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Study of brown algae *Sargassum (Sargassum ilicifolium)* biomass in bio-absorption of various concentrations of phosphate

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Abstract

One of the most important inorganic pollutants is phosphate ion, found in different amounts in urban, industrial and agricultural water, and it is possible to enter the surface and underground water resources. Today, various adsorbents are used to remove or decrease excess elements from aquatic environments. In this study, marine algae, *Sargassum ilicifolium* was studied as a bioabsorbent for removal of phosphorus ion. In this experiment, various range of pH including (pH 2, 3, 4, 5, 6, 7 and 8), the amount of *S. ilicifolium* biomass (0.01, 0.3, 0.05, 0.1, 0.15, 0.2, 0.3 and 0.4 g) and the initial concentration of phosphate ion (50, 100, 150, 200, 250, 300 and 350 mg L⁻¹) at contact time (0-60 minutes) on removal of phosphate ions from aqueous solution was investigated. Phosphate concentration was measured by spectrophotometric method at 890 nm wavelength. The results of this experiment showed that marine macro algae, *S. ilicifolium* had the best phosphate absorption capacity of 653.33 mg g⁻¹ in the most suitable conditions and the phosphate removal efficiency was 71.79%. The most suitable conditions for phosphate absorption were obtained at 0.01 g L⁻¹ algal biomass, pH: 2 and 350 mg L⁻¹ of initial phosphate concentration. The results of this study showed that the dry powder of algae, *S. ilicifolium* is suitable for removal of phosphate ions from aqueous solution and is an appropriate bioactive agent for urban and agricultural wastewater treatment.

Keywords: Absorption Bio, Organic Absorbent, Seaweed Phosphate, *Sargassum ilicifolium*

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Study of concentrations of the copper and cobalt in the edible muscle tissue of Pike perch in (*Esox lucius*) International Anzali Wetland

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Abstract

Pike (*Esox lucius*) is a native species in Anzali wetland and because of its flesh it has been interested to people for a long time. This study was done to compare the rate of accumulation and concentration of pollutants, heavy metals such as copper and cobalt in edible muscle tissue of pike at three stations (West, Central and East) of Anzali wetland in 2015. In this study, fishes were randomly caught in the number of 10 from each station in standard weights by gill nets. Heavy metal concentrations were measured using flame atomic absorption spectrophotometer. The results showed that the average concentration of copper metal in the pike in western, central and eastern wetland were 4.45, 5.09 and 1.2 $\mu\text{g/g}$ dry weight, respectively and the average concentration of cobalt metal 0.02 and 0.04 $\mu\text{g/g}$ dry weight were observed for Center and East of Wetland, respectively, this was not distinguishable in the east wetland by set. In this study, concentrations of lead and chromium in edible muscle tissue pike did not show significant difference among stations ($P>0.05$). Currently no source has been found for comparing cobalt metal concentration in fish edible tissues with standards. The average concentration of copper with standard World Health Organization (WHO) was compared and determined that the concentration of copper in muscle tissue was lower than the limit.

Keywords: Anzali Wetland, Edible Tissue, Heavy Metals, Pike

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Study on abundance and biodiversity of zooplankton communities in Warm Fishes pools of Mazandaran province

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Abstract

Knowing the zooplankton of any aquatic ecosystem is very effective in managing this ecosystem and since zooplankton plays an important role in the transfer of the photosynthetic material transmitted by phytoplankton to other organisms at higher levels. The recognition of each aquatic ecosystem is very effective in better management of the ecosystem and since it has a significant role in the transmission of photosynthetic raw materials by phytoplankton to other organisms at higher levels. In this study, Zooplankton of four water pools located in Mazandaran province, with the geographical position of 36° 68' 12" north and 53° 41' 76" in the east were studied. Each of the pools was in the area of 3 hectares and rectangular, each of which was filled from well water and under the same management. Sampling was performed by a sampler with mesh size of 55-micron, in July, August and September, every 15 days and then data was collected at the laboratory for identification and counting data. In the present study, six groups of zooplankton including 1 genus of Copepoda, 9 genera of Rotifera and 5 genera of Protozoa, 1 Cladocera, 1 Mollusca and 2 Cirripedia genuses were identified. The highest percentage of zooplankton groups in hydrothermal pools was related to Protozoa (44%), which belonged to two genera of Ciliata with a mean density of 8544.7 ± 7 (number per cubic meter) and Vorticella with a mean density of 5128.05 ± 05 Number in m^3) and since this group of zooplankton was not suitable for feeding, they were not fed to offspring, resulting in better conditions for growth, and the rotifers had the most masses, of which Brachionus sp dominated that 65% of this genus is devoted to the relatively good conditions for feeding fish in these pools.

Keywords: Biodiversity, Biomass, Density, Warm Fishes, Zooplankton

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Effects of Habitat Destruction on seasonal floods and Management in River Basin: A Case Study of Zarrin Gol River

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Abstract

Nature is always at the risk of human activity and natural injury and damages. Flooding is one of those natural disasters that causes damage in nature. This research in the Zarin-Gol River basin has a geographic position of 54° 43' 40" to 55° 11' 36" E and the latitude 36° 43' 30" to 37° 8' 44" using the stations registered in the summer of 2017 in order to achieve the process of change (during field operations) and the cause of the flood. The results of this study showed that the highest destructive flood in the Zarin-Gol basin in Aliabad-Katoul city was reported in August, summer. The maximum width is 80 meters in the upper area of the river and is dominated by bedrock. Also, the percentage of river marginal vegetation cover after the flood has decreased dramatically. Reduction of total annual rainfall and the occurrence of long-term droughts, increase in maximum annual precipitation and its occurrence in unusual season in August, the presence of tributary with a steep slope, conversion of forest and rangeland area to dry land, excessive livestock and blockage of bridges are due to being small of natural and human factors that are effective in flood events in this area. In general, these factors caused the destruction of the natural habitat of natives living in the river and reduced biodiversity or destroyed them.

Keywords: Ecological Rehabilitation, Flood, Habitat Degradation, Zarin-Gol River Basin

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Analyzing the trend of catch rate and reconstruction of carp and roach in the Iranian waters of Caspian Sea

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Abstract

The catch of Carp (*Cyprinus carpio*) and Roach (*Rutilus caspicus*) in the southern waters of the Caspian Sea, especially in Golestan province, have been a special status because the major catch of these two species in the Caspian Sea are related to the eastern coast of the Golestan province. This study was conducted to investigate the effect of the size and numbers of fingerling released into the Gorganroud River, decline of the water level in the Caspian Sea and discharge of the river on cpue (catch per unit effort) of these two species. For this purpose, the data on catch and release of two species of carp and roach yearly during 1999-2017 from fisheries organization, the data of changes in the Caspian Sea level from the Caspian Sea Research Center and information related to discharge of river water from the Golestan Meteorological Office were prepared. The catch rate and the number of released fingerling of two species of carp and roach were fluctuated during this period. During the last four years, the catch share of *C. carpio* and *R. caspicus* in Golestan province was decreased in comparison to the total catch rate of these species in the Iranian waters of the southern coast, while the number of release in these four years was increased. The results of this study showed that different factors (sea level, released weight and released number) simultaneously affected the rate of catch per unite effort (cpue) of two species of carp and roach.

Keywords: Carp, Caspian Sea, Reconstruction and stocks, Roach

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Algal bioactive compounds in the cosmeceutical industry: a review

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Abstract

Water environments have numerous bioactive compounds for the cosmeceutical industries. Macro and microalgae are including of proteins, amino acids, carbohydrates, vitamins, pigments, polyphenols and minerals playing an important role in skin health and are used in various industries such as cosmetics and pharmaceuticals. Many algae-derived secondary metabolites have topical applications, including protecting the skin from UV, preventing dry skin and reducing wrinkles, also, due to the presence of antioxidant compounds, they are used as anti-aging ingredients. Production of a variety of cosmetics using bioactive compounds from algal extract, due to derivation of natural sources, is increasing. In this study, although the effects of some of these compounds are described, but the impact of algae in the cosmeceutical industry in terms of biological compounds and mechanisms involved in their functions are still unclear, For this reason, most biomolecules in a variety of algal species have not yet been studied and are not used for cosmetic purposes.

Keywords: Algae, Topical products, Biotechnology

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Effect of sodium chloride replacement with potassium chloride on some quality indices of fish sauce from Caspian Sea sprat (*Clupeonella cultriventris*)

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Abstract

To aim salt reduction and investigation of the effect of sodium chloride (NaCl) replacement by potassium chloride (KCl) on the final product, fish sauce containing 20% (w/w) NaCl was produced from Caspian Sea sprat (*Clupeonella cultriventris*). Then, the effect of substituting NaCl by KCl at 0%, 25% and 50% on the some quality characteristics of prepared fish sauce was evaluated during 45 days of fermentation at 37 ± 2 °C. Qualitative indices were determined at 15, 30 and 45 days of fermentation period. According to results, the range of quality indices in various replacement levels were as following: pH :5.23 to 6.47, total nitrogen: 7.30 to 8.25 g/L, formaldehyde nitrogen 6.93 to 8.40 g/L, amino nitrogen: 4 to 5.60 g/L, rate of amino nitrogen/total nitrogen: 54.79% to 67.88%, total volatile basic nitrogen (TVB-N): 16.65 to 26.90 mg/100g and degree of hydrolysis: 54.88% to 67.99%. In conclusion, 25% and 50% KCl replacement caused that quality of fish sauce decreased in comparison to control treatment (100% NaCl) in terms of qualitative indices including amino nitrogen amino nitrogen/total nitrogen, TVB-N and degree of hydrolysis. Between two replacements concentrations of KCl, 50% has better quality than 25% in terms of total nitrogen, formaldehyde nitrogen and amino nitrogen. Therefore, in order to the reduction of salt in fish sauce, replacing NaCl with KCl at 50% can be suggested.

Keywords: Fish sauce, Potassium chloride, Quality, Sodium chloride

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Investigation of quantitative trait loci (QTLs) variations for growth-related traits in farmed rainbow trout (*Oncorhynchus mykiss*)

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Abstract

The application of genomic technologies of molecular markers specially identification of single nucleotide polymorphism (SNP) and quantitative trait loci (QTLs) towards the genetic improvement of rainbow trout aquaculture is expected to facilitate selective breeding and development of strains of rainbow trout via breeding programs. Thirty male and female broodstock of rainbow trout (n=30) for generating full sibling collected in cold-water fishes Genetic and Breeding Research Center. Then, juveniles were raised at the ponds until 6 months of post-hatching. Genome extracted based on standard method and these individuals randomly selected for molecular analysis. Fin clips were cut and specimens were kept at -20 °C until use. Four specific primers were used for rainbow trout and all the four QTL loci screened in this study were successfully amplified in all families. Statistical analyses including linkage disequilibrium (LD), association between genotypes and two quantitative traits including body weight (BW) and total length (TL) were performed using MapChart 2.1, GDA 1.1. General Linear Model (GLM) was performed with software SPSS 21.0. The results demonstrated that mean observed heterozygosity (H_o) and expected heterozygosity (H_e) varied between 0.354 to 0.699 for locus OMM5140 and 0.568 to 0.836 for locus OMM1268, respectively. No significant epistatic interactions were identified between QTL markers. Proportion of phenotypic variation explained by each QTL (PV) for body weight at age of 30 and 180 were 18.48 and 31.24, respectively. Hardy-Weinberg departure was observed for most loci from all farms and were disequilibrium ($P < 0.05$). The four QTL loci variation in rainbow trout is important to gain a better understanding of the genetics of production traits and for transferring genetic information and improved selective breeding program to farms in Iran.

Keywords: Marker Assisted Selection, QTL, Rainbow Trout, Selection

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The sulfur cycle and hydrogen sulfide production in aquatic ecosystems with an emphasis on aquaculture

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Abstract

The sulfur cycle, the ecology and physiology of sulfate reducing bacteria, the mode of production and factors affecting the production of hydrogen sulfide and, finally, its environmental effects have been investigated in this study. The sulfur cycle is a complex biogeochemical process in aquatic ecosystems including four stages of mineralization, immobilization, reduction and oxidation. In organic matter-rich aquatic ecosystems, especially aquaculture ponds, half of organic matter decomposed under anaerobic condition by sulfate reducing bacteria, and hydrogen sulfide gas is produced as a byproduct during this process. Increasing the concentration of hydrogen sulfide (more than 0.002 mg/l) in aquaculture ponds can lead to aquatic mortality, reduced growth and reproduction, and an unpleasant odor, as well as an increase in oxygen consumption rates. The very low concentration of hydrogen sulfide is very toxic to aquatic organisms and therefore its production must be prevented. On the other hand, degradation of organic matter increases the amount of nutrients (e.g., nitrogen and phosphorus) in water, thus causing eutrophication of the ecosystems. Therefore, sulfur cycle has both negative and positive effect in aquatic ecosystems.

Keywords: Aquaculture, Aquatic ecosystems, Hydrogen sulfide, Sulfate reducing bacteria, Sulfur cycle

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