The experimental rearing of fan mussel *Pinna nobilis* (Linnaeus, 1758)

Valter KOŽUL, Nikša GLAVIĆ, Jakša BOLOTIN, Nenad ANTOLOVIĆ

University of Dubrovnik, Institute for Marine and Coastal Research, D. Jude 12, P.O. Box 83, 20000 Dubrovnik, Croatia, (e-mail: valter.kozul@unidu.hr)

Abstract

The growth of fan mussel *Pinna nobilis* was investigated in commercial shellfish farm in Mali Ston Bay (South-Eastern Adriatic, Croatia). During October to December 2006 juvenile stages of fan mussel were collected at commercial shellfish spat collectors. For the experimental cultivation specimens (n-354) were placed in specially modeled cages (30cm high and 15cm diameter). After one-year of research fast growth was noted; from a minimum of 16.0mm to a maximum of 157.0mm of shell length.

Key words: fan mussel, *Pinna nobilis*, rearing, growth

Introduction

The fan mussel, *Pinna nobilis* is endemic to the Mediterranean Sea. It is one of the largest bivalves in the world, reaching sizes of up to 86cm (Moreteau and Vicente, 1982). According to the latest data, maximum lengths are up to 120cm (Zavodnik et al. 1991). It has very variable recruitment (Butler et al. 1993), and occurs at depths between 0.5 and 60m. It lives mostly on soft-bottom areas overgrown by meadows of the seagrasses *Posidonia oceanica*, *Cymodocea nodosa*, *Zostera marina* or *Zostera noltii* (Zavodnik et al. 1991), but also on bare sandy bottoms (Katsanevakis, 2006, 2007). The population of fan mussel has been greatly reduced during the past few decades as a result of recreational and commercial fishing for food, use of its shell for decorative purposes, and incidental killing by trawling and anchoring. A variety of previous investigations focused on the age and growth rate of the fan mussel under natural conditions (Richardson et al, 1999, 2004; Katsanevakis 2007; Rabaoui et al. 2007; Garcia-March and Márquez-Aliaga, 2007). Solving the problem of controlled breeding could protect natural populations and reduce the harm from illegal extraction from the seabed. This research opens the possibility for commercial production in the future, when the technology for culture in all stages is developed. In this paper, we present the preliminary results of the first controlled cage rearing of fan mussel.
Material and methods

Juvenile stages of fan mussel (354 specimens) were collected in the Mali Ston Bay during October to December 2006. All specimens were collected at commercial collectors for flat oyster, Ostrea edulis and Mediterraneenan mussel, Mytilus galloprovincialis. Collected specimens were measured immediately after removal from the collector. For the experimental cultivation specimens were placed in specially modeled cages (30cm high and 15cm diameter). Cages were made of wire mesh covered with fishing net (mesh size 4mm). Wire framed cages had plastic insulation. The cages were cylindrical and within it, there were two round pieces of Styrofoam (3cm thickness) with holes (1cm deep) in the middle and on the bottom, in which specimens were placed. Holes in the Styrofoam were made so that the lower third section of shells was placed in the hole in the Styrofoam. The individuals were measured once a month throughout experiment. These measurements included maximum dorsal height; ventral and anterior-posterior shell length. Dead or damaged specimens were recorded during the measurements. Each specimen in the cage was marked by a number. Three months after the start of the experiments, the cage sizes were changed. The new cages were squared (40x40x40cm) with a perforation size of 1cm², and with a grid at the bottom for enabling the setting of individuals in a natural vertical position. Sea temperature was monitored daily and salinity was monitored monthly.

Results and discussion

The average length of specimens harvested from the collectors was 29.0±12.1mm, while the average height was 12.9±14.1mm; the minimum length was 16mm, while the maximum was 35mm.

As with other research on this species (Richardson et al., 1999, 2004; Katsanevakis 2007; Rabaoui et al. 2007; Garcia-March & Márquez-Aliaga, 2007), our case also confirmed that fan mussel shows rapid growth. The results of the one-year research indicate fast growth from a minimum of 16.0mm to a maximum of 157.0mm (Fig. 1). Specimens in the experiment increased their growth already after 80 days by cca 50%. Two months later and 140 days since the beginning of the experiment, an almost 100% increase in growth rate was recorded (Fig. 1). We recorded a low mortality rate, which amounted to 6.6%. Vicente et al. (1980) and Moreteau and Vicente (1982) reported fast shell growth over the first 2 to 3 years, and a much slower growth thereafter.

Katsanevakis (2006) reported fan mussel growth in Greek waters (Lake Vouliagmeni). He noted that P. nobilis is growing fast, mostly during the first 3 years of life, and that it may live beyond 15 years. Difference exists in the growth rates of fan mussels at certain locations or in different parts of the Mediterranean, which can be associated with temperature, depth and available food quantities (Zavodnik, 1967; Moreteau & Vicente, 1982; Vicente, 1990; Vicente & Moreteau, 1991; Katsanevakis, 2006, 2007; García-March et al. 2007).

The average monthly growth of shell length for the experimental period was 8.4±4.5mm month⁻¹ (Fig. 2). The highest average growth of shell length was recorded in June with a value of 17.1mm month⁻¹, while the highest average growth in height occurred in February at 7.8mm month⁻¹. The lowest values of shell growth at this depth were recorded in December, when length was 2.2mm month⁻¹, and height was 0.8mm month⁻¹.
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The average temperature for experimental period was, 16.3°C and the average salinity was 36.0psu. The temperature profile during the experiment are presented in Fig.2.

The growth of P. nobilis natural population is described by Katsanevakis (2007) and results are similar to our findings and show peak of growth rates during late spring - early summer and slow growth during the cold season showed.

Controlled rearing along with protection mechanisms, such as the introduction of over fishing adults as reared specimens, can open the doors to mariculture and the gastronomic supply in the region for this species.

Literature


