

# Thawing of Silver carp (*Hypophthalmichthys molitrix*) Frozen Fillets by Different Brine Concentrations: Evaluation of Physico-chemical Quality Indices

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Received date: 18-May-2018

Accepted date: 6-Sept.-2018

## Abstract

Researchers have disclosed that. In the frozen fish, thawing plays an important role in membrane disintegration and quality change as well as affecting sensory attributes. According to importance of thawing process on the final quality of frozen fish fillet, the present research aimed to evaluate quality changes of Silver carp fillets (some major physico-chemical indices) which have been thawed with different brine concentration (0, 1.5, 3, 4.5 & 6 %). Results demonstrated that brine concentration had significant effect on the water holding capacity; WHC. The minimum and maximum content of WHC has been recorded in the control and treatment with 3% brine-water, respectively. The obtained results also have been shown that the lowest reduction in the drip loss was observed in those fillets received 1.5% brine-water ( $p < 0.05$ ). However, regarding to fillet's hardness, the recorded results revealed that there is no significant difference between experimental treatments. The result of chemical analysis also indicated that the minimum content of TVB-N is for the sample thawed with 4% brine-water (13.86 mg nitrogen per 100-gram fish fillet). Considering TBA index, overall trend showed that there is an ascendant process for this index in different concentration of brine-water. In the other words, although the minimum content of TBA has been recorded for control sample (0.62 MD  $\text{kg}^{-1}$  fish fillet), but there was no significant difference observed between other treatments. Thus, on the base of obtained results, using of brine with the concentration of 3% can be suggested for the Silver carp frozen fillet thawing in the seafood processing industry.

**Keywords:** Brine-water, Fish quality, Shelf life, Thawing.

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## Taxonomic Statue of *Ponticola iranicus* (Teleost, Gobiidae) based on Cytochrome Oxydase sub-unit I

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Received date: 21-Mar.-2018

Accepted date: 18-May-2018

### Abstract

The family Gobiidae possesses 42 species and 15 genera in the Iranian inland waters and the genus *Ponticola* with 6 species has a high diversity. Morphological variation of the members of the genus *Ponticola*, makes their identification difficult. Recently, a new species of this genus i.e. *Po. Iranicus* was described from Sefid River drainage i.e. the Bijar, Gisum and Totakabon rivers, Caspian Sea basin of Iran based on the morphological characters. Therefore, this study conducted to verify the validity of this species based on COI gene and its phylogenetic position. For this purpose, specimens were collected, their DNA were extracted by phenol-chloroform method, and the cytochrome COI gene was amplified during the PCR process and then sequenced after purification. The results showed that *Po. Iranicus* is a valid species based on COI gene, as a sister species the *Po. Syrman* with about 3.0% genetic distance.

**Keywords:** Taxonomy, Morphological variation, Genetic variation, Iran.

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## Growth Patterns of *Alburnoides cf. tabarestaensis* in Mobarakabad River of Minoodasht–Golestan Province

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Received date: 19-Feb.-2018

Accepted date: 11-June-2018

### Abstract

To study the biological characteristics of *Alburnoides cf. tabarestaensis*, 325 fish were sampled from March 2017 to July 2017 using electrofishing device. Sex ratio of male to female was 1:0.93 showing no significant difference between sex ratio ( $X^2 = 0.151$ ). Maximum total length and weight were 11.5 cm and 18.18 g for females, 10.5 cm and 11.48 g for males, respectively. The weight-length relationship of female was  $W = 0.0091 TL^{3.13}$  and that of male was  $W = 0.0091 TL^{3.15}$  and the total population  $W = 0.0091 TL^{3.14}$ . The results showed positive allometric growth pattern for this species is in the Mobarakabad River (t-test,  $t_{male} = 2.70$ ,  $t_{female} = 2.52$ ,  $p_{population} = 3.90$ ). The condition factor showed the lowest value for both sexes in July and highest value for male in March and for female in April. The highest instantaneous growth rate was observed for both males and females at zero to one year old. Growth parameters were estimated as  $L_{\infty} = 122.40$  mm for males,  $L_{\infty} = 127.14$  mm for females and  $L_{\infty} = 133.53$  mm for population. Von bertalanffy growth equation was estimated as  $L_t = 127.14(1 - e^{-0.15(t+1.08)})$  and  $L_t = 122.40(1 - e^{-0.24(t+1.07)})$  for female and male fish, respectively.

**Keywords:** Age and Growth, Mobarakabad River, Minodasht, Golestan Province.

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## Growth Trend and Food Regime of Juvenile Pikeperch (*Sander lucioperca*) in Earthen Ponds

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Received date: 13-Jul.-2018

Accepted date: 10-Sept.-2018

### Abstract

This study was carried out during 45 days trial in Siahkal Dr. Yousefpour Marine Fishes Restocking and Genetic Conservation Center. Food habits of juvenile pikeperch were studied up to 1 g body weight in four 4 ha earthen ponds. Sampling of larvae and juveniles was carried out every 15 days interval, and totally, 320 fish were caught from the ponds. The gastrointestinal tract contents of sampled fish were examined. The gut contents of juvenile pikeperch included rotifer, daphnia, cyclops, and chironomid. In larval stage, rotifer and daphnia were main food items. In the second sampling period (day 30), rotifer and daphnia were the main foods items, while cyclops naupli were consumed as marginal foods. At the end of the experiment, daphnia, cyclops and chironomid were among the main foods and rotifer was an occasional food. The results showed that the biomass of live food in ponds increased at the beginning of the rearing period, but at the end it showed a descending trend. Growth indices such as growth rate (GR), specific growth rate (SGR), and condition factor (CF) were measured at each sampling. The results showed that GR increased with increasing weight and length of fish during the rearing period. However, the reduction of SGR and CF at the end of the period was due to the loss of live food in the ponds. According to the present study, live food at different sizes during the experiment period led to acceptable fish growth. Fish are eager to feed larger size (chironomid and daphnia) of live foods after larval stage with reduce consumption of rotifer. Therefore, live food production through fertilization and ponds enrichment is economical approach and can help to manage the ponds for growing and producing higher-quality juvenile pikeperch in a shorter period.

**Keywords:** Juvenile pikeperch, Food habits, Gut content, Growth, Rehabilitation.

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## Investigating the Effects of Different Levels of Ozonation on Physicochemical Parameters of Produced Wastewater of the Rainbow Trout Fish Culture

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Received date: 27-Sept.-2018

Accepted date: 9-Jan.-2019

### Abstract

The role of ozone in water and wastewater treatment as an oxidant and as a disinfectant agent is very important. On the other hand, increasing the quality level required for wastewater, finding new types of microorganisms in the effluent and revealing more types of contaminating material in it has led designers to consider the process of extinction. The purpose of this study was to investigate the effect of various levels of ozonation of cold-water wastewater on pH and TDS, ORP, BOD, COD, phosphate, and MPN bacteria. To conduct this research, about 120 liters of untreated aquaculture wastewater treatment in cold storage in four treatments with 0 (without ozonation) levels as control treatment and 1, 3 and 5 mg/l ozone treatments as research treatments with triplicate were performed per treatment. Ozonation was carried out by an ozone generator with a yield of 5000 mg/l and for 48 hours and sampling was performed immediately at the end of the research period. Based on the results, with increasing ozone levels BOD, COD, TOC, TDS, EC, and MPN bacteria indices decreased significantly. However, in the case of ORP, with an increase in ozone level, the rate of this index also increased significantly. Also, the increase of ozonation level did not show a significant effect on phosphate index. In general, the results showed that with increasing ozone level, physicochemical indices of aquaculture wastewater improved and resulting before entering the water bodies. Therefore, it is recommended that at the discharge point of the rainbow trout culture centers ozonation by 5 mg / l improves the quality of produced wastewater.

**Keywords:** Aquaculture wastewater, Rainbow trout, Ozonation, Disinfection.

## Antifungal Activity of Saponin Extracted from Persian Gulf Sea Cucumber *Stichopus hermanni*

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Received date: 16-Nov.-2018

Accepted date: 31-Dec.-2018

### Abstract

Sea cucumbers belong to phylum Echinodermata and various bioactive metabolites including saponin with a variety of antimicrobial properties have been extracted from them. The objective of this study is to investigate the antifungal properties of saponin extracted from Persian Gulf sea cucumber *Stichopus hermanni* against fungus *Aspergillus fumigatus* and yeast *Candida albicans*. After that the extraction from sea cucumber with ethanol was completed, saponin was separated from concentrated extract through column chromatography by applying different solvents. Identification of saponin was done by thin layer chromatography (TLC) and high performance thin layer chromatography (HPTLC). For investigating the antifungal properties of saponin against the mentioned fungus and yeast, broth microdilution method for determining the minimum inhibition concentration (MIC) and minimum fungicidal concentration (MFC) was used. Two groups of saponins including steroidal saponin and glycosidal-steroidal saponin were identified in fractions extracted by TLC. Steroidal saponin had MIC of 200 micg/ml in fungus and MIC of 400 micg/ml in yeast. This saponin yielded MFC of 400 micg/ml in fungus. For glycosidal-steroidal saponin, MIC was in 30 micg/ml fungus and 100 micg/ml in yeast while MFC was 100 micg/ml fungus and 400 micg/ml in yeast. In conclusion, sea cucumber *S. hermanni* has extractable bioactive metabolites with antifungal properties. Comprehensive research for investigating the possibility of using it as a rich source for the synthesis of pharmacological compounds is suggested.

**Keywords:** Minimum inhibition concentration, Persian Gulf sea cucumber, Bioactive metabolite.

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## **Analysis of Phylogenetic Status of *Luciobarbus esocinus*, *Luciobarbus xanthopterus*, *Tor grypus*, and *Mesopotamichthys sharpeyi***

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Received date: 25-Sept.-2017

Accepted date: 28-Oct.-2018

### **Abstract**

Among the Iranian freshwater fishes, *Luciobarbus esocinus*, *L. xanthopterus*, *Mesopotamichthys sharpeyi*, and *Tor grypus* have a good growth rate in nature bringing its proposals on their controlled breeding and cultivation. This study aimed to analyze the mitochondrial phylogeny of *L. esocinus*, *L. xanthopterus*, *M. sharpeyi*, and *T. grypus*. In this study, the sequences of Cytochrom Oxidase subunit one (COI) was used. The specimens analyzed here were collected from Shadegan Wetland (Khuzistan Province, Iran) and rivers of the Tigris basin in Ghasr-e-Shirin, Iran. Based on the results, it is shown that *T. grypus* and *M. sharpeyi* are phylogenetically closely related and closely affined to the genus *Tor*. In addition, it is shown that *L. esocinus* and *L. xanthopterus* are closely related (0.6% K2P distance), which may indicate a recent divergence of them or possible hybrid origin for one of them. Finally it can be inferred that *M. sharpeyi* and *T. grypus* are affined to the Oriental (East Asian) and Indian species, but have diverged in the Mesopotamia and *L. esocinus* and *L. xanthopterus* are not affined to the Asian species but have Palearctic origin .

**Keywords:** Carps, Phylogenetics, Mitochondrion, COI, Divergence.

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## Physicochemical Properties of Recovered Chitosan from Indian White Shrimp (*Fenneropenaeus indicus*) Shells by an Optimized Method Process

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Received date: 16-June-2018

Accepted date: 19-July-2018

### Abstract

In order to optimize the chitosan extraction efficiency from Indian shrimp (*Fenneropenaeus indicus*) shells by Respond Surface Method (RSM), the microwave power (900, 600, 300 W), time (11, 9, 7 min), and the ratio of sodium hydroxide to the substrate (25: 1, 20: 1, 15: 1), as independent variables, were tested. The water binding capacity for optimal and central chitosan was 600.35 and 600.32, respectively, and significantly higher than commercial chitosan (516.63%). Also, the fat bonding value for the optimum chitosan sample (500.34) and central chitosan (500.33) was significantly higher than commercial chitosan (462.45%). In terms of color, the whiteness (W) for commercial chitosan was 77.99 which was significantly higher than optimal and central production chitosan (69.96 and 70.99 respectively). Based on FT-IR data, absorption bands of NH and CH groups and also bands around 1680-1610, 1560-1515 and 1385-1384 were observed for amides I, II and III in recovered chitosan while the O-C tensile structure occurred in absorption 1085-1010 And the OH group was observed in the absorption of 700-670. The crystallinity in optimal chitosan (2.08) was significantly less than commercial sample (64.21) and central (75.60). The zeta potential of chitosan particles was 8.56, 4.48, and 11.60 mV for the optimal, central and commercial sample, respectively. The SEM images for both commercial and experimental chitosan (optimal and central) represents an inhomogeneous structure, with almost spherical and non-porous, as well as interconnected (microfiber) and powdered structures observed. The particle size for optimal, central and commercial chitosan was 1839, 3524, and 1441 nm, respectively ( $P < 0.05$ ). Finally, despite from the particle size, the recovered chitosan from Indian white shrimp showed high degree of deacetylation along with high qualitative and structural characteristics.

**Keywords:** Chitosan, Color, Crystallinity, Particle morphology, Zeta potential.

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## Quality and Shelf life assessment of Pacific White Shrimp (*Litopenaeus Vannamei*) Freshly, Harvested and During under Slurry Ice Conditions

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Received date: 16-Jul.-2018

Accepted date: 16-Nov.-2018

### Abstract

Pacific white shrimp (*Litopenaeus vannamei*) is an important worldwide cultured species. The evaluation of quality and shelf-life of the shrimp is imperative before utilizing preservative within the harvesting. The effect of slurry ice on the quality of Pacific white shrimp during chilling storage was investigated and compared with flake ice and refrigerator. In this manuscript, the effect of different cold storages conditions including refrigerator (stored at 4°C) (treat A), flake ice (treat B) and Slurry ice (treat C) up to 12 days was investigated. To analyze chemical characteristics, and freshness indicators of Pacific white shrimp, changes in total volatile base nitrogen, thiobarbituric acid, titratable acidity (TA) and microbial count of white shrimp during 12 days (every two days) storage was investigated. Increases of the total volatile base nitrogen and thiobarbituric acid reactive substance, values in shrimp treated with slurry ice were found to be significantly slower during slurry ice storage than during flake ice storage ( $P < 0.05$ ). The shelf life of ice stored Pacific white shrimps was determined to be 8 days. Contrarily, the aerobic plate count (APC) and psychrophilic bacterial counts (PTC) compared to two treatments exhibited significant increases during iced storage ( $P < 0.05$ ). Nevertheless, the results demonstrated that storage in slurry ice immediately after harvesting caused quality stability during the cold storage.

**Keywords:** Pacific white shrimp, Slurry ice, Quality, Shelf life, Iced storage.

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## Effects of Commercial Dietary Prebiotic (Agrimos®) and Probiotic (Batozell®) Supplements on Intestinal Lactic Acid Bacteria, Salinity and Thermal Stress Resistance in Zebrafish (*Danio rerio*)

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Received date: 25-Aug.-2018 Accepted date: 9-Oct.-2018

### Abstract

Present study investigates the effects of two commercial dietary prebiotic and probiotic supplements on thermal and salinity stress resistance and intestinal Lactic Acid Bacteria (LAB) population in zebrafish. A total of 630 healthy 15 days old zebrafish were distributed in 21 aquariums and assigned to 7 groups fed control (T<sub>0</sub>) or diet supplemented by 2, 4 and 8 g kg<sup>-1</sup> Agrimos® (T<sub>1</sub>, T<sub>2</sub>& T<sub>3</sub>) and 0.1, 0.2 and 0.4 g kg<sup>-1</sup> Batozell® (T<sub>4</sub>, T<sub>5</sub>& T<sub>6</sub>) for 90 days. At the end of the experiment, the results of prebiotic treatment showed significant ( $P < 0.05$ ) increase in salinity stress resistance treated fish to the control group during the experimental period. In thermal stress resistance, all groups showed positive results compared to control one. Lactic acid bacteria (LAB) count in Prebiotic and probiotic treatments was significantly higher than control group (T<sub>0</sub>), but in total bacterial count, probiotic treated fish showed significant difference with other groups. The result demonstrated that these commercial dietary supplements have beneficial effect on the assayed parameters and can improve stress resistance and modulated intestinal microbiota of zebrafish.

**Keywords:** Thermal and Salinity stress, intestinal microbiota, Agrimos®, Batozell®.