

PERSPECTIVES OF POLYCULTURE OF ASTACUS ASTACUS (EUROPEAN CRAYFISH) WITH COREGONUS WARTMANNI (WHITEFISH)

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The scientific projections show an increase in the demand for seafood products to 2030. The average per capita consumption by the 28 EU countries will move from 22 kg/caput/year in 1998 to 24 kg/caput/year in 2030. The two additional kilograms per capita signify that the net supply will have to increase by 1.6 million tonnes (Mt) (respectively 1.1 Mt for the 2 extra kilos per person and 550 000 tonnes due to the 22 million population growth over the period). Aquaculture growth will not be able to meet the increasing demand; therefore, imports are projected to rise to 11 Mt (+15 percent from 1998), increasing the dependency of Europe on the rest of the world for its fish and fish products [1].

The observed increase in consumption reflects the fact that consumers in European countries increasingly demand seafood as part of a modern and healthy lifestyle. Seafood is promoted as a healthy food in the media. In the short term, as a result of the difficult economic situation in Europe, consumption of seafood is not expected to increase further in Europe as a whole. However, in the long term and if the economy recovers, seafood consumption is expected to increase. Seafood consumption volumes in Southern and Northern and Western Europe are expected to remain relatively stable. Prices of seafood are expected to stabilize [2].

Increases in seafood consumption are expected in Eastern Europe in the medium and long term because consumer buying power is increasing slowly and seafood is increasingly seen as a substitute for meat products.

European production from capture fisheries is expected to remain relatively stable over the next few years. While supplies of some fish species may show some growth, others are likely to decrease. Production from aquaculture is most likely to increase slowly. Therefore, both in the short term and the long term, total European production is expected to remain relatively stable.

The increase in production from aquaculture is stimulated by the European Commission which aims to increase EU aquaculture production in order to become less dependent on imports from outside the EU. The European Commission invests in research initiatives focusing on aquaculture of both local and exotic fish species [2].

Most of the world fisheries today are either overexploited or in a state of full exploitation because of greater fishing effort and increased competition between fishers, vessels or nations over the resource. National governments, development agencies and development practitioners and scholars around the world are working hard on how best to manage the fisheries resources without compromising the biological, economic and social objectives for the benefit of present and future generations.



Astacus astacus (European crayfish) was originally often inhabited in almost all European rivers, lakes and ponds. It was a popular delicatessen fish product with its good availability and its savory meat for a long time. Through the acquisition of the American signal cancer (*Pacifastacus leniusculus*) and the Galician crayfish (*Procambarus clarkia*) *Astacus astacus* (European crayfish) was almost exterminated. These two entrained cancers brought Oomycetes (algae / fungus-like pathogens), which is does not affect themselves; their transferring to *Astacus* in a short time in most cases its leads to death. Thus, this wave of infection was - the so-called plague of cancer - a result of which, during the last century has seen a dramatic reduction in the number of home cancer. They survived only a few waters in Europe and now are listed in the red list of endangered species.

For resistance breeding was lack of resistant strains for *Astacus astacus* is only research on the types of pathogens, but without any further attempts. This should be started in the main proceedings, after genetic tests of *Astacus* individuals in whom currently socialization with American species could be proved.

The whitefish has been for centuries a valued food fish whose catches have been reduced by the reduction of the phosphate containing in Bodensee based on that related to *Coregonen* species imported from Canada in order to meet existing demand. About whitefish from own breeding is repeatedly discussed, but still was nothing implemented. There are breeding farms, where is able to increase the breeding in recirculation systems and provide the conditions for the annual fry (young fish in their first year) as part of a research project on strengthening of flat or declining young fish heads in some high mountain lakes in Germany and Switzerland.

There is described current state of technology and research of the project. At the scheduled Project of polyculture *Astacus* with *Coregonen* are currently specified no experience in extensive research among experts and publications. The behavioral biology and common nutritional base, as well as the fact that at the certain appropriate size of types can be grow at the one socialization suggests that a polyculture can be successful. The conditions under which

such production is biologically possible and economically viable, it must be established in the main project [3].

The aim of the scientific research is to evaluation of the economic potential of the BMBF research project Polyculture of *Astacus astacus* (European crayfish) with *Coregonus wartmanni* (whitefish).

The research problem is the economical and biological verification of polyculture *Astacus astacus* (crayfish) with *Coregonus wartmanni* (whitefish) in different intensity stages in ponds and possibility of recycling systems that can be operated economically efficient.

In the scheduled main project is to be tested in a pilot plant, if it is possible to generate the *Astacus* in association with *Coregonus* as co-product of aquaculture. In the preparatory phase were collected and selected the water by suitable research partners, which are responsible for the study of polyculture in the feasibility phase. In the exploratory phase has been defined (objectives, indicators, research priorities, etc.) for the planned stages of feasibility of the study. In feasibility stage will be examined whether is possible one polyculture with *Astacus astacus* and *Coregonus* in different intensity stages in pond and circular economy and can be sensible economically operated.

In the planned feasibility phase will be tested in a pilot installation the possibility to generate the *Astacus* in association with *Coregonus* as co-product of aquaculture. It could be first successful 2 top products of aquaculture under utilization of synergy effects in parallel in the same waters. The demands on habitat and food, and the expected behavior towards each other can expect a successful cooperation. One problem with fish farming, namely with the accumulation of unaccepted fish feed on the pond floor, it's connected with flush debris and appropriate cleaning effort should be mitigated considerably because just there the *Astacus* staying for feed intake. In the farms is possible again rationally to use unneeded water treatment facilities of the old ponds that in abundance. In the process it should be checked different degrees of eco-friendly extensive farming, in which part of the economic use it's possible.

During this research will be also disclosed and defined following essential for the project issues:

- Exploration and description of the biological production process
- Illustration of the supply chain, including procurement of breeding and fodder production, logistics and distribution.
- Development of services such as plant monitoring and services for aquaculture
- Cost analysis, such as Investment costs (depreciation), energy costs, food costs, labor cost structure in the production, utilization of breeding ponds, logistics costs, etc.
- Multiplication and scaling of research results to other interested companies [3].

The contribution of a bio-based economy is the main thing is that different polyculture and methods are developed, will be made available in the future are used by the third party. Already, there is an interest, for example, for fishermen regarding circulation systems as well as an interest of fish breeding for polyculture were logged in the pond. After a successful completion of the research results can be thus multiplied and scaled. Here also the international potential is considered quite deliberately [3].

The use of fish aquaculture breeding methods for polyculture will allow increasing fish and crustacean production in this project specifically European crayfish and whitefish.

According to the specifics of the project were identified the following research methods and tools:

- 1) Use for the primary data of qualitative research method based on interviews with experts;
- 2) Evaluation of Research data, costs, expenses, duration that allow analyzes economic effectiveness;
- 3) European Fishery reports and Statistics survey are essential to get secondary Data for the Research work and for understanding of Market situation
- 4) Quantitative analyze based on Interviews with potential customer in order to define their preferences, attitude to product price, etc. Additionally on the last stage to conduct focus group discussions and key- informant interviews that shows spontaneous reaction and impression of customer to products and will allow identifying customer opinion to product taste, color, smell, qualities.

Currently, the on-going project has high chances of successful realization and perceptiveness as applied solution in many areas.

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