The distribution, diversity and molecular phylogeny of *Halophila* species from two marine nature areas in Singapore

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Labrador Beach is a gazetted marine nature area located in the southwestern region of the Singapore mainland. Tanjong Chek Jawa is a mudflat located on the offshore island of Pulau Ubin, northeast of the Singapore mainland (Figures 1 & 2). Plans to reclaim the land to build a vehicle bridge have been postponed due to public opposition.

Seagrass species that occur in these habitats are: *Cymodocea rotundata, Thalassia hemprichii, Halodule pinifolia, Halodule uninervis, Halophila beccarii, Halophila minor, Halophila spinulosa* and *Halophila ovalis.*

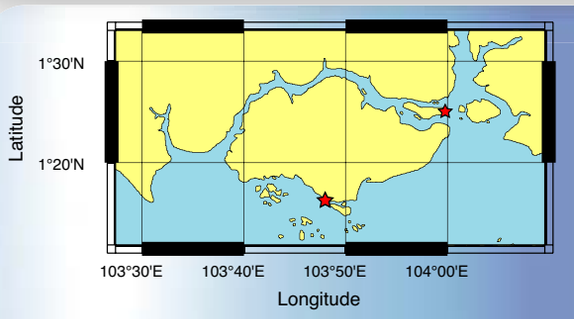

Figure 1: Map of Singapore, red stars denoting the location of study sites where samples were collected. Top right Chek Jawa, lower left, Labrador Beach.

The aim of this study is to determine the distribution and abundance of seagrass in two marine nature areas in Singapore and to determine the phylogenetic relationship of Singapore specimens in relation to those found elsewhere.

Figure 2 : Intertidal rocky shore at Labrador Beach (left, photo courtesty of Dr. Shawn Lum), seagrass Lagoon at Chek Jawa (right, photo courtesy of Ria Tan).

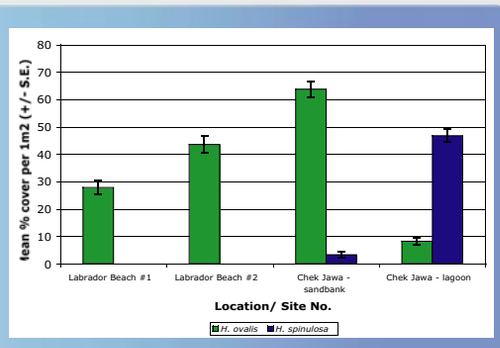

Figure 3: Graph showing the percent cover of two beds of *H. ovalis* and *H. spinulosa* at Labrdor Beach and Chek Jawa.

Three species of seagrass were observed growing at Labrador Beach, *Halophila ovalis, Thalassia hemprichii and Enhalus acoroides*. In January 2004 the mean percent cover of the two *H. ovalis* beds were ca. 30% and 40% per square meter respectively (Figure 3). A visual estimate suggests that cover of *T. hemprichii* nearby was close to 80% (Figure 4). Subsequent visits to Labrador Beach (July/August 2004) suggest that the seagrass beds are expanding in size. Sediment input has buried macroalgae previously growing higher in the intertidal, over which new pockets of *H. ovalis* are growing.

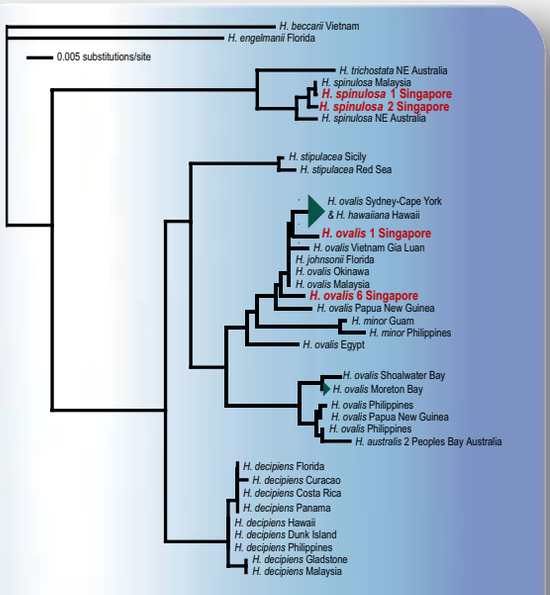

Figure 5: Phylogenetic tree showing the place of Singapore *Halophila* samples among other representitves of the global distribution. This Neighbour Joining tree has similar topology to trees generated by parsimony methods.

In comparison to Labrador Beach, all species from the region have been observed at Chek Jawa. The seagrasses are found on sandflats and in the seagrass lagoon. A comparison of the percent cover between the sandflat and seagrass lagoon showed that both areas had percent covers of more than 50% per square meter (Figure 3). *H. ovalis* dominated the sandflat, which were exposed at very low tides, whereas *H. spinulosa* was the dominant species found in the lagoon (Figure 3).

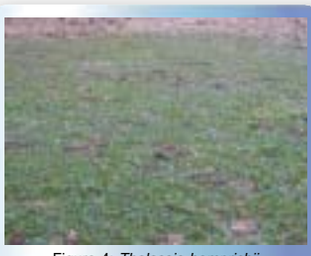

Figure 4: *Thalassia hemprichii* meadow at Labrador Beach.

Specimens of *H. ovalis* and *H. spinulosa* from Singapore were collected for DNA extraction. Phylogenetic analysis of the internal transcribed spacer (ITS) region of the nuclear ribosomal DNA of *H. ovalis* and *H. spinulosa* showed that both were placed among other representitives of their species (Figure 5). *H. spinulosa* specimens from Singapore were placed among those from Malaysia and Australian samples from the Whitsundays.

H. ovalis specimens from the same location are genetically variable at this locus and are interspersed among representitives of diverse geographic origins. Additonal data on the population genetic variability of Singapore seagrasses is underway.

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