



REPRODUCTIVE BIOLOGY AND TROPHIC ECOLOGY OF THE SEA CUCUMBER *Holothuria sanctori*: A POTENTIAL CANDIDATE FOR INTEGRATED MULTI-TROPHIC AQUACULTURE

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The global concept of environmental sustainability is gradually being implemented in industry and various production sectors after societal awareness of the consequences of resources irresponsible consumption and the demands for stakeholders to establish applicable policies. In line with the general approach of the European Union to achieve blue growth and sustainable development, scientific research in the aquaculture sector offers innovative solutions, in particular, Integrated Multi-Trophic Aquaculture (IMTA) that represents a new generation productive system, allowing to diversify production while preserving resources and reducing environmental impacts. In a typical IMTA system, two or more compatible species of different trophic levels are combined wherein the "principal species" are often higher in the trophic level while others are lower and are known as "extractive species"; since their food is highly dependent on the waste of the principal species. The current research project aims to investigate the biology and ecology of the sea cucumber *Holothuria sanctori* in order to evaluate its suitability as an extractive species devoted to waste consumption of principal species, thus contributing to reducing the total economic cost of production and mitigating environmental impacts.

H. sanctori was selected as a target species as it is endemic to the Mediterranean and there is some evidence for its highly selective ability and for being a good bioremediation agent. In addition, this species has recently become an economically valuable species that is targeted by fishermen and food export companies, which alerts the danger of overfishing, especially with the absence of a production protocol. Therefore, it is a necessity to disclose its hatchery production protocol through in-captive breeding within the current project to avoid irresponsible consumption scenarios. Indeed, hatchery production and growing-out of *H. sanctori* within IMTA system ensure successful aquaculture of this species which helps diversify food production and meet market demand.

Consequently, specimens of wild broodstock will be collected from the central Tyrrhenian Sea and various procedures for spawning induction will be carried out to obtain gametes. Larvae will then be cultivated in typical conditions to reach the juvenile stage. Simultaneously, the ideal breeding conditions for each of these stages will be investigated. In addition, the species feeding behavior will be evaluated in RAS by testing different conditions and finally, an IMTA pilot-scale experiment will be established to integrate caged finfish and sea cucumber and the data obtained from this trial will be analyzed to determine the bioremediation capacity of *H. sanctori* on fish waste and the potential for cultivation under these conditions.



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