

<p>Capacity building and expert training in the frame of the Constanta Shellfish Aquaculture Demonstrative Center <i>(Victor Niță, John A. Theodorou, Simion Nicolaev, Valodia Maximov, Magda-Ioana Nenciu)</i></p>	<p>“Cercetări Marine” Issue no. 48 Pages 92-99</p>	<p>2018</p>
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CAPACITY BUILDING AND EXPERT TRAINING IN THE FRAME OF THE CONSTANTA SHELLFISH AQUACULTURE DEMONSTRATIVE CENTER

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ABSTRACT

Since 2012, at the first meeting of the GFCM Black Sea Working Group (WGBS), it was concluded that mariculture is a development priority for the Black Sea region. The main features identified, namely a heterogeneous development in the various regions of the Black Sea (Turkey vs. Bulgaria vs. Romania), constraints related to environmental factors (climate, salinity, exposed coastline, no sheltered areas), difficulties in integrating mariculture with other uses of the marine and coastal environment (transport, tourism etc.), the need to implement an appropriate legislative framework with clear certification procedures for marine aquaculture products, all call for immediate attention and focused research.

Key-Words: mariculture, shellfish, technologies, legislation, training

AIMS AND BACKGROUND

Mussel culture has been known since the last century. The development of technologies based on scientific observations was possible only a short time after advancing the knowledge of the physiology and ecology of mollusks (Ursache, 2014).

Due to their undeniable culinary qualities and the high content of biochemical compounds with nutritional value (amino acids, vitamins, enzymes, proteins, carbohydrates), many species of mollusks are industrially harvested or

grown in specialized aquaculture farms (Sirbu et al., 2012). The world production of bivalves has increased over the last 50 years, from 0.9 million tons in 1950 to over 22 million tons in 2010. The increase is largely due to the share of aquaculture, which grew rapidly in the 1990s. World production of farmed bivalves increased from 3.3 million tons in 1990 to nearly 20 million tons in 2010, with an annual average increase of 11% (Rosioru et al., 2014).

In Romania, bivalves are not considered a common food, but in the last decade there has been a slight increase in the consumption of mussels and oysters in public nutrition.

The increase in the demand for bivalves for food consumption in recent years has encouraged the harvesting of mussels from natural populations, growing mussels on floating installations (long-line systems) and acclimatization of high-value bivalves - the Japanese oyster, for instance (Rosioru et al., 2014).

The annual quantity of mussels harvested in the Romanian Black Sea coast area amounts to approx. 15 tons (estimated value), and the only existing mariculture farm, S.C. MARICULTURA S.R.L., can produce annually approx. 5 tons of cultured mussels (Zaharia et al., 2017).

In some countries bordering the Black Sea, mussel culture is relatively well represented, having an obvious increasing development over the last two decades; for example, Ukraine produces about 400 tons per year, while Bulgaria is approaching 4,000 t/year (Zaharia et al., 2017). However, given that mussel culture is little developed in Romania, the promotion of scientific, technical and technological bases for this activity is absolutely necessary.

EXPERIMENTAL

At the Meeting on the Establishment of a Demonstrative Center for the Promotion of Sustainable Aquaculture in the Black Sea, 27-28 September, 2017, Constanta, Romania, it was decided:

- NIMRD “Grigore Antipa” will host and coordinate a demonstration production module for the cultivation of mussels (*Mytilus galloprovincialis*): Shellfish Aquaculture Demonstrative Center (S-ADC);
- CFRI Trabzon, Turkey, will host and coordinate a Demonstrative Module of Growth and Repeated Breeding of turbot (*Psetta maxima*) and trout (*Salmo trutta labrax*): Finfish Aquaculture Demonstrative Center (F-ADC);

The arguments for selecting NIMRD to host the S-ADC were the following:

- NIMRD has specific responsibilities and extensive experience in the development of studies in the field of Black Sea Living Resources, as well as data reporting to regional bodies (Black Sea Commission) and international (GFCM, FAO, JRC/DG-MARE, MEDIAS, MEDITs, ICES);
- NIMRD hosts the National Oceanographic and Environmental Data Center (RNOEDC) [5];
- NIMRD has National Scientific Responsibility for the General Fisheries Commission for the Mediterranean (GFCM), coordinated by the Black Sea Working Group (WGSB) (Dr. Eng. Simion Nicolaev);
- NIMRD coordinates and hosts the Regional Activity Center for Fisheries

- Environment and Other Marine Living Resources Management, as well as other National Focal Points within the Black Sea Commission;
- National scientific responsibilities for the collection of fisheries data and the assessment of living marine resources (in accordance with GD No 253/2015) and for the implementation of the Marine Strategy Framework Directive (MSFD);
 - NIMRD hosts and ensures the functioning of the Training Centers for the Environment and Fisheries professions;
- NIMRD has qualified staff, an extensive experience in marine aquaculture and infrastructure (Nita & Nenciu, 2017; Nita et al., 2018a; Nita et al., 2018b).

RESULTS AND DISCUSSION

Shellfish Aquaculture Demonstrative Center in Constanta (S-ADC)

The S-ADC is a part of the well-established research facilities of the National Institute for Marine Research & Development “Grigore Antipa” (NIMRD), Constanta, Romania. NIMRD has semi-pilot scale production installations (with potential for expansion in the future) and takes advantage of existing infrastructures and expertise to share knowledge and to improve cooperation. It meets the establishment criteria about the nature and functions of the S-ADC as recommended during the WGB Constanta Meeting (2017):

- 1) It is a regional hub able to respond to Black Sea countries’ needs & expectations for aquaculture development;
- 2) Raising awareness at every level on the aquaculture potential, among others, in terms of economic opportunity for coastal communities, source of sustainable seafood & contribution to the conservation of ecological services provided;
- 3) Useful tool for local and national administration to assess new aquaculture projects proposals;
- 4) Cooperative approach and knowledge sharing of best farming practices;
- 5) Attract the interest of the private sector to invest on aquaculture activities instrument whose results should offer further employment opportunities;
- 6) Be pivotal to launch aquaculture pilot projects in specific areas of the Black Sea;
- 7) Follow an ad hoc, integrated & holistic approach, focus on the Black Sea region;
- 8) Consider the different level of national aquaculture development & requirements;
- 9) Take into the account the diverse ecological & environmental conditions in the Black Sea area;
- 10) Build upon the various expertise/disciplines available in the Black Sea riparian countries.

The demonstration production module for mussel culture is based on the long-line technology and has 2 components:

- long-line system on sea floats and boats (Fig. 1);
- shore facilities (analytical laboratories and purification system).



Fig. 1. Long-line system suitable for Black Sea mussel culture
(*photo by Mirică Crivăţ*).

The demonstration module for mussel production forms the basis of training activities in the field of mussel culture and covers all aspects of the production cycle:

- Biology and ecology of *M. galloprovincialis*;
- Providing brood and collecting larvae from the natural environment;
- Design and construction of the long-line system;
- Mussel growth and handling technologies;
- Mussel processing and purification technologies;
- Production management systems (production costs, market analysis);
- Training in methodological and practical aspects of the sanitary-veterinary classification of mollusks for domestic consumption / export.

The target groups and beneficiaries of the S-ADC activities are:

- 1) national and local management authorities/administration involved in aquaculture planning, management, sanitary control;
- 2) private sector, especially the small-scale producers with limited investment capacity, potential & existing investors, small farmers, coastal fishers;
- 3) public institutions & other organizations (e.g. NGOs) to increase their awareness on the relevance of aquaculture in particular for its potentiality;
- 4) scientific existing networks which could benefit from specific aquaculture training courses national & international R&D organizations dealing with aquaculture existing & future partnerships between fisheries actors & other local private & public stakeholders.

The S-ADC working methods are the following:

- Modules to provide hands-on practical experience & facilitate technology transfer;

- Showcase different shellfish aquaculture production technologies, well-established systems, species & technology that have proven to reduce investment risks;
- Training programs, seminars, & ad hoc visits, based on end-user needs;
- Production demonstrative/didactic material;
- Linkages and synergies with existing Black Sea aquaculture research facilities and farms.

S-ADC Training Course on Mussel Culture, 17-28 September 2018, Constanta, Romania

The first short term activity of the S-ADC was the “Demonstrative Training on Mussel Farming”, carried-out between 17-28 September 2018 in Constanta, Romania, involving trainees from Bulgaria, Georgia, Turkey, Ukraine and Romania, from research organizations, authorities and the business sector. Representatives from the sanitary-veterinary authorities also attended and were engaged in discussion regarding certifications aspects of shellfish waters. The aim of the training was to enhance the theoretical and practical knowledge, focusing on legal and administrative issues (Theodorou et al., 2018).

Course on Mussel Culture, 17-28 September 2018, Constanta, Romania.

The training was made by including 5 modules and their related theory and practical classes, involving:

- i) mussel biology (e.g. theory: life cycle, growth and reproduction, practical: anatomy and filtration rate estimation);
- ii) culture systems (e.g. theory: system installation, on-growing techniques, production planning and farm development, practical: farm visits and related practical experience);
- iii) legislation-licensing (e.g. EU legislative Hygiene Directive (EC) No. 492/91, the classification of the production areas Directive 91/492/EEC) (Rosioru & Dumitrescu, 2010; Rosioru et al., 2012);
- iv) monitoring services (e.g. theory: microbiology, algal blooms, establish bivalve zones, practical: water sampling, *E. coli* estimation, toxic algae identification and production capacity estimation);
- v) post harvesting technology and quality management (e.g. theory: EU seafood legislation, depuration tanks design, storage, distribution, expedition and quality management of shellfish products, practical: depuration operation, design and operation of the shellfish product chain, Hazard Analysis of Critical Control Points - HACCP - development).

The practical hands-on part of the module focused on shellfish packing/processing plant visit in order the participants to be familiar with the shellfish factory plant specifications, work flow of the raw shellfish material from the harvesting up to dispatch for further processing distribution, HACCP plan operation and new shellfish product forms/packing developments and marketing needs (Fig. 2).

The field visit at the Black Sea Shells mussel farm in Kavarna, Bulgaria, was an excellent opportunity to experience live mussel harvesting from long-line systems and juveniles' socking for relaying (Fig. 3).



Fig. 2. Training visit at the shellfish packing plant during the S-ADC Training (23 August, Constanta, Romania) (*original photo*).

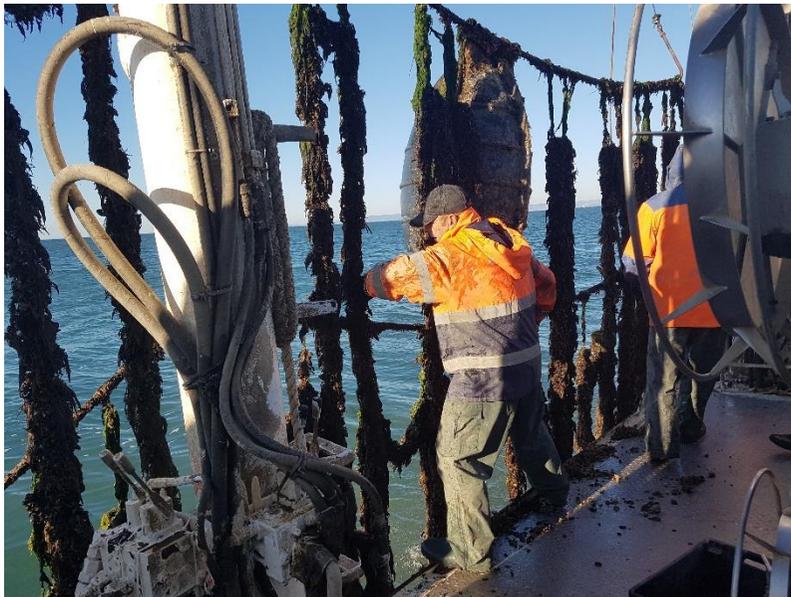


Fig. 3. Training visit at the Black Sea Shells mussel farm during the S-ADC Training (Kavarna, Bulgaria) (*original photo*).

The training concluded with the awarding of graduation certificates (Fig. 4). Future training organized in the frame of the S-ADC will focus on developing the skills of potential investors and people working in the shellfish culture around the Black Sea, aiming at transferring the know-how into the market.



Fig. 4. Graduates of the S-ADC Training Course on Mussel Culture, 17-28 September 2018, Constanta, Romania (*original photo*).

CONCLUSIONS

The first S-ADC course focused on the holistic approach of the steps to establish the sector. It was focused to bring together people from different levels of the decision making in order to fill the gap between them so as to support the sector development from the “farm to the fork” of the consumer. The industry development has multi-scale and multidimensional levels, as a socio-ecological system depending on the captured-based approach of aquaculture.

The next step is from the holistic approach to focus on a certain module development, targeting on techniques and skills to support essential principles for Allocated Zones for Aquaculture (AZA) Development. In order to achieve this target, a review of the existing tools for AZA could be used in conjunction with shellfish zone specifications. Training on the monitoring sampling protocols, as well as on the tools for AZA will be carried out.

Similar interest for the further development of the post-harvesting shellfish quality management systems could be referred on the mussel depuration demonstration, as well as on the exploitation and handling of the *Rapana sp.*, another high value shell-fisheries product in Black Sea.

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