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## **Evaluation of native phytobiotic effects on immune response of fish and shellfish**

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### **Abstract**

The increasing demands for food and aquaculture besides the limited natural resources caused the changes of cultural systems towards intensive and super-intensive culture in which water is more polluted and probability of developing diseases is higher compared to semi-intensive and open systems. Since application of antibiotics in aquaculture is prohibited under international laws, administration of food additives and immunity complements as a substitute for antibiotics has been studied in the past decade. Application of vaccines is also limited due to host specificity of pathogens as well as the high cost of vaccines. The review of literatures revealed that administration of probiotics, prebiotics, synbiotics, and herbal medicines has been the successful approaches for controlling pathogens. Among those approaches, herbal medicines are cheaper for treatment of aquatic organisms, protect the environment, and have fewer side effects compared to chemicals. This present manuscript reviews the effects of native medicinal plants and their derivatives on the immune response of fish and crustaceans.

**Keywords:** Phytobiotics, Aquaculture, Immunostimulants, Herbal medicine

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## The effect of probiotic bacteria of *Bacillus subtilis* on fatty acid profiles of common carp (*Cyprinus carpio*) fillet

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### Abstract

Probiotic bacteria play an important role in the development of optimal fish culture. This study was carried out to evaluate the effect of *Bacillus subtilis* probiotic isolated from common carp, on fatty acid composition of fish fillet with an average weight (54/56 ±1 g). Control group fish with common diet and experimental treatments with supplemented diets were fed in two levels of concentration 10<sup>3</sup> (treatment 1) and 10<sup>6</sup> (treatment 2) CFU/ ml (cells per ml). The experiment in a completely randomized design with three replications was carried out for 8 weeks. Feed rate was based on 2% of body weight and 2 times at a day. Determination of length and weight were carried out every 14 days. The results of the fatty acid profile showed no significant differences in the amounts of SFA, MUFA, Omega-3, Omega-6 among all with (P>0.05). PUFA and PUFA levels in treatments decreased significantly as compared the control and treatment 2. The highest amounts of EPA and DHA, were observed in the treatment 1 and the control. The results of this study showed that probiotic bacillus can be affected on fatty acid composition of common carp.

**Keywords:** Common carp, Probiotic, *Bacillus subtilis*, Fatty acid profile

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## **Economic Evaluation of Carp Production in Golestan Province**

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### **Abstract**

This study was done to evaluate profitability of common carp culture in Golestan province. For data collection, a comprehensive questionnaire was provided including information from farms (fixed and variable costs) and farms' managers. Thirty farms were randomly selected. The collected information was analyzed using SPSS program. The result showed that with the average larvae stocking density of 1955 per hectares and finally harvested carp of 2533 kg/ha, the average cost of fertilizer, food, energy, manpower, larvae and bank interest was calculated 4352/4, 2538/9, 2357/56, 1994/85, 1623/157 and 1269/45 respectively. The average profit, benefit-cost and rate of return of investment were 29000 Rials per kg, 6/2 and 50% respectively.

**Keywords:** Cultured carp, Golestan province, Economic evaluation

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## **Development of sustainable aquaculture by using biofloc technology**

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### **Abstract**

With increasing world population, food production industries such as aquaculture needs to be expanded very well. An innovative technology called biofloc technology (BFT) can follow the objectives of sustainable aquaculture using zero-water exchange system. BFT is the eco-friendly aquaculture system that considered as an efficient alternative system since nutrients could be continuously recycled and reused as food for aquatic. This technology is basically dependent on adjustment of carbon/ nitrogen (C/N) ratio for development of microbial community and bioflocs which leads to microbes harvest excreted inorganic nitrogen and produce microbial proteins. These bioflocs improve water quality. Limited water exchange, minimizing the effluent, maintaining of water quality, food supply, reducing protein in food, growth improvement, biosecurity and production of organic products are the important of this technology that has greatly considered during these the recent two decades. In this review, introduction of biofloc technology will be discussed, that can be suggested as a strategy for enhancement and development of sustainable aquaculture in the country and also as an appropriate way for beneficial use of water resources.

**Keywords:** Sustainable aquaculture, Biofloc technology

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## **Study on some water physicochemical parameters of entrance and effluent of Gomishan shrimp farms, Golestan Province**

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### **Abstract**

The outgoing effluent control of large complexes aquaculture including shrimp culture to reduce the pollution load is considered very important. This research was conducted on shrimp farms in the northern of Gomishan city in Golestan province. For this project, the two stations, at water input and output lagoon, in the last 3 months during the breeding period (end of August, September and October in year 1394) were taken by measuring some the physicochemical parameters including temperature, pH, EC, BOD, TSS, NO<sub>3</sub>, PO<sub>4</sub> and NH<sub>4</sub> samples. According to the results of this study, it was observed that the values of pH, temperature, total suspended solids, BOD, nitrate, ammonium and phosphate ions at three points, entry site, indicating a lack of impact of shrimp farming on these factors. The results showed that shrimp farms significantly increased the electrical conductivity and total dissolved solids in the water output as compared with the site input. In general, due to the aforementioned factors, Gomishan shrimp farming with this volume of production, is not a serious threat for Gomishan wetland and the Caspian Sea ecosystem.

**Keywords:** Effluent Sewage, Golestan Province, Gomishan Shrimp Farms, Pollutant Depletion

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## Study of histological and histochemical structure of mantel edges in *Chlamys ruschenbergerii*

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### Abstract

Calcium is involved in the formation of the shell in bivalves. The shell is produced by the mantle. Despite the undeniable importance of mantle and calcium in the formation of the shell, no studies have clarified the structure of the mantle edge and detection of its calcium in Iran. The present study aimed to provide structural description of the mantle edge and to identify the presence of calcium in the important species of the Persian Gulf, *Chlamysrus chenbergerii*. The anterior and posterior segments and the center segment of the mantle edge of each valve were cut, and the tissue sections were stained with Harris Hematoxylin and Eosin. Alizarin red S and Von Kossa methods were used to detect calcium content in the mantle. The result showed that the mantle edge of *Chlamysrus chenbergerii* consists of outer, middle and inner fold. The inner fold was taller than two the other folds. Each of the three folds had a different shape and size. The mantle edges had mucus cells, brown granules, hemocytes, and muscle fibers. However, the distribution of these items differed in each fold. The differences were observed in the structure, height and the kind of epithelium in various area of the mantle edge. With the two mentioned method, calcium was not colored and detected in the mantle of *Chlamysrus chenbergerii*.

**Keywords:** Histology, Mantle edge, Bivalve, Persian Gulf

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## **Effect of diets containing Astaxanthin on continuous quality fish rainbow trout in refrigerator (*Oncorhynchus mykiss*)**

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### **Abstract**

The effect of diet containing astaxanthin on continuous quality of rainbow trout for 8 weeks with synthetic astaxanthin at concentrations of 40, 60, 100 mg/kg were used for 60 days. Comparing the qualitative parameters of the samples, using chemical indicators, as well as color indices ( $L * a * b$ ) in five separate times every 4 days (0, 4, 8, 12, 16) in typical refrigerator temperature were taken. The results showed that the highest levels of astaxanthin (100 mg) in the diet of rainbow trout caused reducing the amount of PH, PV TBA and FFA. Further, the effect of time and antioxidant was significant statically ( $p < 0/05$ ). Additionally, based on the color analysis, it can be proposed that the highest level of astaxanthin showed the best results.

**Keywords:** Astaxanthin, Shelf life, Quality, Rainbow trout

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