REPRODUCTIVE CONDITIONING OF *Tridacna crocea* (Tridacnidae) USING ALGAE AND DISSOLVED INORGANIC NITROGEN AS NUTRITIONAL SUPPLEMENTS

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ABSTRACT

Hermaphroditic *T. crocea* were hatchery-conditioned with nutritional supplements of dissolved inorganic nitrogen (DIN) and live mixed algal diet of *Isochrysis galbana* and *Tetraselmis tetrathele,* taking into account the autotrophic and heterotrophic sources of tridacnid nutrition. Four conditioning treatments were applied as follows: algal conditioning, nitrogen conditioning, combination of both algae and nitrogen, and hatchery control. The gonads were examined histologically to determine reproductive stages of development, and gonad index, protein, carbohydrate, and lipid contents were measured.

The DIN and live algae supplemented to the clams significantly influenced the protein and carbohydrate concentrations found in the gonads. Lipids were significantly influenced by algae alone. Conditioned broodstock had higher concentrations of the above components than the controls. Significant difference was found among the different treatments in the reproductive stages of development of the ovary and testis over the experimental period. No significant difference was found on the gonad state and synchronicity of reproductive stages of both ovary and testis. There was no significant and strong association between the protein, lipid and carbohydrate components in the gonads to the reproductive stages of development. The data and sampling intervals in this study are not sufficient to infer the gametogenic rate and cycle of the different treatments. But, the results showed the significant influence of the nutritional supplement in enhancing a shift in gametogenic development in its ordered and chronological process over the 4 months of nutritional exposure.

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I. INTRODUCTION

Giant clams (Tridacnidae) are the largest of the bivalve molluscs. They are commercially important for their meat and shells. The extensive utilization of these bivalves resulted in over- harvesting leading to a severe depletion of natural stocks in their geographical distribution (IUCN, 1983). Mariculture of these bivalves was initiated to ensure conservation, replenishment, and restocking of depleted reefs (Heslinga et al., 1984). However, one major drawback in the mass production of juveniles is the limited number of mature clams in the wild and the scarcity of information on their reproduction.

Giant clams are protandric hermaphrodites, meaning they first mature sexually as males (Wada, 1952). After a brief period of maleness (protandry), the clams shift to become functional or simultaneous hermaphrodites. In this stage, the ovary and testis lie side by side throughout the gonad, but the gametes are discharged separately.

The tridacnids are unique among bivalves because of their symbiotic relationship with photosynthesizing dinoflagellate algae, called zooxanthellae. In addition, clams still retain the functional filter system for feeding of normal bivalve molluscs (Morton, 1978; Reid et al., 1984; Klumpp et al., 1992; Klumpp & Lucas, 1994). Unlike most molluscs that derive food mostly from filtering the water, giant clams derive additional food through the translocation of photosynthetic products from their algal symbionts. The zooxanthellae translocate 90-95% of their photosynthetic products to the clam host (Fitt, 1993). This typifies autotrophic as well as heterotrophic sources of nutrition.

Recent studies by Klumpp et al. (1992) and Klumpp & Lucas (1994) quantified the relative importance of each source of nutrition on the three largest species, *Tridacna gigas*, *T. derasa*, and *T. tevoroa*. *T. derasa* has been shown to function as a complete