



A new record of seagrass, *Halophila decipiens* Ostenfeld (Hydrocharitaceae), in Taiwan

Hin-Kiu Mok¹, Jeng-Di Lee¹, Chung-Pan Lee²

¹*Institute of Marine Biology, National Sun Yat-sen University, Kaohsiung, Taiwan, Republic of China*

²*Department of Marine Environment, National Sun Yat-sen University, Kaohsiung, Taiwan, Republic of China*

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Abstract. In a series of underwater surveys made in 1992 by a remotely operated vehicle and by scuba divers, a seagrass, *Halophila decipiens* Ostenfeld, was found at 2-40 meters along the southwestern coast of the Hanchun Peninsula, Taiwan. This is the second *Halophila* species reported in Taiwan. *H. decipiens* was found in several small colonies in a sandy area. Flowering was noticed in April. Its occurrence and abundance exhibit no clear relationship to depth and season. A line drawing of external morphology, a description, the distribution, and a note on ecology are provided.

Key words: Benthic vegetation; Seagrass; Hydrocharitaceae; *Halophila decipiens*; Remotely operated vehicle.

Five linear-leaf species and possibly two oval-leaf species of seagrass have been reported in Taiwan (Yang, 1978; Doebler, 1984). One oval-leaf species, *Halophila ovalis* Hook, is distributed on the Pescardo Islands, southern and eastern Taiwan (Yang, 1978; Yang, pers. comm.). The other oval-leaf *Halophila* species, *H. beccarii* Aschers., was recorded in Taiwan by Masamune, but Yang (1978, and pers. comm.) remains uncertain of its occurrence in this region due to the lack of available specimens.

Most of the early surveys of seagrass in Taiwan had been made in the intertidal zone (Doebler, 1984; Huang, 1989). The subtidal surveys of benthic vegetation in southern Taiwan conducted in the last twenty years have been limited to the study of macroalgae (e.g., Chiang, 1973; Chiang and Wang, 1986; Dai *et al.*, 1992). An underwater survey was undertaken in southern Taiwan in 1992, using a remotely operated vehicle (ROV), at depths between 20 and 100 meters. *Halophila decipiens* Ostenfeld was first discovered at 25 meters via the ROV. The seagrass was small and difficult to

collect with the articulator of the ROV. *In situ* observation and specimen collecting were carried out at various depths by scuba divers, with the assistance of the ROV (Tables 1, 2).

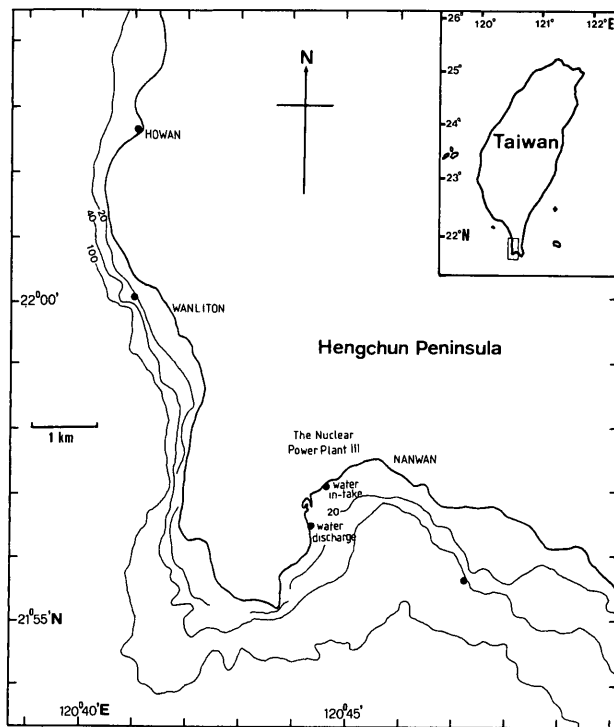
The specimens were collected from the water intake and discharge channels of Nuclear Power Plant III at Nanwan (Fig. 1), and deposited at the Institute of Marine Biology, National Sun Yat-sen University, Cat. No: NSYSU-IMB-MOK-SG-001 to 008.

***Halophila decipiens* Ostenfeld** in Bot. Tidsskr. 24: 260. 1902; den Hartog, The seagrasses of the world. 254-255, 1970.; de Oliveira *et al.* in Aquatic Bot. 16: 251-267. 1983. Figs. 1 & 2

Rhizomes thin, fragile, 0.4-0.7 mm in diameter; nodes 1-rooted, 2-scaled, 2-leaved; internodes 13.0-20.0 mm long; scales transparent, keeled, obovate, hairy abaxially, incised at apex, amplexicaule at base, 2.3-3.7 mm long. Leaves oblong-obovate, rounded at apex, cuneate at base, bright green, unicellular-haired, 9.0-13.0

Table 1. Seasonal occurrence (+) of *H. decipiens* in southwestern Taiwan. Blank indicates no data.

Localities	April	July	October	January
Howan	—	+	—	—
Wanliton	+	—	—	—
Water discharge channel of NPP-III	—	+	—	+
Water intake channel of NPP-III	+		+	+
Nanwan	+	—	—	+

**Fig. 1.** Records (solid circles) of *H. decipiens* in southwestern Taiwan.

mm long, 3.3–4.6 mm wide, very finely serrulate, the cross-veins 6–8 pairs, the intramarginal-veins run at 0.5 mm from the margin. Petioles 4.5–14.0 mm long. Plants monoecious. Flowers 1-staminate and 1-pistillate, enclosed by 2 bracts; bracts 2, membranous, transparent, keeled, ovate, acuminate, 3.0–3.5 mm long, hairy outside. Staminate flower pediceled, completely broken off after anthesis; tepals oblong-elliptic. Pistillate flower subsessile; ovary ovoid, unilocular; styles 3. Fruit globose, 3.0–3.5 mm long; pericarp membranous, transparent; beak ca. 1 mm long. Seeds numerous, ovoid, ca. 0.5 mm in diameter.

Our specimens differed from those described elsewhere. The stem was indistinct or less than 1 mm vs. about 5 mm long in others (den Hartog, 1970; de Oliveira *et al.*, 1983). Due to the fact that *H. decipiens* has a world-wide pantropical distribution, e.g., the Atlantic, Australia, Indonesia, Thailand (den Hartog, 1970), the variation may be intra-specific. *H. decipiens* can be distinguished from *H. ovalis* by its hairy leaves.

Distribution and Ecology

Halophila decipiens has only been reported in Taiwan on the southwestern coast of Hengchun Peninsula (this report). The depth limit of this sciaphilous species is about 85 meters (den Hartog, 1970) and it usually occurs between 10 and 40 meters (den Hartog, 1970; Duarte, 1991). We found it in 2 to 40 meters (Table 2). It exhibits a number of adaptations to a low-light environment, including a high ratio of leaf tissue to non-photosynthetic tissue, a low leaf-area index to reduce self-shading, a high turnover of leaf material, and the ability to rapidly colonize sandy bottoms when suitably illuminated (Josselyn *et al.*, 1986:47). Relatively little is known about the ecology of *H. decipiens*, especially of those at depths below 10 meters (Josselyn *et al.*, 1986). The other *Halophila* species in Taiwan, the shrimp grass *H. ovalis*, usually occurs in the intertidal zone and seldom lives in waters deeper than 10 meters.

In the tropical Caribbean the flowering of *H. decipiens* occurs throughout the year and peaks between January and April (McMillan and Soong, 1989). We collected only one flowering specimen, in April, 1992. Further investigation of its flowering season in Taiwan is in order. On the Hengchun Peninsula *H. decipiens* grew in small scattered patches. Only one patch was found during two underwater inspections,

Table 2. Distribution, substrate characteristics and colony size of *H. decipiens* on the southwestern coast of Taiwan. +, ++, +++, abundance in increasing order

Localities	Depth(m)	Substrate	Colonies
Howan	2	Sand	+
Water intake channel of NPP-III	6	mud	+++
Water discharge channel of NPP-III	8	mud	++
Wanliton	25	Sand, mud	+++
Nanwan	40	mud	++

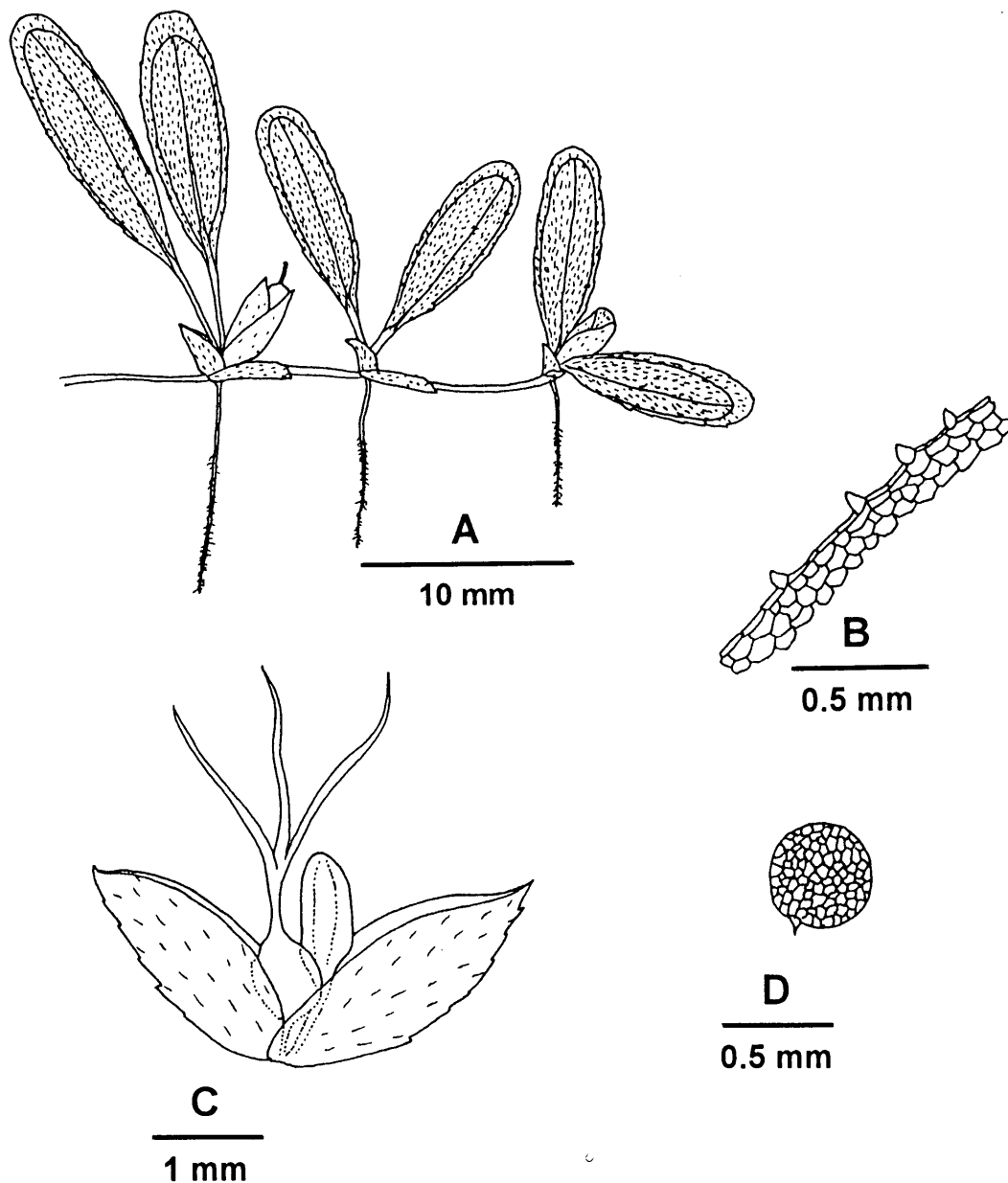


Fig. 2. *Halophila decipiens* Ostenfeld. A, Habit; B, Detail of a leaf margin; C, Staminate and pistillate flowers protected by the bracts; D, Seed.

indicating an unstable survival pattern in this region (Table 1). It has been found in continuous beds on the Caribbean coast of Panama (McMillan, 1988). No clear relationship was revealed between abundance and depth or season (Table 2). The substrate of the *H. decipiens* beds was sand and mud (Table 2), which may be an important factor in its distribution.

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Literature Cited

- Chiang, Y. M. 1973. Studies on the marine flora of southern Taiwan. Bull. Jap. Soc. Phycol. 21: 97-102.
- Chiang, Y. M. and W. L. Wang. 1986. Marine algae of Kenting National Park. Spec. Publ. No. 35-1. Kenting National Park Headquarters, Ministry of Interior, R.O.C.
- Dai, C. F., L. L. Stewart, R. A. Copper, and H. J. Sprunk. 1992. Distribution of substrates and macrobenthos at depths between 35 and 120 m in southern Taiwan. Acta Oceanographica Taiwanica 28: 1-18.
- De Oliveira, E. C., J. Pirani, and A. M. Giuliatti. 1983. The Brazilian seagrasses. Aquatic Bot. 16: 251-267.
- Den Hartog, C. 1970. The Seagrasses of the World. North-Holland Publ., Amsterdam.
- Doebler, P. K. 1984. Seagrass of Taiwan as a potential source. Master thesis, National Taiwan University.
- Duarte, C. M. 1991. Seagrass depth limits. Aquatic Bot. 40: 363-377.
- Huang, Y. C. 1989. The study of the growth and adaptation of *Thalassia hemprichii* (Enrenb.) Aschers. of Nan-Wan, southern Taiwan. Master thesis, National Sun Yat-sen University.
- Josselyn, M., M. Fonseca, T. Niesen, and R. Larson. 1986. Biomass, production and decomposition of a deep water seagrass, *Halophila decipiens* Ostenf.. Aquatic Bot. 25: 47-61.
- McMillan, C. 1988. The seed reserve of *Halophila decipiens* Ostenfeld (Hydrocharitaceae) in Panama. Aquatic Bot. 31: 177-182.
- McMillan, C. and K. Soong. 1989. An annual cycle of flowering, fruiting and seed reserve for *Halophila decipiens* Ostenfeld (Hydrocharitaceae) in Panama. Aquatic Bot. 34: 375-379.
- Yang, Y. P. 1978. Hydrocharitaceae. In H. L. Li., T. S. Liu, T. C. Huang, T. Koyama, and C. E. DeVol (eds.), Flora of Taiwan, Vol. 5. Epoch Publ. Co., Taipei, pp. 17-19.

台灣新紀錄海草：毛葉鹽草

莫顯蕎¹ 李政諦¹ 李忠潘²¹國立中山大學海洋生物研究所²國立中山大學海洋環境學系

在一項使用遙控水下潛航器進行台灣南部海域的底棲生態調查研究中，發現生長於水下 2-40 公尺的新紀錄海草，毛葉鹽草 *Halophila decipiens* Ostenfeld。本文描述其形態、分佈、與生態資料。