

Deciding the methodological approach for marine sponge rearing in an Integrated Multi-Trophic Aquaculture (IMTA) system

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INTRODUCTION

The polyculture of fish with other organisms at different levels of the trophic web (Integrated Multi-Trophic Aquaculture, IMTA) has considerable economic potential especially if edible and/or non-edible species with a potentially high commercial value are co-cultured. Among the co-cultured organisms Porifera, or sponges, are ecologically and economically high-valued by-products [1]. The present study was undertaken to assess the best rearing method in terms of survival rate of the bioactive compound synthesizing sponge *Sarcotragus spinosulus* within the Remedia Life IMTA system.

MATERIALS AND METHODS

In the Remedia Life IMTA system, ongoing in the “Maricoltura del Mar Grande” aquaculture plant (Fig. 1A), to the fish cages producing *Dicentrarchus labrax* and *Sparus aurata* an innovative set of bioremediator organisms such as sponges, polychaetes, bivalves and macroalgae have been associated [2] (Fig. 1B). Among sponge species, specimens of *Sarcotragus spinosulus* were cut into explants of similar size, arranged in fishnet sock, rope and net bag systems (Fig. 2) and monitored in terms of survival rate ($(N_{\text{final}} / N_{\text{initial}}) \times 100$) over a time period of one year.



Fig 2. The three tested rearing methods: fishnet sock (left), rope (centre) and rope with net bag (right).

RESULTS

All method treatments during the first year of rearing showed a high mean survival ratio with values not lower than 82%, reaching more than 93% of the cases when the “net bag” systems was used (Fig. 3). Most of the mortality occurred in the first months after the explants were cut and during hot period, when cut surfaces could not properly heal.

DISCUSSION AND CONCLUSIONS

Overall, all tested rearing methods promise great results in the IMTA activity, with high survival rates (> 80%). When compared with same taxonomic subclass sponges (i.e. Keratosa) reared in net and rope systems, all methodological treatments used in Remedia Life IMTA plant showed a higher mean survival rate [3]. All in all, the measured high survival rates together with its demonstrated filtering activity (e.g. [4]) make the culture of *Sarcotragus spinosulus* by means of the three reared methodologies a promising approach to implement in IMTA systems.

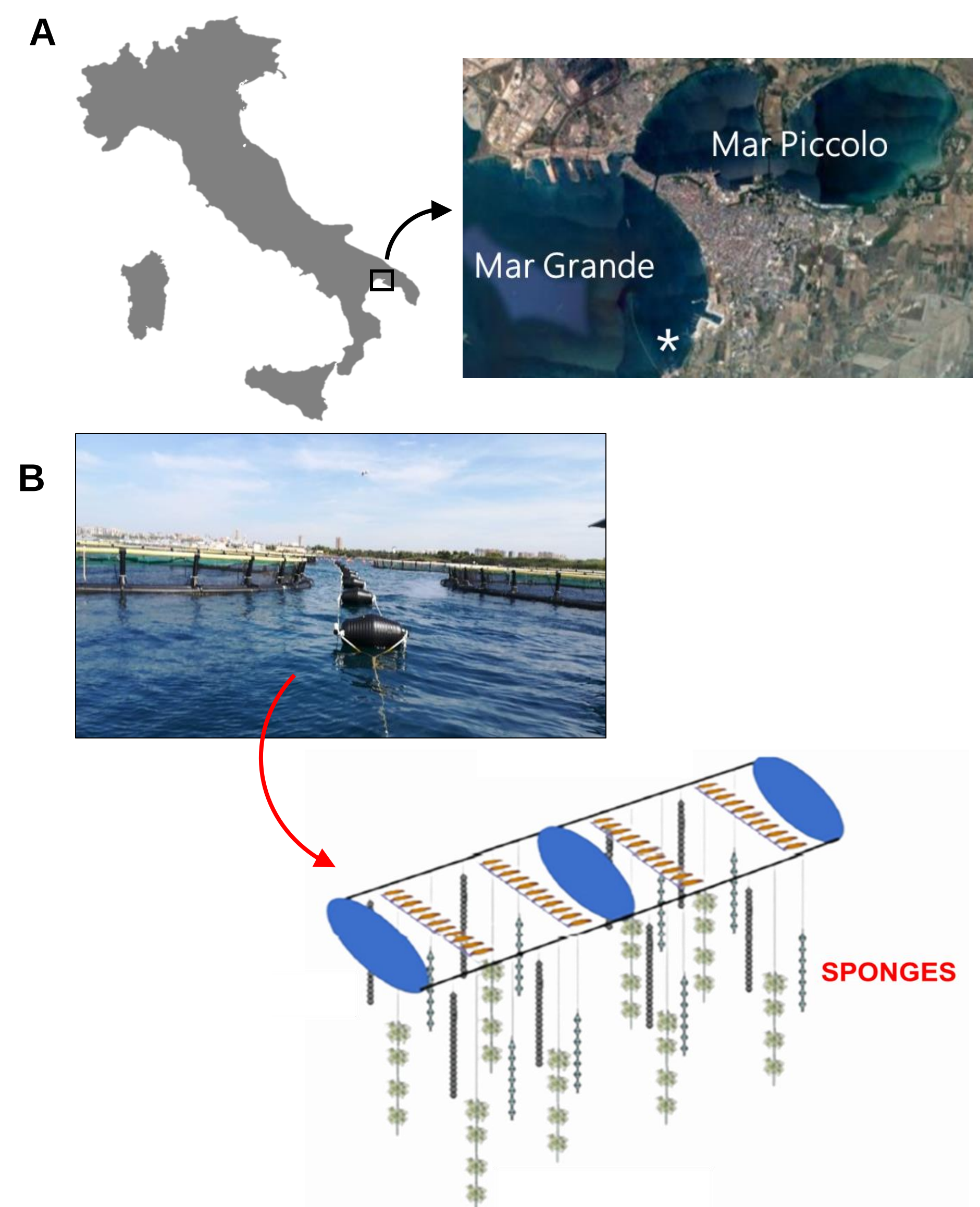


Fig 1. (A) Geographic location of the mariculture plant; (B) Remedia Life IMTA system photo and scheme.

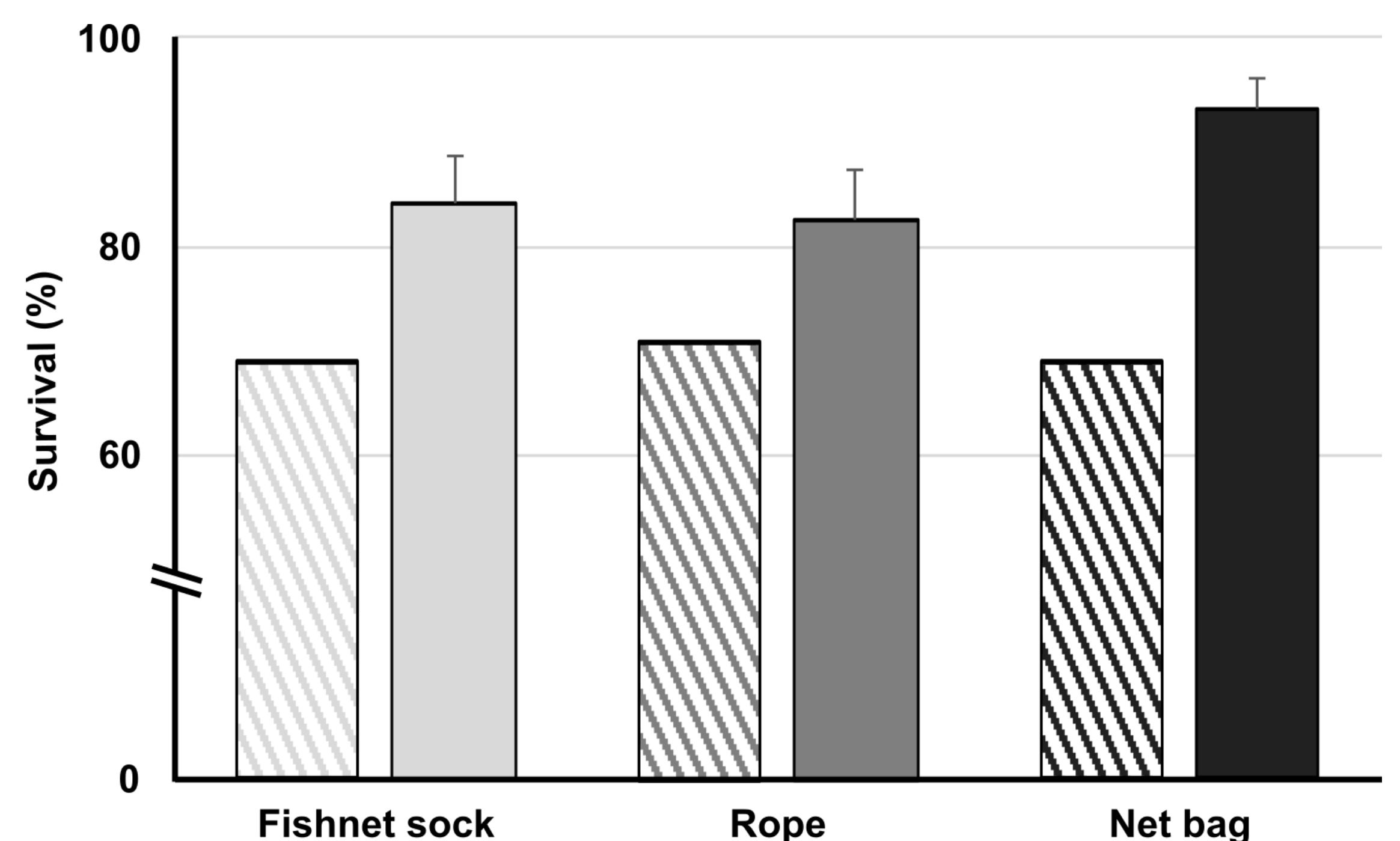


Fig 3. Effect of the rearing method in the survival ($\pm$ SE) of *Sarcotragus spinosulus* compared with mean rates of *Keratosa* (rayed bars) cultured in similar systems reviewed in [3].