# Comparison of Functional Responses of Purple Clam, *Saxidomus purpuratus* Among Life Stage and Temperature

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## INTRODUCTION

The purple clam, *Saxidomus purpuratus* (Fig. 1) is a local species inhabiting relatively restricted areas around Korea, Japan, and China. This species is one of the most important shellfish resources for human consumption with high prices. Recently, the commercial yield from the traditional exploitation of natural fisheries by divers has been declining due to over-harvesting. The total accepted catches for *S. purpuratus* in 2002 was 8,000 MT. Therefore much attention has been concentrated to the aquaculture and restocking of this species. Several culture conditions for artificial seedling production were set up (Choi et al., 2003). However, rates of feeding and the optimal ration for inland culture were not understood yet. Thus the purpose of this study was established to know the feeding rates and to determine optimal ration level for each life stage of *S. purpuratus*.

## MATERIALS & METHODS

Clearance rate (CR) and ingestion rate (IR) of the larvae (5-day old), spats (6-month old), and adults (3-year old) of *S. purpuratus* were measured by indirect method (Coughlan, 1969) with *Isochrysis galbana* as a food organism in static systems. Five to six different treatments of algal concentration (4.3103 ~ 2.6106 cells/ml) were used to know the functional responses. To know the effects of temperature, spats were incubated at 6 different temperatures (from 5 to 30C). Feeding experiments were conducted for 1 hr (adults), 2 hr (spats) or 24 hr (larvae). CR and IR were calculated from the changes in algal concentrations at the start and the end of experiments. IR data were fitted to a Michaelis-Menten equation (Bmstedt et al., 2000).

## RESULTS & DISCUSSION

Algal concentration strongly affected CR of all three stages. With increasing algal concentration CR increased rapidly, but after a certain threshold level it decreased gradually (Fig. 2). The maximum CR for larva, spat, and adult were 0.002, 19.9 and 238 ml/ind/hr, respectively (Table 1). IR was also affected by algal concentration. In the experiments with larvae and spats, the changing pattern of IR could be divided into

two phases: (1) as algal concentration increased with low level, IR increased rapidly, (2) but, as algal concentration increased further, IR did not increase any more (Figs. 2, 3). However, in the experiments with adults, IR increased continuously. The maximum IR for larva, spat, and adult were estimated as 37, 7.5106, and 3.0108 cells/ind/hr, respectively. For rearing larvae and spats with better nutritional conditions, algal concentration should not be less than 1.6104 cells/ml for larvae and 7.0105 cells/ml for spats. As for temperature, maximum IR in spats of *S. purpuratus* increased when temperature increased from 5 to 25C, but it was lowest at 30C. Between 15 and 25C the IR was most stable (Fig. 5). At this temperature range, the Q10 was 1.6. To acquire fast growth of spats in inland culture during winter, it is necessary to maintain water temperature over 15C.

## REFERENCES

Bmstedt, U., D.J. Gifford, X. Irigoien, A. Atkinson and M. Roman, 2000. Feeding. Pp. 297-399. *In*: Zooplankton Methodology Manual. (eds) Harris, R.P., P.H. Wiebe, J. Lenz, H.R. Skjoldal and M. Huntley. Academic Press. London, UK.

Choi, J.-W., S.-K. Kim, Y.-S. Choi, C.-H. Lee, W.-J. Lee and T.-K. Ryu, 2003. Optimal conditions for artificial fertilization, embryonic development, and larval growth of the purple clam, *Saxidomus purpuratus* from southern coast of Korea. Korean J. Malacol., 19(1): 33-40.

Coughlan, J., 1969. The estimation of filtering rate from the clearance of suspensions. Mar. Biol., 2: 356-358.