Acanthophora spicifera

System: Marine

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
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<tr>
<td>Plantae</td>
<td>Rhodophyta</td>
<td>Florideophiceae</td>
<td>Ceramiales</td>
<td>Rhodomelaceae</td>
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Common name
bulung tombong bideng (Malay), red alga (English), spiny seaweed (English), spiny alga (English, Hawaii), culot (Ilocano)

Synonym
Acanthophora intermedia, Crouan
Fucus spicifer, M. Vahl 1802
Fucus acanthophorus, J.V. Lamouroux 1805
Acanthophora thiyri, J.V. Lamouroux 1813
Chondria acanthophorara, C. Agardh 1822
Acanthophora orientalis, J. Agardh 1863
Acanthophora wightii, J. Agardh 1863
Acanthophora antilariam, Montagne ex K?tzing 1865
Acanthophora thiyri, f. gracilis, P.L. Crouan & H.M. Crouan 1878
Acanthophora orientalis, var. wightii, (J. Agardh) Sonder 1879
Acanthophora spicifera, f. wightii, (J. Agardh) Weber-van Bosse 1923
Acanthophora spicifera, f. orientalis (J. Agardh) Weber-van Bosse 1923
Acanthophora spicifera, var. orientalis (J. Agardh) Zaneveld 1956

Similar species

Summary
Acanthophora spicifera is a red algae which is found in most tropical or subtropical seas of the world. Its plastic morphology allows it to adapt to a variety of environmental conditions, and hence it can invade a diverse range of habitats. It is an alien invasive species in Hawaii. It is amongst the most successful alien algal species in this region, where it may modify native communities and compete with native algae.

view this species on IUCN Red List
Species Description

*Acanthophora spicifera* is an erect macroalgae which grows up to 40cm tall. It has solid cylindrical branches, 2-3mm wide, branched either sparingly or repeatedly. The main branches have short, determinate branches, irregularly shaped and spinose, with spines numerous and radially arranged. There are no spines on main axes. The plant grows from a large, irregularly shaped holdfast. In intertidal high-motion water areas, *A. spicifera* has short (4 - 10cm), compact and very dense thalli. In moderate or low water motion areas, the thalli are tall (10 - 25cm), more openly branched and occur in scattered clumps. Apices are pyramidal, with incurved trichoblasts. Pericentral cells are corticated densely, with central axial cells usually evident. In older axes, central axial filaments may be surrounded by small-celled adventitious filaments. *A. spicifera* is highly variable in colour: it can be shades of red, purple, yellow, orange, or brown. Thalli are often very dark in colour in intertidal, high motion areas, and are usually lighter colour in shallow areas with low water motion and reflective sandy or silty bottoms (University of Hawaii, 2001).

Notes

In Panama, it has been reported that fish can exclude *A. spicifera* from some habitats by including it in their diet. *A. spicifera* is also grazed by sea urchins and crabs (Kilar and McLachlan, 1986).

Lifecycle Stages

*Acanthophora spicifera* has been reported to have a triphasic alternation of generations. Tetrasporophytic and gametophytic generations are isomorphic, and the gametophyte dioecious (Kilar and McLachlan, 1986).

Uses

*Acanthophora spicifera* is consumed in Tahiti, and also features in the diet of native Fijians (Payri *et al.* 2000; in Guiry, M.D. & Guiry, G.M. 2007; South, 1993). It is also used in vegetable salads, as soup flavouring and as a thickening agent in the Philippines, and is reported to contain carragenaans, used as an emulsifying agent (Trono, 1999).

Habitat Description

*Acanthophora spicifera* is commonly found on calm, shallow reef flats, tidepools, and on rocky intertidal benches. It usually attaches to hard substrates, such as rocks, basalt ledges, or dead coral heads, but may also occur as an epiphyte on other algae, or as relatively stable unattached populations. It has been reported at depths of up to 22m in the Virgin Islands, although it more typically occurs at 1-8m depths (University of Hawaii, 2001; Kilar and McLachlan, 1986; Hill, 2001). *A. spicifera* cannot withstand prolonged exposure to air, and as such its survival on reefs is increased when it co-occurs with dense aggregates of other algal species which are more tolerant of wave exposure, and are able to retain water when exposed to air (Hill, 2001).
Reproduction
Sexual: Tetrasporophytes were the most common reproductive phase occurring on reef flats in Panama, with over 80% of plants tetrasporic throughout much of the year. This percentage was reduced to only 5% during periods of prolonged tidal immersion (Kilar and McLachlan, 1986; Hill, 2001).

Asexual: Fragmentation accounts for much of the distribution and standing crop of *A. spicifera*. On reef flats, as much as 26% of the standing crop can be lost to drift fragments each month (Hill, 2001) especially if the fragments either (a) do not release viable spores or (b) are unable to reattach to the substratum by production of secondary rhizoids (Mads Thomsen, pers.comm., June 2008).

*A. spicifera* appears to be able to release sexual propagules at all times of the year in Hawaii, and therefore may have greater potential for dispersal than macroalgae that reproduce only by fragmentation (Smith *et al*. 2002).

Nutrition
Autotrophic.

General Impacts
*Acanthophora spicifera* has a plastic morphology, which allows it to adapt to different conditions and invade a diversity of habitats. The brittle nature of its branches often results in fragmentation, which contributes to frequent, large free-floating populations, and its widespread distribution (University of Hawaii, 2001). It is now one of the most widespread and successful alien algae in Hawaii, and may modify native communities by smothering and outcompeting native algal species (Preskitt, 2002; Eldredge, 2003).

Blooms of native *A. spicifera* covered by cyanobacterial epiphytes have been observed on several reefs in the Eastern Tropical Pacific, since widespread coral mortality opened substrate for colonisation during the 1997-98 El Nino Southern Oscillation. The bloom coincided with La Nina conditions, with thermocline shoaling and mixing upwards of nutrient-rich bottom water, but it persisted for several years after this (Fong *et al*. 2006).

Management Info
No specific management action plans have been reported for this species

Pathway
*Acanthophora spicifera* is likely to have reached Hawaii as fouling on a barge from Guam (Kilar and McLachlan, 1986).

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from La Fondation d'entreprise Total

Review: Mads Solgaard Thomsen, Post doc, Benthic Section, Marine Department, National Environmental Research Institute University of Aarhus, Roskilde, Denmark.
Publication date: 2007-01-09

**ALIEN RANGE**

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<th>Country</th>
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<tbody>
<tr>
<td>[44] UNITED STATES</td>
<td>[2] VENEZUELA</td>
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**BIBLIOGRAPHY**

23 references found for *Acanthophora spicifera*

Management information

**General information**


**Summary:** This paper provides a comprehensive report on the marine algae present on Lord Howe Island, Australia.


**Summary:** This paper discusses the diet of the rabbitfish in Queensland, Australia.


**Summary:** This paper discusses the introductions of exotic species to coral reefs, with emphasis on Hawaii.

Available from: http://muse.jhu.edu/journals/pacific_science/v056/56.2coles.pdf [Accessed 3 December 2006]
GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: Acanthophora spicifera


Summary: This paper presents a record of the introduced marine species in Pearl Harbour, Hawaii.


Summary: This paper presents the methodology and results of a survey of introduced marine species in Hawaiian waters. Available from: http://muse.jhu.edu/journals/pacific_science/v60/60.4coles.pdf [Accessed 3 December 2006]


Summary: This paper describes the marine flora of Kadmat Island, Lakshadweep Archipelago, India.


Summary: This paper discusses the factors contributing to macroalgal dominance on coral reefs.


Summary: AlgaeBase is a database of information on algae that includes terrestrial, marine and freshwater organisms. AlgaeBase is available from: http://www.algaebase.org; Acanthophora spicifera information is available from: http://www.algaebase.org/speciesdetail.lasso?species_id=3309&sk=0&from=results&session=abv3:82D8BFA71b8423986CyJV30A9723 [Accessed 15 November 2006].


Summary: This website provides comprehensive information about A. spicifera. Available from: http://www.sms.si.edu/ilr/spec/Acanth_spif.htm [Accessed 3 December 2006]

ITIS (Integrated Taxonomic Information System). 2007. Online Database Acanthophora spicifera


Summary: This paper discusses the ecology of A. spicifera, with specific reference to the role of vegetative fragmentation in reproduction.


Summary: This paper describes the seasonal variations in tissue nitrogen and phosphorous for macroalgae in a Brazilian lagoon.


Summary: This fact sheet provides basic detail about A. spicifera in Hawaii.


Summary: This paper discusses the interactions between the invasive A. spicifera and native algae in Hawaii.


Summary: This paper reports on the utilisation of the invasive algae A. spicifera and Hypnea musciformis by the endangered green turtle in the Hawaiian Islands.


Summary: This paper provides information about the distribution and impacts of A. spicifera in Hawaii.

Available from: http://muse.jhu.edu/journals/pacific_science/v056/56.3smith.pdf [Accessed 3 December 2006]


Summary: This paper describes the edible seaweeds of Fiji, which include A. spicifera.
Stimson, J., Larned, S.T. and Conklin, E. 2001. Effects of herbivory, nutrient levels, and introduced algae on the 
distribution and abundance of the invasive macroalga Dictyosphaeria cavernosa in Kaneohe Bay, Hawaii. Coral Reefs. 19: 
343-357.

Summary: This paper discusses the interactions between A. spicifera and another invasive algae in Hawaii.

The Ocean Biogeographic Information System (OBIS) Dataset Extent Map, Distribution of Acanthophora spicifera 
Summary: The Ocean Biogeographic Information System (OBIS) is the information component of the Census of Marine 
Life (CoML), a growing network of more than 1000 researchers in 73 nations engaged in a 10-year initiative to assess and 
explain the diversity, distribution, and abundance of life in the oceans - past, present, and future. OBIS is a web-based 
provider of global geo-referenced information on marine species. OBIS contains expert species level and habitat level 
databases and provide a variety of spatial query tools for visualizing relationships among species and their environment. 
This page is available from:
http://www.iobis.org/OBISWEB/ObisControllerServlet?category=all&names=data&tableName=0&searchName=acanthoph 
ora+spicifera&x=20&y=13 [Accessed 3 December 2006]

Ocean Biogeographic Information System (OBIS) available from: www.iobis.org


Summary: This paper discusses the uses of A. spicifera in the Philippines.

Tsuda, Roy T.; Steve L. Coles; Eric B. Guinther; R. Andrew O. Finlay & Frankie L. Harriss., 2008. Acanthophora spicifera 

Summary: Available from:
http://www.uog.edu/up/micronesica/dynamicdata/assetmanager/images/vol40/14%20tsuda%20acanthophora.pdf 
[Accessed 22 September 2008]

Hawaii at Manoa.

Summary: This fact sheet provides comprehensive information about A. spicifera in Hawaii.