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Colonization of Marine Zooplankton and Epifauna on Artificial Seagrass Beds with Different Morphology

SUCHANA CHAVANICH *, WASANA PHIU-ON AND VORANOP VIYAKARN

Department of Marine Science, Faculty of Science, Chulalongkorn University, Bangkok 10330, THAILAND

Habitat selection by organisms is influenced by several factors including food preference, habitat structure, chemical defense, predation, and competition (Heck and Wetstone, 1977; Hacker and Steneck, 1990; Duffy and Hay, 1991). Several studies show that structures of habitats play an important role for the distribution of benthic organisms and fish. They tend to choose habitats that are more complex to avoid predators (Hacker and Steneck, 1990). Similarly with other marine plants, structures of seagrass beds such as leaf density, length, and morphology have an influence on distribution of benthic organisms and fish inhabiting in the beds. Several reports have found the relationship between seagrass structure and abundance of invertebrates in temperate and tropical regions (Heck and Wetstone, 1977; Heck and Thoman, 1981; Edgar, 1990). Species diversity of benthic organisms increases when seagrasses become denser or more complex (Edgar, 1990).

To determine the effect of seagrass structure on the benthic community, artificial seagrass has been used in the field experiment. Artificial seagrass allows to manipulate sizes, shapes, and scales of seagrass, and create replicates for the experiment (Bell et al., 1985). A study showed that there is no significant difference on the abundance of fauna between natural and artificial seagrasses when both have the same sizes and shapes of leaves (Bell et al., 1985).

The objective of this study was to determine whether the morphology of artificial seagrass has influence in the colonization and abundance of zooplankton and epifauna in tropical area. The abundance of zooplankton and epifauna was compared between natural seagrass and two types of artificial seagrasses: one with long-thin leaves and the other with short-round leaves. Each was imitated to *Enhalus acoroides* and *Halodule pinifolia* respectively.

The study site was at the Khungkrabane Bay, Chantaburi Province, where both *Enhalus acoroides* and *Halodule pinifolia* are found. Each artificial seagrass plot was constructed from plastic ribbons tied to a rectangular bamboo frame (8 x 10 m^2). Each plot composed of one type of artificial seagrass blade. There were two types of blades: short-round blade shape (17 cm long, 4 cm wide) and long-thin blade shape (61 cm long, 1 cm wide). The plots of artificial seagrasses were anchored to sand adjacent to the natural seagrass bed. Zooplankton and epifauna were sampled monthly by using plankton net (300 μm) and by collecting seagrass leaves in both natural and artificial seagrass beds during August to November 2001. Then, all the samples were brought back for further identification and analysis at Chulalongkorn University.

The results showed that there was no difference on zooplankton and epifauna communities occurring in natural and two types of artificial seagrasses (One-way ANOVA $P >$

* Corresponding author.
Tel: (662) 218-5394
Fax: (662) 255-0780
E-mail: csuchana@sc.chula.ac.th

0.05) (Table 1 and Table 2). However, the abundance of amphipods was much higher on the artificial beds than the natural one (Table 1), and there are more than 10-fold differences in the density of bivalves between the two types of artificial beds (Table 2). In the artificial leaves, trachymedusae and isopod were not found while foramminiferan did not occur in natural and long-thin artificial seagrasses. Overall the natural seagrass seemed to have higher density of zooplankton than the artificial ones. In the field experiment, we observed that zooplankton and epifauna were able to colonize in artificial beds as quickly as one month, and the number of species was almost the same as the natural (more details in Phiu-on, 2002). Therefore, the time scale of experiments should not have any effect on interpretation of data. It should be noted that number of individuals of most epifauna were high on both types of artificial leaves comparing to the natural leaves (Table 2). Long-thin leaf usually provides more habitat complexity than the short-round leaf (Hacker and Steneck, 1990). Studies showed that habitat morphology of seagrass has an effect on the community structures and species of invertebrates (Heck and Wetstone, 1977; Edgar, 1990). They showed that more complexity of habitats led to more diverse and higher number of benthic organisms inhabiting in the areas (Heck and Wetstone, 1977; Edgar, 1990). Yet, from this experiment, shapes and sizes of the leaves did not have influence on the colonization and immigration of species of most marine zooplankton and invertebrates. The contrasting results may be attributed to several

TABLE 1. Average number of individuals of zooplankton (individuals/liter) found on three different types of seagrasses.

Groups of Zooplankton	Types of Seagrasses		
	Natural (*Enhalus acoroides* and *Halodule piniffolia*)	**Long-Thin Artificial Seagrass**	**Short-Round Artificial Seagrass**
Anthomedusae	60	48	32.5
Leptomedusae	212.5	11.5	10
Trachymedusae	5	0	0
Ctenophores	45.5	28	8
Polychaetes	83	26	55.25
Copepods	1647	914.25	854
Barnacles	157	93.25	110.75
Nymphons	1.5	5.5	2
Chaetognaths	81	46	71.5
Cladoceras	0	9	10.75
Isopods	3	0	0
Pagurid larvae	83	77	53.5
Pugilator megalops	18.5	18.5	17
Amphipods	76.5	101	600.5
Crab larvae	46.5	99	65
Lucifers	42	60.5	50
Mysids	40.5	23	11.5
Cumaceans	38	2.5	0
Gastropod larvae	3	23	45.5
Larvaceans	383	77.5	62
Echinoderm larvae	110.5	62	42
Bivalves	3.5	2	0.5
Fish eggs	29	9	4
Fish larvae	22.5	16.5	9

TABLE 2. Average number of individuals of epifauna (individuals/plant) found on three different types of seagrasses.

Groups of Epifauna	Types of Seagrasses		
	Natural (*Enhalus acoroides* and *Halodule piniffolia*)	Long-Thin Artificial Seagrass	Short-Round Artificial Seagrass
Foramminiferans	0	0	1.34
Polychaetes	4	67.34	20
Nymphons	4.67	4.67	0
Pagurid larvae	2	8	10.67
Amphipods	118	37.34	111.34
Crab larvae	0	0	2.67
Nudibranchs	0	0.67	0
Gastropod larvae	2.67	8	31
Bivalves	3.33	5.34	56.34
Fish eggs	0.67	0.67	0.67

additional factors such as predator, prey, and physical environments that may also play an important role on the distribution of the organisms. Morphology of plants can have influence on habitat selection by benthic fauna; however, it seems that morphology factor would not play a major role in habitat selection by benthic organisms in some marine communities such as in this study. Instead of focusing only a single factor, combination of specific factors in field experiments should be considered to determine habitat selection by benthic organisms in different communities.

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