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# INDIAN FISHERIES ABSTRACTS



**Central Inland Fisheries Research Institute**  
*(Indian Council of Agricultural Research)*  
Barrackpore, Kolkata 700 120, West Bengal, India

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*(The only abstracting service on Indian Fisheries)*

*Edited by*  
*R. K. Manna*  
*Aparna Roy*

*Compiled by*  
*K. Jacqueline*  
*Fatik Manna*

*Published by*  
*Prof. A. P. Sharma*



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# ENTRIES

1. Abdussamad, E. M.; Pillai, N. G. K.; Mohamed Kasim, H.; Habeeb Mohamed, O. M. M. J.; Jeyabalan, K. (Central Marine Fisheries Research Institute, Kochi - 682018, Kerala, (India)). **Fishery, biology and population characteristics of the Indian mackerel, *Rastrelliger kanagurta* (Cuvier) exploited along the Tuticorin coast.** Indian Journal of Fisheries (2010) v. 57(1) p. 17-21.

Fishery and population characteristic of mackerel along the Tuticorin coast were studied during 1997-2007. The production of mackerel exploited mainly by trawls and gillnets varied widely between 411 t and 2,038 t during the period. Fishery occurred round the year with peak abundance in June and August. Spawning as well as recruitment also occurred round the year with peak in January-April. Young ones start entering the fishery at a size of 6 cm in April every year. Growth parameters, L & K were estimated as 33.28 cm and 1.634 year<sup>-1</sup> respectively. Natural mortality (M) estimated was 2.52. Total mortality (Z) varied between 6.04 and 11.85 and fishing mortality (F) between 3.52 and 9.33. The exploitation ratio (E) was in the range 0.582 - 0.787. The value of E<sub>max</sub> obtained (0.86) was lower than the exploitation rate throughout the period and MSY estimated (1,346 t) was higher than the average production during the period. Stock varied between 666 and 2,650 t and biomass between 99 and 365 t. The results showed that the fishery was largely based on the stock position and was independent of the effort. Since the species mature at an early age and spawn round the year, present fishing pattern appear to have no adverse impact on recruitment. Currently the resource is exploited near the optimum level and there appears to be no immediate threat for the stock.

2. Ahamad Ali, S.; Gopal, C.; Ramana, J. V.; Sampooram, B.; Arul Vasu, C.; Vaitheeswaran, T.; Selvakumar, P. (Central Institute of Brackishwater Aquaculture, 75, Santhome High Road Chennai - 600 028, Tamil Nadu, (India)). **Evaluation of selected binders in a ring-die pellet mill for processing shrimp feed pellets.** Indian Journal of Fisheries (2010) v. 57(1) p. 103-106.

Polymethylol carbamide (PMC), guar gum and wheat gluten were evaluated as feed binders in a ring-die (R-D) pellet mill at 0.5, 2.0 and 5.0% levels using a shrimp feed formulation. Pelleting of feeds was carried out at three different temperatures of 70, 80 and 90°C. Highest increase in moisture level was recorded in the case of feed mix with wheat gluten as binder (20.9 - 26.0%), followed by the feed mix with guar gum (16.2 - 17.2%) and least increase with PMC (11.4 - 12.6%). The results indicated that wheat gluten has the highest moisture absorbing capacity followed by guar gum and PMC has the least moisture absorbing property. The turbidity of water in which pellets with binder PMC were soaked resulted in lowest nephelometer reading (10.6 maximum). Pellets with wheat gluten resulted in higher values of turbidity (18.6 nephelometric units maximum) while those with guar gum as binder resulted in intermediate values of turbidity (15.3 nephelometric units maximum) between PMC and wheat gluten. Pelleting temperature of 70, 80 and 90°C improved hydrostability of pellets for all the three binders from 79.5 to 82% in the case of PMC, 80.5 to 81.5% in the case of wheat gluten and from 77.9 to 80.5% for guar gum. Pelleting temperature had no influence on water turbidity (10.6 - 10.8 nephelometric units) for pellets with binder PMC. Increase in pelleting temperature from 70 to 90°C reduced the turbidity of water from 18.6 to 17.0 and from 15.3 to 14.9 nephelometer readings, in the case of wheat gluten and guar gum respectively. The drop in turbidity meter reading was more pronounced for wheat gluten than for guar gum. The results of the study indicates that PMC like synthetic binders are more suitable for processing shrimp feeds in ring-die pellet mill, which is required at very low level (0.5%), imparts good water stability to pellets and is also cost effective.

- Ahmad, Tabrez; Paul, Newton; Shukla, Kavyanjali; Sharma, A. K. (Protozoology Laboratory, Department of Zoology, University of Lucknow, Lucknow - 226 007, (India)). **Water quality assessment of river Gomti at Lucknow, U.P. India: Pollution due to industrial and domestic wastes.** *Aquacult* (2010) v. 11 (1) p. 39-46.

Present study was undertaken to investigate the variations in the physico-chemical characteristics of sewage fed river Gomti at Lucknow. To assess the impact of effluent on the water quality, eleven physico-chemicals like temperature, pH, total solids, total dissolved solids, dissolved oxygen, total alkalinity, total hardness, calcium, magnesium, chloride and nitrate were monitored. All the parameters were compared with standard values which are recommended by Bureau of Indian Standard (BIS). The study revealed that the domestic sewage discharge from the nearby bank of this river is a real threat for water quality. Overall the water quality of river Gomti was relatively poor with respect to its use for domestic purposes.

- Ali, Ayub; Tamuli Krishna Kanta. (Department of Fishery Biology, College of Fisheries, Assam Agricultural University Raha – 782 103 (India)). **Effect of yeast glucan on the immune response of Indian major carp *Labeo rohita* (Ham.)** *Environment & Ecology (India)*. (2010) v. 28(2A) p. 971-974.

The effects of yeast glucan on specific and non-specific immune response of Indian major carp *L. rohita* were studied using whole cell *Aeromonas hydrophila* vaccine. Specific immune response was studied by antibody agglutination test, non-specific immune response by NBT assay while the protective immune response was studied by challenging the fish with potent virulent strain of *A. hydrophilla*. Glucan alone enhanced the non-specific agglutinin, respiratory burst activity, and protective immunity, but in the combination with *A. hydrophilla* vaccine, it elicited higher immune response and better protective immunity. Protective immunity correlates well with oxidative burst activity rather than antibody titer. Results of this study indicate that glucan stimulates non-specific and enhances protective immune response in Indian major carp *L. rohita*.

- Ali, Ayub; Tamuli Krishna Kanta; (College of Fisheries, Assam Agricultural University, Raha – 782 103, Assam (India)). **Level of coliforms as an index of fecal pollution in integrated pig fish culture system.** *Environment & Ecology (India)*. (2010) v. 28 (2A) p. 975-979.

Ponds measuring 0.40-0.54 ha were used for the study. Pig sties were constructed on the embankment of the three treated ponds. The waste and spilled feeds were collected every morning and evening and disposed in the five prefixed sites selected at equal distance. Pig urine was allowed to go directly into the pond water through pipe; 2-3 months old piglets were introduced into the respective pig sties at the rate of 50 numbers/ha. Fourth pond was used as the control pond in which only lime (CaO) was applied. Indian Major and exotic carps were stocked at the rate of 8500 nos./ha. Cumulative average coliform counts in water and fish muscle varied from  $3.1 \times 10^3$  -  $3.4 \times 10^4$  and  $1.3 \times 10^3$  -  $1.5 \times 10^3$  respectively in treated ponds while the corresponding fecal coliform counts were  $1.5 - 1.6 \times 10^3$  in water sample and  $7.98 - 9.03 \times 10^2$  in fish muscle. In the control pond, the coliform counts were  $3.9 \times 10^2$  and  $4.0 \times 10^1$  in water sample and  $1.42 \times 10^2$  and  $2.0 \times 10^1$  in fish muscle respectively. The total plate count recorded were  $4.4 \times 10^3$  -  $4.9 \times 10^5$  and  $7.4 \times 10^4$  in fish muscle of the treated and the control ponds respectively. Significant differences exist in coliform and fecal coliform counts between the treated and the control ponds.

- Ali, Ayub; Tamuli, Krishna Kanta; (College of Fisheries, Assam Agricultural University, Raha – 782 103, Assam (India)). **Effect of testosterone on the immune response of the Indian major carp *Labeo rohita* (Ham.) to *Aeromonas hydrophila* Vaccine.** *Environment & Ecology (India)*. (2010) v. 28 (2A) p. 980-983.

The dose dependent effect of testosterone on specific immune response and protective immunity of *Labeo rohita* was studied. The specific immune response was studied by antibody agglutination test while protective immunity was tested by challenging the fish with potent strain of bacterial fish pathogen, *Aeromonas hydrophila*. The low dose of testosterone (5 ppm) enhanced the humoral immunity while the dose (25 ppm) was found to suppress it. It was also observed that the high dose of testosterone decreased the protective immunity against the pathogen and the low dose had no adverse effect on protective immunity.

7. Ali, Ayub; Tamuli, Krishna Kanta. (College of Fisheries, Assam Agriculture University, Raha 782103, Assam, India). **Effect of Malathion on the kinetics of humoral Immune response and protective immunity of the Indian major carp, *Labeo rohita* (Ham.)** Environment & Ecology (India). (2010) v. 28(2A) p. 984-987.

Effect of Malathion on humoral immune response, its kinetics and protective immunity of *Labeo rohita* were studied using antibody agglutination and challenge test. Level of serum antibody of the control and the treated groups were determined by antibody agglutination test in microtitre plates. The peak day of antibody titers of each group was critically observed to know the Kinetics of immune response. Protective immunity was determined by challenging the fish with potent strain of fish pathogenic bacteria, *Aeromonas hydrophila*. Malathion was not found to have any adverse effect on the kinetics of immune response of *Labeo rohita*. However, the results of the present study indicated a suppression of antibody formation. The protective immunity too was found to marginally effect by the pesticide in the long run.

8. Athithan, S. (Associate Professor, KVK, Veterinary College and Research Institute Campus, Namakkal – 637 002, South India); Singh, Soibam Khogen (Fisheries College and Research Institute, Thoothukudi- 08, Tamilnadu, (India)). **Evaluation of Palm oil as a dietary energy ingredient and fish oil replacer in the diet of *Labeo rohita* (Hamilton).** Aquacult (2010) v. 11 (1) p. 9-20.

Experiment was conducted for substitution of marine fish oil (MFO) with palm oil (PO) in the diets of *Labeo rohita* at the Fish farm complex of the Fisheries College and Research Institute, Thoothukudi, South India. Student's t-test confirmed that mean values of *L. rohita* showed significant difference between test diet T3 and control diet ( $p < 0.002$ ) and between test diet T4 and control diet ( $p < 0.02$ ). However, mean growth values showed no significant difference between T1T2, T2T3, T1T4, TIC, T2T3, T2T4, T2C and T3T4. Two way ANOVA of the data collected affirmed that among the different test diets, the mean growth values showed no significant difference between the test diets except T1 & C ( $p < 0.03$ ). However, time bound variations showed significant difference. Different inclusion levels of palm oil in the test diets did not significantly affect the muscle proximate composition in terms of moisture, protein, lipid, ash and fibre when compared with the test groups and control. Thus, palm oil can be used to replace marine fish oil up to 25% in the diet without affecting the bio growth parameters and the cost of production per kg of diet will also be reduced than marine fish oil included diets.

9. Baishya, Anjali; Dutta, Aparna; Bordoloi, Sabitry (Institute of Advanced study in Science and Technology, P O. Gorchuk, Guwahati - 781 035, Assam, (India)). **Morphometry and length-weight relationship of *Amblypharyngodon mola* (Hamilton-Buchanan, 1822).** Indian Journal of Fisheries (2010) v. 57(1) p. 87-91.

The morphometry and length-weight relationship of the freshwater fish *Amblypharyngodon mola* (Hamilton-Buchanan, 1822) from the Garjan beel, Kamrup district of Assam was studied. The study reveals that there is no significant ( $p > 0.05$ ) difference between morphometric characters of male and female fishes and the length-weight relationship established for the fish suggested that the fish did not follow the cube law strictly. The

equations and the correlation coefficients suggested a significant relation ( $p < 0.01$ ) between the length and weight of the fish.

10. Bhattacharjya, B. K.; Sarma, K. K. (Central Inland Fisheries Research Institute (ICAR), Regional Center, Housefed Complex, Dispur, Guwahati 781006, (India)). **Stock enhancement practices followed in floodplain wetlands (beels) of Barak Valley, Assam.** Environment & Ecology (India). (2010) v. 28 (2B) p. 1396-1399.

Floodplain wetlands (beels) are the most important fisheries resource of Assam owing to their large resource size and high fish production potential. Studies conducted in seven beels of Barak Valley of Assam during 2006-07 showed that stock enhancement was practiced in all the selected beels. Candidate species stocked in the selected beels were catla, rohu, mrigal, grass, silver, bighead and common carp. In addition, seeds of *Labeo bata* and exotic *Puntius gonionotus* were also stocked in lesser numbers. Species ratio followed in the beels varied widely in the selected beels; mrigal was the dominant component of stocked fishes in Sibnarayan anoa, Fulbari anoa; Banskandi anoa and Sakaity beel, whereas Catla and grass/common carp were the dominant stocking components in Baraknadi anoa and Korkoria beel respectively. In Chiri anoa, rohu contributed 80% of the stocked seed. Stocking density in the selected beels varied from 2,193 (Fulbari anoa) to 13,158 no./ha (Chiri anoa). Availability of fund and seed influenced stocking decisions. Contribution of stocked fishes to total fish production ranged from 25% (Baraknadi anoa) to 80% (Korkoria beel and Chiri anoa). Stock enhancement obviously resulted in moderate (250.4-477.8 kg/ha per yr) to high fish production (1500 kg/ha per yr) in the selected beels; only Fulbari anoa recorded low fish production rate of 121.4 kg/ha per yr, which was lower than that of the state's average beel fish yield rate.

11. Bhaumik, Utpal; Nath, D; Gupta, A.; Sett, P.; Saha, Suman; Chatterjee, J. G. (Central Inland Fisheries Research Institute, Barrackpore, Kolkata - 700 120 (India)). **Organic approach for popularization of sustainable aquaculture.** Journal of Inland Fisheries Society of India (2010) v. 42(1) p. 8-22.

Organic farming has gained popularity all over the world as sustainable farming system, which maintains the long-term fertility of the soil and uses less of the Earth's finite resources to produce quality, nutritious food. Organic farming is based on a holistic view where nature is considered as a whole with an intrinsic value of its own. On the environmental front, especially the pollution resulting in from nitrogen and pesticide use is of increasing concern. Organic farming also offers biodiversity benefits for the soil and aquatic ecosystems. People are to take moral responsibility regarding the ecological, economical and social aspects of aquaculture production. Broad general principles such as good nutrition, the maintenance of fish health and recycling of nutrients where possible are relevant to fin fish and shell fish production (Thomas, 1994; Laird, 1999). Basically, the urgent task facing Indian aquaculture today is reduction in the cost of fish production in sustainable manner and putting the available resources to optimum use through new practices/technologies. With a view to popularizing organic farming for sustainable aquaculture in the rural areas demonstrations in some areas of West Bengal were carried out utilizing organic manures namely vermi-compost, cow dung, and compost and duck droppings. The abiotic and biotic factors were observed to be conducive for favourable fish production. The productions obtained under carp culture utilizing duck droppings, raw cow dung, compost, vermicompost were 3216 kg/ha/yr, 2486 kg/ha/yr, 2280 kg/ha/yr, 1808 kg/ha/yr respectively. Low cost involved in the experimentations has been motivating the fish farmers towards the adoption process.

12. Bhawane, G. P.; Chavan, J. A.; Aland, S. R.; Kumbhar, V. J.; & Pawar, T. (Department of Zoology, Shivaji University, Kolhapur - 416004.(India)). Gaikwad, S. M; (Department of Zoology, Bhogawati Mahavidhyalaya, Kurukhali, Kolhapur, (India)). **Efficacy of ethanolic plant extracts on biochemical moieties and cocoon characters of *Beauveria Bassiana***

*(Bals.)Vuill. infected 5<sup>th</sup> instar larvae, Bombyx mori L.* Geobios (India). (2010) v. 37(4) p. 314-318.

The efficacy of ethanolic plant extracts of *Azadirachta indica*, *Aegle marmelos* and *Hyptis suaveolens* on biochemical moieties and cocoon characters of *Beauveria bassiana* infected 5<sup>th</sup> instar silkworm larvae, *Bombyx mori L.* show a significant reduction in total carbohydrate, protein and lipid content as well as reduction in cocoon characters in treated larvae.

13. Dubey, Amit; Pani, Subrata; Dixit, Mukesh (Lake Conservation Authority of M. P., Paryavaran Parisar, E-5, Arera Colony, Bhopal (India)). **Seasonal changes in primary productivity in two tropical water bodies of central India.** Aquacult (India). (2010) v. 11 (1) p. 79-84.

Primarily Productivity in lakes refers to the number of carbon atoms fixed per unit area per unit time. The value of primary productivity is best indicator of the trophic status of the lakes. Higher primary productivity indicates presence of plant nutrients in higher concentration, while lower value of productivity indicates lower concentrations of the nutrients. The present paper deals with the assessment of primary productivity in two tropical water bodies of central India viz. Upper Lake and Lower lake of Bhopal possessing different trophic status and comparing the water quality based on the results of primary productivity. The study also encompasses the assessment of seasonal changes in the value of primary productivity.

14. Gautam, R. K.; Ahmad, Parvaiz (Department of Zoology, School of life Sciences, Dr. B. R. Ambedkar University, Khandari Campus, Agra- 282 002, (India)). **Biochemical responses in the blood serum of fresh water catfish, *Clarias batrachus* (Linn.) after exposed to carbosulfan.** Aquacult (India). (2010). v. 11 (1) p. 93-97.

The aim of the study was to assess the effect induced by carbosulfan pesticide on biochemical indices of walking catfish, *Clarias batrachus* (Linn.) after exposed to sub lethal concentration, 0.1 ml (1/5 of LC<sub>50</sub>) of carbosulfan at different time intervals 24, 48, 72 and 96 hrs. The present study showed statistically significant increase value in blood glucose and significant decrease value in total protein level.

15. Ghosh, Amitabha; Chattopadhyay, A. K; Naskar, K. R. (Central Inland fisheries Research Institute, Barrackpore, Kolkata - 700 120 (India)). **Review and assessment of brackish-water fisheries and aquaculture in Indian sundarbans.** Journal of Indian Society Coastal Agricultural Research (2009) v. 27(2) p. 44-48.

Extensive mangrove areas have been converted into brackish water aquaculture ponds over the years. Traditional methods of piscicultural practices predominate and there is much room for improving the yields. Adoption of improved cultural practices e.g., maintenance of water level in the ponds during the rearing cycle, the land can be fully watered at ordinary high tides and drained at low tides. Areas with very narrow tidal regimes of less than one meter daily are not suitable since pumping may be needed to fill in the water bodies, and areas with very large tidal amplitude are unsuitable for the chances of over flooding. Soils should be predominantly clay in order to retain water and the pH should be suitable. As most mangrove soils are potentially acid soils, a thorough examination of surface and sub-surface layer is needed to ensure that bottom layer of high-potential acidity will not be exposed. Otherwise heavy inputs in the form of lime may be required and the production will not be cost effective. Mangrove forests serve as links between terrestrial and marine ecosystems. There is generally an import of inorganic nutrients from the land to the mangroves and an export of organic matter from the mangroves' to the sea. Many species of commercially important marine organisms seem to depend on mangroves for at least part of their life cycle and mangroves also function as feeding grounds for coastal fish, shrimp/prawn and crabs. Sundarbans, the mangrove forest in the delta formed by the Ganga and the Brahmaputra, supports a large commercial fishery. As

much as 80 percent of the Indian part of entire catches of the Ganga-Brahmputra system comes from the Sundarbans where as less than 100 species of fish have been listed. Many species of penaeid shrimp spawn off shore but use mangroves as refuge and feeding grounds during the later stages of development. It is only partly known, however, to what extent such species will disappear from the area if the mangrove forest is removed by reclamation or whether mangrove-dependent species only demand a muddy bottom and a certain salinity regime and therefore may persist even after destruction of the mangrove vegetation. The degree of importance of mangroves to fisheries is difficult to assess. Landing data are often incomplete. Finally, estimates of mangrove areas are also incomplete. In spite of these difficulties, a correlation between shrimp landings and mangrove areas has been found in Indonesia. In some other cases such relations do not exist.

16. Ghosh, Subhabrata; Keshari, Jaiprakash (CAS in Botany, The University of Burdwan, Golapbag, Burdwan – 713 104 (India)). **Phytoplankton show the pollution status of a pond.** Geobios (India). (2010) v.37 (4) p. 281-284.

A study of phytoplankton composition of pond shows the pollution scenario of a particular water body. Members of Cyanophyceae dominate but chlorophyceae were very few in numbers. Shannon-Weaver species diversity index value (2.201-2.419) indicates light to moderate pollution status.

17. Ghosh, Shubhadeep (Veraval Regional Centre of Central Marine Fisheries Research institute, Matsya Bhavan P. B. No. 17, Veraval- 362 269, Gujarat, (India)); Sasmal, Debasis; Abraham, T. Jawahar (Department of Fishery Pathology and Microbiology, Faculty of Fishery Sciences, West Bengal University of Animal and Fishery Sciences, 5- Budherhat Road, Kolkata - 700 094 West Bengal, (India)). **Microcosm evaluation of indigenous microflora of traditional shrimp farming system as bioremediators.** Indian Journal of Fisheries (2010) v. 57(1) p. 97-101.

The ability of indigenous microflora of traditional shrimp farming system to remove ammonia was evaluated under laboratory conditions. The indigenous microflora in combination was capable of removal of total ammoniacal nitrogen (TAN) to the tune of 85 - 99% within a week. The activity of nitrifying bacteria was observed to be substrate dependent. The results revealed that the TAN removal rate was affected by high initial TAN concentration and varied microbial activity. The results of the present study would release new avenues for future research and refinement of techniques on bioremediation in shrimp aquaculture.

18. John Chembian, A. (Cochin base of Fishery Survey of India, Cochin - 682005, Kerala, (India)). **Description of spawning ground and egg capsules of the batoid *Raja miraletus* Linnaeus, 1758 in the Wadge Bank, along the south-west coast of India.** Indian Journal of Fisheries (2010) v. 57(1) p. 13-16.

Samplings were conducted in fifteen stations in the Wadge Bank (lat. 07°07'N to 07°58'N and long. 76°55' E to 77°54'E) along the south-west coast of India for collecting egg capsules of *Raja miraletus*. Among the 15 stations covered, egg capsules of *R. miraletus* were observed only at three stations. A total of 119 egg capsules were collected from the area (lat. 07°21'N to 07°29'N and long. 76°55' E to 77°04'E), at the depth range of 112 -123 m indicating this area as the probable spawning ground of the species along the south-west coast of India. Only two of the egg capsules collected had embryo inside. The ratio of unhatched egg capsules to the number of empty capsules found during the survey indicates that, the terminal period of incubation may be in the month of May.

19. Joseph, JiJi; Balasingh, Gini (Department of Botany and Research Centre, Scott Christian College (Autonomous), Nagercoil -629003, Tamil Nadu, (India)). **Cyanobacterial**

**biodiversity in a fresh water perennial pond of Kanyakumari District, Tamilnadu (India).** Aquacult (2010) v. 11 (1) p. 73-78.

The present investigation was mainly aimed to know the cyanobacterial diversity of a perennial pond. The study was carried out during a period of 2007 February-2008 January. In this present investigation, 37 species of blue-green algae were identified. *Microcystis aeruginosa* and *Oscillatoria princeps* were the dominant species observed in the experimental pond.

20. Joshi, Hemant Kumar; (Department of Zoology, H.N.B. Garhwal University (Central University), Pauri Campus, Uttarakhand, (India)). Bahuguna, Pankaj (Department of Zoology, L.S.M. Govt. P.G. College Pithoragarh, Pithoragarh Distt - 262502, Uttarakhand, (India)). Kotnala, C. B. University (Central University), Pauri Campus, Uttarakhand, (India)). Kumar, Rakesh (Department of Zoology, L.S.M. Govt. P.G. College Pithoragarh, Pithoragarh Distt - 262502, Uttarakhand, (India)). **Reproductive power of a hillstream loach sune machi, *Lepedocephalichthys guntea* (Hamilton) from mountain region of Garhwal, Central Himalaya, Uttarakhand.** Aquacult (India). (2010). v. 11 (1) p. 115-118.

Present communication deals with the reproductive power of a hillstream fish *Lepedocephalichthys guntea*, collected from Mandal river in the foothill region of Garhwal Himalaya. Study was based on 21 mature female fishes. The total fecundity was recorded as 280 to 3929 in the fish ranging from 61 mm to 84 mm. It was noticed that the fecundity was highly dependent on ovary length (0.8073) and fish length (0.7840) than the other body parameters.

21. Joshi, K. K. (Tuticorin Research Centre of Central Marine Fisheries Research Institute South Beach Road, Tuticorin - 628 001, Tamil Nadu, (India)). **Population dynamics of *Nemipterus japonicus* (Bloch) in the trawling grounds off Cochin.** Indian Journal of Fisheries (2010) v. 57(1) p. 7-12.

Population dynamics of *Nemipterus japonicus* (Bloch), the dominant species of threadfin breams fished off Cochin was studied during the period 2000-2002. *N. japonicus* was dominant during south-west monsoon and its spawning season extended from May to November. The estimated YBGF parameters were  $L\alpha = 318$  mm,  $K = 0.69$  yr<sup>-1</sup> (males), and  $L\alpha = 265$  mm,  $K = 0.77$  yr<sup>-1</sup> (females) indicating marked growth difference between the two sexes of *N. japonicus*. The study indicated that the present fishing effort along Cochin has reached an optimum level. The maximum yield in the present level of F can be obtained by increasing the length at first capture by 177 % of the present yield. The reduction in the cod-end mesh size unless stopped will lead to recruitment overfishing over a period of years.

22. Kumar, D. (Center for Aquaculture Research and Extension (CARE), St. Xavier's College (Autonomous), Palayamkottai, Tirunelveli); Fernandez P. Arockia Mary (Department of Zoology, Aditanar College of Arts & Science, Tiruchendur). **Growth appraisal of *Channa striatus* fry using sewage sludge mixed diets.** Aquacult (2010) v. 11 (1) p. 65-72.

Effect of sewage sludge on growth of *Channa striatus* fry was investigated using four different types of diets antibiotic treated, acid treated, (raw) sewage sludge and conventional feed for 21 days. The diets were prepared using sewage sludge after they were treated in two methods. The fry fed with acid treated feed showed the best growth rate (0.169 g) and specific growth rate of 0.8%/ day and FCR% 0.016, *Channa striatus* in other diets (Untreated feed, Conventional feed, and Antibiotic treated feed) showed minimum growth rates of 0.135 mg, 0.108 g and 0.151 g. Acid treated feed exhibited the best gross growth efficiency (4.00), net growth efficiency (4.225), relative growth efficiency (0.029) and FCR of (0.016 %). The fish fed on antibiotic treated feed showed the best Assimilation efficiency of 95.1, but the fish fed on untreated feed showed the best Assimilation (7.81) and Consumption (C) (4.225) rate for 21 days.

23. Karodt, Serena Agnes; Radhakrishnan, C. K. (Department of Marine Biology, Microbiology and Biochemistry Cochin University of Science and Technology, Fine Art's Avenue, Cochin - 682 016, Kerala, (India)). **Seasonal variations in the gut contents of *Arius Arius* (Hamilton) from Cochin backwaters.** Indian Journal of Fisheries (2010) v. 57(1) p. 93-96.

The gut contents of the cat fish *Arius arius* from two areas of Cochin backwater *i.e.*, Fort Cochin (high saline area) and Arookutty (low saline area) during pre-monsoon, monsoon and post-monsoon periods, were studied for the period of 1 year from January 2002 to December 2002. The results indicated that *A. arius* is a voracious bottom feeder. Marked variations in the quality and quantity of food intake were observed in relation to season. Crustaceans, fishes and molluscs formed dominant food items in both the locations, during pre and post-monsoon seasons, whereas monsoon marked very low feeding activity. During pre-monsoon and post-monsoon, different conditions of the stomach such as gorged (overfed), full and 3/4% full (active) were seen, while 1/2 full (moderate) stomach and empty condition or stomach with traces (poor) were encountered during monsoon. No sex-wise difference in the feeding habit was observed.

24. Kosygin, Laishram (Zoological Survey of India, Hilltop, Gopalpur 761002. Orissa, (India)); Dhamendra, Haobuam (Lake Monitoring and Research Laboratory, Loktak Development Authority, Ningthoukhong 795126. Manipur, (India)). **Fish diversity and physico-chemical characteristics of the upstream of Imphal river, Manipur, India.** Environment & Ecology (India). (2010) v. 28 (2B) p. 1328-1332.

This paper presents a comprehensive list of the fish and physico-chemical characteristics of the upstream of Imphal river, Manipur. In total, 65 species of fishes representing 40 genera and 18 families have been recorded. As per IUCN status, the fish fauna of the river includes one extinct in the wild, nine endangered and 19 vulnerable species. Highest species composition was observed in the Cyprinidae family (53.8%) followed by Sisoridae (7.7%) and Cobitidae (6.1%). Fish fauna of the river is a mixture of endemic hill stream Burmese and some widely distributed forms. The water quality of the river is considered to be suitable for fish culture and wildlife propagation.

25. Kumar, M. (P.G Department of Chemistry, B. R. Ambedkar Bihar University, Muzaffarpur 84200, (India)). Georgie, K. E. (Department of Chemistry, Marthoma College Chungathara, Nilambur 679334, Kerala, (India)); Kumar, N.; Tinuki, K. K. (PG Department of Chemistry. B. R. Ambedkar Bihar University, Muzaffarpur 84200, (India)); **Some aspect of abiotic studies of polluted Turkaulia lake at Motihari (North Bihar), India.** Environment & Ecology (India). (2010) v. 28 (2B) p. 1313-1316.

The present investigation on water body of Turkaulia Lake was carried out in four different periods, viz., March-May, June-September, October-November, and December-February during 2007-2009. Physico-chemical parameters such as pH, electrical conductivity, total suspended solids (TSS), total dissolved solids (TDS), total alkalinity (T-alk), total hardness (T-Hard), BOD, COD, DO, dissolved CO<sub>2</sub>, nitrate, sulphate, phosphate and iron were investigated. The Langelier saturation index and Ryznar stability of Turkaulia lake water body were calculated from the average value of pH, total dissolved solid, hardness and total alkalinity. The Langelier saturation index value found to be negative, which indicates corrosive tendency of water. Ryznar stability factor value observed above 7. This too indicates corrosive nature of water. These values indicate non-consumable nature of lake water by human beings.

26. Langer, Seema; Sharma, Chetna; Devi, Arti (Department of Zoology, University of Jammu, Jammu - 180006 (India)). **Effects of alternate starvation and re-feeding cycles on compensatory growth response in *Cyprinus Carpio* and *Cirrhinus Mrigala*: a comparative study.** Journal of Inland Fisheries Society of India (2010) v. 42(1) p. 46-52.

A comparative study was conducted to evaluate the effect of feed cycling and ration level on the compensatory growth of *Cirrhinus mrigala* and *Cyprinus carpio*. Fingerlings of *Cirrhinus mrigala* and *Cyprinus carpio* were randomly collected from Nowabad Fish Farm and divided into control, 1 week, 2 week and 3 week feed cycling groups. No hyperphagy occurred in *Cirrhinus mrigala* and *Cyprinus carpio* during re-feeding periods. '3 and 3' feeding cycle group with 5% ration level performed better than '2 and 2' and '1 and 1' feeding cycle groups in case of *Cirrhinus mrigala* and '1 & 1' feeding cycle group with 5% ration level performed better than '2 & 2' and '3 & 3' feeding cycle group in case of *Cyprinus carpio*. However, final results suggested that growth parameters were significantly different ( $P < 0.05$ ) in case of control group in both the experiments as compared to experimental groups suggesting that starvation followed by subsequent re-feeding did not play a role in more growth of *Cirrhinus mrigala* and *Cyprinus carpio*.

27. Kolekar, Vijay (Regional Centre of Central Inland Fisheries Research Institute, Housefed Complex, 4th floor, Dispur, Guwahati - 781 006 (Assam) (India)); Das, Subrata (Central Inland fisheries Research Institute, Barrackpore, Kolkata - 700 120 (India)). **Mangroves of mandovi-zuari estuarine complex, Goa and their associated fish fauna.** Journal of Indian Society Coastal Agricultural Research (2009) v. 27(2) p. 58-60.

Mangroves are highly specialized system forming a luxuriant growth at the mouths of Mandovi-Zuari estuarine complex. The estuarine complex has a wide variety of biotic communities of fish, prawns and mollusks inclusive of a variety of threatened and endemic species. In the present study 16 numbers of mangrove plants and associated flora were recorded which harbored a rich fish fauna. The possibilities of aquaculture of euryhaline varieties of fishes and prawns in the mangrove waters are discussed. There is an excellent feeding ground for fishes with rich plankton varieties observed in the mangrove areas.

28. Mandal, R. N.; Sharma, K. K.; Mazumdar, D. (Wastewater Aquaculture Division, Central Institute of Freshwater Aquaculture P.O. Rahara, Kolkata - 700 118, (India)). Naskar, K. R. (Waste Water Aquaculture Division, Central Institute of Fisheries Research Institute, M.S.O. building, 'C' Wing, DF Block, Saltlake City, Kolkata-700 064, (India)). **Diversity, abundance, association and spatial distribution of aquatic macrophytes in flood-plain wetlands of coastal West Bengal, India.** Journal of Indian Society Coastal Agricultural Research (2009) v. 27(2) p. 61-67.

A survey on macrophytes vegetation was carried out covering 72 water bodies ranging sizes between 0.5-3.5 ha in flood plain areas in respect to area coverage and depth. The study accounted those macrophytes, which occupied at least 10 water bodies and covered minimum 10% of area in individual water body. A total of 34 macrophytes distributed in 30 genera and 22 families have been listed under four groups viz., floating leaved, free floating, emergent and submerged. Results showed that emergent group, with coverage of  $1.6 \pm 0.19\%$  (Mean  $\pm$  SD) area, were significantly higher from other three groups. A wide range of abundance was found in the members of emergent and submerged groups, as compared to those recorded for the members of floating leaved and free floating ones. Ordination Technique like Canonical Correspondence Analysis (CCA) has correlated the relationship between macrophytes distribution and habitats factors. Besides, backward multiple regression technique has developed the best prediction of species distribution in relation to environmental parameters. The study revealed that macrophytes distribution in flood plain areas was diffused than discrete, which was mostly governed by water depth and water retention period rather than by recorded soil parameters such as organic carbon, available nitrogen and phosphorous.

29. Manojkumar, T. G.; Madhusoodana Kurup, B. (School of Industrial Fisheries, Cochin University of Science and Technology, Cochin - 682 016, Kerala, (India)). **Age and growth of the Carnatic carp, *Puntius carnaticus* (Jerdon, 1849) from Chalakudy River, Kerala.** Indian Journal of Fisheries (2010) v. 57(1) p. 81-85.

Based on length composition of commercial landings of *Puntius carnaticus* from the river Chalakudy in Kerala, growth parameters such as asymptotic length ( $L_{\infty}$ ), growth co-efficient (K) and growth performance index ( $\phi$ ) were estimated using ELEFAN I programme as 493.5 mm, 0.5 and 5.08 per annum in male and 504.6 mm, 0.65 and 5.22 per annum in female respectively. The life span of *P. carnaticus* was estimated to be 4-5 years. Males and females attain 286.9 mm and 345.18 mm respectively at the end of 1 year. The growth co-efficient 'K' of *P. carnaticus* (male = 0.5; female = 0.65) was also found to be comparable with many of the freshwater species used in aquaculture. Based on the present study, it can be concluded that along with other favorable characteristics, the higher growth rate of *P. carnaticus* in the first year of its life span makes this species an excellent candidate for freshwater aquaculture.

30. Mishra, S. S.; Dhiman, M.; Das, Priyanka.; Dutta, C.; Mali, P.; Samanta, S. (Central Inland Fisheries Research Institute, Barrackpore, Kolkata - 700 120 (India)). **Microbial hazards associated with fish from different water bodies in relation to pathogens of public health significance.** Journal of Inland Fisheries Society of India (2010) v. 42(1) p. 33-38.

Fish and water samples from a sewage-fed bhery, Mathura beel and the Hooghly river were examined for total plate count, total *Vibrio*, fecal coliforms, *E. coli*, *Aeromonas*, *Salmonella*, faecal *Streptococci*. Results revealed presence of most of these pathogens in water samples but comparatively low level of pathogens in fish muscle. Fish and water collected from Hooghly River were found to be more polluted as indicated by higher microbial load, fecal coli and *Vibrio* counts, followed by that collected from sewage-fed bhery and Mathura beel. Microbial isolates were screened using PCR for specific detection of *E. coli*, enterotoxigenic *E. coli* (ETEC), *Vibrio cholerae*, *Salmonella* spp. and *Aeromonas hydrophilla*. Most fish samples were found negative for ETEC and *V. cholera* but few were positive for *E. coli*, *Aeromonas* and *Salmonella*. However, most water and gill samples were found positive for *E. coli* and *Aeromonas*. Antibiotic susceptibility test of *E. coli*, *Salmonella*, *Aeromonas* and *Vibrio* isolates indicated higher resistance to multiple antibiotics.

31. Nanda, B. P.; Das, P. C.; Jena, J. K.; Sahoo, P. K. (Aquaculture Production and Environment Division, Central Institute of Freshwater Aquaculture, Bhubaneswar - 751 002, Orissa, (India)). **Changes in selected haematological and enzymatic parameters of *Heteropneustes fossilis* exposed to sub-lethal toxicity of rotenone.** Indian Journal of Fisheries (2010) v. 57(1) p. 73-80.

Physiological changes associated with rotenone toxicity in fish was studied by exposing stinging catfish, *Heteropneustes fossilis* to 1/50, 1/10 and 1/2 sub-lethal concentrations of 48 h  $LC_{50}$ , i.e., 0.004, 0.021 and 0.107 mg l<sup>-1</sup> of rotenone, respectively. The haematological and enzymatic parameters studied in general showed dose-dependant changes in response to the toxicant concentrations. The initial haematological responses in toxicant-exposed fish included reduction in total erythrocyte counts and haemoglobin content, and increase in total leukocyte counts and plasma glucose level. Activities of enzymes such as aspartate aminotransferase (ASAT), alanine aminotransferase (ALAT), gamma glutamyl transpeptidase (GGT) and acetylcholinesterase (ACLE) showed varied responses. Changes in haematological parameters increase in the ASAT, ALAT and GGT and inhibition of AChE concentrations observed in the study suggested prevalence of hypoxic stress and tissue damage in the organism due to rotenone toxicity. The reduction of rotenone toxicity within 24-48 h post-application suggests low residual problems since most of these parameters returned back to normalcy in the experimental animals.

32. Paik, T. K. (Vidyasagar University); Acharya, S. K. (Bidhan Chandra Krishi Viswavidyalaya); Chakraborty, S. K. (Vidyasagar University); Biswasand, S.; Haque, A (Bidhan Chandra Krishi Viswavidyalaya). **Assessment of the productivity of fishery in lentic aquasystem from a score of bio-social and techno managerial factors.** Journal of Inland Fisheries Society of India (2010) v. 42(1) p. 23-32.

Lentic aqua-system is the largest ecosystem for managing inland fishery. The productivity at fishery in such aqua-system presupposes the befitting performance from the social, economics and management subsystem. Alongside the technological dimension, the issues of livelihood and income generation are equally important. The present study envisages fish productivity as a collateral contribution made by a score of causal factors. The study carried out in some blocks of North 24 Pgs in W.B. depicted that the techno managerial factors like water area ( $X_7$ ), pH of pond area ( $X_{12}$ ), plankton quantity ( $X_{13}$ ), dissolved  $O_2$  ( $X_{15}$ ), stocking density ( $X_{17}$ ), cost of input ( $X_{18}$ ), size of the fry ( $X_{19}$ ) had recorded significant association in fish productivity. Multiple regression analysis evince that plankton quality ( $X_{13}$ ), stocking density ( $X_{17}$ ), cost of input ( $X_{18}$ ), size of fry ( $X_{19}$ ) and gross investment also exerted predominant causal impacts on the fish productivity.

33. Paul, Moumita.; Gupta, Sandipan.; Basu, Abhisek.; Banerjee, Samir. (Aquaculture Research Unit, Department of zoology, University of Calcutta Kolkata 700 014, (India)). **Indigenous ornamental fish resource of Darjeeling district.** Environmental & Ecology (India). (2010). v.28 (2A) p. 991- 996.

At present, ornamental fishes are one of the most popular pets throughout the world and the high demand for this fishes has made the business of ornamental fishes into a global trade. In India the popularity of these fishes are increasing in a rapid rate. Throughout the world, the export of the ornamental fishes is mostly encircled around the south-East Asian countries, but India's share in this aspect is negligible. West Bengal is a pioneering state in respect to the ornamental fish trade in India. The northern most part of west Bengal is the high fish resources, holding a number of the threatened and endemic fish species, specially the Darjeeling district because this district is with a number of rivers, canals and jhoras and is also thickly interspersed with innumerable hill streams, some of which are potential sources of indigenous ornamental fishes. Works regarding the availability of the indigenous ornamental fishes in this particular district are scanty and for that reason the present work was designed to get an over view about the available indigenous ornamental fish resources of Darjeeling district. During the survey period, we have collected a total of 90 indigenous ornamental fish species belonging to 9 orders, 25 families and 59 genera. Cyprinidae was the most dominant family with 39 representative species followed by Cobitidae and Sisoridae with 6 representative species each.

34. Radhakrishnan. M. V. & Sugumaran. (Department of Zoology, Annamalai University, Annamalinagar-608 002, India ). **Nutrient analysis of sugarcane bagasse and its utilization as a substrate for fish culture.** Geobios (India). (2010) v. 37 (4) p. 249-252.

The Chemical composition of sugarcane bagasse shows that calcium and iron were the major macro and micronutrients, respectively. Protein is the chief constituent.

35. Rajaiah, V.; Vimala, V.; Reddy, K, Vasumathi; Reddy. T, Ravinder (Department of Zoology, Kakatiya University, Warangal - 506 009 (A.P.) (India)). **Tissue esterase patterns of gill and intestine of Perciformes, siluriformes and atheriniform fishes.** Aquacult (2010) v. 11 (1) p. 57-63.

Distribution of esterases are studied in nine fresh water fishes of order Perciformes, Siluriformes, and Atheriniformes in two tissues viz. gill and intestine. In Gill, ESE and ESTP esterases are noticed in perciformes fishes but not in Siluriformes fishes. ChE esterases are dominant in all the siluriformes fishes but not in perciformes fishes. In Intestine CHSP esterases are dominant in all the Siluriformes and Atheriniformes fishes. Perciformes fishes exhibits other esterases like CE, ER, ChE ESE etc.

36. Rajaiah, V.; Vimala, V.; Reddy, T, Ravinder; Reddy, K, Vasumathi. (Department of Zoology, Kakatiya University, Warangal-506 009 (A.P.) (India)). **Tissue esterase polymorphism of fishes belongings to siluriformes and atheriniformes.** *Aquacult* (2010) v. 11 (1) p. 1-8.

Tissue Esterase polymorphism was studied in four fishes namely *Mystus vittatus*, *Clarias batrachus*, *Heteropneustes fossilis* of siluriformes and *Strongylura strongylura* of Atheriniformes. Variation is noticed in *Strongylura strongylura* from other species in having fast moving zones with higher activity and Atheriniformes fish's exhibits similarities in having type of esterase. Predominance of ER esterases in Atheriniformes fish (*Strongylura strongylura*). Absence of ArE esterases in brain of this species distinguishes it from other siluriforme fishes.

37. Ranjeet, K.; (Post Graduate Department of Aquaculture and Fishery Microbiology, MES Ponnani College, Ponnani South, P.O. Malappuram - 679 586, (India)); Madhusoodana Kurup, B. (School of Industrial Fisheries, Cochin University of Science and Technology, Kochi - 682 106 (India)). **Effect of different substrata on growth, survival and production of *Macrobrachium rosenbergii* in polders.** *Journal of Inland Fisheries Society of India* (2010) v. 42(1) p. 39-45.

Growth, survival and production performance of *Macrobrachium rosenbergii* in polders incorporating two different artificial substrates was compared against treatments without any added substrates. Treatments involving tiers of nylon nets as added substrates (T3), the mean weight (58.8 g) and survival rate (58.6%) were comparatively better than treatment T2 involving earthen pipes (52.2 g and 48.4%) or T1 with no additional substrates (32.5 g and 26.8% respectively) at all. Preference of net-tiers during initial phase of development was an important factor governing better production in T3, which was significantly higher (605.6 kg/ha/6 months) than T2 or T1 (453.1 and 211.6 kg/ ha/6 months).

38. Rana, Deep Jyoti Singh; Varshney, Vipin Chandra (Department of Zoology, Shri Varshney College, Aligarh – 202 001, (India)). **Free-living nematodes in wetland of Shekha Jheel.** *Geobios (India)*. (2010) v. 37 p. 117-120.

During a survey of nematodes of Shekha Jheel, 53 genera were collected. Bacterivore nematodes showed greater density as compared to other trophic groups. Rhabditids were the most dominant due to swampy conditions of soil where available carbon was 0.24%, potash 269.9 kg/ha and phosphates 11.9 kg/ha.

39. Rauthan, Geeta (Department of Zoology, S.G.R.R. (PG) College, Dehradun - 248 001 (India)); Rauthan, J. V. S. (Fisheries Research Lab, Department of Zoology, D.A.V. (P.G.) College, Dehradun - 248 001. Uttarakhand (India)). Singla, G. D.; Bisht, R. S.; Negi, Leela; Rawat, Sangeeta; Negi, Manjeshwari (Department of Zoology, D.A.V. (P.G.) College, Dehradun- 248 001. Uttarakhand (India)). **Some haematological values of fresh water fish *Mastacembelus armatus* (Lecepede) of Pilli reservoir infected with haemoflagellate.** *Aquacult (India)*. (2010) v. 11 (1) p. 119-122.

The presence of haemoflagellates particularly the trypanosomes in fish is well known and has been extensively studied. During the course of haematological and pathological studies in freshwater fish of Pilli reservoir of Dhampur (U.P.), we come across a fish *Mastacembelus armatus* infected with a haemoflagellate *Trypanosoma vittai*. The infection was heavy and the presence of trypanosomes in the blood caused some conspicuous changes in the Total Erythrocyte Count (TEC), Total Leucocyte Count (TLC), Differential Leucocyte Count (small lymphocytes, large lymphocytes, neutrophils, eosinophils, basophils, monocytes) and Erythrocyte Sedimentation Rate (ESR).

40. Roy, S. Dam; George, Grinson (Fisheries Science Division, P.B.No.181, CARI, Port Blair - 744 101, Andaman (India)). **Prospect and scope of extensive shrimp farming in tsunami submerged areas.** Journal of Indian Society Coastal Agricultural Research (2009) v. 27(2) p. 54-57.

Fertile arable lands lying above the highest high tide level mark in Port Blair submerged in a fortnight as the lands got sub-ducted to a depth of 1.25 m. The ingress of seawater was high. The inundated areas were having unique features. There were sites, which remained permanently inundated during the lowest low tide. In some sites, water started coming in during high tide and moving out during low tide creating a steady flood and ebb. Some areas dried up after the immediate ingress showing least influence on the tidal cycle. The South West area of Port Blair was severely affected. Mangrove forests dried up with species like *Rhizophora* alone withstanding continuous saline water logging phases. Outlet channels, which served as pathways for flushing out freshwater from catchment areas, became inlet channels for seawater gushing in during high tide. Vast areas of land, which supported the crops, vegetables and paddy cultivation, became barren with the saline water ingress. Thousands of people became jobless with mainstream agriculture activity coming to a stand still. Coastal aquaculture is opening up as a viable option in the submerged areas. A feasibility study was conducted in search of an alternate livelihood for the farmers affected by seduction of lands due to the earthquake on 26 December 2004.

41. Saha, Rina S. (Department of Zoology, M D. Mohta College of Science, Sakkar Dhara, Nagpur – 444 012 (India)); Raja, I. A. (Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola - 444001, (India)). **Blood electrolyte alteration in *Channa punctatus* exposed to endosulfan.** Environment & Ecology (India). (2010) v. 28 (2B) p. 1361-1364.

Endosulfan an organochlorine insecticide is toxic to aquatic organisms, hampering fish health through impairment of body electrolytes balance leading some times to death. So an experimental protocol was designed to look at endosulfan effects on electrolytes content in the blood of the fish *Channa punctatus* a fresh water air breathing fish. The fish was exposed to sub-lethal concentration of endosulfan (0.04 mg/liter) for 7, 14 and 21 days. After the exposure periods, electrolytes balance of Ca and P decreased, and Na took various values depending on the duration of exposure to the insecticide. The alteration in the levels of electrolytes may disturb the metabolism of fish.

42. Sarang, N.; Sharma, L. L. (Department of Aquaculture, College of Fisheries, Maharana Pratap University of Agriculture and Technology, Udaipur - 313 001 (Rajasthan) (India)). **Length-weight relationship and harvestable size of *Labeo Calbasu* from Jawahar Sagar Dam of Southern Rajasthan, India.** Journal of Inland Fisheries Society of India (2010) v. 42(1) p. 53-58.

Length-weight relationship and harvestable size of *Labeo calbasu* from Jawahar Sagar dam (24°82.792' N latitude and 76°52.072 ' E longitude) of southern Rajasthan was studied using key scales. The length-weight relationship of this fish was observed to conform to the formula  $\text{Log } W = - 3.34124 + 1.91260 \text{ Log } \text{TL}$ . The coefficient of correlation (r) 0.959 showed a high degree of correlation between total length and weight. Maximum three annual rings were found in the cycloid scales of fish to assess growth data in the samples representing 1 to 4 year classes. On the basis of growth parameter the harvestable size of 60 cm at the age of 3+ year class has been calculated for *Labeo calbasu* of Jawahar Sagar dam.

43. Sayesware, H. A.; (Department of Zoology, Sahyadri Science College, Kuvempu University, Shivamogga - 577203 (India)). Goudar, Mahesh Anand (Department of Chemistry, D.V.S. College of Arts & Science, Shivamogga – 577 203, (India)). & Ravikumar, M. (Department of Botany, A.D.B. First Grade College, Harpanahalli, Davangere - 577004 (India)).

**Limnological studies Santhekadur pond, Bhadravathi, Karnataka, India.** Geobios (India). (2010) v.37 (4) p. 293-296.

The analysis of Santhekadur pond water for physico-chemical parameters and planktonic composition revealed that it is polluted, possessing high BOD and free CO<sub>2</sub>. A total of 49 species belonging to 31 genera of phytoplanktons were recorded, of which chlorophycean and diatoms were dominant. Ten zooplanktons were also recorded.

44. Shamsan, E. F.; Ansari, Z. A. (National Institute of Oceanography, Dona Paula, Goa - 403 004, (India)). **Biochemical composition and caloric content in the sand whiting *Sillago sihama* (Forsskal), from Zuari Estuary, Goa.** Indian Journal of Fisheries (2010) v. 57(1) p. 61-64.

Fish condition as well as the seasonal variation in biochemical composition (moisture content, lipid, protein and carbohydrate) of an economically important fish, *Sillago sihama* (Forsskal), from Zuari estuary, Goa were monitored over a period of fifteen months from January 2004 to April 2005. Moisture content ranged from 76.2 to 79.6%. Lipid content varied between 4.2 and 2.2%. Protein content formed the highest percentage among the various other components and ranged from 19.1 to 24.96%, while carbohydrate was the lowest, which fluctuated between 0.46 and 0.63 %. The results revealed that moisture content was high when lipid was low during the peak spawning, indicating a significant inverse relationship between the two components ( $r = -0.6$ ,  $p < 0.05$ ). Highest protein values were recorded in November when the lipid content was lowest. Carbohydrate did not appear to contribute much to the reserve in the body.

45. Srinivas, A. (Krishi Vigyan Kendra, Jammikunta, Karimnagar District Andhra Pradesh - 505 122); Venugopal, G. (Scientist in-charge, CIFE, Kakinada); Piska, Ravi Shankar (Department of Zoology, Fisheries Division, University College of Science, Osmania University, Hyderabad-500 007 (India)). **Effect of formulated diets on growth and survival of murrel, *Channa striatus*.** Aquacult (2010) v. 11 (1) p. 21-25.

A study was conducted to determine the growth and survival rate of striped murrel *Channa striatus*. Four types of formulated feeds with different levels of animal and plant source feeds were fed to fish for 32 days in FRP tanks (200 lits capacity). Based on the mean growth rate, specific growth rate and weight gain, efficiency of the feeds were analysed. *Channa striatus* fingerlings exhibited better growth performance with animal source (chicken intestine and fish meal powder) feed than the plant source (rice bran and groundnut oil cake). Feed I, processed chicken intestine offal and Feed II, chicken intestine and fish meal powder have shown maximum specific growth rate of 2.74%/day and 2.37%/day respectively and weight gain of 140.565 %/day and 113.55%/day respectively of *Channa striatus*. The mean growth in terms of weight of murrel seed with different feeds ( $P < 0.05$ ) and in terms of length with different feeds ( $P < 0.05$ ) are significant. The survival rates were also found much higher in animal source feed diet than plant source diet.

46. Syda Rao, G. (Central Marine Fisheries Research Institute, Kochi - 682 018, Kerala, (India)); George, Rani Mary; Anil, M. K.; Saleela, K. N.; Jasmine, S.; Jose Kingsly, H.; Hanumanta Rao, G. (Vizhinjam Research Centre of Central Marine Fisheries Research Institute, Trivandrum - 695221, Kerala, (India)). **Cage culture of the spiny lobster *Panulirus homarus* (Linnaeus) at Vizhinjam, Trivandrum along the south-west coast of India.** Indian Journal of Fisheries (2010) v. 57(1) p. 23-29.

The potential for using floating sea cage for the aquaculture of spiny lobster, *Panulirus homarus* was assessed by rearing them in two different holding systems such as land-based FRP tanks and a large floating cage moored at Vizhinjam Bay along the south-west coast of India. Lobsters were reared for a period of 120 and 135 days in the tanks and cage,

respectively and regularly fed on small/medium sized live mussels (*Perna indica*), in order to evaluate their growth, survival and feasibility for culture. Juvenile lobsters with average weight of  $114.8 \pm 25.67$  g in the cage grew to an average weight of  $225.95 \pm 42.7$  g in 135 days. The weight increase recorded was  $0.82$  g day<sup>-1</sup> with a percentage weight gain of 96.68 in the cage whereas juvenile lobsters in tanks with an average weight of  $77.87 \pm 15.87$  g attained  $137.35 \pm 30.07$  g with a weight increase of  $0.48$  g day<sup>-1</sup> and percentage weight gain of 69.2%. The specific growth rates achieved in lobsters maintained in FRP tanks and in the sea cage were 0.45% and 0.50% of the body weight per day respectively. The hydrological parameters viz., temperature, pH, salinity, dissolved oxygen and microbial load recorded were at the optimal levels for normal growth of lobsters. Bio-foulers on the cage unit were represented by ascidians, barnacles, sponges, polychaetes, brown mussels, oysters and seaweeds, which did not affect the performance of the lobsters as indicated by the significant growth advantages and better survival (75%) of juvenile spiny lobsters in the cage over the tank systems (71 %).

47. Syda Rao, G. (Central Marine Fisheries Research Institute, Post Box No. 1603, Ernakulam North P O. Kochi - 682 018, Kerala, (India)); Pattnaik, Phalguni (Visakhapatnam Regional Centre of Central Marine Fisheries Research Institute Visakhapatnam - 530 003, Andhra Pradesh, (India)); Dash, Biswajit (Central Marine Fisheries Research Institute, Post Box No. 1603, Ernakulam North P O. Kochi - 682 018, Kerala, (India)). **Comparative regeneration of excised mantle tissue in one year and seven year old Indian pearl oyster, *Pinctada fucata* (Gould) grown under land-based culture system.** Indian Journal of Fisheries (2010) v. 57(1) p. 39-43.

Excised mantle tissue (saibo) from the donor oyster is one of the important factors determining quality of cultured pearls. The present study was conducted to compare the process of regeneration of excised mantle tissue in one year and seven year old donor oysters, *Pinctada fucata* grown under land-based culture system. Menthol was used as relaxant prior to excision of mantle tissue, which was found to be effective at a concentration of  $500$  mg l<sup>-1</sup>. The mantle tissue was found to regenerate within 3 months post-excision in both one year as well as seven year old *P. fucata*, with 100% survival. On gross examination, the regenerated mantle tissue of the 1 year as well as the 7 year old oysters appeared similar to that of the normal mantle tissue of the control group. Histological analysis demonstrated complete regeneration of the mantle tissue and its associated structures in both the groups. This is the first description of *in vivo* mantle regeneration in 7 year old pearl oyster, *P. fucata*. The findings revealed that even aged donor oysters yielding good quality saibo can be recovered after mantle excision and could be further used as saibo donors for quality pearl production.

48. Tripathi, Sarita; Mayank, Priyanka; Kumar, Rishi; Singh, Krishna Raj (Central Inland Fisheries Research Institute (ICAR), 24 Panna Lal Road Allahabad 211002 (U.P.) (India)); Pathak, Ravindra Kumar (Department of Zoology, University of Allahabad, Allahabad); Dwivedi, Amitabh Chandra (Central Inland Fisheries Research Institute (ICAR), 24 Panna Lal Road Allahabad 211002 (U.P.) (India)). **Growth rate and age structure of *Cyprinus carpio* var. *communis* in the tributary of the River Ganga at Allahabad.** Aquacult (2010) v. 11 (1) p. 31-38.

The study was carried out to determine the growth rate and age structure of *Cyprinus carpio* var. *communis* (Common carp). Samples of common carp were collected during March 2007 to February 2008 from the Yamuna River at Allahabad. Fishes measured to range from 10.1-76.2 cm. Scales have been validated as an accurate structure for estimating age of *Cyprinus carpio* var. *communis*. Age composition of *Cyprinus carpio* var. *communis* varied from 0 to 12+ age groups. The fish growth rate was 19.0, 7.7, 10.8, 3.6, 4.4, 4.1, 5.3, 4.6, 3.6, 3.1, 4.7 and 5.3 cm at the end of I, II, III, VI, V, VI, VII, VIII, IX, X, XI and XII years of life respectively. The maximum growth was attained in 1 year (9.0 cm) and minimum in the X year (3.1 cm) of the life. According to the percentage occurrence, age group 1<sup>st</sup> was dominant (24.88%), nearly one fourth of the total sample. The age groups 2+, 3+, 4+, 5+, 6+, 7+ and 8+

contributed 19.16%, 16.54%, 10.51%, 5.72%, 4.17%, 3.09%, and 2.78%, respectively. The remaining age groups (9+ to 12+) contributed below 7% of the stock. The 0 age group contributed only 7.26%.

49. Vass, K. K. (Central Inland Fisheries Research Institute (ICAR), Barrackpore, Kolkata – 700120 (India)); Raina, H. S. (Shivram Enclave, Post Office Sidhra, Sidhra - Jammu Tawi, J. K. State – 180019 (India)); Haldar, R. S. (National Research Centre on Coldwater Fisheries (ICAR), Bhimtal, Uttarakhand - 236 136 (India)). **Prospects of rainbow trout - *Oncorhynchus mykiss*, Walbaum culture in mid altitudes of Central Himalayas, India.** Journal of Inland Fisheries Society of India (2010) v. 42(1) p. 1-7.

In temperate regions, the relatively short growing season requires technologies, which can result in high biomass during available growing period. Therefore, to achieve higher growth rates, seasonality factor has to be blended with better aquaculture practices with a focus on diets and environment. This study aims at evaluating the influence of higher water volume, modified culture system and temperature on growth and survival of a fast growing strain of rainbow trout-*Oncorhynchus mykiss* (Norwegian strain). The fishes were reared exclusively on groundwater at a temperature range of 10.0-21.0°C. Experimental trials were carried out in FRP tanks of 2.0 m<sup>2</sup>, the stocks were fed with two different protein and energy content diets. The comparative growth rates over a period of one year at different temperature regimes with two diets have been analyzed. A slightly better growth was found for fish fed on high-energy contents and on low fat feed at higher temperature. The results suggest that the species is well suited for aquafarming in mid-altitudes of Central Himalayas and adoption on commercial scale by entrepreneurs is promising.

50. Varghese, Molly; Krishnan, L. (Central Marine Fisheries Research Institute, P B. No.1603, Kochi - 682 018, Kerala, (India)). **Reproductive potential of the rotifer, *Brachionus rotundiformis* Tschugunoff in relation to salinity, feed type and feed concentration.** Indian Journal of Fisheries (2010) v. 57(1) p. 31-37.

The rotifer, *Brachionus rotundiformis* was isolated from Cochin backwaters, off the Vypeen Island. Pure cultures were developed and experiments were conducted to evaluate the reproductive potential, using different salinities, feed types and feed concentrations as variables. The studies indicated that, these three variables exert significant influence on reproductive potential of this rotifer. For the four different feed types tested, the  $r_{max}$  values were found to decrease in the order, *Nannochloropsis oculata* → *Chlorella marina* → *Isochrysis galbana* → Baker's yeast. For all the 4 feed types tested, the  $r$  values were maximum at the highest feed concentrations used in the experiment. The influence of salinity, feed type and feed concentration, individually as well as in combination, on the reproductive potential of the species is presented.

51. Zaman, M. R.; Banu, R. A.; & Islam, M. S.; (Environmental and Tracer Studies Laboratory, Department of Chemistry and Chemical Engineering, Faculty of Engineering, Rajshahi University. 6205, Bangladesh.) **Toxic metal concentrations in five fish species available at city market Rajshahi, Bangladesh.** Pollution Research (India). (2010) v. 29 (3) p. 379-384.

In this study we have used atomic absorption spectrophotometry (AAS) to determine the concentration of potentially toxic heavy elements viz, As, Pb, Cd and Mn in locally available and highly consumed five fish species collected from central city market (called Shaheb Bazar), Rajshahi, Bangladesh, Sampling was made during the month of February 2006. It is observed that out of five, three fish species (viz, *Pangasius pangasius*, *Labeo rohita* and *Macrobrachium rogenbergii*) are burdened with lead ranging from 13.96-26.54 mg Kg<sup>-1</sup> compared to the permissible value of 0-7.2 mg Kg<sup>-1</sup> (dry weight basis). Pb concentration are significantly higher in *Pangasius pangasius*, *Labeo rohita* and *Macrobrachium rogenbergii* but *Puntius sarana* and *Hilsha ilisha* fishes show Pb content within the safe limit; *Hilsha*

*ilisha* records the lowest. The sequence in Pb concentration according to fish species in the order of *P. pangasius* (26.54 mg kg<sup>-1</sup>) > *L. rohita* (19.71 mg kg<sup>-1</sup>) > *M. rogenbergii* (13.96 mg kg<sup>-1</sup>) > *P. sarana* (3.91 mg kg<sup>-1</sup>) > *H. ilisha* (2.63 mg Kg<sup>-1</sup>). Results revealed that in terms of As, Cd and Mn, all fish species including *P.sarana* and *H.ilisha* are quite safe for human consumption and no public health problem would be raised; however, pb contents in *P. pangasius*, *L. rohita* and *M. rogenbergii* exceed the recommendad limited. The metal concentration found in this study was similar to the metal levels of fishes collected from slightly polluted waters all over the world. Present investigation so far is a first attempt to characterize the indigenous fish species available at Rajshahi City area in terms of As, Pb, Cd and Mn. The results might be useful for evaluating health risks resulting from contamination. Results also would provide support towards remediation related decisions.



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