The morphometric study of the mud eel monopterus cuchia from the west bengal

Morphology & Taxonomy

Jana and Dasgupta (2007) described on the morphometric study of the mud eel Monopterus cuchia from the new alluvial zone of west Bengal. They studied on the biology and morphometry of Monopterus cuchia from the New Alluvial Zone of West Bengal. They classified various morphometric characters on the basis of range difference into genetical (less than 10%), intermediate (10-15%) and environmentally (greater than 15%) controlled characters. They found that morphometric and meristic characters may range from genetic variability to the influence of environmental parameters like habitat, temperature, elevation, slope, gradient, stream velocity, food, productivity, length, sex and age also.

Munshi et al. (1989) described on the structure of the air-breathing organs of a swamp mud eel, Monopterus cuchia. They studied on the structure of the air-breathing organs of Monopterus cuchia by using light, scanning and transmission electron microscopy and the morphological basis for buccopharyngeal respiration, aerial. They found that the respiratory islets are well distributed over the surface of the buccopharynx, hypopharynx and branchial arches extending deep into the gill clefts but occupy only the anterior two-thirds of the air sacs, the remaining posterior one-third part seems to be non-respiratory in function and may serve as a reservoir for residual air.

They also found the respiratory area, capillary loading, thickness of air-blood tissue barrier, and the diffusing capacity of the respiratory membrane of a 200g fish were found to be 20cm2, 2. 72cm3/m2, 0. 72×10-4cm, and 0.

00165ml O2/min/mmHg/kg, respectively. Banerji et al. (1980) studied on the observations on natural breeding and larval development of the common mud-eel Amphipnous cuchia (Ham.). They found that Amphipnous cuchia is a rare fish in India with a spawning period confined down to peak summer. The fish lays its eggs in especially prepared nest-holes and keeps a guard on the developing young ones and yolk reserve persists till about 22 to 24 days of development. They also found that larvae respond to direct feeding even before yolk-absorption and young ones feed actively on chironomus larvae. They conducted that surface breaking habit for aerial respiration apparently commences around 15th–16th day of larval life. Adult characters are almost attained in about a month's time.

Genetic aspects

Begum et al. (2017) studied on the induced breeding attempt of vulnerable freshwater mud eel, Monopterus cuchia. They induced breeding purposes average 350g injected female and average 230g injected male of M. cuchia were stocked. After injection, mud eel transferred into the three habitats such as Cistern, Hapa and Pond. From four months results, it was observed that the mean final length and weight of fry under Tray habitat were 10. 68±1. 89 cm and 1. 09±0. 24g. Besides Cisterns habitat were 10. 78±0. 32 cm and 1. 02±2. 35g and percentage of survival rate was 80 and 77 respectively. They also found that the European eel Anguila. Anguilla and the New Zealand freshwater eels Anguilla dieffenbachia and Anguilla australis, experimentally produced larvae which survived only for a few days and like the Japanese eel, did not develop into leptocephali.

Devi et al. (2017) described on the genetic diversity and population structure of Monopterus spp. of assam and manipur states of northeast india using microsatellite markers. They used eleven microsatellite markers to sort out genetic diversity and population differentiation of Monopterus species as M. albus and M. cuchia. They found that the mean expected heterozygosity within and among individuals of M. albus was 0. 573 and 0. 709 respectively while these values for M. cuchia ranged between 0. 695 to 0. 748 and 0. 692 to 0. 769, approves moderate genetic diversity in M. albus and M. cuchia.

Miah et al. (2016) described on the genetic diversity based population study of freshwater mud eel (Monopterus cuchia) in Bangladesh. They were undertaken for investigating genetic diversity of freshwater mud eel, Monopterus cuchia at population level where ecological population such as flooded area of Sylhet (P1), open water of Moulvibazar (P2) and open water of Sunamgonj (P3) districts of Bangladesh were considered.

They found that allelic information where the frequency of p and q alleles were observed 0. 093 and 0. 907 in P1, 0. 076 and 0. 924 in P2, 0. 074 and 0. 926 in P3 respectively. The average gene diversity was observed highest in P2 (0. 132) followed by P3 (0. 131) and P1 (0. 121) respectively. Miah et al. (2015) analyzed on the breeding biology and induced breeding status of freshwater mud eel, Monopterus cuchia. They observed breeding biology and induced breeding of freshwater mud eel, Monopterus cuchia. The ova diameter was recorded from 0. 3 mm to 4. 30 mm and the individual fecundity was recorded from 155 to 1495 while relative fecundity was found from 2. 64 to 12. 45. The fecundity related to body weight and length of fish was also discussed.

A peak of GSI was observed 2. 14±0. 2 in male and 5. 1±1. 09 in female. Induced breeding of freshwater mud eel, Monopterus cuchia was also practiced with different doses of different inducing agents like Pituitary Gland (PG), Human Chorionic Gonadotropin (HCG), Gonadotropin Releasing Hormone (GnRH) and Ovuline-a synthetic hormone in different environmental conditions. Jahan et al. (2014) described about reproductive biology and gonad histology of mud eel, monopterus cuchia (hamilton, 1822). They studied on the reproductive biology and gonad histology of freshwater mud eel Monopterus cuchia. They found Gonado somatic Index (GSI) and ova diameter were found to range between 0. 31 to 1. 85 and 0. 53 mm to 4. 20 mm. They also found Mean absolute and relative fecundity were 645. 13±92. 12 and 2. 52±0. 29. They analyzed the percentage of Early Peri Nucleolus (EPN) stage was highest (7. 67±1. 53%) while Late Peri nucleolus (LPN) stage was highest(31. 00±2. 65 %) and Cortical Alveoli (CA) stage reached to maximum (10. 67±2. 08%). Vitellogenic stage (VG) was found in ripe phase and chronologically increased and highest percentage of ripe oocytes was recorded (33. 67±3. 51%). Chakraborty et al. (2013) analyzed on the fecundity and gonado somatic index of Gangetic mud eel, Monopterus cuchia. They found that the fecundity ranged from 458. 0±31. 22 to 1116. 0±11. 31 and have a total length of 54. 25±1. 71 to 66. 05±0. 71 cm, body weight from 256. 33±45. 14 to 492. 50±2. 50 g and gonad weight from 21. 32±4. 48 to 55. 90±0. 98g.

They found that the relationships between body length and fecundity was found to be polynomial of second order of body weight and was expressed as: Y= 0. 2683 X2- 1. 9383 X+370. 72. They analyzed that the regression

equation established for fecundity on total body weight was Y= 454. 37 X-692. 8 and total gonad weight was Y= 19. 602 X-27. 546. They showed that the relationship between fecundity and total weight was curvilinear. Miah et al. (2013) analyzed on the molecular identification and sexual differentiation of freshwater mud eel, Monopterus cuchia. They identified molecular identification and sexual differentiation of freshwater mud eel, Monopterus cuchia which is most important for induced breeding. They used a rapid and cost effective molecular markers, mitochondrial 16S rRNA and glutamine synthetase gene to establish molecular standards for identification of this fish.

They observed Similar bands in all the individuals at the level of 250bp length by using 16s mitochondrial DNA and 544bp length for partial sequence of glutamine synthetage gene. They also described sexual differentiation of this species was established through morphometric and histological analysis for, suitable differentiation between male and female fish. Alam et al. (2010) analyzed on the DNA fingerprinting of the freshwater Mud Eel, Monopterus Cuchia (Hamilton) by Randomly Amplified Polymorphic DNA Marker. They studied on the genetic status and subsequently implementing programs on conservation of the genetic resources. They found that Index and band sharing based similarity index were 0. 285, 0. 423 and 88. 33% respectively indicating a substantial level of genetic diversity. They also found the PCRRAPD fingerprinting technique has been found to be suitable for assessing the genetic structure of the freshwater mud eel.

Health condition, growth & survival rate

Hangzo et al. (2017) conducted to ammonia stress under high environmental ammonia induces hsp70 and hsp90 in the mud eel, Monopterus cuchia. They investigated the possible induction of heat shock protein 70 and 90 (hsp70, hsc70, hsp90α and hsp90β) genes and more expression of hsp70 and hsp90 proteins under ammonia stress in different tissues of the mud eel. They analyzed that more abundance of Hsp70 and Hsp90α proteins might be one of the strategies adopted by the mud eel to defend itself from the ammonia-induced cellular damages under ammonia stress. Further, they reported that ammonia-induced induction of hsp70 and hsp90α genes under hyper-ammonia stress in any freshwater air-breathing teleost.

Sharmin et al. (2016) studied on the effect of different stocking densities on growth and survival rate of monopterus cuchia (hamilton) fry reared in cemented cisterns. They described different stocking densities in cemented cisterns measuring 2. 45 x 1. 5 x 0. 75 meter. They analyzed that water quality parameters such as; temperature, dissolve oxygen, ph, total alkalinity and ammonia-nitrogen in suitable ranges for fish culture and the treatments evaluated was the best stocking density considering the highest growth and survival of fingerlings of Monopterus cuchia in cemented cisterns. They found that survival was found to be negatively influenced by stocking densities and it might be due to the high competition and space as well as cannibalistic nature among the M. cuchia fries. Mech et al. (2014) described about an acute toxicity study of Retinoic acid in the freshwater eel, Monopterus cuchia. They carried out to calculate the LD50 value of RA in Monopterus cuchia through intramuscular injection. They used RA in

managing various fish farms and to increase the immune function of the fish for better yield. They found that the in vivo use of RA in fish and the calculated value can be assumed to be used in various purposes such as in fish farming, in aquaculture etc as fishes are susceptible to various wounds, infection and diseases due to various environmental factors, pollution and various other reasons.

Ahmed et al. (2009) described an investigation on health condition of a freshwater eel, monopterus cuchia from ailee beel, mymensingh, bangladesh. They observed clinical and histopathological health conditions of freshwater mud eel, Monopterus cuchia. They found major pathology in the skin and muscle such as loss of epidermis and dermis, necrosis of myotoms, huge vacuum spaces, marked melanomacrophage and fungal granuloma. They also found that fishes were affected by EUS, with the evidence of development of fungal granuloma in skin, muscle and kidney. They also noticed that marked melanomacrophages, severe haemorrhage, vaccums, hepatic necrosis, fat droplets in the liver and numerous haemorrhagic areas, necrosis, few fat droplets and many fungal granulomas in the kidney. Rahman et al. (2005) studied on the effect of temperature on food, growth and survival rate of freshwater mud eel, monopterus cuchia (hamilton) during aestivation period. They studied on feed intake, growth and survival rate of freshwater mud eel, Monopterus cuchia. They found that the mean initial weight of mud eel was 82. 4 ± 1. 53 g and the mean final weight was 78. 45 ± 0. 92 g. No mortality was observed during the experimental period. No food was taken by the fish at or below the average temperature of 12°C. They also found that metabolic rates were most closely connected with

changes in temperature of the water and increased the anaerobic metabolism as well as changes in nitrogen metabolism by burrowing in the mud and also live off on large fat reserves located in their tails.

Socio- economic condition

Khatun et al. (2016) studied on the socio-economic condition of coastal people involved in kuchia catching in south-western region of bangladesh. They described to create a better understanding about the socio-economic condition of coastal communities involved in kuchia catching. They showed that the highest percentage (50%) of kuchia catchers belong to the age group of 31-40 years, 89. 29% of kuchia catchers were Hindu, while only 10. 71% were Muslim and the highest percentage (46. 42%) of kuchia catchers were found to be educated at the level of class one to two. They showed that the highest percentage (42. 86%) of Kuchia catchers earned Tk. 30-60/day by selling their collected kuchias. They found that Economic status of kuchia catcher is not good and live below poverty line. Kuchia catchers having no own land, live in khas land.

Rahmatullah et al. (2015) studied on the socio-economic status of kuchia catchers at Purbadhala upazila under netrokona district. They observed the present socio-economic status of kuchia catchers at Purbadhala upazila under Netrokona district. They showed that the highest percentage (42. 5%) of kuchia catchers belonged to the age group of 21-25 years and 75% of them were ethnic people and also family consisting of 4-5 members was the highest (47. 5%). They also found that the highest percentages (70%) of kuchia catchers had monthly income between 10200- 11000 Taka. They

observed that kuchia catchers were poor, lack of educational knowledge and not conscious about hygiene, environment and curse of poverty.

Culture system

Miah et al. (2015) described on the rearing and production performance of freshwater mud eel, Monopterus cuchia in different culture regimes. They studied the effect of different environments on rearing and production performance of freshwater mud eel, Monopterus cuchia. They found that the live feed are suitable for obtaining highest growth performance based on the findings of plastic tank and house tank. They also found that the environmental conditions were same but different amount of supplied feed has different impacts on growth performance of fishes.

Barman et al. (2013) studied on the indigenous techniques of catching the mud eel, Monopterus cuchia. They found fishing technique of catching mud eel. They found that the complexities of its habitat, behavior, and life history characteristics, makes it difficult to catch the fish and documentation on the fishing method for catching mud eel is scanty. They conducted that wounding gears included spear, knives and sickle were used. Among plants, Derris elliptica Benth. and Milletia pachycarpa Benth. were used. Spindle shaped, cubical traps, bunding, digging and light fishing used to catch the mud eel.

Chakraborty et al. (2010) investigated the technical and co-management aspects of mud eel (monopterus cuchia) culture by ethnic (adivasi) communities in the northern Bangladesh. They observed production potential of mud eel in participatory semi-intensive culture systems. They

observed that the individual final weight was 310. 63±17. 59 g in 150 days of culture period. The average daily gain, specific growth rate, FCR and survival rate were 1. 43±0. 08, 0. 79±0. 23, 1. 0±0. 0 and 90. 0±0. 0, respectively. They reported that an ideal temperature for proper feeding and growth of M cuchia is between 20. 0 to 35. 0 0C that the fish would not eat well below and above temperature. They also found that fish don’t grow at all, hibernating and burrows in the mud.

Hossain et al. (2007) studied on the status and potentials of eel fisheries in Bangladesh. They explored production and marketing of eel fisher community. They found that at the present rate of exploitation eels will be extinct within a few decade, conservation measure of eels product should be taken, culture and rearing practice should introduce, intervention and participations of collectors in the market chain should be ensured and finally various institutional and non-institutional barriers e. g. high transportation cost/illegal toll/taxation, price exploitative market players between producers and consumers should be eradicated.