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Occurrence and Fruit and Seed Biology of *Halophila tricostata* Greenway (Hydrocharitaceae)

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Abstract

Halophila tricostata Greenway appears to be endemic to eastern Queensland, Australia, and occurs between 14°11′S and 23°45′S. It was found at depths from 1·4 to 30 m in well sheltered habitats, including in shallow coastal sites near mangrove-lined estuaries, on the lee side of continental and coral-reef islands, and on some commercial prawn-trawling grounds within the Great Barrier Reef lagoon. It grows on predominantly fine mud substratum in small monospecific meadows or mixed with other tropical seagrasses, mostly other *Halophila* species. Field observations indicate that *H. tricostata* is an annual angiosperm and produces an estimated 70 000 seeds m^{-2} $year^{-1}$.

Halophila tricostata is dioecious. The plant has a horizontal rhizome bearing an erect shoot with eight to twelve nodes and a root at each rhizome node. Except at the first two or three nodes, the mature plants produce a reproductive organ at each node of their rarely branched erect shoot. The reproductive organs and fruits develop and mature acropetally along the erect shoot. There are 24–60 seeds, with a mean of 41 seeds, per fruit. The seed has a coiled embryo protected by a cotyledon, and an enlarged hypocotyl. The hypocotyl acts as a nutrient store and contains starch, protein and lipid. The seed covering consists of pericarp remains and two thin cuticular layers of seed coat. The surface of the seed covering has numerous fine protrusions. The seed covering becomes loose and is discarded during germination, exposing the hypocotyl. The surface of the hypocotyl develops hair-like unicellular structures during seedling development. The majority of the seeds begin to germinate at 26–28°C after two weeks of culturing, but germination is not synchronized. The culturing of *H. tricostata* seedlings beyond the three-leaf stage was not successful.

Introduction

The distribution and reproductive biology of *Halophila tricostata* Greenway are among the least known for the *Halophila* species. Since the first description of *H. tricostata* from sledge samples near Lizard Island, north-eastern Queensland (Greenway 1979), its presence has been recorded over a much wider distributional range (Coles *et al.* 1987*a*, 1987*b*, 1992; Lee Long *et al.* 1989). Observations during these surveys indicated that the plant may be much more ephemeral than most other seagrasses, and a monitoring study was implemented to examine this aspect of its biology.

Morphological descriptions of fruits and seeds in *Halophila* are few (Balfour 1878; den Hartog 1970). This has been attributed to the inconspicuous fruits and seeds, which have probably been overlooked (den Hartog 1970). However, recent studies of fruit and seed morphology have been carried out on *H. engelmannii* Aschers. (McMillan 1986, 1987*a*, 1988*a*), *H. decipiens* Ostenfeld (McMillan 1986*c*; Parthasarathy *et al.* 1988*b*; McMillan and Soong 1989), *H. beccarii* Aschers. (Parthasarathy *et al.* 1988*a*) and *H. ovalis* (R. Br.) Hook. f. (Kuo and Kirkman 1992). The mature fruits and seeds of *H. tricostata* have

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