9458 | -25.146063 | Intertidal |
| 21         | SMA_VP_Eem   | Vila do Porto | Emissores | Entre-marés | 36.998404 | -25.175029 | Intertidal |
| 22         | SMA_VP_FBbrs | Vila do Porto | Feteiras de Baixo | Baía do Raposo | 37.010939 | -25.118291 | Subtidal |
| 23         | SMA_VP_Fem   | Vila do Porto | Figueiral | Entre-marés | 36.94574 | -25.122836 | Intertidal |
| 24         | SMA_VP_Fps   | Vila do Porto | Figueiral | Ponta | 36.94405 | -25.122131 | Subtidal |
| 25         | SMA_VP_ISLs  | Vila do Porto | Ilhéu de São Lourenço | Subtidal | 36.987488 | -25.041122 | Subtidal |
| 26         | SMA_VP_IVem  | Vila do Porto | Ilhéu da Vila | Entre-marés | 36.944045 | -25.171163 | Intertidal |
| 27         | SMA_VP_IVs1  | Vila do Porto | Ilhéu da Vila | Subtidal | 36.93948333 | -25.17646667 | Subtidal |
| 28         | SMA_VP_IVs10 | Vila do Porto | Ilhéu da Vila | Subtidal | 36.941005 | -25.167868 | Subtidal |
| 29         | SMA_VP_IVs2  | Vila do Porto | Ilhéu da Vila | Subtidal | 36.93883333 | -25.1757 | Subtidal |
| 30         | SMA_VP_IVs3  | Vila do Porto | Ilhéu da Vila | Subtidal | 36.9392 | -25.17541667 | Subtidal |
| 31         | SMA_VP_IVs4  | Vila do Porto | Ilhéu da Vila | Subtidal | 36.94125 | -25.17528333 | Subtidal |
| 32         | SMA_VP_IVs5  | Vila do Porto | Ilhéu da Vila | Subtidal | 36.939 | -25.1752 | Subtidal |
| Location N0 | Location ID | Municipality | Locality | Latitude | Longitude | Littoral zone |
|------------|-------------|--------------|----------|----------|-----------|---------------|
| 33         | SMA_VP_IVs6 | Vila do Porto | Ilhéu da Vila | Subtidal 6 | 36.94318333 | -25.17496667 | Subtidal     |
| 34         | SMA_VP_IVs7 | Vila do Porto | Ilhéu da Vila | Subtidal 7 | 36.94045 | -25.17448333 | Subtidal     |
| 35         | SMA_VP_IVs8 | Vila do Porto | Ilhéu da Vila | Subtidal 8 | 36.9431 | -25.17426667 | Subtidal     |
| 36         | SMA_VP_IVs9 | Vila do Porto | Ilhéu da Vila | Subtidal 9 | 36.941125 | -25.169649 | Subtidal     |
| 37         | SMA_VP_LApps | Vila do Porto | Lagoa | Pedra que Pica | Subtidal | 36.931597 | -25.075562 | Subtidal     |
| 38         | SMA_VP_Lbscs | Vila do Porto | Lagoinhas | Baía do Salto dos Cães | Subtidal | 37.017358 | -25.098105 | Subtidal     |
| 39         | SMA_VP_LiIem | Vila do Porto | Lagoinhas | Entre-marés | 37.015012 | -25.085176 | Intertidal   |
| 40         | SMA_VP_LiIfis | Vila do Porto | Lagoinhas | Fora do ilhéu | Subtidal | 37.03565 | -25.09881 | Subtidal     |
| 41         | SMA_VP_LIIs | Vila do Porto | Lagoinhas | Subtidal | 37.017954 | -25.086356 | Subtidal     |
| 42         | SMA_VP_MbccIlnem | Vila do Porto | Maia | Baía entre Cedros e Castelete | lado Norte | Entre-marés | 36.954591 | -25.020362 | Intertidal   |
| 43         | SMA_VP_MbccIlsenm | Vila do Porto | Maia | Baía entre Cedros e Castelete | lado Sul | Entre-marés | 36.95264 | -25.019663 | Intertidal   |
| 44         | SMA_VP_Mbcs | Vila do Porto | Maia | Baía dos Cedros | Subtidal | 36.954952 | -25.017313 | Subtidal     |
| 45         | SMA_VP_Mbs1 | Vila do Porto | Maia | Baía | Subtidal 1 | 36.94436667 | -25.00838333 | Subtidal     |
| 46         | SMA_VP_Mbs2 | Vila do Porto | Maia | Baía | Subtidal 2 | 36.94393333 | -25.00826667 | Subtidal     |
| 47         | SMA_VP_Mbs3 | Vila do Porto | Maia | Baía | Subtidal 3 | 36.94433333 | -25.00768333 | Subtidal     |
| 48         | SMA_VP_Mbs4 | Vila do Porto | Maia | Baía | Subtidal 4 | 36.94235 | -25.0076 | Subtidal     |
| Location N0 | Location ID    | Municipality      | Locality                  | Latitude      | Longitude     | Littoral zone |
|------------|---------------|-------------------|---------------------------|---------------|--------------|---------------|
| 49         | SMA_VP_Mbs5   | Vila do Porto     | Maia | Baía | Subtidal 5   | 36.94318333 | -25.00753333 | Subtidal      |
| 50         | SMA_VP_Mem    | Vila do Porto     | Maia | Entre-marés |               | 36.943886   | -25.014773   | Intertidal    |
| 51         | SMA_VP_Mfpis  | Vila do Porto     | Maia | Lado de Fora da Piscina | Subtidal | 36.938923 | -25.012707 | Subtidal      |
| 52         | SMA_VP_mfps1  | Vila do Porto     | Marina | Lado de fora do Pontão | Subtidal 1 | 36.944834 | -25.146131 | Subtidal      |
| 53         | SMA_VP_mfps2  | Vila do Porto     | Marina | Lado de fora do Pontão | Subtidal 2 | 36.9458   | -25.148333 | Subtidal      |
| 54         | SMA_VP_mpem   | Vila do Porto     | Marina | Pontão | Entre-marés | 36.944396 | -25.147067 | Intertidal    |
| 55         | SMA_VP_Mpiem  | Vila do Porto     | Maia | Piscina | Entre-marés | 36.939526 | -25.013879 | Intertidal    |
| 56         | SMA_VP_MPsis1 | Vila do Porto     | Malbusca-Piedade | Subtidal 1 |               | 36.92783333 | -25.0714 | Subtidal      |
| 57         | SMA_VP_MPsis10| Vila do Porto     | Malbusca-Piedade    | Subtidal 10  |               | 36.929380 | -25.071470 | Subtidal      |
| 58         | SMA_VP_MPsis11| Vila do Porto     | Malbusca-Piedade    | Subtidal 11  |               | 36.930017 | -25.071383 | Subtidal      |
| 59         | SMA_VP_MPsis2 | Vila do Porto     | Malbusca-Piedade    | Subtidal 2   |               | 36.92723333 | -25.06591667 | Subtidal      |
| 60         | SMA_VP_MPsis3 | Vila do Porto     | Malbusca-Piedade    | Subtidal 3   |               | 36.9279    | -25.07065  | Subtidal      |
| 61         | SMA_VP_MPsis4 | Vila do Porto     | Malbusca-Piedade    | Subtidal 4   |               | 36.927967 | -25.072933 | Subtidal      |
| 62         | SMA_VP_MPsis5 | Vila do Porto     | Malbusca-Piedade    | Subtidal 5   |               | 36.92806667 | -25.07045 | Subtidal      |
| 63         | SMA_VP_MPsis6 | Vila do Porto     | Malbusca-Piedade    | Subtidal 6   |               | 36.92621667 | -25.06138333 | Subtidal      |
| 64         | SMA_VP_MPsis7 | Vila do Porto     | Malbusca-Piedade    | Subtidal 7   |               | 36.925667 | -25.057567 | Subtidal      |
| 65         | SMA_VP_MPsis8 | Vila do Porto     | Malbusca-Piedade    | Subtidal 8   |               | 36.923030 | -25.066550 | Subtidal      |
| Location N° | Location ID | Municipality | Locality | Latitude  | Longitude  | Littoral zone |
|------------|-------------|--------------|----------|-----------|------------|---------------|
| 66         | SMA_VP_MPs9 | Vila do Porto | Malbusca-Piedade | 36.928750 | -25.065217 | Subtidal     |
| 67         | SMA_VP_Ms1  | Vila do Porto | Malbusca | 36.93582965 | -25.09382679 | Subtidal     |
| 68         | SMA_VP_Ms2  | Vila do Porto | Malbusca | 36.93821161 | -25.07944033 | Subtidal     |
| 69         | SMA_VP_Ms3  | Vila do Porto | Malbusca | 36.938555  | -25.085032  | Subtidal     |
| 70         | SMA_VP_PCbnss | Vila do Porto | Ponta do Castelo | 36.931039  | -25.057255  | Subtidal     |
| 71         | SMA_VP_PCem  | Vila do Porto | Ponta do Castelo | 36.928153  | -25.017055  | Intertidal   |
| 72         | SMA_VP_PCras | Vila do Porto | Ponta do Castelo | 36.926463  | -25.014565  | Subtidal     |
| 73         | SMA_VP_Pem   | Vila do Porto | Prainha     | 36.951808  | -25.104061  | Intertidal   |
| 74         | SMA_VP_PFepem | Vila do Porto | Praia Formosa | 36.950235  | -25.095009  | Intertidal   |
| 75         | SMA_VP_PFppem | Vila do Porto | Praia Formosa | 36.94734   | -25.088821  | Intertidal   |
| 76         | SMA_VP_PFps  | Vila do Porto | Praia Formosa | 36.937365  | -25.105259  | Subtidal     |
| 77         | SMA_VP_PFsa1 | Vila do Porto | Praia Formosa | 36.940431  | -25.095659  | Subtidal     |
| 78         | SMA_VP_PMs   | Vila do Porto | Ponta do Marvão | 36.936973  | -25.139363  | Subtidal     |
| 79         | SMA_VP_Rs    | Vila do Porto | Restinga    | 37.001733  | -25.172973  | Subtidal     |
| 80         | SMA_VP_SLaps | Vila do Porto | São Lourenço | 36.99533   | -25.052727  | Subtidal     |
| 81         | SMA_VP_SLb11s | Vila do Porto | São Lourenço | 36.98472   | -25.04341   | Subtidal     |
| 82         | SMA_VP_SLfem | Vila do Porto | São Lourenço | 36.9858    | -25.049216  | Intertidal   |
| Location N0 | Location ID | Municipality | Locality | Latitude  | Longitude  | Littoral zone |
|------------|-------------|--------------|----------|-----------|------------|---------------|
| 83         | SMA_VP_Slpnem | Vila do Porto | São Lourenço | Ponta Norte | Entre-marés | 36.998556 | -25.050887 | Intertidal |
| 84         | SMA_VP_SLpns  | Vila do Porto | São Lourenço | Ponta do Norte | Subtidal | 37.00491 | -25.05133 | Subtidal |
| 85         | SMA_VP_Slpsbem | Vila do Porto | São Lourenço | Ponta Sul da Baía | Entre-marés | 36.98538307 | -25.05051544 | Intertidal |
| 86         | SMA_VP_SLs1   | Vila do Porto | São Lourenço | Subtidal 1 |  | 36.996286 | -25.045811 | Subtidal |
| 87         | SMA_VP_SLs2   | Vila do Porto | São Lourenço | Subtidal 2 |  | 36.997331 | -25.047914 | Subtidal |
| 88         | SMA_VP_VPpaem | Vila do Porto | Vila do Porto | Porto antigo | Entre-marés | 36.945957 | -25.14822 | Intertidal |
| 89         | SMA_VP_VPpnemW | Vila do Porto | Vila do Porto | Porto Novo | Entre-marés W | 36.94141 | -25.154005 | Intertidal |
| 90         | SMA_VP_VPpns  | Vila do Porto | Vila do Porto | Porto Novo | Subtidal | 36.940838 | -25.146736 | Subtidal |
| 91         | SMA_VP_VPpnsE | Vila do Porto | Vila do Porto | Porto Novo | Subtidal E | 36.9431 | -25.146917 | Subtidal |
| 92         | SMA_VP_VPpnsW | Vila do Porto | Vila do Porto | Porto Novo | Subtidal W | 36.9402 | -25.150384 | Subtidal |

**Sampling description:** Sampling involved specimen collecting and species presence recording. At each location, samples were obtained by scraping and/or manually collecting one or two specimens of all different species found into labelled bags (Fig. 14). Species recording data were gathered by registering all species present in the sampled locations (Fig. 15). Intertidal collections were made during low tide by walking over the shores. Subtidal collections were made by SCUBA diving around the area.

**Quality control:** Each sampled taxon was identified by trained taxonomists and involved morphological and anatomical observations of whole specimens by eye and/or of histological preparations under microscopes to determine the main diagnostic features of each species as described in literature.

**Step description:** At the laboratory, standard procedures were followed in specimens sorting and macroalgae identification. A combination of morphological and anatomical characters and reproductive structures was used for species identification. For small and simple thalli, this required the observation of the entire thallus with the naked eye and/or using dissecting and compound microscopes. For larger and more complex algae,
investigation of the thallus anatomy required histological preparations (longitudinal and transverse sections) or squashed preparations of mucilaginous thalli, sometimes after staining, to observe vegetative and reproductive structures and other diagnostic features.

The Azorean algal flora has components from several geographical regions which implies difficulties in species identification. Floras and keys for the North Atlantic, Tropical Atlantic and Western Mediterranean were used (e.g. Schmidt 1931, Taylor 1967, Taylor 1978, Levring 1974, Dixon and Irvine 1977, Lawson and John 1982, Irvine 1983, Gayral and Cosson 1986, Fletcher 1987, Afonso-Carrillo and Sansón 1989, Burrows 1991,
Boudouresque et al. 1992, Cabioc'h et al. 1992, Maggs and Hommersand 1993, Irvine and Chamberlain 1994, Brodie et al. 2007, Lloréns et al. 2012, Rodríguez-Prieto et al. 2013). For more critical and taxonomically difficult taxa, specimens were taken to the Natural History Museum (London) for comparison with collections there.

A reference collection was made for all collected specimens by assigning them a herbarium code number and depositing them at the AZB Herbarium Ruy Telles Palhinha and the LSM - Molecular Systematics Laboratory, University of Azores. Depending on the species and on planned further research, different types of collections were made, namely (i) wet collections using 5% buffered formaldehyde seawater and then replacing it by the fixing agent Kew (Bridsen and Forman 1999); (ii) dried collections, either by pressing the algae (most species) as described by Gayral and Cosson (1986) or by letting them air dry (calcareous species); and (iii) silica gel collections for molecular study.

Nomenclatural and taxonomic status used here follow Algaebase (Guiry and Guiry 2020). The database was organised on FileMaker Pro.

**Geographic coverage**

**Description:** Santa Maria Island

**Description:** Azores, Portugal (approximately 37°1'19''N, -25°11'24''W);

**Coordinates:** 36.918 and 37.022 Latitude; -25.190 and -25.009 Longitude.

**Taxonomic coverage**

**Description:** All macroalgae were identified to genus or species level. In total, 261 taxa were identified belonging to 28 orders and 60 families, in the phyla Rhodophyta (14 orders and 34 families), Chlorophyta (5 orders and 9 families) and Ochrophyta (9 orders and 17 families).

**Temporal coverage**

**Notes:** The sampling was performed on several occasions in the period between 1989 and 2019.

**Collection data**

**Collection name:** AZB | Marine macroalgae collection of Santa Maria Island (Azores)-Expedition Santa Maria and Formigas/90; AZB | Marine macroalgae collection of Santa Maria Island (Azores)-Project LAUMACAT; AZB | Marine macroalgae collection of Santa Maria Island (Azores)-Project PARQMAR; AZB | Marine macroalgae collection of Santa Maria Island (Azores)-Occasional sampling; LSM | Marine macroalgae collection of Santa
Collection identifier: 81c64926-4d75-429d-b21f-f7cd93e30504; 100ab0f2-7f8b-4eb6-a5f5-6257d32003a5; af962795-47c6-4219-a295-6687a94afeda; 08883948-f896-495f-ab3d-9fe49f23b76c; 865b91e9-1ec6-4bb8-a941-aba2b586071a; 4efe744e-1e38-431c-b112-7fb9f9bf279a; 77a28947-47db-420f-b40d-f49e87556090; 6606098f-5fbb-4731-9cfa-b7c8e78c3638; bae7fc8f-6333-43d4-887b-3e65617df133; 579bc266-7779-49ea-a775-f44abc2bdad3; 30ed893c-b66d-4c85-8848-10f144a6f957; 852eadcd-977e-44dd-9a52-172a5082a6dd; b74c3414-e277-4789-8806-27a9ab0f7fee; 22941d45-0678-49fb-bdfe-8b0052ceb298; 93e46396-33b2-4c85-8848-10f144a6f957.

Parent collection identifier: AZB Herbarium Ruy Telles Palhinha, Faculty of Sciences and Technology of the University of the Azores; AZB Herbarium Ruy Telles Palhinha, Faculty of Sciences and Technology of the University of the Azores; AZB Herbarium Ruy Telles Palhinha, Faculty of Sciences and Technology of the University of the Azores; AZB Herbarium Ruy Telles Palhinha, Faculty of Sciences and Technology of the University of the Azores; LSM - Molecular Systematics Laboratory, Faculty of Sciences and Technology of the University of the Azores; AZB Herbarium Ruy Telles Palhinha, Faculty of Sciences and Technology of the University of the Azores; LSM - Molecular Systematics Laboratory, Faculty of Sciences and Technology of the University of the Azores; Not applicable; Not applicable; Not applicable; Not applicable; Not applicable; Not applicable; Not applicable.

Specimen preservation method: Air dry, Dried and pressed; Wet (Formalin; fixing agent Kew), Silica gel.

Usage licence

Usage licence: Creative Commons Public Domain Waiver (CC-Zero)

Data resources

Data package title: Marine algal flora of Santa Maria Island, Azores

Resource link: https://www.gbif.org/dataset/38c70a82-c6e3-4ef4-89f4-a37455c6f73a

Alternative identifiers: http://ipt.gbif.pt/ipt/resource?r=santa_maria_macroalgal_flora
Number of data sets: 1

Data set name: Marine algal flora of Santa Maria Island, Azores

Download URL: http://ipt.gbif.pt/ipt/resource?r=santa_maria_macroalgal_flora&v=1.3

Data format: Darwin Core Archive

Data format version: 1.3

Description: This data paper presents physical and occurrence data from macroalgal surveys undertaken on Santa Maria Island between 1989 and 2019 (Neto et al. 2020d). The dataset submitted to GBIF is structured as a sample event dataset, with two tables: event (as core) and occurrences. The data in this sampling event resource have been published as a Darwin Core Archive (DwCA), which is a standardised format for sharing biodiversity data as a set of one or more data tables. The core data table contains 139 records (eventID). The extension data table has 2329 occurrences. An extension record supplies extra information about a core record. The number of records in each extension data table is illustrated in the IPT link. This IPT archives the data and thus serves as the data repository. The data and resource metadata are available for downloading in the downloads section.

| Column label               | Column description                                                                 |
|----------------------------|-----------------------------------------------------------------------------------|
| eventID                    | Identifier of the event, unique for the dataset                                   |
| country                    | Country of the sampling site                                                      |
| countryCode                | Code of the country where the event occurred                                      |
| stateProvince              | Name of the region                                                                |
| island                     | Name of the island                                                                |
| municipality               | Name of the municipality                                                          |
| locality                   | Name of the locality                                                              |
| locationID                 | Identifier of the location                                                        |
| decimalLatitude            | The geographic latitude of the sampling site                                       |
| decimalLongitude           | The geographic longitud of the sampling site                                        |
| geodeticDatum              | The spatial reference system upon which the geographic coordinates are based       |
| coordinateUncertaintyInMetres | The horizontal distance (in metres) from the given decimalLatitude and decimalLongitude describing the smallest circle containing the whole of the Location |
| eventDate                  | Time interval when the event occurred                                             |
| year                       | The year of the event                                                             |
| samplingProtocol           | Sampling method used during an event                                              |
| Field                      | Description                                                                 |
|----------------------------|-----------------------------------------------------------------------------|
| locationRemarks            | Zonation level                                                              |
| minimumDepthInMetres       | The minimum depth in metres where the specimen was found                    |
| maximumDepthInMetres       | The maximum depth in metres where the specimen was found                    |
| eventRemarks               | Notes about the event                                                       |
| occurrenceID               | Identifier of the record, coded as a global unique identifier               |
| institutionID              | The identifier for the institution having custody of the object or information referred to in the record |
| institutionCode            | The acronym of the institution having custody of the object or information referred to in the record |
| collectionID               | An identifier of the collection to which the record belongs                  |
| collectionCode             | The name of the collection from which the record was derived                |
| datasetName                | The name identifying the dataset from which the record was derived          |
| kingdom                    | Kingdom name                                                                 |
| phylum                     | Phylum name                                                                  |
| class                      | Class name                                                                   |
| order                      | Order name                                                                   |
| family                     | Family name                                                                   |
| genus                      | Genus name                                                                   |
| specificEpithet            | The name of the first or species epithet of the scientificName               |
| infraspecificEpithet       | The name of the lowest or terminal infraspecific epithet of the scientificName, excluding any rank designation |
| acceptedNameUsage          | The specimen accepted name, with authorship                                 |
| previousIdentifications    | Previous name of the specimen, with authorship                              |
| scientificName             | The name without authorship applied on the first identification of the specimen |
| scientificNameAuthorship   | The authorship information for the scientificName formatted according to the conventions of the applicable nomenclaturalCode |
| taxonRank                  | The taxonomic rank of the most specific name in the scientificName          |
| basisOfRecord              | The specific nature of the data record                                       |
| habitat                    | Description of the habitat where the specimen was found                      |
| organismQuantityType       | The type of quantification system used to quantify the organisms             |
| organismQuantity           | Percentage of the organism coverage                                         |
| recordedBy                 | Person(s) responsible for sampling                                          |
| catalogNumber              | Identifying code for a unique sample lot in a biological collection         |
This paper is based on 2329 specimens of macroalgae recorded from Santa Maria Island in 261 taxa, comprising 174 confirmed species (Table 3) and 86 taxa identified only to genus level. The confirmed species (Table 4) include 102 Rhodophyta, 29 Chlorophyta and 43 Ochrophyta (Phaeophyceae). Of these, 52 species are newly recorded to the Island (30 Rhodophyta, 9 Chlorophyta and 13 Ochrophyta). Most species are native, including the two Macaronesian endemics (*Laurencia viridis* and *Millerella tinerfensis*). Eighteen have an uncertain status (11 Rhodophyta, 3 Chlorophyta and 4 Ochrophyta) and ten species represent introductions to the algal flora (the Rhodophyta *Acrothamnion preissii*, *Antithamnion hubbsii*, *Asparagopsis armata*, *Bonnemaisonia hamifera*, *Melanothamnus harveyi*, *Scinaia acuta* and *Symphyocladia marchantioides*; the Chlorophyta *Codium fragile* subsp. *fragile*; and the Ochrophyta *Hydroclathrus tilesii* and *Papenfussiella kuromo*).

### Table 3.
Macroalgae species recorded from Santa Maria Island, with information on relative abundance, origin and status

| Phylum         | Species (Accepted Name)                  | Number of records | Establishment Means | OccurrenceRemarks |
|----------------|------------------------------------------|-------------------|--------------------|------------------|
| Rhodophyta     | *Acrosorium ciliolatum* (Harvey) Kylin    | 6                 | Native             |                  |
| Rhodophyta     | *Acrothamnion preissii* (Sonder)          | 28                | Introduced         |                  |
| Rhodophyta     | *Aglaothamnion pseudobyssoides* (Crouan & Crouan) Halos | 1                 | Native             | New record       |
| Rhodophyta     | *Amphiroa fragilissima* (Linnaeus) J.V.Lamouroux | 1                 | Native             | New record       |
| Rhodophyta     | *Anotrichium furcellatum* (J.Agardh) Baldock | 6                 | Uncertain          |                  |
| Rhodophyta     | *Antithamnion hubbsii* E.Y.Dawson         | 5                 | Introduced         | New record       |
| Rhodophyta     | *Asparagopsis armata* Harvey              | 22                | Introduced         |                  |
| Phylum    | Species (Accepted Name)                                                                 | Number of records | Establishment Means | Occurrence Remarks |
|-----------|----------------------------------------------------------------------------------------|-------------------|---------------------|--------------------|
| Rhodophyta| *Asparagopsis armata* Harvey phase                                                      | 16                | Introduced          |                    |
|           | *Falkenbergia rufolanosa* (Harvey) F.Schmitz                                           |                   |                     |                    |
|           | *Bonnemaisonia hamifera* Hariot                                                        | 3                 | Introduced          | New record         |
|           | *Bornetia secundiflora* (J.Agardh) Thuret                                              | 1                 | Native              | New record         |
| Rhodophyta| *Callithamnion corymbosum* (J.E.Smith) Lyngbye                                           | 2                 | Native              |                    |
| Rhodophyta| *Callithamnion granulatum* (Ducluzeau) C.Agardh                                        | 4                 | Native              |                    |
| Rhodophyta| *Carradoriella denudata* (Dillwyn) A.M.Savoie & G.W.Saunders                           | 3                 | Uncertain           |                    |
| Rhodophyta| *Carradoriella elongata* (Hudson) A.M.Savoie & G.W.Saunders                            | 5                 | Native              |                    |
| Rhodophyta| *Catenella caespitosa* (Withering) L.M.Irvine                                         | 3                 | Native              |                    |
| Rhodophyta| *Caulacanthus ustulatus* (Turner) Kützing                                              | 6                 | Uncertain           |                    |
| Rhodophyta| *Centroceras clavulatum* (C.Agardh) Montagne                                           | 8                 | Native              |                    |
| Rhodophyta| *Ceramium codii* (H.Richards) Mazoyer                                                 | 1                 | Native              | New record         |
| Rhodophyta| *Ceramium diaphanum* (Lightfoot) Roth                                                  | 10                | Native              |                    |
| Rhodophyta| *Ceramium strictum* Roth                                                               | 1                 | Native              |                    |
| Rhodophyta| *Ceramium virgatum* Roth                                                               | 5                 | Native              |                    |
| Rhodophyta| *Chondracanthus acicularis* (Roth) Fredericq                                           | 6                 | Native              |                    |
| Rhodophyta| *Chondracanthus teedei* (Mertens ex Roth) Kützing                                       | 3                 | Native              |                    |
| Rhodophyta| *Chondria capillaris* (Hudson) M.J.Wynne                                              | 2                 | Native              |                    |
| Rhodophyta| *Chondria dasyphylla* (Woodward) C.Agardh                                             | 19                | Uncertain           |                    |
| Rhodophyta| *Corallina ferreyrae* E.Y.Dawson, Acleto & Foldvik                                    | 3                 | Native              | New record         |
| Rhodophyta| *Corallina officinalis* Linnaeus                                                      | 5                 | Native              |                    |
| Rhodophyta| *Cottoniella filamentosa* (M.Howe) Børgesen                                            | 30                | Native              | New record         |
| Rhodophyta| *Crouania attenuata* (C.Agardh) J.Agardh                                              | 1                 | Native              | New record         |
| Rhodophyta| *Cryptopleura ramosa* (Hudson) L.Newton                                               | 19                | Native              |                    |
| Phylum      | Species (Accepted Name)                                                                 | Number of records | Establishment Means | OccurrenceRemarks |
|------------|----------------------------------------------------------------------------------------|-------------------|---------------------|-------------------|
| Rhodophyta | *Dasya bailloniana* (S.G.Gmelin) Montagne                                               | 3                 | Uncertain           | New record        |
| Rhodophyta | *Dasya corymbifera* J.Agardh                                                             | 3                 | Native              |                   |
| Rhodophyta | *Dasya hutchinsiae* Harvey                                                              | 2                 | Native              |                   |
| Rhodophyta | *Dasya rigidula* (Kützing) Ardissone                                                    | 2                 | Native              | New record        |
| Rhodophyta | *Dermocorynus dichotomus* (J.Agardh) Gargiulo, M.Morabito & Manghisi                     | 1                 | Native              |                   |
| Rhodophyta | *Dudresnaya verticillata* (Withering) Le Jolis                                           | 1                 | Native              |                   |
| Rhodophyta | *Ellisantia elongata* (J.Ellis & Solander) K.R.Hind & G.W.Saunders                      | 6                 | Native              |                   |
| Rhodophyta | *Erythrocystis montagnei* (Derbès & Solier) P.C.Silva                                  | 2                 | Native              |                   |
| Rhodophyta | *Feldmannophycus rayssiae* (Feldmann & G.Feldmann) H.Augier & Boudouresque             | 1                 | Native              | New record        |
| Rhodophyta | *Gaillona hookeri* (Dillwyn) Athanasiadis                                               | 6                 | Native              |                   |
| Rhodophyta | *Gelidium corneum* (Hudson) J.V.Lamouroux                                               | 3                 | Native              | New record        |
| Rhodophyta | *Gelidium microdon* Kützing                                                              | 11                | Native              |                   |
| Rhodophyta | *Gelidium pusillum* (Stackhouse) Le Jolis                                                | 1                 | Native              |                   |
| Rhodophyta | *Gelidium spinosum* (S.G.Gmelin) P.C.Silva                                             | 2                 | Native              |                   |
| Rhodophyta | *Gigartina pistillata* (S.G.Gmel.) Stackhouse                                           | 3                 | Native              |                   |
| Rhodophyta | *Gracilariosis longissima* (S.G.Gmelin) Steentoft, L.M.Irvine & Farnham                 | 14                | Native              |                   |
| Rhodophyta | *Gratelouopia filicina* (J.V.Lamouroux) C.Agardh                                        | 16                | Native              |                   |
| Rhodophyta | *Griffithsia corallinoides* (Linnaeus) Trevisan                                         | 1                 | Uncertain           |                   |
| Rhodophyta | *Gymnogongrus crenulatus* (Turner) J.Agardh                                             | 3                 | Native              |                   |
| Rhodophyta | *Gymnogongrus griffithsiae* (Turner) C.Martius                                          | 4                 | Native              |                   |
| Rhodophyta | *Halarachnion ligulatum* (Woodward) Kützing                                             | 1                 | Native              | New record        |
| Rhodophyta | *Halurus equisetifolius* (Lightfoot) Kützing                                             | 1                 | Native              | New record        |
| Rhodophyta | *Halurus flosculosus* (J.Ellis) Maggs & Hommersand                                       | 6                 | Native              |                   |
| Phylum       | Species (Accepted Name)                                                                 | Number of records | Establishment Means | Occurrence Remarks |
|--------------|----------------------------------------------------------------------------------------|-------------------|---------------------|--------------------|
| Rhodophyta   | Herposiphonia secunda (C.Agardh) Ambronn                                                | 2                 | Native              |                    |
| Rhodophyta   | Herposiphonia secunda f. tenella (C.Agardh) M.J.Wynne                                   | 2                 | Native              | New record         |
| Rhodophyta   | Hypnea musciformis (Wulfen) J.V.Lamouroux                                                | 21                | Uncertain           |                    |
| Rhodophyta   | Hypoglossum hypoglossoides (Stackhouse) F.S.Collins & Hervey                            | 1                 | Native              |                    |
| Rhodophyta   | Itonoa marginifera (J.Agardh) Masuda & Guiry                                            | 1                 | Native              | New record         |
| Rhodophyta   | Jania capillacea Harvey                                                                  | 1                 | Native              |                    |
| Rhodophyta   | Jania longifurca Zanardini                                                              | 2                 | Uncertain           |                    |
| Rhodophyta   | Jania pedunculata var. adhaerens (J.V.Lamouroux) A.S.Harvey, Woelkerling & Reviers     | 5                 | Native              | New record         |
| Rhodophyta   | Jania rubens (Linnaeus) J.V.Lamouroux                                                   | 11                | Native              |                    |
| Rhodophyta   | Jania virgata (Zanardini) Montagne                                                      | 25                | Uncertain           |                    |
| Rhodophyta   | Laurencia obtusa (Hudson) J.V.Lamouroux                                                 | 2                 | Native              |                    |
| Rhodophyta   | Laurencia pyramidalis Bory ex Kützing                                                   | 4                 | Native              | New record         |
| Rhodophyta   | Laurencia tenera C.K.Tseng                                                               | 1                 | Native              | New record         |
| Rhodophyta   | Laurencia viridis Gil-Rodriguez & Haroun                                                | 111               | Macaronesian endemism |                |
| Rhodophyta   | Leptosiphonia brodiei (Dillwyn) A.M.Savoie & G.W.Saunders                               | 3                 | Uncertain           |                    |
| Rhodophyta   | Liagora distenta (Mertens ex Roth) J.V.Lamouroux                                        | 4                 | Native              | New record         |
| Rhodophyta   | Liagora viscida (Forsskål) C.A.Agardh                                                   | 6                 | Native              | New record         |
| Rhodophyta   | Lophosphonia cristata Falkenberg                                                        | 2                 | Native              |                    |
| Rhodophyta   | Melanothamnus harveyi (Bailey) Diaz-Tapia & Maggs                                      | 2                 | Introduced          | New record         |
| Rhodophyta   | Meredithia microphylla (J.Agardh) J.Agardh                                              | 11                | Native              |                    |
| Rhodophyta   | Millerella tinerfensis (Seoane-Camba) S.M.Boo & J.M.Rico                                | 1                 | Macaronesian endemism |                |
| Rhodophyta   | Nemalion elminthoides (Velley) Batters                                                  | 4                 | Native              |                    |
| Rhodophyta   | Nitophyllum punctatum (Stackhouse) Greville                                            | 2                 | Native              |                    |
| Phylum | Species (Accepted Name) | Number of records | Establishment Means | OccurrenceRemarks |
|--------|-------------------------|-------------------|---------------------|-------------------|
| Rhodophyta | Osmundea pinnatifida (Hudson) Stackhouse | 7 | Native | |
| Rhodophyta | Osmundea truncata (Kützing) K.W.Nam & Maggs | 1 | Native | |
| Rhodophyta | Peyssonnelia squamaria (S.G.Gmelin) Decaisne ex J.Agardh | 1 | Native | |
| Rhodophyta | Phyllophora crispa (Hudson) P.S.Dixon | 6 | Native | New record |
| Rhodophyta | Platoma cyclocolpum (Montagne) F.Schmitz | 8 | Native | |
| Rhodophyta | Platysiphonia delicata (Clemente) Cremades | 2 | Native | New record |
| Rhodophyta | Pleonosporium borreri (Smith) Nägeli | 7 | Native | New record |
| Rhodophyta | Plocamium cartilagineum (Linnaeus) P.S.Dixon | 22 | Native | |
| Rhodophyta | Polysiphonia atlantica Kapraun & J.N.Norris | 2 | Native | |
| Rhodophyta | Polysiphonia breviarticulata (C.Agardh) Zanardini | 1 | Native | New record |
| Rhodophyta | Polysiphonia ceramiiformis P.Crouan & H.Crouan | 1 | Native | |
| Rhodophyta | Polysiphonia havanensis Montagne | 2 | Native | |
| Rhodophyta | Predaea feldmannii Bergesen | 9 | Native | New record |
| Rhodophyta | Pterocladiella capillacea (S.G.Gmelin) Santelices & Hommersand | 41 | Native | |
| Rhodophyta | Rhodymenia holmesii Ardissone | 6 | Native | |
| Rhodophyta | Scinaia acuta M.J.Wynne | 2 | Introduced | |
| Rhodophyta | Scinaia furcellata (Turner) J.Agardh | 2 | Native | |
| Rhodophyta | Sphaerococcus coronopifolius Stackhouse | 13 | Native | New record |
| Rhodophyta | Sphondylothamnion multifidum (Hudson) Nägeli | 1 | Native | |
| Rhodophyta | Spyridia filamentosa (Wulfen) Harvey | 8 | Native | |
| Rhodophyta | Symphyocalcia marchantioides (Harvey) Falkenberg | 5 | Introduced | |
| Rhodophyta | Taenioma nanum (Kützing) Papenfuss | 1 | Native | |
| Rhodophyta | Vertebrata foetidissima (Cocks ex Bornet) Diaz-Tapia & Maggs | 1 | Native | New record |
| Rhodophyta | Vertebrata fruticulosa (Wulfen) Kuntze | 9 | Native | |
| Rhodophyta | Vertebrata fucoides (Hudson) Kuntze | 3 | Uncertain | |
| Phylum          | Species (Accepted Name)                                                                 | Number of records | Establishment Means | OccurrenceRemarks |
|-----------------|----------------------------------------------------------------------------------------|-------------------|---------------------|-------------------|
| Rhodophyta      | Xiphosiphonia pennata (C.Agardh) Savoie & G.W.Saunders                                  | 5                 | Native              |                   |
| Chlorophyta     | Bryopsis hypnoides J.V.Lamouroux                                                        | 3                 | Native              |                   |
| Chlorophyta     | Bryopsis plumosa (Hudson) C.Agardh                                                      | 1                 | Native              |                   |
| Chlorophyta     | Chaetomorpha aerea (Dillwyn) Kützing                                                    | 3                 | Native              |                   |
| Chlorophyta     | Chaetomorpha linum (O.F.Müller) Kützing                                                  | 7                 | Native              |                   |
| Chlorophyta     | Chaetomorpha pachynema (Montagne) Kützing                                               | 1                 | Native              |                   |
| Chlorophyta     | Cladophora albida (Nees) Kützing                                                        | 6                 | Native              |                   |
| Chlorophyta     | Cladophora coelothrix Kützing                                                           | 6                 | Native              |                   |
| Chlorophyta     | Cladophora laetevirens (Dillwyn) Kützing                                                | 10                | Uncertain           |                   |
| Chlorophyta     | Cladophora lehmanniana (Lindenberg) Kützing                                             | 4                 | Native              | New record        |
| Chlorophyta     | Cladophora liebetruthii Grunow                                                         | 9                 | Native              |                   |
| Chlorophyta     | Cladophora prolifera (Roth) Kützing                                                    | 42                | Native              |                   |
| Chlorophyta     | Codium adhaerens C.Agardh                                                               | 43                | Native              |                   |
| Chlorophyta     | Codium effusum (Rafinesque) Delle Chiaje                                                | 1                 | Uncertain           | New record        |
| Chlorophyta     | Codium fragile subsp. atlanticum (A.D.Cotton) P.C.Silva                                | 1                 | Native              | New record        |
| Chlorophyta     | Codium fragile subsp. fragile (Suringar) Hariat                                          | 13                | Introduced          | New record        |
| Chlorophyta     | Codium taylorii P.C.Silva                                                               | 4                 | Native              | New record        |
| Chlorophyta     | Codium tomentosum Stackhouse                                                            | 1                 | Native              |                   |
| Chlorophyta     | Lychaete pellucida (Hudson) M.J.Wynne                                                  | 5                 | Native              |                   |
| Chlorophyta     | Microdictyon umbilicatum (Velley) Zanardini                                             | 8                 | Native              | New record        |
| Chlorophyta     | Pseudorhizoclonium africanum (Kützing) Boedeker                                        | 1                 | Native              | New record        |
| Chlorophyta     | Ullothrix flacca (Dillwyn) Thuret                                                       | 1                 | Native              | New record        |
| Chlorophyta     | Ulva clathrata (Roth) C.Agardh                                                         | 13                | Native              |                   |
| Chlorophyta     | Ulva compressa Linnaeus                                                                 | 12                | Native              |                   |
| Chlorophyta     | Ulva intestinalis Linnaeus                                                              | 13                | Native              |                   |
| Chlorophyta     | Ulva lactuca Linnaeus                                                                  | 3                 | Uncertain           | New record        |
| Chlorophyta     | Ulva linza Linnaeus                                                                    | 2                 | Native              |                   |
| Chlorophyta     | Ulva rigida C.Agardh                                                                    | 25                | Native              |                   |
| Phylum        | Species (Accepted Name)                                      | Number of records | Establishment Means | Occurrence Remarks |
|--------------|-------------------------------------------------------------|-------------------|---------------------|--------------------|
| Chlorophyta  | Valonia macrophysa Kützing                                  | 1                 | Native              |                    |
| Chlorophyta  | Valonia utricularis (Roth) C.Agardh                         | 7                 | Native              |                    |
| Ochrophyta   | Bachelotia antillarum (Grunow) Gerloff                     | 1                 | Native              |                    |
| Ochrophyta   | Canistrocarpus cervicornis (Kützing) De Paula & De Clerck  | 1                 | Native              | New record         |
| Ochrophyta   | Carpomitra costata (Stackhouse) Batters                    | 2                 | Native              | New record         |
| Ochrophyta   | Cladostephus spongiosus (Hudson) C.Agardh                   | 44                | Native              |                    |
| Ochrophyta   | Colpomenia sinuosa (Mertens ex Roth) Derbès & Solier       | 90                | Native              |                    |
| Ochrophyta   | Cutleria multifida (Turner) Greville                       | 2                 | Uncertain           | New record         |
| Ochrophyta   | Cutleria multifida (Turner) Greville phase Aglaozonia parvula (Greville) Zanardini | 2 | Uncertain | | |
| Ochrophyta   | Cystoseira compressa (Esper) Gerloff & Nizamuddin          | 17                | Native              | New record         |
| Ochrophyta   | Cystoseira foeniculacea (Linnaeus) Greville                | 2                 | Native              |                    |
| Ochrophyta   | Cystoseira humilis Schousboe ex Kützing                    | 7                 | Native              |                    |
| Ochrophyta   | Cystoseira tamariscifolia (Hudson) Papenfuss               | 5                 | Native              |                    |
| Ochrophyta   | Dictyopteris polyiodioides (A.P.De Candolle) J.V.Lamouroux | 8                 | Native              |                    |
| Ochrophyta   | Dictyota bartayresiana J.V.Lamouroux                       | 3                 | Native              |                    |
| Ochrophyta   | Dictyota ciliolata Sonder ex Kützing                        | 1                 | Native              |                    |
| Ochrophyta   | Dictyota dichotoma (Hudson) J.V.Lamouroux                   | 24                | Native              |                    |
| Ochrophyta   | Dictyota dichotoma var. intricata (C.Agardh) Greville      | 11                | Native              | New record         |
| Ochrophyta   | Dictyota implexa (Desfontaines) J.V.Lamouroux               | 2                 | Native              |                    |
| Ochrophyta   | Feldmannia globifera (Kützing) Hamel                       | 1                 | Native              | New record         |
| Ochrophyta   | Fucus spiralis Linnaeus                                     | 27                | Uncertain           |                    |
| Ochrophyta   | Halopteris filicina (Grateloup) Kützing                    | 37                | Native              |                    |
| Ochrophyta   | Halopteris scoparia (Linnaeus) Sauvageau                    | 54                | Native              |                    |
| Ochrophyta   | Hydroclathrus tilesii (Endlicher) Santiañez & M.J.Wynne    | 8                 | Introduced          | New record         |
| Ochrophyta   | Hydroclathrus clathratus (C.Agardh) M.Howe                  | 6                 | Native              |                    |
| Phylum  | Species (Accepted Name)                                                                 | Number of records | Establishment Means | OccurrenceRemarks |
|---------|----------------------------------------------------------------------------------------|-------------------|---------------------|-------------------|
| Ochrophyta | Leathesia marina (Lyngbye) Decaisne                                                      | 9                 | Uncertain           |                   |
| Ochrophyta | Lobophora variegata (J.V.Lamouroux) Womersley ex E.C.Oliveira                          | 41                | Native              |                   |
| Ochrophyta | Mesogloia vermiculata (Smith) S.F.Gray                                                  | 16                | Native              | New record        |
| Ochrophyta | Myronema strangulans Greville                                                           | 8                 | Native              |                   |
| Ochrophyta | Nemoderma tingitanum Schousboe ex Bornet                                                 | 3                 | Native              |                   |
| Ochrophyta | Padina pavonica (Linnaeus) Thivy                                                        | 144               | Native              |                   |
| Ochrophyta | Papenfussiella kuromo (Yendo) Inagaki                                                    | 8                 | Introduced          |                   |
| Ochrophyta | Ralfsia verrucosa (Areschoung) Areschoug                                                | 1                 | Native              | New record        |
| Ochrophyta | Sargassum cymosum C.Agardh                                                              | 8                 | Native              |                   |
| Ochrophyta | Sargassum desfontainesii (Turner) C.Agardh                                              | 3                 | Native              |                   |
| Ochrophyta | Sargassum furcatum Kützing                                                               | 16                | Native              | New record        |
| Ochrophyta | Sargassum vulgare C.Agardh, nom. illeg.                                                 | 2                 | Native              |                   |
| Ochrophyta | Scytopsiphon lomentaria (Lyngbye) Link                                                   | 5                 | Native              |                   |
| Ochrophyta | Sphacelaria cirrosa (Roth) C.Agardh                                                     | 6                 | Native              |                   |
| Ochrophyta | Sphacelaria plumula Zanardini                                                           | 2                 | Native              |                   |
| Ochrophyta | Sphaerorhiza divaricata (C.Agardh) Kylin                                                 | 4                 | Uncertain           | New record        |
| Ochrophyta | Sporochnus pedunculatus (Hudson) C.Agardh                                               | 2                 | Native              | New record        |
| Ochrophyta | Stytopodium zonale (J.V.Lamoureoux) Papenfuss                                            | 1                 | Native              | New record        |
| Ochrophyta | Taonia atomaria (Woodward) J.Agardh                                                     | 3                 | Native              |                   |
| Ochrophyta | Treptacantha abies-marina (S.G.Gmelin) Kützing                                           | 35                | Native              |                   |
| Ochrophyta | Zonaria tournefortii (J.V.Lamoureoux) Montagne                                            | 100               | Native              |                   |

Table 4.
Summary of the macroalgal flora of the Island of Santa Maria with information on the species origin and status

| Phylum | Order | Family | Specimens Number | Total taxa | Total species | Native | Introduced | Uncertain | Macaronesian endemism | New record |
|---------|-------|--------|------------------|------------|---------------|--------|------------|-----------|-----------------------|------------|
| Rhodophyta | 14    | 34     | 988              | 152        | 102           | 82     | 7          | 11        | 2                     | 30         |
| Phylum    | Order | Family | Specimens Number | Total taxa | Total species | Native | Introduced | Uncertain | Macaronesian endemism | New record |
|----------|-------|--------|------------------|------------|---------------|--------|------------|-----------|------------------------|------------|
| Chlorophyta | 5     | 9      | 276              | 43         | 29            | 25     | 1          | 3         | 9                      |            |
| Ochrophyta   | 9     | 17     | 1065             | 66         | 44            | 37     | 2          | 4         | 13                     |            |
| Total        | 28    | 60     | 2329             | 261        | 174           | 144    | 10         | 18        | 2                      | 52         |

Many species were only sporadically recorded, but 12 were commonly found around the Island and occurred quite abundantly in some locations, namely: the Rhodophyta *Asparagopsis taxiformis* (Delile) Trevisan, *Laurencia viridis*, and *Pterocladiella capillacea* (S.G. Gmelin) Santelices & Hommersand; the Chlorophyta *Cladophora prolifera* (Roth) Kützing, *Codium adhaerens* C. Agardh and *Ulva rigida* C. Agardh; and the Ochrophyta *Cladostephus spongiosus* (Hudson) C. Agardh, *Colpomenia sinuosa* (Mertens ex Roth) Derbès & Solier, *Halopteris scoparia*, *Lobophora variegata* (J.V. Lamouroux) Womersley ex E. C. Oliveira, *Padina pavonica* and *Zonaria tournefortii*.

A mismatch regarding the GBIF backbone taxonomy of some of the macroalgae species names was identified as detailed in Suppl. material 1.

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Author contributions

AIN: Conceptualisation; Methodology; Research (field and laboratory work); Resources; Data Curation; Formal analysis and interpretation; Paper writing

MIP: Research (field and laboratory work); Data Curation; Formal analysis and interpretation; Paper writing

EC: Research (field work and laboratory work); Data Curation

ACC: Research (field work and laboratory work); Resources; Data Curation

AZB: Research (field and laboratory work); Data Curation

EB: Research (field work and laboratory work); Resources; Data Curation

SM: Research (field and laboratory work); Data Curation

RR: Resources; Data Curation

PA: Resources

ACLP: Research (field and laboratory work); Data Curation

RFP: Research (field and laboratory work); Data Curation

NVA: Research (field work); Maps elaboration

DM-F: Research (field and laboratory work); Data Curation

RMAN: Data Curation; Formal analysis and interpretation; Paper writing

JMNA: Research (field work and laboratory work); Formal analysis and interpretation; Paper writing

IM: Data Curation; Formal analysis and interpretation; Paper writing

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Supplementary material

Suppl. material 1: DP-SMA-id_15162_normalized.csv doi

Authors: Ana I Neto
Data type: Macroalgae taxonomic mismatching
Brief description: GBIF does not have the more actualised nomenclature for some of the macroalgae species names. Therefore, the matching tools of its platform were applied to the species list, as required by Pensoft’s data auditor, to identify the problematic taxonomic situations. The resulting file (DP-SMA-id_15162_normalized.csv) is included here, since the names will not be immediately updated in the GBIF Taxonomic Backbone. A request was already sent to GBIF helpdesk to solve this situation.
Download file (45.34 kb)