

PF-1

Reproduction and population dynamics of *Acetes chinensis* (Decapoda: Sergestidae) on the south-western coastal waters of Korea, Yellow Sea

Chul-Woong Oh, In-Ju Jeong, Chae-Woo Ma*

Dept. of Marine Resources, Mokpo National University, * Biological Sciences, Soonchunhyang University

Introduction

The planktonic shrimp, *Acetes chinensis* Hansen, 1919 inhabits the coastal areas of the Indo-West Pacific, Korea, China, Taiwan, and Japan and is most abundant along the coastal areas of Yellow Sea. Several studies have locally examined aspects of reproductive biology of the species such as reproductive cycle, spawning, maturity, breeding pattern and fecundity. However, to date there have not been any studies on the population dynamics of *A. chinensis* in the Yellow Sea. Thus, its stock assessment and fisheries management in the area have been impeded by local dispersion of data available on reproductive biology and lack of information on population dynamics (Xio and Greenwood, 1993).

This study investigates the reproductive biology of *A. chinensis* in Korea, Yellow Sea, based on observation of gonad index, and ovarian development. Sex ratio, size at sexual maturity, fecundity and relationship between reproductive variables and certain body dimensions, are also investigated. Growth, mortality and recruitment patterns have been estimated on the basis of length-frequency data analysis (LFDA) for monthly samples collected from May 2000-October 2001.

Materials and Methods

Monthly samples of *Acetes chinensis* were collected from the shrimp fisheries on the south-western coastal waters of Korea, Yellow Sea between May 2000 and October 2001. Carapace length (CL) was measured to nearest 0.01mm after sex determination. For each female, maturity of the ovary was determined into four categories, (1) immature ovaries, (2) mature ovaries, (3) near spawning ovaries and (4) spent ovaries, and then weighed body and ovary dry weights. The oocytes were

directly counted to calculate fecundity.

Length-frequency distributions (LFD) were constructed for males, females and pooled data, using 5mm intervals of CL. Growth was described using the modified von Bertalanffy growth function (VBGF) (Pauly and Gaschütz, 1979). Mortality was estimated in ELEFAN using a linearized length-converted catch curve. The recruitment pattern was established by projecting the corrected length frequency data backward into time axis to zero length, using the estimated growth parameters. Normal distribution of the recruitment pattern was determined by Hasselblads NORMSEP in FiSAT.

Results

In most samples there was a predominance of females, except for March 2001. The mature females first appeared in April, reached a peak in July and then did not appear after September. The main breeding season (percentage of females with mature ovaries > 50%) was from June to September in 2000 and from June to September in 2001. Similar pattern could be found in monthly changes of gonad index (GI), showing relatively higher GI during the annual breeding season. The highest gonad index occurred at late in July.

The carapace length of the shrimps ranged from 3.24 mm to 10.39 mm for males and from 3.88 mm to 11.12mm for females. The analyses of modal progression for each sex separately showed that females ($L_{\infty} = 13.51$ mm CL, $K = 0.69$ year⁻¹) are higher in L_{∞} and K than males ($L_{\infty} = 10.48$ mm CL, $K = 0.84$ year⁻¹). The values of L_{∞} and K for pooled data were 13.94 mm CL and 0.64 year⁻¹, respectively. Females had greater growth rates at age than males.

The mortality rate (Z) ($\pm 95\%$ confidence limit) calculated by length-converted catch curves was $Z = 3.93$ (± 2.00). The structure of the recruitment patterns obtained by the ELEFAN program indicated two normally distributed groups (autumn and winter).

Reference

- Pauly, D. and G. Gaschütz. 1979. A simple method for fitting oscillating length growth data, with a program for pocket calculators. ICES CM 1979/G:24, 26.
- Xiao, Y. and J.G. Greenwood. 1993. The biology of *Acetes* (Crustacea; Sergestidae). Oceanogr. Mar. Biol. Annu. Rev., 31: 259-444.