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Vol. 39, No. 1, February 1990
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**TYPIFICATION OF *SARGASSUM FILIPENDULA* C. AGARDH
(PHAEOPHYCEAE, FUCALES, SARGASSACEAE)
AND THE NAMES OF TWO VARIETIES**

*M. Dennis Hanisak*¹ and *John A. Kilar*^{1,2}

Summary

Lectotype specimens are designated for the brown alga, *Sargassum filipendula* C. Agardh var. *filipendula*, and two of its varieties, *S. filipendula* var. *laxum* J. Agardh and *S. filipendula* var. *contractum* J. Agardh.

Introduction

Sargassum C. Agardh (1820: 1) is one of the largest, most morphologically complex genera in the Phaeophyta and occurs in temperate to tropical areas throughout the world (Nizamuddin, 1970). The

¹ Marine Botany Department, Harbor Branch Oceanographic Institution, 5600 Old Dixie Highway, Fort Pierce, FL 34946, U.S.A.

² Mote Marine Laboratory, 1600 City Island Park, Sarasota, FL 33577, U.S.A.



Fig. 1. Lectotype of *Sargassum filipendula* C. Agardh var. *filipendula* (Agardh Herbarium specimen number 3253, LD).

existence of considerable morphological variability in taxonomically important features renders specific determinations difficult. Causes of this morphological variability have been attributed to environmental or phenotypic plasticity (e.g., Taylor, 1960; Soe-Htun and Yoshida, 1986), ontogenetic forms (Critchley, 1983a, b; Kilar and Hanisak, 1988), polymorphism within individual populations (Kilar and Hanisak, in press), and hybridization between taxa (Taylor, 1960; Paula and Oliveira, 1982). Incomplete developmental, ecological, and taxonomic information has resulted in inadequate species descriptions and a myriad of infraspecific entities (e.g., Agardh, 1889; Grunow, 1915, 1916; Setchell, 1931, 1933a, b, 1935, 1936).

Table 1. Measurements of blades from extant specimens of *Sargassum filipendula* of C. Agardh.

Agardh Herbarium number	n	Length (mm)		Width (mm)		Length/width ratio	
		Mean \pm SE	Max	Mean \pm SE	Max	Mean \pm SE	Max
3244 <i>S. filipendula</i> var. <i>contractum</i>	31	17.6 \pm 0.9	33.0	1.9 \pm 0.1	3.0	10.1 \pm 1.0	30.0
3247 <i>S. filipendula</i> var. <i>contractum</i>	30	26.0 \pm 1.4	43.0	1.4 \pm 0.1	3.0	20.5 \pm 1.6	46.7
3252 <i>S. filipendula</i> var. <i>laxum</i>	15	41.0 \pm 3.1	60.0	0.5 \pm 0.0	0.5	82.0 \pm 6.2	120.0
3253 <i>S. filipendula</i> var. <i>filipendula</i>	30	34.2 \pm 2.2	58.0	1.1 \pm 0.1	4.0	37.0 \pm 3.1	73.3
3258 (No. 1) <i>S. filipendula</i> var. <i>laxum</i>	15	35.1 \pm 3.1	50.0	0.5 \pm 0.0	1.0	70.3 \pm 4.4	100.0
3258 (No. 2) <i>S. filipendula</i> var. <i>contractum</i>	16	14.8 \pm 1.4	29.0	1.3 \pm 0.2	2.0	13.5 \pm 1.7	24.0

During ongoing studies of the systematics of *Sargassum* in Florida and the Bahamas (Kilar and Hanisak, 1988, in press), collections were made from several populations that could be attributed to *S. filipendula* C. Agardh (1824: 300) based on its generally accepted description for this region (Taylor, 1960). On requesting type specimens from the Agardh Herbarium (LD), we learned there were only syntypes (Per Lassen, pers. comm.). All known material from C. Agardh's collections were obtained from LD, including specimens that had been obviously remounted by J. Agardh. It became apparent that J. Agardh (1848: 315) had also used this material to describe *S. filipendula* var. *contractum* ('contracta') and var. *laxum* ('laxa'). Herein, we designate lectotypes for the names of these three taxa.

Lectotypification of Sargassum filipendula C. Agardh

Sargassum filipendula C. Agardh, Syst. alg. 300. 1824. LT: "India Occidentalis, Aspegren" [cited as "In sinu mexicano?"] Agardh Herbarium no. 3253 (LD), here first designated.

Sargassum filipendula var. *contractum* J. Agardh, Spec. gen. ord. alg. 315. 1848, 'contracta'. LT: "India Occidentalis, Aspegren" [cited as "in sinu Mexicano"] Agardh Herbarium no. 3244 (LD), here first designated.

Sargassum filipendula var. *laxum* J. Agardh, Spec. gen. ord. alg. 315. 1848, 'laxa'. LT: "India Occidentalis, Aspegren" [cited as "in sinu Mexicano"] Agardh Herbarium no. 3252 (LD), here first designated.

It is unknown if all of the specimens that C. Agardh had at hand are extant, but all of the available material designated as "*S. filipendula*" in C. Agardh's handwriting (Agardh Herbarium, LD, specimen #3244, 3247, 3248, 3252, 3253, and 3258) fits the original description (C. Agardh, 1824: 300) of the species. Relative to other species of *Sargassum*, C. Agardh characterized *S. filipendula* by its long, linear leaves and long petioles, greatly exceeding vesicle diameter.

The extant specimens that C. Agardh attributed to *Sargassum filipendula* are main branches of reproductively mature plants; there are no holdfasts, associated basal parts of the plants, or specimens of different developmental stages present. Given the degree of morphological variability in *Sargassum*, the taxonomic value of these specimens is somewhat limited, a common problem for taxa of *Sargassum* (Womersley, 1954).

There is no specific locality or date information on the specimens or in the protologue; C. Agardh (1824: 300) listed the type locality only as "In sinu mexicano?". The specimens themselves are all annotated as "India Occidentalis, Aspegren" (or similarly abbreviated). The difference between the protologue and the annotation on the sheets is not significant; "Sinus Mexicanus" and "India Occidentalis" appear to be used interchangeably by C. Agardh to refer to the same geographical region (Per Lassen, pers. comm.).

Given the fragmentary habit of these specimens, we designate the most complete specimen, Agardh Herbarium specimen (LD) number 3253 (Fig. 1), as the lectotype of *Sargassum filipendula* C. Agardh

(1824). This selection is consistent with the protologue of this taxon and agrees with J. Agardh's (1848: 314; 1889: 120) concept of this species, as he annotated this specimen as *S. filipendula*.

J. Agardh (1848: 315) appears to have used C. Agardh material in his designations of two new varieties, *Sargassum filipendula* var. *contractum*, as 'contracta', and *S. filipendula* var. *laxum*, as 'laxa'. J. Agardh differentiated the two varieties primarily by blade features (length, degree of serration) and degree of branching.

We are skeptical about the utility of most infraspecific differentiations within algal species because the ranges and the causes of morphological variability in these organisms are not well understood. This is particularly true for *Sargassum* in which a wide range of morphological variability in taxonomically important traits, even within a single population, has been described (Kilar and Hanisak, 1988, in press). An analysis of the relevant morphological features of the C. Agardh specimens of *Sargassum filipendula* demonstrated a tremendous range of blade length and length : width ratio (Table 1). We did not observe other significant differences in the morphological features of the limited amount of material available. J. Agardh (1848: 315) believed these varieties were part of a morphological continuum: "Formas duas . . . , intermediis confluentes vidi".

Consistent with the protologues of the two varieties, we designate Agardh Herbarium (LD) specimen number 3244 as the lectotype of *S. filipendula* var. *contractum* J. Agardh, and Agardh Herbarium (LD) specimen number 3252 as the lectotype of *S. filipendula* var. *laxum* J. Agardh. This lectotypification is consistent with J. Agardh's concept of the varieties; both specimens are annotated in his handwriting to their respective varieties and cite p. 315 of Agardh (1848).

Given the large variability in vegetative traits currently used in the taxonomy of *Sargassum*, we suggest a greater emphasis on reproductive and developmental characteristics, as exemplified by the work of Sawada (1958) and Soc-Htun and Yoshida (1986). Careful analyses of both reproductive and vegetative traits, with consideration of their temporal and spatial variability, are required for a more practical taxonomy of *Sargassum*.

Acknowledgments

This is Contribution No. 732 from Harbor Branch Oceanographic Institution. Partial funding for J. Kilar's participation in this project was provided by a Senior Postdoctoral Fellowship at Harbor Branch Institution. We thank Dr. Per Lassen, Curator at Lund, for the loan of herbarium specimens and for his comments on their background and the need for lectotypification in *Sargassum filipendula*. We are grateful to Dan Nicolson and Jim Norris for their helpful and constructive review of the manuscript.

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