

# INDIAN FISHERIES ABSTRACTS

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## ENTRIES

1. Abraham, T. Jawahar; Sasmal, Debasis (West Bengal University of Animal and Fishery Sciences, 5, Budherhat Road, Chakgaria, P.O. Panchasayar, Kolkata – 700 094, West Bengal (India). Department of Fishery Pathology and Microbiology). **Incidence of different disease conditions in shrimp culture systems of West Bengal with special reference to white spot syndrome virus infection.** Journal of the Inland Fisheries Society of India. (2008) v. 40(2) p. 1-6.

Incidence of different disease conditions in shrimp culture systems of West Bengal with special reference to white spot syndrome virus infection was studied for a period of five years between 2000 and 2004. The types of shrimp culture practiced in West Bengal include traditional (*bheries*), improved traditional, stagnant pond culture with or without management, modified extensive and semi-intensive. Twenty-four different disease conditions were noticed in *Penaeus monodon*. Among the infectious diseases, white spot syndrome viral (WSSV) disease was the predominant followed by red discolouration (disease), shell disease and vibriosis. Among the non-infectious diseases, epicomensal infestation was quite common followed by uneven growth, gill choke and soft shelling. The WSSV infection was the most devastating disease condition resulting in severe economic loss in modified extensive and semi-intensive shrimp culture systems. Four different types of WSSV infection were recorded. Prominent white spots and red discolouration were the dominant clinical signs followed by red discolouration alone, prominent white spots alone and healthy WSSV positive. The shrimp ponds with < 60 days of culture were the most severely affected. The details of the culture practices, principal features associated with WSSV disease outbreaks and the management practices followed are discussed.

2. Abraham, T. Jawahar; Shanmugam, S. A. (Fisheries College and Research Institute, Tamil Nadu Veterinary and Animal Sciences, University, Tuticorin – 628 008 (India)). Dhevendaran, K. (University of Kerala, Thiruvananthapuram – 695 007 (India). Department of Aquatic Biology and Fisheries). Palaniappan, R. (Sri Paramakalyani College, Alwarkurichi – 627 417 (India). P G Department of Microbiology). **Luminous bacterial flora of penaeid shrimps and their environs in semi-intensive culture systems.** Indian Journal of Fisheries. (2008) v. 55(4) p. 311-316.

The association and species composition of luminous bacteria in semi-intensive grown penaeid shrimp of both seawater and brackishwater fed shrimp culture systems were studied. Luminous bacterial counts of pond water, pond sediment and shrimp increased with days of culture in both systems. Although the proportion of luminous bacteria in the total viable population increased in all the samples, the quantum and rate of increase were comparatively low in brackishwater shrimp pond samples. A salinity dependant distribution of luminous bacteria was observed in brackishwater ponds. Quantitatively, five species of luminous bacteria, viz., *Photobacterium leiognathi*, *Vibrio fischeri*, *V. harveyi*, *V. orientalis* and *V. splendidus* biotype 1 were encountered in sea water fed ponds. *Vibrio harveyi* was the dominant species, comprising about 80.00-92.30% of the total luminous population. *Photobacterium leiognathi* and *V. fischeri* were absent in sediment samples. In brackishwater ponds, *P. leiognathi*, *V. harveyi* and *V. splendidus*

biotype 1 were isolated, only in water samples, with the dominance of *V. harveyi*. Sediment samples had *V. harveyi* alone; while in shrimp, *P. leiognathi* was absent. The result in general revealed that the luminous bacteria are part of the autochthonous flora of the eutrophic shrimp farm environment as in marine environment, which increased with period of culture.

3. Agrahari, Raj Kumar.; Saxsena, Arti, (Government model Science College Rewa M.P. (India)). Varshney, P. K. (National Bureau of Fish Genetic Resources, Aquaculture Research & Training Unit, Chinhat, Lucknow – 227 105 U. P. (India)). **Zoo-benthic diversity of picnic spot area-aquaduct of river Gomti at Lucknow (Uttar Pradesh), India.** Aquacult (India). (2008) v. 9(2) p. 141-149.

To study the benthic diversity of river Gomti in Lucknow, the Picnic spot area – Aquaduct was located. The water quality in this region was poor with low dissolved oxygen (>3) and higher levels of CO<sub>2</sub> (26.00 mg l<sup>-1</sup>), NO<sub>3</sub> (70.20 mg l<sup>-1</sup>), PO<sub>4</sub> (2.80 mg l<sup>-1</sup>) and COD (160.20 mg l<sup>-1</sup>). The vicinity was filthy with foul smell, garbage and polythene bags floating on the surface of water. Zoo-benthic population was represented by oligochaeta, diptera, gastropoda, porifera, nematode and plecoptera and fishes. The dominant genera of oligochaeta were *Lumbriculus*, *Tubifex*, *Nais* and *Chaetogaster*. Apart from Chironomus diptera consisted of Culicodies and Tipula larvae. Pomacea was the dominant genera among the gastropods. Mean population density and biomass were 4,623 m<sup>-2</sup> and 13.7135 mg. M<sup>-2</sup> respectively. Oligochaeta pre-dominated the fauna (67.55%) followed by Chironomus (30.89%). Seasonally maxima for population density and biomass were observed during pre-monsoon. Shannon Weiner diversity index (H) was less than “one”. The worms *Tubifex* and *Chironomus* and insects, Culicodies, and Tipula are the indicator of pollution. The deteriorated environmental conditions coupled with poor benthic diversity and presence of indicator organisms refelects that the river is severely under the impact of discharge at Picnic spot-Aquaduct is polluted.

4. Akhtar, Md. Shahbaz; Saravanan, S.; Alexander, Ciji (Central Institute of Fisheries Education, Versova, Mumbai – 61 (India). Division of Fish Nutrition and Biochemistry). Suma, D. (Central Institute of Fisheries Education, Versova, Mumbai – 61 (India). Division of Post Harvest Technology). **Single cell proteins in aquafeed.** Fishing Chimes (India). (2008) v. 28(6) p. 21-23.

The authors described an account of the single cell proteins such as yeast, bacteria and various single cell algal species such as *spirulina* and *chlorella*, plead for replacement of the expensive fish meal in fish feeds with these single cell species. They pointed out that numerous industrial processes that are now being developed for the production of single cell proteins.

5. Bhargavan, Santhamma Jaishinimol; Radhakrishnan, Tresa; Radhakrishnan, S. (University of Kerala, Kariavattom, Trivandrum – 695 581, Kerala (India). Department of Aquatic Biology and Fisheries). **A preliminary account on the fishery resources of Thottappally Spillway Canal, Alappuzha, Kerala.** Indian Journal of Fisheries. (2008) v. 55(4) p. 345-347.

An account on the fin and shellfish species inhabiting the Thottappally Spillway (T.S.) Canal, Alappuzha District, Kerala is presented. Thirty seven species belonging to 26 families have been identified from this brackishwater canal. Of this four species were

typically marine, 21 species were transient forms, 11 were typically riverine forms and one strictly estuarine. Cichlids were the most abundant group. The presence of *Tetraodon travancorius*, *Anabas testudineus*, *Horabagrus brachysoma*, *Parambassis thomassi* and *Hyporhamphus limbatus* listed as threatened/rare species by IUCN, is a remarkable feature.

6. Bhattacharjee, Soma; Verma, Prakriti; Kumar, Arun; Sinha, Dharmendra Kumar; Nath, A.; (Cell Biology and Toxicology Laboratory, Patna University, Patna – 800 005 (India). Department of Zoology). **Role of *Withania Somnifera* against carbofuran induced hepatotoxicity of fish, *Clarias batrachus*.** Journal of the Inland Fisheries Society of India. (2008) v. 40(2) p. 50-55.

The role of *Withania somnifera* (Ashwagandha) root extract as an antidote has been tested on *Clarias batrachus* pretreated with carbamate pesticide carbofuran. The observation shows that the level of Serum Glutamic Pyruvate Transaminase (SGPT), bilirubin, glucose and percentage of haemoglobin tends towards normal and histopathological study reveal that the hepatic cells showed the distinct regenerative changes when fish fed with *W. somnifera* root extract mixed pelleted feed for six weeks. This fishes also showed increased rate of food consumption indicating better physiological status of liver.

7. Bhavan, P. Saravana; Yuvaraj, C.; Leena, M.; Sangeetha, M. (Bharathiar University, Coimbatore – 641 046, Tamilnadu (India). Department of Zoology). **Concentrations of total protein, lipid and carbohydrate in juveniles and sub adults of the prawn *Macrobrachium malcolmsonii* collected from the Cauvery river.** Indian Journal of Fisheries. (2008) v. 55(4) p. 323-325.

Juveniles and sub adults of *Macrobrachium malcolmsonii* were collected from lower Anicut of the Cauvery River, Tamilnadu, India. Sample tissues such as hepatopancreas, gills and muscle were taken for analyzing total protein, lipid and carbohydrate contents. The content of these biochemical constituents showed an increasing trend of juveniles to different sub adult sizes. Among the three tissues tested, the concentration of total protein was found to be higher in the muscle, followed by hepatopancreas and gills. The concentration of total lipid was found to be higher in the hepatopancreas, followed by gills and muscle. The concentration of total carbohydrate was found to be higher in the muscle, followed by gills and least in the hepatopancreas. The overall percentage difference in concentration of total protein between juveniles and sub adults was found to be higher in the hepatopancreas, less in the muscle and least in the gills. In cases of total carbohydrate and total lipid, the overall percentage difference were found to be higher in the muscle, followed by gills and least in the hepatopancreas. The results clearly indicated that the content of these biochemical constituents proportionately increased with growth of the prawns. As far as muscle is concerned, in terms of nutrients, the proportion of total protein was found to be higher followed by total carbohydrate and total lipid.

8. De, H. K.; Saha, G. S.; Panda, Nirupama (Central Institute of Freshwater Aquaculture, Bhubaneswar, Orissa – 751002 (India)). **Role of FFDA in promoting freshwater fish farming: An evaluation.** Fishing Chimes (India). (2008) v. 28 (4) p. 35-38.

In this contribution, the authors have reviewed the remarkable achievements of FFDA in Orissa, in respect of increased fish production from tanks and ponds. The production per ha, which was 1.2 t/ha before FFDA came into being, rose to 1.94 t/ha. In Khurda and

Puri districts, for instance, fish production went up to 2.29 and 2.18 t/ha annum respectively. One pond in Puri district registered a production of 4.49 t/ha annum.

**8. De, Souresh Prasad;** (46, S. N. Banerjee Road, Barrackpore, Kolkata – 700 120 (India). **Organic fish farming: An approach.** Fishing Chimes (India). (2008) v. 28 (5) p. 21-26.

In this paper the author mentioned that organic fish farming has been acquiring increasing focus as years go by Europe and U.S.A. are in the lead in this practice. He pointed out that organic farming has traditional roots in India, providing the background of the global status of organic farming, which told about the scope for organic fish farming in India with particular focus on West Bengal. He explained the organic sources available and their utility in the upgradation of fish farming of various categories.

**10. Doss, P. Jacob** (S.V. University, Tirupati, Chittoor Dt. A. P. (India). Department of Zoology). Sreelatha, P.; Sulthana, R. Nigar (S.P. W. Degree College, Tirupati, Chittoor Dt. A. P. (India). Department of Zoology). Bai, V. Kezia Lakshmi (D.K.W. Degree College, Nellore, A.P. (India). Department of Zoology). **Effect of cypermethrin on selective biochemical parameters in a fish *Heteropneustes fossilis*.** Aquacult (India). (2008) v. 9(2) p. 205-210.

The activity levels of protein, free amino acids, ammonia and urea in gill, muscle, brain, liver of *Heteropneustes Fossils* which had been exposed to sublethal concentrations of cypermethrin for 7 days and 15 days study the results indicated a steady decrease in protein activity with a concomitant increase in free amino acids, ammonia and urea. The decreased protein activity indicated the accumulation of cypermethrin results in the gradual increase in toxicity and increased free amino acids, ammonia and urea activities to overcome the toxic stress due to cypermethrin.

**11. Felix, N.;** Jeyaseelan, M. J. Prince; Kirubakaran, C. John Wesley (Fisheries College and Research Institute, TamilNadu Veterinary and Animal Sciences University, Thoothukudi, Tamil Nadu – 628008 (India). Department of Aquaculture). **Growth improvement and enhanced disease resistance against *Vibrio alginolyticus* using  $\beta$ -glucan as a dietary supplement for *Penaeus monodon* (Fabricius).** Indian Journal of Fisheries. (2008)v. 55(3) p. 247-250.

An investigation was carried out to determine the effect of oral administration of  $\beta$ -glucan on the growth and disease resistance of *Penaeus monodon* (mean initial weight  $0.036 \pm 0.002$  g) against *Vibrio alginolyticus*. Three types of diets were prepared with the supplementation of  $\beta$ -glucan at 0.1%, 0.7% and 1.3% concentrations along with an unsupplemented control. After 75 days of feeding, weight gain, specific growth rate and survival were found to be higher in shrimps fed with  $\beta$ -glucan supplemented diets when compared to those fed with the control feed. When shrimps were challenged with *Vibrio alginolyticus*, the survival of shrimp fed with  $\beta$ -glucan supplemented diets was found to be significantly higher ( $p < 0.05$ ) when compared to those fed with control diet. Among the  $\beta$ -glucan supplemented diets, the shrimp fed with diet supplemented with 0.7% and 1.3% showed almost similar weight gain and resistance against *Vibrio alginolyticus* infection. The results suggest that  $\beta$ -glucan at round 0.7% concentration is ideal for feed supplementation to improve weight gain and disease resistance of *P. monodon*.

12. Gangwar, Gunjan; Rao, A. P. (Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad (India). Department of Fisheries). Tiwari, S. C. (University of Allahabad, Allahabad, U.P. (India). Department of Zoology). **Changes in body traits of an Indian major carp, *Labeo rohita* (Ham.) in influence of age.** Aquacult (India). (2008) v. 9(2) p. 173 – 176.

Rohu is one of the important species among Indian major carps used for aquaculture in the country. However, very little information is available on the body traits in relation to age. Present investigation carried out on changes in body traits of an Indian major carp – *Labeo rohita* (Rohu) in influence of age. Various body traits such as total length, head length, muscular body length, caudal peduncle length, tail length and fins, scales, viscera, gills and head weight were studied with the help of measuring scales and top pan balance. All the lengths and weight increases with age except gills weight, which was decrease with age.

13. Gautam, R. K.; Singh, Nirbhay; Kumar, Sunil (School of life Sciences, Dr. B. R. Ambedkar University, Khandari Campus, Agra – 282 002 (India). Department of Zoology). **Hematological Studies of *Channa punctatus* (Bloch.) exposed to chromium trioxide.** Aquacult (India). (2008) v. 9(2) p. 217-219.

Heavy metals are the serious pollutants of the aquatic environmental because of their environmental persistence and ability to be accumulated by aquatic organisms. The effect of sub-lethal concentration ( $1/5^{\text{th}}$  of LC50) of chromium trioxide on *Channa punctatus* was studied after 5, 10 and 20 days. The results indicate decrease in TEC, Hb, Hematocrit and increase in TLC in all treated fish.

14. Ghosh, P. K. (Kolkata Centre of CIFE, Kolkata – 700 091 (India)). **Role of commercial banks in aquaculture development.** Fishing Chimes (India). (2008) v. 28(5) p. 43-45.

In this contribution, the author highlighted the present status of the role of commercial banks in aquaculture development in India. Outlining the various aquaculture activities for which banks consider extending loan facility and aspects connected there of, he also explained the latest financing facility in the form of 'short term credit', extended by NABARD to the fisheries sector through co-operative banks, rural banks, and others for helping SHGs and others: An informative account.

15. James, P. S. B. R. (832/27, 3<sup>rd</sup> B. Main, 2<sup>nd</sup> Cross, Prem Nivas Road, Kammanapalli, P.D. St. Thomas Town, Bangalore – 560 084, Karnataka (India)). **On conservation of sea cucumber, *Holothuria scabra* in India.** Fishing Chimes (India). (2008) v. 28(5) p. 29-36.

The author mentioned sea cucumber, an over exploited and consequently an endangered one, is in the list of species banned from fishing. He also added that there is a strong view that, alongside the banning, there have to be measures introduced to promote controlled breeding of this species, raising of the spawn to early juvenile stage and framing them. He also mentioned that the juveniles of sea cucumbers/ adults so raised can be used for ranching, besides diversion for commercial use as admissible and the provisions under the act may have to be amended as needed in this light. He indicated that the resources and vulnerability of sea cucumbers, CMFRI's contribution in this regard,

and the conservation strategy to be followed to protect these animals and for their framing and sea ranching, besides policy issues.

16. James, P. S. B. R. (832/27, 3<sup>rd</sup> B Main, 2<sup>nd</sup> Cross, Prem Nivas Road, Kammanahalli, P.O., St. Thomas Town, Bangalore – 560 084 (India). **Osteo-taxonomic distinction of fishes of the family Leiognathidae.** Indian Journal of Fisheries. (2008) v. 55(4) p. 305-310.

The subtle external taxonomic differences between closely resembling species of Leiognathidae have been osteologically substantiated by highlighting the differences in the skull bones. Amongst them, the vomer, epiotic, basisphenoid and palatine were found to be characteristic of most of the species.

17. Jha, Keshav K. (Jawaharlal Nehru College, Pasighat – 791 103, Arunachal Pradesh, (India). Department of Zoology). Roy, Prabhat K.; Ghosh, Tapan K. (T.M. Bhagalpur University, Bhagal – 812 007, Bihar (India). Department of Zoology). **Oxygen uptake in the early development stages of two Indian major carps, *Catla catla* (Ham.) and *Labeo rohita* (Ham.) in relation to body weight.** Journal of the Inland Fisheries Society of India. (2008) v. 40 (2) p. 7-12.

Oxygen uptaken in the early developmental stages of two Indian major carps *C. catla* and *L. rohita* in relation to their body weight have been measured using a cylindrical glass respirometer with continuous water flow system. In *C. catla* the oxygen uptake increased from 60.736 to 528.324  $\mu\text{O}_2\text{h}^{-1}$  with an increase in body weight from 15.0 to 1000.0 mg. Similarly, in *L. rohita* the oxygen uptake increased from 20.353 to 314.225  $\mu\text{O}_2\text{h}^{-1}$  with increase in body weight from 5.0 to 903.0 mg. In both the species the log/log plot of oxygen uptake ( $\mu\text{O}_2\text{h}^{-1}$ ) in relation to body weight gave straight lines with a slope (b) value of 0.5612 for *C. catla* and 0.5384 for *L. rohita*. The relationship was found to be highly significant. However, the weight specific oxygen uptake decreased by a power of – 0.443 in *C. catla* and –0.463 in *L. rohita* for the same weight group of fishes showing a significant negative correlation.

18. Joseph, Imelda; Raj, R. Paul; Bhatnagar, D. (Central Marine Fisheries Research Institute, Ernakulam North P.O. Cochin – 682 018 (India)). **Effect of solid state fermentation on nutrient composition of selected feed ingredients.** Indian Journal of Fisheries. (2008) v. 55(4) p. 327–332.

Solid-state cultivation of the fungus *Aspergillus niger* and the bacterium *Bacillus coagulans* was carried out to enrich the nutritional value of plant ingredients like soyabean meal, mixed ingredients and wheat bran to use as aquafeed ingredients. Fermentation of soyabean meal (FSBM) using *B. coagulans* for 48 h resulted in significant ( $p < 0.005$ ) increase in the crude protein content (@ 3 to 7%) with concurrent decrease in nitrogen free extract (NFE) (11 to 16%). Among the essential amino acids, valine (7%), isoleucine (2%), leucine (2%), lysine (93%) and tryptophan (42%) showed substantial increases in FSBM after 48 h. Solid state fermentation (SSF) of ingredient mix using *A. niger* NCIM 616 resulted in initial reduction of crude protein content during the first 48 h followed by significant ( $p < 0.05$ ) increase of 4 to 14% during the course of fermentation. The crude fat content showed a 35% increase in 96 h. Nitrogen free extract though increased marginally (4%) at 48 h showed significant reduction (17%) at 96 h. A marginal increase in arginine, valine and methionine levels were also observed in the

fermented ingredient mix (FIM). Solid state fermentation of wheat bran using *A. niger* S<sub>14</sub> (a mangrove isolate) had resulted in substantial increase in crude protein level (57 to 66%) as compared to that of raw wheat bran. The carbohydrate content in wheat bran showed substantial reduction (75 to 39%) during the course of fermentation. Essential amino acids like, histidine, threonine, valine, isoleucine and lysine showed increase during SSF. The results of the present study show that *B. coagulans* and the selected strains of *A. niger* can be used for nutritional enrichment of plant ingredients for further use in aquafeed formulations.

**19.** Joshi, H. K.; Bahuguna, P.; Bahuguna, P. K.; Dobriyal, A. K. (H. N. B. Garhwal University Campus Pauri, Garhwal, Uttarakhand – 246 001 (India). Department of Zoology). Bahuguna, S. N. (H N B Garhwal University campus Srinagar, Garhwal, Uttarakhand – 246 174 (India). Department of Zoology). **Cyto-morphological changes in the ovarian cycle of golden mahseer *Tor putitora* (Ham.) from Doon valley.** Aquacult (India). (2008) v. 9(2) p. 197-203.

Paper deals with the cyto-morphological changes of the ovary through this it is possible to describe the reproductive cycle of the fish. As the mahseer is known to perform migration with the onset of the monsoon (June-Sept) when brooders alone migrate into the smaller streams for spawning, the ovarian cycle of *Tor putitora* can be divisible into 3 successive phases, i.e. premigratory, migratory and post migratory phase.

**20.** Kailasam, M; Thirunavukkarasu A. R.; Abraham, Mathew; Thiagarajan, G.; Karaiyan, K.; Subburaj, R.; Jagan S. Mohan (Central Institute of Brackishwater Aquaculture, No. 75, Santhome High Road, R. A. Puram, Chennai – 600 028, (India)). **Priliminary report on cage culture of brown spotted grouper *Epinephelus tauvina* (Forsskal).** Indian Journal of Fisheries. (2008) v. 55(4) p. 353 –354.

Growth performance of the brown spotted grouper *Epinephelus tauvina* (Forsskal) was evaluated under cage culture in brackishwater ecosystem. Juveniles of grouper were stocked in a stationary net cage @ 6 nos./m<sup>2</sup> having an initial mean total length of 143 mm and mean body weight of 43.6. After seven months culture period, fish attained mean total length and mean body weight of 365 mm and 618g respectively. The fish gained total length increment of 222 mm and body weight of 575.4g with daily average length and average weight increments of 1.06 mm and 2.73 g respectively. The growth rate recorded in this study showed promising results for large scale farming of this species in cages.

**21.** Kale, R. S.; Shejule, K. B.; Kharat, P. S.; Sonawane, A. K. (Dr. Babasaheb Ambedkar, Marathwada University, Aurangabad – 431 004 M. S. (India). Department of Zoology). **Study of induced ovarian maturation by hormone and eyestalk ablation in freshwater crab, *Barytelphusa cunicularis*.** Aquacult (India). (2008) v. 9(2) p. 211-215.

The present investigation was under taken to determine the effect of 17 $\alpha$ -hydroxy progesterone hormone on ovarian rematuration of freshwater edible female crab, *B. cunicularis*. Histological studies showed that, administration of 17 $\alpha$ -hydroxy progesterone hormone showed more enhancements in ovarian rematuration. Although, eyestalk ablation showed significant increase in ovarian rematuration over experimental control and hormone treated crabs ovary.

22. Kasherwani, Deepak; Tiwari, Kunwar Ji; Sharma, U. D. (Prawn research Centre, University of Lucknow – 226 007 U.P. (India). Department of Zoology). Shukla, Sanjive (BSNVPG College, Lucknow – 226 001 U.P. (India). Department of Zoology). **Annual fluctuations in GSI and HIS of fresh water catfish, *Heteropneustes fossilis* (Bloch)**. Aquacult (India). (2008) v. 9(2) p. 221-226.

Present study investigates the fluctuations in GSI and HSI value of fresh water catfish, *Heteropneustes fossilis* during annual cycle. Marked fluctuations in GSI and HSI were recorded in different months of year in both the sexes i.e. male and female. GSI values ranged between 0.062 – 0.356 in males and 0.985-3.759 in females. Peak GSI values were noticed in September for both the sexes (0.356 for males and 3,759 for females), while the lowest values were found in December for males (0.062) and in January for female (0.985). HSI values for males and females were 0.79-2.22 and 0.76-2.15, respectively. Highest HSI values were found in April (2.22 for males and 2.15 for females), while lowest values were found in September (0.79 for males and 0.76 for females). A clear-cut inverse relationship between GSI and HIS values was observed during annual reproductive cycle.

23. Katadi, V. S. R.; Mulye, V. B.; Chogale, N. D.; Sapkale, P. H.; Sawant, S. S. (College of Fisheries, Shirgaon, Ratnagiri – 415 5629, Maharashtra (India)). **Preparation of prawn wafers by using the tiny prawn (*Parapenaropsis stylifera*)**. Aquacult (India). (2008) v. 9(2) p. 185-191.

An attempt has been made to prepared prawn wafers by using the tiny prawn (*Parapenaropsis stylifera*) by adopting the method of fish wafer preparation of Sudhakara, 1979. The prepared product was packed in low density polythene (LDPE) of 200 gauge and 12 micron clear polyester/400 gauge polythene (PE/P) pouches, sealed and stored at ambient temperature for estimation of shelf life study of the product. The microbiological, biochemical and organoleptic evaluation were studied during storage, as the product can be stored for a period of 180 days. The nutritional value of prawn wafers has been studied.

24. Kathar, Bablusing; Sharma, O. P. (College of Fisheries, Udaipur (India). Department of Aquaculture). Jain, H. K. (Rajasthan College of Agriculture, Udaipur (India). Department of Statistics and Computer Application). **Efficacy of fermented cereal flours and decomposed kitchen waste in augmenting production of aquatic microbial and zooplankton populations**. Indian Journal of Fisheries. (2008) v. 55(3) p. 261-265.

The present investigation was carried out for a period of 50 days in cement cisterns to evaluate the efficacies of fermented rice (T<sub>1</sub>), maize (T<sub>2</sub>), wheat flour (T<sub>3</sub>) as well as decomposed kitchen waste (T<sub>4</sub>) in the production of microbial and zooplankton population. These were added @ 10 mg l<sup>-1</sup>. The effect of different treatments on the bacterial and zooplankton population was quite significant. The average total bacterial population in 7 weeks duration was found to be highest (1817 No./ml) in T<sub>4</sub>, followed by T<sub>3</sub> (1278 No./ml), T<sub>1</sub> (1234 No./ml), and control (662 No./ml). Highest zooplankton population of 5553 No./l was obtained from T<sub>4</sub> followed by T<sub>2</sub> (4910 No./l), T<sub>3</sub> (4357 No./l), T<sub>1</sub> (3220 No./l) and control (2113 no./l). The results indicated highest efficacy of decomposed kitchen waste under the existing environmental conditions. The coefficient

of correlation between the average total bacterial population and average total zooplankton population was found significant.

**25.** Kumar, Biju A (University of Kerala, Kariavattom, Thiruvananthapuram – 695 581, Kerala (India). Department of Aquatic Biology and Fisheries. **The impacts of trawling and by-catch.** Fishing Chimes (India). (2008) v. 28(4) p. 42-47.

In this contribution, the author presented a vivid picture of the harmful impacts of trawling, with particular reference to bycatches, resources status and the socio-economics of fishers. He explained in detail the steps taken to bring down the quantum of bycatches which have not however proved to be effective. He has pleaded for further research inputs to neutralize the harmful effects of trawling.

**26.** Kumar, D. (Central Inland Fisheries Research Institute (ICAR), Allahabad – 211 022 U. P (India). Riverine Division). Joshi, K. D. (Directorate of Coldwater Fisheries Research, Bhimtal – 263 136, Nainital, Uttarakhand (India)). **Status of fishery and its management in certain wetlands of Uttar Pradesh.** Journal of the Inland fisheries Society of India. (2008) v. 40(2) p. 56-60.

Sixteen wetlands situated in central and western Uttar Pradesh were studied during 2002-05. The water spread area of the wetlands ranged between 21.0 and 900.0 ha. Most of the wetlands (87.5%) were leased out for fish production but were still underutilized, as far as proper fishery development is concerned. Twenty three fish species were recorded in these wetlands. Fishery was mainly dominated by miscellaneous fishes (27.14 - 100.0%), followed by catfishes (5.0-42.11%) and Indian major carps (10.0-38.7%). Exotic species were also reported from 3 wetlands. Fish yield varied from 0.70 to 320.07 kg ha<sup>-1</sup>yr<sup>-1</sup>. Fish yield from these wetlands could be modestly enhanced up to 3-4 times from the present average production of 148.9 kg ha<sup>-1</sup>yr<sup>-1</sup>. Besides fish production enhancement there is scope for development of fishery based eco-tourism in a few wetlands.

**27.** Kumar, G. Sunil; Prajneshu (Indian Agricultural Statistics Research Institute, New Delhi – 110 012 (India)). **Modelling and forecasting the marine fish production of India using Wavelet thresholding for autocorrelated errors.** Indian Journal of Fisheries. (2008) v. 55(4) p. 291-294.

The newly emerging area of “Wavelet analysis” is thoroughly discussed along with its modification through different thresholding procedures. As an illustrations, the methodology is applied to model and forecast country’s marine fish production data during 1971 to 2002 using S-PLUS Wavelet toolkit. Presence of autocorrelation for residuals is detected by Durbin Watson test. Subsequently, Wavelet techniques, are also applied to the data. Comparison, on the basis of mean square errors, shows superiority of Wavelet procedure over Box-Jenkins ARIMA and non-parametric regression method for data under consideration. Finally, forecast of country’s marine fish production for the year 2003 is obtained through Wavelet methodology.

**28.** Kumaran, M.; Alagappan, M.; Raja, S.; Sarada, C.; Vimala, D. D.; Chandrasekaran, V. S.; Kalaimani, N. (Central Institute of Brackishwater Aquaculture, 75, Santhome High Road, Chennai – 600 028, (India)). **Extent of adoption gaps in good management practices (GMPs) of shrimp farming.** Indian Journal of Fisheries. (2008) v. 55(3) p. 267-272.

Adoption is a mental process through which an individual eventually make a decision to follow an innovation after carefully evaluating its relative advantage. Compatibility, complexity, visibility and adoptability *vis-à-vis* his biophysical and socio-economic environment. An investigation carried out among the shrimp farmers of Andhra Pradesh (AP) and Tamil Nadu (TN) to access the 'adoption-gap' in Good Management Practices (GMPs) of shrimp culture has found that about 68 and 72% of the GMPs of shrimp farming were adopted by the farmers of AP and TN and an average adoption gap of 32 and 28% was noticed in AP and TN respectively. Adoption of aquaculture guidelines like Effluent Treatment System (ETS) needs mass education, voluntary cooperation and maximum motivation among the farmers. A strong extension support to facilitate the above is absolutely essential. Further, educational status, occupation, farm size, training, farm experience and social participation of the shrimp farmers aid significantly in minimizing their adoption gap.

**29.** Lodhi, Harnam Singh; Sharma, U. D. (Prawn Research Centre, University of Lucknow, Lucknow – 226 007 U. P. (India). Department of Zoology). Shukla, Sanjive (B S N V P G College, Lucknow – 226 001 U. P. (India). Department of Zoology). **Light microscopic and histochemical studies on the haemocytes of fresh water prawn, *Macrobrachium lamarrei* (Crustacea-Decapoda).** Aquacult (India). (2008) v. 9(2) p.121-134.

The haemocytes of the fresh water prawn, *M. Lamarrei* were classified into seven types on the basis of light microscopic studies, morphology, their behavior under phase contrast microscope and their reactions with different stains. The seven types of cells distinguished include Phohaemocytes, Plasmacytes, Spindle cells, Granular haemocytes, Spherule cells, Adipohaemocytes and the Cystocytes. The structural details and their significance in haemocyte classification along with functions of different haemocytes types have been discussed.

**30.** Mathew, K. M. (College of Fisheries, Panangad, Kochi – 682 506 Kerala Agricultural University (India). Department of Management Studies). **Ornamental fisheries sector of Kerala State, strengths, weaknesses, opportunities and threats (SWOT) analysis.** Fishing Chimes (India). (2008) v. 28(6) p. 48-49.

Kerala is among of the few States of India where ornamental fish production has come up in a distinctive way. The author presented in this contribution an analysis of the strengths, weaknesses, opportunities and threats the activity has generated. He also suggested that the weaknesses and threats to the sector can be overcome through introduction of suitably modified policies and programmes.

**31.** Mercy, T. V. Anna; Jacob, Eapen; Bhaskar, Rajesh K. (College of Fisheries, Kerala, Agriculture University, Panangad, Cochin – 682 506 (India)). **Length-weight relationship of sixteen species of indigenous ornamental fishes of the Western Ghats of India.** Indian Journal of Fisheries. (2008) v. 55(4) p. 337-339.

The parameters 'a' and 'b' of the length weight relationship (LWR) of the form  $W=aL^b$  are presented for 16 species of indigenous ornamental fishes of the Western Ghats of India. The fish samples used for this study were collected by operating cast net during the period June 2000 to June 2002 from different rivers of Kerala, south-west part of the

Western Ghat region. The 'b' values of 10 species out of 16 were found very close to the isometric value of 3.0

32. Mishra, R (Krishi Vigyan Kendra, Puri, Orissa University of Agriculture and Technology, Orissa (India)). Dora, K. C. (West Bengal University of Animal and Fisheries Science, West Bengal (India). Faculty of Fisheries). **Shelf life of frozen stored mud crab (*Scylla serrata*) meat.** Indian Journal of Fisheries. (2008) v. 55(4) p. 333-336.

Shelf life of mud crab (*Scylla serrata*) meat during frozen storage at  $-20^{\circ}\text{C}$  for 200 days was determined by chemical and sensory evaluation. The results indicated that crab meat can be stored in an acceptable condition for 130 days. During frozen storage, decreases in pH, moisture, total nitrogen, TVBN (2.6 to 32.7 mg%), Trimethylamine nitrogen peroxide value, TMAN (1.01 to 17.55 mg%) and Peroxide value, PV (0.84 to 27.93 milli moles of oxygen/kg of fat) increased, whereas non-protein nitrogen, NPN (417.4 to 356.8 mg%) and alpha amino nitrogen, AAN (292.2 to 251.8 mg%) values decreased. Sensory evaluation of the frozen stored crab meat revealed the limits of acceptability of the product to be TVBN 18.2 mg%, TMAN 7.25 mg% and PV 15.13 millimoles of oxygen per kg fat.

33. Mohapatra, B. C.; Sarkar, Bikash; Sarangi, N. (Central Institute of Freshwater Aquaculture, Indian Institute of Agriculture Research, P. O.– Kausalyaganga, Bhubaneswar – 751 002, Orissa (India)). **Portable FRP crap hatchery technology, successful adoption in India.** Fishing Chimes (India). (2008) v. 28(4) p. 48-52.

One of the outstanding achievements of CIFA in recent years is the standardization and successful population of portable Fiberglass Reinforced Plastic Carp Hatcheries. This breakthrough deserves to be acclaimed as an excellent follow-up development to the introduction of the epoch making induced breeding technology in 1957. Many in India have already incorporated the portable hatchery technology in their seed production working systems, with a sense of gratitude of CIFA. The hatchery model introduced being portable, there is the advantage of taking it to the places concerned where hatchery operations would have to be conducted. In this context the authors indicated various stering aspects of the breakthrough, including the economics of FRP carp hatchery operations.

34. Mohite, A. S. (College of Fisheries, Ratnagiri – 415 629, Maharashtra, (India). Department of Fisheries Engineering). Mohite, S. A. (College of Fisheries, Ratnagiri - 415629, Maharashtra (India). Department of Fisheries Biology). **Study of stocks of ribbon fish *Trichiurus lepturus* from different landing centers of Maharashtra.** Aquacult (India). (2008) v. 9(2) p. 113-119.

Various morphometric, meristic as well as length-weight relationship studies were done to understand the relationship of the stocks of ribbon fish *Trichiurus lepturus* from Mirkarwada at Ratnagiri. New Ferry Wharf as well as Versove at Mumbai which represented the three categories of the fisheries harbours, viz, minor harbour, major harbour and fish landing centre respectively from October 1995 to September 1997. The various dependent variables seem to be highly correlated with the independent variables like TL, OHL, SVL, and SNL, irrespective of the sexes or the specimen being either from Ratnagire or Mumbai. The coefficient of correlation "r" ranged from 0.9470 to 1 for females, 0.9179 to 1 for males and 0.7522 to 0.9998 for indeterminants from Ratnagiri.

While it ranged from 0.9505 to 1, 0.9646 to 0.9997 and 0.9234 to 0.9998 in the corresponding populations from Mumbai. The “r” values for the pooled data ranged from 0.9616 to 1 and 0.9633 to 0.9999 while “r<sup>2</sup>” values ranged from 0.9156 to 0.9999 and from 0.9279 to 0.9998. The differences encountered in certain morphometric relationships for the *T. lepturus* specimen from the two sampling stations viz. Ratnagiri and Mumbai might be due to the varying ecological or environmental factors prevalent at the sampling stations.

**35.** Mukherjee, S. C. (Central Institute of Fisheries Education, Versove, Mumbai – 400 061(India)). **Health management in aquaculture through application of biotechnology.** Fishing Chimes (India). (2008) v. 28(6) p. 34-36.

In this contribution, the author presented the paper at the international seminar on aquaculture held at ILDEX 2008, New Delhi recently. The author explained the biotechnological approaches to health management in aquaculture. He also mentioned on bacterial biofilm vaccines, monoclonal antibodies, immune response of fish to pathogens, immune system, protection against pathogens, and on development. He also highlighted regarding administration of vaccine and DNA vaccines.

**36.** Mulye, V. B.; Sapkale, P. H.; Chogale, N. D.; Bondre, R. D.; Mohite, A. S. (College of Fisheries, Shirgaon, Ratnagiri – 415 629, Maharashtra (India)). **A study on biochemical parameters of fish meal produced in Sakhartar locality, Ratnagiri.** Aquacult (India). (2008) v. 9(2) p. 135-139.

In India fishmeal is produced from sun-dried fish and in recent years from waste disposals such as prawn shell waste from processing factories and head, skin, and bone from surimi manufacturing and cannery units. The samples were collected at random from Sakhartar locality, Ratnagiri. Four samples were drawn at random periodically after every fortnight for two months to analyze biochemical parameters. Storage study was also conducted at ambient temperature 28<sup>0</sup>C to 30<sup>0</sup>C and humidity 65% in gunny bags over a period of 3 month in fishmeal godown. All biochemical parameters of fish meal such as moisture, fat, crude protein, TVB-N, dry matter, ash and acid insoluble ash were estimated and are compared with I.S.I. specifications. The overall quality of locally produced fishmeal was inferior and do not meet the I.S.I. specifications.

**37.** Nagpure, N. S.; Sharma, Shilpi; Pandey, Sanjay; Kumar, Ravindar; Srivastava, Satish K.; Verma, M. S.; Kapoor, D. (National Bureau of Fish Genetics Resources, Canal Ring Road, Telibagh, P. O. – Dilkhusha, Lucknow – 226 002 (India)). **Use of comet assay for genotoxicity assessment in fishes from Gomti river.** Indian Journal of Fisheries. (2008) v. 55(3) p. 285-288.

An increasing number of genotoxic chemicals are being released into the aquatic environment, posing serious damage to our rich aquatic biodiversity and also indirectly to human health. In view of the above, attempts have been to explore the feasibility of application of comet assay for biomonitoring of fish from polluted sites of River Gomti in Lucknow (Uttar Pradesh), which has been exposed to heavy pollution during the recent years. For comet assay, blood samples of two fish species found in the river namely *Labeo rohita* and *Puntius*, were tested. Blood samples from fishes of the same species collected from the fish ponds of the National Bureau of Fish Genetic Resource (NBFGR), Lucknow were taken as control for comparison. The samples were then subjected to

comet assay for assessing DNA damage. Significant differences were observed with respect to the two important comet parameters viz., percentage tail DNA and tail length as compared to control. The results indicated the sensitivity and suitability of comet assay for 'in situ' biomonitoring programmes to explore genotoxicity of environmental pollutants.

**38.** Nair, M. Asha (V.T.M.N.S.S. College, Dhanuvachapuram, Thiruvananthapuram – 695 503, Kerala (India). Department of Zoology). Aravindan, C. M. (University of Kerala, Kariavattom Campus, Thiruvananthapuram – 695581, Kerala (India). Department of Aquatic Biology and Fisheries). **Effect of trawling on dietary patterns of demersal fish community along the Kerala coast.** Indian Journal of Fisheries. (2008) v. 55(3) p.241-246.

The pattern of trophic organizations within fish community reflect the food resource partitioning existing in a given marine ecosystem. The present investigation was undertaken to understand the shifts in the dietary pattern of three demersal finfish species at two different sites, one where intense trawling is practiced and the other where no trawling is undertaken. Multivariate statistical analysis viz., cluster analysis was carried out to understand these patterns. Results of the study revealed interesting diet sharing patterns among the selected demersal fishes at trawled and non-trawled sites.

**39.** Nanda, Saumyendra; Patra, Sapan Kumar; Mohanty, Subal Chandra; Sial, N. K. (College of Fisheries, Rangailunda, Berhampur – 7, State Government Fish Seed Farm, Kausalyaganga, Bhubaneswar (India). P.G. Department of Aquaculture). **Observations on efficacy of different inducing agents on induced breeding of *Labeo calbasu*.** Aquacult (India). (2008) v. 9(2) p. 227-231.

Breeding experiments on *Labeo calbasu* by using different inducing agents were carried out during the month of July-August, 2007 under captive conditions. The experiments were conducted in three groups. The brooders of one group were administered with the synthetic hormone Ova prim where as the other group of fishes were administered with the synthetic hormone WOVA-FH. In this paper, the optimum dosages of different inducing agents were tried separately for successful induced spawning of *Labeo calbasu* which have been further evaluated, standardized and discussed to arrive at the conclusion on their efficacy for mass scale production of seed.

**40.** Nath, D.; Shrivastava, N. P.; Mondal, S. (CIFRI, Barrackpore – 700 120, West Bengal (India)). **Water pollution at river Narmada in Madhya Pradesh.** Journal of the Inland Fisheries Society of India. (2008) v. 40(2) p. 74-77.

In this communication the authors tried to evaluate the present status of the pollution in Narmada in the stretch Sandia to Mola in Madhya Pradesh. The study was conducted during 1996-1999 during different seasons. Physico-chemical conditions of different centers of Narmada are depicted. The study revealed that river Narmada was polluted at Nalaghat and Dongerwada SPM outfall region during summer and winter season.

**41.** Pathak, Janardan; Goswami, M. M. (Guwahati University, Guwahati – 781 014, Assam (India). Department of Zoology). **A comparative study of the seasonal trend of heleoplankton in two fresh water aquaculture ponds of Guwahati, Assam.** Aquacult (India). (2008) v. 9(2) p. 157-165.

Seasonal variation of helioplankton was studied in two freshwater aquaculture ponds named as pond A and pond B. Pond A man made and managed with application of fertilizers and organic manures. Pond B was a reclaimed swamp and maintained naturally. Seasonal fluctuation of plankton density in the two ponds showed significant variation. Density of plankton in pond A was found remarkably higher in comparison to pond B. But the species composition of plankton in pond B was higher than pond A. Plankton production in the two ponds can be represented as Plankton>Phytoplankton>Zooplankton. In both the ponds chlorophyceae was dominant among phytoplankton while rotifers among zooplankton.

42. Radheyshyam (Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar – 751 002 (India)). Sahoo, Damayanti (Maharshi College of Natural Law, Sahidnagar, Bhubaneswar (India)). **Sediment characteristic and macrozoobenthic fluctuations in different aged rural fish ponds.** Journal of the Inland Fisheries Society of India. (2008) v. 40(2) p. 43-49.

Macrozoobenthic variation was studied in ten, five and zero year old rural fish ponds. Macrozoobenthos was represented by Oligochaeta, Odonata, Diptera, Ephemeroptera, Coleoptera, Hemiptera, Ostracoda and Mollusca in the descending order of importance. Their density fluctuated with time and space. Maximum density was in five year old pond followed by zero and ten year old ponds, suggested their progressive increase with the pond age up to certain extent and a gradual decline thereafter. Interactions within the groups exhibited pond wise variations. With few exceptions Mollusca showed a significant negative correlation with other groups, indicated its grazing effects. Some of the physico-chemical parameters had positive effects in one pond, but negative and/or no effect in other.

43. Rahman, M. A. (Bangladesh Fisheries Research Institute, Riverine Station, Chandpur – 3602, (Bangladesh)). Haque, M. M.; Khan, S. (Bangladesh Agricultural University. Mymensingh – 2202, (Bangladesh)). Department of Fisheries Management, **Food and feeding habits of *Chapila*, *Gudusia chapra* (Hamilton-Buchanan) from Rajdhala reservoir.** Journal of the Inland Fisheries Society of India. (2008) v. 40(2) p. 13-20.

Feeding habits of *Chapila*, *Gudusia chapra*, total plankton and limnological conditions in Rajdhala reservoir (24<sup>0</sup>70' and 25<sup>0</sup>80'N and 90<sup>0</sup>20' and 90<sup>0</sup>48'E), Netrakona, Bangladesh were studied during January to December 2003. The fish was found to be a surface feeder and consumed mainly phytoplankton. Thirty eight genera of phytoplankton belonging to five broad groups such as Chlorophyceae (44.02%), Cyanophyceae (39.00%), Bacillariophyceae (9.44%), Euglenophyceae (1.58%), Dinophyceae (1.58%) and thirteen genera of zooplankton belonging to two major groups such as Crustacea (2.55%) and Rotifera (1.83%) were found in the reservoir throughout the study period. The gut contents of chapila was composed Chlorophyceae (51.02%), Cyanophyceae (37.01%), Bacillariophyceae (6.2%), Dinophyceae (1.33%), Euglenophyceae (0.23%), Crustacea (3.03%) and Rotifera (1.18%). Feeding intensity showed that the fish consumed various food items with full satiation except during breeding season from February to June.

44. Rauthan, J. V. S. (Fisheries Research Lab., D.A.V. (P.G.) College, Deharadun – 248 001 (India). Department of Zoology). Kumar, Dinesh (R.S.M. (P.G.) College, Dhampur (Bijnor) (India). Department of Zoology). Rauthan, Geeta (S.G.R.R. (P.G.) College,

Dehradun (India). Department of Zoology). **Fish fauna of Pilli reservoir near Rehar Town, Dhampur; (Dist. Bijnor, U.P.)**. Aquacult (India). (2008) v. 9(2) p. 233-238.

During present investigation it has been observed 46 species of fishes belonging to 26 genera in Pilli Reservoir near Rehar Town, Dhampur, Distt., Bijnor, Uttar Pradesh.

**45.** Rayaz, Khalid (Govt. P.G. College, Rajouri (J & K) – 185212 (India). Department of Geography). **Hydrometeorological and physico-chemical characteristics of Tattapani hot water spring Kalakote, (J & K) India**. Aquacult (India). (2008) v. 9(2) p. 257-261.

Tattapani, the only hot water spring at Kalakote tehsil of Rajouri district is not only known for its therapeutic properties but also possessing charming environment for recreational purposes. Present investigation seeks to analyze the seasonal variability of climatic phenomenon like air pressure, atmospheric temperature, relative humidity and rainfall along with the in depth study of physico-chemical characteristics of hot-water spring. The study established the fact that hot water spring of Kalakote is acting as malady for chronic rheumatism, uric and other forms of arthritis, neuritis and other neurological disorder, cutaneous diseases, gynecological diseases and allergies.

**46.** Rohit, Prathibha; Gupta, Alli C. (Mangalore Research Centre of Central Marine Fisheries Research Institute, Mangalore, P.B No. 244, Bolar, Mangalore – 575 001, Karnataka (India)). **Whitebait fishery of Mangalore – Malpe, Karnataka during 1997-2002**. Indian Journal of Fisheries. (2008) v. 55(3) p. 211-214.

Whitebaits, with an annual average of 5,152 t formed 4.2% of the total fish catch of Mangalore-Malpe region during 1997-2002. Trawls, purseseine and *ranibale* contributed to the fishery with peak abundance during October-February. The fishery has registered a steady decline over the years with the lowest catch being observed in 2001-02. Three species dominated the fishery of the region. Growth parameters estimated were  $L_{\infty} = 109$  mm and  $K = 1.5 \text{ yr}^{-1}$  for *Encrasicholina devisi*,  $L_{\infty} = 122$  mm and  $K = 1.1 \text{ yr}^{-1}$  for *Stolephorus waitei* and  $L_{\infty} = 188$  mm and  $K = 1.6 \text{ yr}^{-1}$  for *Encrasicholina punctifer*. Total mortality estimated was 8.19, 6.18 and 8.97 respectively for the above species and natural mortality was 3.11, 2.46 and 3.18 respectively. The study indicated that the stock is under greater fishing pressure than desired. Biology of *E. punctifer* and *S. insularis* is being reported for the first time from this area.

**47.** Roy, Moitreyee; Ghosh, Koushik (Aquaculture Laboratory, University of Burdwan, Burdwan – 713104, West Bengal (India). Department of Zoology). **Antibiotic sensitivity and effect of tetracycline on gut bacterial flora and enzyme activity in *Labeo rohita* (Hamilton) fingerlings**. Journal of the Inland Fisheries Society of India. (2008) v. 40(2) p. 21-26.

The objective of the study was to examine the suppressive effect of antibiotics on fish gut bacterial flora. Antibiotic sensitivity of the isolated gut bacterial flora from *Labeo rohita* fingerlings was determined against some broad-spectrum antibiotics using Himedia Octodiscs. Gut bacteria were sensitive to most of the antibiotics except bacitracin. MIC for two bacterial strains were  $\leq 0.01 \mu \text{ ml}^{-1}$  for ceftriaxone and about  $18 \mu \text{ ml}^{-1}$  for tetracycline. Later, laboratory acclimatized rohu fingerlings were fed with tetracycline incorporated diets ( $250 \text{ mg } 100 \text{ g feed}^{-1}$  and  $500 \text{ mg } 100 \text{ g feed}^{-1}$ ) for three weeks. The fish fed with antibiotic incorporated diets showed reduction in the gut bacterial population

and a significant decrease in the digestive protease and amylase enzymes. The result might contribute to concerns about the ill effects of antibiotics on fish health.

**48.** Sajwan, Mamta (Nagraj Mandir, Srilot Ganganali, Srinagar, Garhwal, Uttarakhand (India)). Joshi, Shobha (Fish pheromone and Behaviour Study Unit, HNBG University, Srinagar Garhwal, Uttarakhand – 246174 (India)). **Food diversity and feeding habit of a hill stream minor carp (*Barilius bendelisis*) from Garhwal Himalaya, Uttarakhand (India).** Aquacult (India). (2008) v. 9(2) p. 151-155.

The present study reveals the food diversity and feeding habit of a hill-stream fish *Barilius bendelisis* within Garhwal Himalaya. Few of the hill-stream minor carps prefer small rivers and hill streams, where the water is not contaminated and shallow with high percentage of dissolved oxygen. This hill stream fish is found in few of the cold water streams present in Garhwal Himalaya; show a drastic pattern for their routine requirements. Sometimes the eggs are also observed in these areas, where weeds (Few algae) are present in tremendous amount. The studied Gad constitutes few filamentous algae with rich benthic community. The present study was conducted in Khanda Gad of Garhwal Himalaya. The said Gad is a tributary of holy river Alakhnanda and this Gad mingles with river near to Bilkedar. This study is part of our long term study and the food diversity and feeding behaviour of hill-stream fish *Barilius* from Garhwal Himalayan region.

**49.** Sen, Pooja; Tiwari, Kunwar Ji; Shukla, Sanjive (B.S.N.V.P.G. College, Lucknow – 226 001 (U.P.) (India). PG. Department of Zoology). Sharma, U.D (Prawn Research Centre, University of Lucknow, Lucknow – 226 007 (India). Department Zoology). **Cadmium induced pathomorphological changes in gills of freshwater prawn, *Macrobrachium dayanum* (Crustacea-Decapoda).** Aquacult (India). (2008) v. 9(2) p. 249 –255.

Freshwater prawn, *Macrobrachium dayanum* (Crustacea – Decapoda) subjected to acute concentration of cadmium chloride (0.15 mg/l; 96 h LC<sub>50</sub>) showed severe histopathological alterations in gills after 24, 48, 72 and 96 h exposure. Chief alterations in initial stage were thickening of gill plates, reduction in inter-lamellar spaces, cuticular irruption, inflammation and necrosis where as clumping of gill plates, hyperplasia, hypertrophied haemocytes with nuclear pyknosis and leakage of haemocytes in inter-lamellar spaces as well as deposition of broken tissue debris near gill base were observed at final stage. Heavy influx of haemocytes in gills was peculiar features after 48 h of exposure. The severity of pathomorphological alterations was found duration dependant.

**50.** Shankar, B. S. (Dr MG Ramachandran Deemed University, Chennai - 600 095, (India)). Balasubramanya, N. (M.S.R.I.T., M.S.R. Nagar, Bangalore 560054 (India). Department of Civil Engineering. **Computation of water quality of an industrial area in Bangalore, India.** Environment & Ecology (India). (2008) v. 26(3A) p.1332-1336.

The present study was conducted to assess the water quality index (WQI) of the ground waters of Peenya industrial area in Bangalore. Thirty groundwater samples were collected in and around the industrial area and a comprehensive physico-chemical analysis was made. For calculating the water quality index, 10 critical parameters were considered. The WQI for these 30 samples ranged from 16.54 to 432.68 with an average value of 111.40; 53.33% of the samples exceeded 100, the upper limit for drinking water. The high

value of WQI at these stations has been found to be mainly from the higher values of hardness, nitrate, total dissolved solids, iron, sulfates and fluorides in the groundwater. The analysis reveals that the groundwater of the area needs some treatment before consumption and it also needs to be protected from the perils of contamination.

51. Singh, Arun Kumar (B.D.E. College (Magadh University), Patna – 800 001, Bihar (India). Department of Zoology). Ahmad, Sayed Hasib (405, Saket Enclave, Khajepura, Bailey Road, P.O. – Bihar, Veterinary College, Patna- 800 014, Bihar (India)). **Prospects of fish production from wetlands of Bihar.** Fishing Chimes (India). (2008) v. 28 (4) p. 32-34.

The authors mentioned that there are over 40,000 ha of wetlands (*Chaur*s) in Bihar. The authors suggested in this contribution a plan of action for developing of these wetlands. In this context they also mentioned that as wetlands of this kind occur in most of the North-eastern States fisheries of India, the proposed plan of action may prove to be useful in *chaur* fishery development in these States too. They suggested that so far as Bihar is concerned through conservation of part of the deeper zones of *chaur*s in the state for undertaking extensive, semi-intensive and intensive farming as appropriate, a production of 45,300 t/yr can be obtained through the development of the wetlands (40,000 ha) for farmed fish production.

52. Singh, Kehar (College of Veterinary Sciences & Animal Husbandry Central Agricultural University, Selesih, Aizawl, Mizoram – 796 014 (India). Department of Veterinary & Animal Husbandry Extension). **Prioritization of production and marketing problems and constraints of fish culture in south Tripura, India;** Environment & Ecology (India). (2008) v. 26 (4A) p. 1742-1745.

The study is based on the primary cross section data collected from six villages (two villages each from Matabari, Amarpur and Bagafa rural development blocks) of South Tripura district of Tripura state of India during 2004-05. A sample of 250 fish farms, proportionately allocated to two pre-stratified categories and villages, was drawn. The production and marketing problems and constraints were prioritized by using rank based quotient.

53. Singh, Rajan (K.N. Govt. (PG) College, Gyanpur – 221 304 (India). Department of Chemistry). Yadav, Vinita (P G College Gyanpur - 221 304 (India)). Chaturvedi, C. S. (CARI (ICAR) Port Blair, Andaman and Nicobar Islands (India)). **Evaluation of adsorbents for the removal of Zn, Cr (VI), Hg (II) and dyes from industrial effluents in son river of U.P.** Aquacult (India). (2008) v. 9(2) p. 245-248.

The present paper reports the removal of toxic metal from the waste water of Sonebhadra district of U.P. The methodology included the adsorption behaviour and adsorption potential. Sorption studies were conducted by Batch technique. The present study shows that Fillers earth method may be used as for removal of toxic metals and dyes from the waste water.

54. Sood, Neeraj; Swaminathan, T. Raja; Rathore, Gaurav (National Bureau of Fish Genetic Resources, Canal Ring Road, Lucknow – 226 002, Uttar Pradesh (India)). **Purification and partial characterization of serum immunoglobulins of *Channa striatus* (Bloch).** Indian Journal of Fisheries. (2008) v. 55(3) p. 257-260.

*Channa striatus* immunoglobulin (Ig) was purified from serum by affinity chromatography using bovine serum albumin as capture ligand. The purified Ig had a molecular weight (MW) of 820 kDa as determined with gel filtration chromatography. Under reducing SDS-PAGE, the Ig molecule was shown to consist of two subunits, heavy and light chain having a MW of 70.4 and 25.3 kDa, respectively. A high MW band was observed in non-reducing SDS-Page, suggesting tetrameric structure.

**55.** Suresh, N.; Ranganathan, L. S. (Annamalai University, Annamalai Nagar – 608 002 (India). Department of Zoology). **Ontogeny of lymphoid organs – thymus, spleen and kidney in *Catla catla* (Hamilton)**. Indian Journal of fisheries. (2008) v. 55(4) p. 317-322.

Ontogeny of the lymphoid organs thymus, spleen and kidney were studied in the Indian major carp *Catla catla* during the early development stages, i.e. from day one post-hatch to three months of age. Routine histological methods were adopted to study the development of these organs. Thymus appeared as thymic analogue and kidney appeared as an undifferentiated mass of stem cells on first day of post-hatch whereas spleen appeared on the fifth day of post-hatch.

**56.** Yaledhalli, N. A.; Ravi, M. V.; Prakash, S. S.; Patil, C. V. (College of Agriculture, University of Agriculture Sciences, Dharwad Raichur – 584 101 (India). Department of Soil Science & Agriculture Chemistry). **Leachability of heavy metal elements in sewage sludge amended soil**. Environment & Ecology (India). (2008) v.26 (3A) p.1263-1268.

A column study was conducted to assess the potential heavy elements viz. Cr, Ni, Cu, Zn, Cd, and Pb movement through a reconstructed soil profile to which digested sewage was applied. Sewage sludge was mixed with surface soil at 20, 50 and 100 t/ha to each column. These treatments were fixed based on long-term sewage loading on soils. Soil column were leached with 5 liter of water. After leaching 5 soil columns were sampled at depth intervals of 0-10, 10-30, 30-50 and 50-80 cm. The results showed that the heavy element balance accounted for over 97% of elements and over 80% of metal elements were retained in the first 0-10 cm of the soil column. The maximum heavy metal concentration in leachates was lower than the limit values for irrigation water but metal concentration exceeded the drinking water levels for Pb and Ni in all the treatments. Thus, harmful health effects may results from the application of sewage sludge over a period of continuous application to land.

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