

STOCK ASSESSMENT AND GENETIC DIVERSITY OF THE EDIBLE ASCIDIAN *MICROCOSMUS SABATIERI* ROULE, 1885 IN THE SOUTH AEGEAN SEA

D. Vafidis¹*, C. Antoniadou², N. Kapetanios¹, G. Gkafas¹, A. Exadactylos¹

¹ Department of Ichthyology and Aquatic Environment, School of Agricultural Sciences, University of Thessaly, Nea Ionia, Magnesia's, Hellas. - dvafidis@uth.gr

² Department of Zoology, School of Biology, Aristotle University, Thessaloniki, Hellas.

Abstract

The spatial variation in population density of the edible ascidian *Microcosmus sabatieri* Roule, 1885 was studied in the Dodecanese complex (south Aegean). Sampling included the random collection of specimens during a 50 min dive with SCUBA apparatus. Mean population density was 156 ± 53 individuals/20-min. Additionally we examined its genetic polymorphism using RAPD markers. Data imply high genetic diversity between populations with a rather complex clustering of a southeastern to northwestern pattern in the Aegean Sea. Thus, its fishery should be treated as complicated stocks, which respond independently to exploitation.

Keywords : *Aegean Sea, Genetics, Population Dynamics, Stock Assessment.*

Introduction

Ascidians are among the most important members of the benthic assemblages in the Mediterranean Sea. *Microcosmus sabatieri* Roule, 1885 is an endemic species known from Adriatic and Western Mediterranean basin. It is an edible and of commercial interest species in many Mediterranean areas. However, few data exist on its population structure and even fewer in the South Aegean [1]. This study presents preliminary data on spatial variation of its population density in South Aegean, where it has been traditionally harvested. We also determined its genetic structure using RAPD fingerprinting [2]. The results were used to investigate the differentiation between six Aegean populations and provide information to assist management and conservation on this marine species. No studies on genetic structure of the species in question are available in the bibliography.

Results and Discussion

Mean population density, over all sites, was 156 ± 53 individuals/20-min. Increased stocks were found at three stations (St1, St3, St8), while at St4 and St7 few specimens were caught (Fig. 1). One-way ANOVA showed significant spatial differences on mean tunic length ($F=9.82$ $p<0.05$) and diameter ($F=10.99$ $p<0.05$). Both characters varied in a similar way, showing maximum values at St4 and St6 and minimum at St2. Large sized specimens were also caught from St1, St3 and St5, while the specimens from St7, St8 and St9 were smaller, for both dimensions. Total $H_e=0.499$ was higher, but not statistically significant, than $H_e=0.311$, implying a heterozygote deficit on the sampled populations. Total $F_{IS}=0.492$ was high enough and statistically significant on the P_{99} criterion, indicating a possible presence of local sub-populations. Studied populations either do not follow Hardy-Weinberg law, or are not yet in genetic equilibrium, so there is evidence to reject random mating within them. Total $F_{ST}=0.286$ was high enough and pairwise F_{ST} values were statistically significant for all populations at all loci on the P_{99} criterion. Data imply high genetic diversity among populations, since a quite low $N_m=0.046$ migrants per generation, was observed. Furthermore, one could observe a rather complex, but not statistically significant, clustering pattern of southeastern to northwestern populations in the Aegean Sea, by using the stepwise method [3]. Even if fishing pressure becomes intensive, natural stocks of *M. sabatieri* tend to recolonize the substratum from deeper populations; in any case its high local population diversity is preserved.

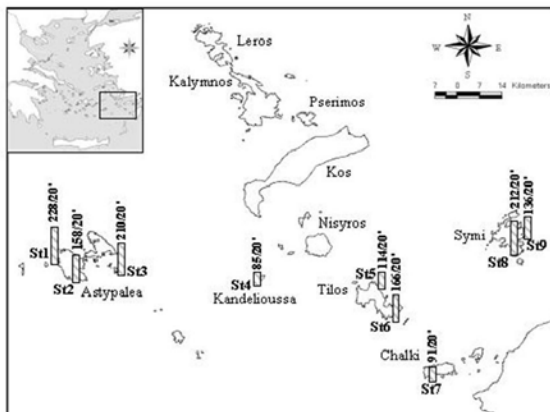


Fig. 1. Spatial population density of *M. sabatieri* over nine sampling sites in the Dodecanese complex.

Materials and Methods

In the south Aegean, overall sampling of 1,513 specimens was carried out with SCUBA diving at nine coastal stations (Fig. 1), at depths between 20 and 60 m in September 2005. Specimens of *M. sabatieri* were randomly collected during a 50 min dive and counted in the field with a tapeline to the nearest mm (total length of the tunic and maximum diameter of the tunic). Population density was estimated as the number of individuals collected per 20 min dive ($N/20$ -min). The null hypothesis of no significant differences in the mean length (or diameter) of *M. sabatieri* specimens among stations was tested with one-way ANOVA, after an initial logarithmic transformation of the data to meet the assumption of the analysis. Seventy eight (78) samples from Astypalea Island along with 28 from Trikeri (central Aegean), 61 from Plataniakos (central Aegean), 20 from A. Nikolaos (central Aegean) and 27 from Maliakos Gulf (central Aegean) were used for the genetic screening. Eight RAPD primer markers were found to produce well-amplified and reproducible electrophoretic bands. In total 22 loci were observed and scored. Genetic statistical indices were calculated according to [2].

References

- 1 - Antoniadou C., Chintiroglou C.C., Voultsiadou E., and Vafidis D. (2004). First assessment of the natural stock of *Microcosmus sabatieri* in the south Aegean Sea (Greece). *Rapp. Comm. Int. Mer Médit.*, 37: 477.
- 2 - Exadactylos A., Geffen A. J., Panagiotaki P., and Thorpe J. P. (2003). Population structure of Dover sole, *Solea solea* (L.), in the northeast Atlantic; comparisons of RAPD and allozyme data indicate divergence of British and continental European stocks. *Mar. Ecol. Prog. Ser.*, 246: 253-264.
- 3 - Nei M., (1972). Genetic distance between populations. *Am. Nat.*, 106: 283-292.