

Effects of temperature on the embryonic and early larval development in tropical species of black sea urchin, *Diadema setosum* (Leske, 1778)

ABSTRACT

Influence of temperature on the embryonic and early development and growth performance of larva in tropical sea urchin, *Diadema setosum* was investigated in water temperature ranging between 16 and 34°C under controlled laboratory conditions. The critical lower and higher temperature for embryonic development was found at 16 and 34°C, respectively. Embryos reared in both of these two temperatures exhibited 100% abnormality within 48 hrs post-insemination. The time required to reach these embryonic and larval stages increased with temperature from 28 followed by 31, 25, 22 and 19°C in that order. The developmental times of 2-cell stage until 4-arm pluteus larva showed significant differences ($P < 0.05$) among the tested temperatures. The larvae in the state of prism and 2-arm pluteus, survived at temperature ranging from 19 to 31°C, while the 4-arm pluteus larvae survived at temperature between 22° to 31°C. However, larval development within a temperature range of 22° to 31°C was acceptable since no abnormalities occurred. The morphometric characteristics from prism to 4-arm pluteus larvae in all the temperatures differed significantly ($P > 0.05$). Among them, 28°C was found to be the best temperature with respect of the highest larval growth and development at all stages. The findings of the study will not only be helpful to understand the critical limits of temperature, but also to identify the most appropriate temperature for optimum growth and development of embryos and larvae, as well as to facilitate the development of captive breeding and mass seed production of *D. setosum* and other important sea urchins for commercial aquaculture.

Keyword: Sea urchin; *Diadema setosum*; Temperature; Embryo; Larvae