THE EFFECT OF LIGHT ON HATCHING AND SETTLING OF CULTURED TEREDINID LARVAE (*TEREDO* SP.)

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ABSTRACT

Teredo sp. hatched in uncovered aquaria, but not in aquaria provided with a cover. Larval development of this shipworm was studied. Trochophore larvae measured 70-75 µm, straight hinge veligers 100-160 µm, and pediveligers 160-230 µm. Settling of larvae on the surface of wood was slightly affected by light intensity: 57 larvae 100 cm^{-2} settled at 2400 lux , 55 larvae 100 cm^{-2} at 1600 lux, and 52 larvae 100 cm^{-2} at 1150 lux. The larvae tended to select the underside of wood for settlement. On an average, 60 and 50 larvae settled 100 cm^{-2} on the underside and top side of wood respectively.

INTRODUCTION

The bivalve family Teredinidae feed on wood in the sea (Turner 1966; Muslich and Sumarni 1988). Hence, they constitute a threat to things made of wood, such as piers and boats. The attack by shipworms is influenced by environmental conditions and the kinds of wood. Some species may be selective in the choice of wood to be attacked (Yulianda 1996). The attack of shipworms begins when larvae settle on the surface of wood. The settlement is influenced by light and gravity in general but specific information is not available (Yulianda *et al.*. 1997). The purpose of this study is to investigate how controlled light intensity may affect the shipworm activities. It is believed that each type of organisms has a different level of response to light.

MATERIALS AND METHODS

The research was conducted in the wet laboratory of the Faculty of Fisheries and Marine Sciences, IPB. The shipworm broodstock was collected in the waters of Pelabuhan Ratu, West Java.

Shipworm broodstock was put in aquaria with sea water of 26-28 ‰ salinity. To study how light affected the hatching of larvae, the aquaria were either covered with black plastic or uncovered and placed in daylight.

To study the effect of light intensity on settling, 400 trochophore larvae were put in each of 12 aquaria (20 x 30 x 30 cm). Three groups of 4 aquaria were exposed to similar light intensity provided by fluorescent light tubes: 7 watt (equal to 1150 lux), 9 watt (1600 lux) and 11 watt (2400 lux) respectively. The salinity ranged from 33-34‰ and the temperature from 28-29 °C. A piece of red meranti (10 x 10 x 2.5 cm) was put in each aquarium and soaked in the water. The Larvae of *Teredo* sp. were fed phytoplankton (*Chlorella* sp.) at a rate of 10,000 cells per aquarium every 5 days. The settlement of the larvae on the wood was estimated weekly for 5 weeks. A luxmeter was used to check the light intensity. Salinity was checked with a refracto salinometer.

RESULTS

The effect of light on hatching

A total of 32 *Teredo* broodstock yielded 1133 trochophore larvae per litre in the light, while no larvae hatched in the dark (covered aquaria).

Stages of larval development

The larval phases consist of 3 stages. Newly hatched trochophore larvae measured 70-75 µm, straight hinge veligers 100-160 µm), and

pediveligers 160-230 µm. Trochophore larvae developed into straight hinge veligers after 6-12 hours. The pediveliger is the last phase of development before the larvae settle on the substratum (wood). The foot and umbo are fully developed (Figure 1).

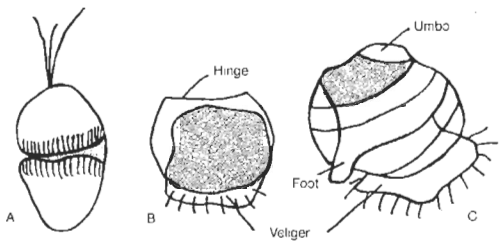

Figure 1. The morphology of larvae *Teredo* sp.: A. Trochophore, B. Straight hinge veliger, C. Pediveliger.

The effect of light intensity on settling

During the five weeks of the experiment, an average of 57 larvae settled 100 cm^{-2} at a light intensity of 2400 lux, 55 larvae 100 cm^{-2} at 1600 lux, and 52 larvae 100 cm^{-2} at 1150 lux (Fig. 2).

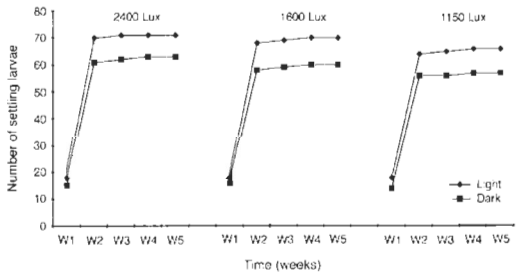

Figure 2. Settlement of *Teredo* larvae on red meranti as a function of light intensity.

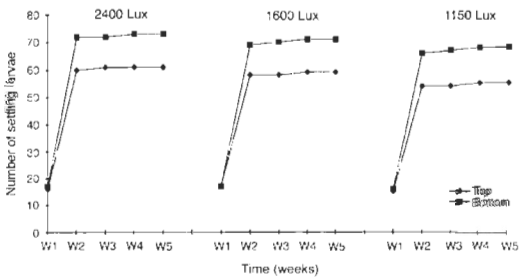

Figure 3. Settlement of *Teredo* larvae on the top and undersides of red meranti wood.

The number of settling larvae was higher on the underside than on the topside of the floating wood (Fig. 3).

DISCUSSION

The activities of shipworm broodstocks were affected by light. Only the shipworms in light (uncovered aquaria) successfully hatched while none of the 35 individuals in the covered aquaria were able to reproduce. Another indication of the well-being of shipworms kept in light versus darkness was is the growing of siphons in the former but not in the latter.

A great proportion of planktonic larvae respond to light and gravity during the pelagic stage. They are strongly photopositive in the beginning but change to become photonegative when they are ready to settle (Crisp, 1976; Isham et. al. 1951). In this study, light resulted in more active shipworm larvae and they tended to come closer to the source of light. Yet, nothing is known about the optimal light intensity or the maximum intensity tolerated by the larvae. The obvious increase of larvae in the second week in all 3 light intensities was an indication that larvae adapted to the light. However, the substratum also changed during the first weeks. In the beginning of this experiment, the wood was fresh and Hoagland (1986) found that *Teredo bartschi* larvae preferred wood that had been soaked long to the newly soaked wood.

The different settlement of larvae on the top and underside of wood may indicate a response to gravity (Loeb and Boyne in Meadows and Campbell 1972) or it may be a response to light at the time of settling. The light always came from above so the intensity differed on the top and underside of wood.

It was easier for the larvae to settle on the underside of the wood because of the upward movement (the photopositive response), increasing the chance of hitting the underside of the wood. It was difficult for

larvae swimming at the surface to perform downwards swimming. They easily got trapped because of the light body structure. This phenomenon is also indicated by Yulianda (1998): It is easier for larvae to settle on the wood placed horizontally compared with that placed vertically.

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