

GROWTH AND MORTALITY RATES OF *PINNA NOBILIS* JUVENILES UNDER DIFFERENT EUTROPHICATION LEVELS

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Abstract

The present work assessed the survival and growth rates of *Pinna nobilis* juveniles in a range of eutrophic conditions (fish farm vs MPA) around Mallorca. A high mortality rate of juveniles appears in the locality of high human impact. However, the growth rate of individuals in this area was higher compared to the oligotrophic environment. Differential survival rates are indicating large impact of organic loads and anthropogenic related activities in the first life stages of a vulnerable species.

Keywords: Marine parks, Eutrophication, Growth, Bio-indicators, Balearic Islands

Introduction

The pen shell *Pinna nobilis* is a long-lived organism, presenting a life span of more than 20 years. Its responsiveness to environmental perturbations makes it a good bioindicator of water quality and, therefore habitat conditions [1,2]. Eutrophication and aquaculture-derived effects are affecting benthic species especially at oligotrophic environments. In this study, our main objectives were (1) to compare the growth plasticity of *P. nobilis* in two trophic environments around Mallorca, (2) to evaluate the success of survival in each environment.

Material and methods

Pinna nobilis juveniles were suspended in the water column at 5 meters depth with seed collectors. 25 individuals were located within the port of Andratx (39 ° 32'38 .36 "N, 2 ° 22'50 .95" E) under a fish farm, i.e. eutrophic environment with high anthropogenic impact. In contrast, 26 individuals were situated in MPA Cabrera National Park (39 ° 8'45 .65 "N, 2 ° 55'54 .48" E), an oligotrophic environment free of any sewage or organic dumping. During the 2 years study (Feb. 2011-Feb. 2013), pen shells were monitored by measuring the length and width of each individual together with mortality rates (6 visits in Andratx and 5 in Cabrera). Growth was calculated by linear regression through the 2 years.

Results and discussion

The study showed that in a eutrophic environment *Pinna nobilis* juvenile survival rates after the first days of exposure to anthropic conditions are a key factor to the population's sustainability. We found a drastic population decline in Andratx samples at the first monitoring visit where the number of individuals is halved, and a smaller percentage decline in the next few days, keeping a survival percentage of <30% at endpoint (Fig. 1). In contrast, Cabrera's survival percentages are larger than 80%. Although survival success in the eutrophic environment is much lower than in the oligotrophic one (difference >50% between the two environments), surviving individuals present higher growth rates (22.65 ± 12.2 mm mean for Andratx and 85.71 ± 4.28 mm mean for Cabrera) (Fig. 2). However, this growth is not natural, since individuals were suspended in the water column, while their natural habitat is benthic and associated mainly to seagrass meadows. However, other studies report higher growth rates in normal conditions [3,4]. The environmental conditions where *P. nobilis* develops will influence their ability to assimilate nutrients. Differential survival rates are indicating large impact of organic loads and anthropic related activities in the first life stages of a vulnerable species.

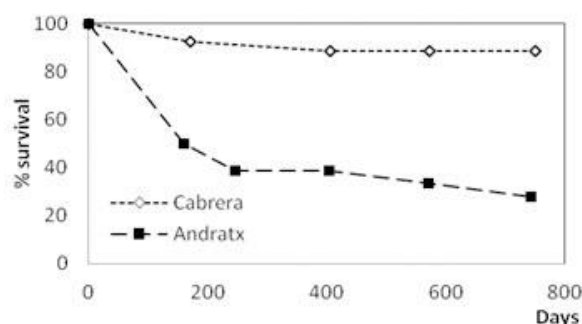


Fig. 1. Temporal variation of survival percentage of *P. nobilis* juveniles in the two environments studied.

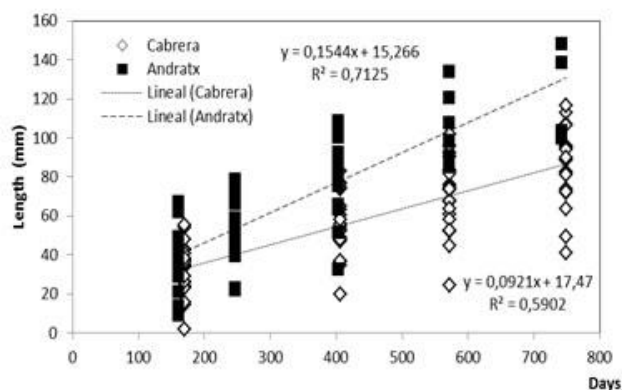


Fig. 2. Growth rate in shell length for *P. nobilis* juveniles in Andratx (eutrophic) and Cabrera (oligotrophic).

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