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CORRELATION STUDY BETWEEN PHYSICO-CHEMICAL & MORPHOMETRIC PARAMETERS OF FRESHWATER CRAB (*BARYTELPHUSA CUNICULARIS)* AT SHAIKH FARMS TQ. KANNAD

Gaikwad B.H[2], Mohammad Mohsin[1], Vidya Pradhan[1*]

1. Dr. Rafiq Zakaria College for Women, Aurangabad
2. Shivaji college, Kannad.

Email: gaikwadbh1965@gmail.com

Abstract:
Environmental pollution is one of the undesirable side effects of industrialization and found responsible factor for environmental degradation. Water samples and crabs Barytelphusa cunicularies were collected from Kannad Tahsil and analyzed for physico-chemical parameters and correlation study is carried out with weight, size etc. The results showed alkaline pH and hardness, D.O., etc. parameters are within permissible limit. The results obtained were discussed in relation to physico-chemical parameters over size, body weight, length, width of male and female crab Barytelphusa cunicularies.

1. Introduction:

The utilization of dietary protein is closely related to both protein level and availability of non-protein energy sources (such as lipids and carbohydrates) in the feed. In particular, as a macronutrient, lipids are principally a source of energy and satisfy the energy needs of the aquaculture animal, the amount of dietary lipid requirement is influenced by the contents of dietary protein and carbohydrate, which can also serve as sources of energy[1]. In general, the presence of other dietary energy-yielding nutrients in adequate amounts to reduce dietary amino acid catabolism, an effect that is commonly referred to as "protein-sparing", may be economical, moreover, increasing the lipid content of the diet can reduce dietary protein (amino acid) catabolism in animals, a lot of studies also have demonstrated that extra digestible energy provided from lipid has a limited impact on the efficiency of protein utilization under certain conditions. There is a strong argument that the digestible protein to digestible energy ratio is a more rational method of expressing the protein requirement than the dietary "crude protein" requirement (percentage CP of diet)[2]. Thus, balancing the protein to energy ratio of aquaculture feed is essential for efficient protein deposition. The interaction of the protein level and energy ratio of

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protein is influenced by the growth rate of daily and retention of lipid. To maintain the balance of protein and energy ratio in feed, which is the appropriate P/E, can be conducive to the use of feed energy, can promote the rapid growth of the aquaculture object, and can improve the feed utilization[3]. The study aimed to investigate the effects of including high levels of oilseed meals in the diets of Chinese mitten crabs (Eriocheir sinensis) on their growth performance, non-specific immunity, hepatopancreatic function and intestinal morphology[4-5]. Eight isonitrogenous and isoenergetic diets containing soybean meal (SBM), cottonseed meal (CSM), rapeseed meal (RSM) and peanut meal (PNM) were formulated. The control diet contained 400 g/kg fish meal (FM) and 150 g/kg combined oilseed meals. The content of each oilseed meal in test diets ranged from 400 or 600 g/kg diet, with the total oilseed meals in each test diet ranging from 760 to 840 g/kg. One diet containing 651 g/kg of the combined oilseed meals and 80 g/kg FM (diet FM80) was also assessed. The experimental diets were each fed to four replicate groups of juvenile crabs (1.48 ± 0.04 g) for 14 weeks. Results showed no differences in the survival rate and feed intake among the treatments (P>0.05). Ectothermic vertebrates and invertebrates display seasonal variation in behavior, growth and reproductive activity. In general, growth and reproduction occur during the months with warmer temperature, while colder temperature slows or halts these processes. Thus, animals with a life span over one year often show a species-specific pattern of growth, reproduction, and migratory behavior that reflects their specific life stage and season[6-12].

2. Material and Methods:

1. **pH:** pH was determined by measurement of the electromotive force of a cell comprising an indicator electrode and a reference electrode immersed in test solution is usually achieved by means of a liquid junction. This is a high impedance electrometer calibrated in terms of pH.
2. **Temperature:** To measure the temperature of water zeal thermometer was used with ± 0.1 ^{0}C.
3. **Turbidity:** To measure the turbidity of the water sample equip-Tronic turbidometer was used.
4. **Conductivity:** Conductivity was measure by the Elico make (model CM 180) conductometer.
5. **Total dissolved solids:** It was obtained by filtration and evaporation method.
6. **Dissolved Oxygen:** Winkler's Iodometric method was followed to determine dissolved oxygen. The manganous sulphate reacts with alkali (NaOH or KOH) to form a white precipitate of manganous hydroxide, which in the presence of oxygen gets oxidized to a brown coloured compound. In the strong acidic medium manganese ions are reduced by iodide ions which get converted into iodine equivalent to the original concentration of oxygen in the sample. The liberated iodine was titrated against sodium thiosulphate solution (0.025N) and by using starch as indicator.
7. **Free Carbon dioxide:** Free carbon dioxide can be determined by titrating the sample using a strong alkali to pH 8.3. At this pH all free carbon dioxide is converted into

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bicarbonates. To estimate amount of free carbon dioxide a sample aliquot is taken in a conical flask to it phenolphthalein is added and titrated against a known concentration of sodium hydroxide. If the colour of the solution turned to pink, free carbon dioxide is absent. If the sample remains colourless after titrating with alkali and at the end point a pink colour appears.

8. **A1kalinity:** The alkalinity in water is generally imparted by the salts of carbonates, bicarbonates, phosphates, nitrates, borates, silicates, etc. Together with hydroxyl ions in free state. However, most of the waters are rich in carbonates and bicarbonates with a little concentration of other alkalinity been determined by titrating the samples with standard hydrochloric acid. Phenolphthalein and methyl orange were used as indicators. In the case of the use of phenolphthalein alkalinity (PA) and in case of methyl orange it is called as total alkalinity (TA). From the neutral point obtained by the two indicators, alkalinity expressed as $CaCO_3$ and as CO_3 and HCO_3 was calculated. The results have been expressed in ppm and as individual ion in mg/L. PA and TA have been calculated as follows
9. **Bicarbonate:** Total alkalinity is the measure of the capacity of the water to neutralize a strong acid. The alkalinity in the waters is generally imparted by the salts of carbonates, bicarbonates, phosphates nitrates, borates, silicates etc. together with the hydroxyl ions in, Free State. However, most of the waters are rich in carbonates and bicarbonates with little concentration of other alkalinity imparting ions.

   Total, alkalinity, carbonates and bicarbonates can be estimated by titrating the sample, with a strong acid (HCI or HSO), first to pH 8.3 using phenolphthalein as an indicator and then, further to pH between 4.2 and 5.4 with methyl orange or mixed indicator. In first case, the value is called as phenolphthalein alkalinity (PA), and in second case, it is total alkalinity (TA). Values of carbonates, bicarbonates and hydroxyl, ions can be computed from these two types of alkalinities.

   Concentration of, carbonates, bicarbonates and hydroxyl ions can be determined from the Table of carbonate using data of PA and TA.
10. **Carbonate:**

Values of Hydroxyl ions, carbonates and bicarbonates from the values of phenolphthalein and total alkalinities

Result of titration	OH alkalinity as $CaCO_3$	CO_3 alkalinity as $CaCO_3$	HCO_3 alkalinity as $CaCO_3$
P = 0	0	0	T
P < 1/2 T	0	2 P	T – 2P
P = 1/2 T	0	2 P	0
P > 1/2 T	2P – T	2 (T – P)	0
P = T	T	0	0

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11. **Phosphate:** The water sample is digested in H_2SO_4-K_2SO_4 mixture and taken from it a specified quantity, diluted with distilled water. Neutralized by sodium hydroxide solution, followed by ammonium molybdate and few drops of $SnCl_2$ solution. The amount of phosphate is obtained from the calibration curve of blue colour produced

12. **Nitrate:** The nitrate concentration was determined by using UV-Visible spectrophotometer Elico make (model SL-159) at 220 nm and 275 nm. Since dissolved organic matter absorbed at 220 nm and NO_3 does not absorb at 275 nm.

13. **Hardness:** Water hardness is the traditional measure of the capacity of water to react with soap. Hard water requiring considerable amount of soap to produce lather. To 50 ml of well mixed sample in porcelain dish added 1 to 2 ml of buffer solution followed by a 1 ml of inhibitor. A pinch of EBT indicator is mixed and titrated with standard EDTA solution till wine red colour changes to blue. In the similar fashion a blank titration is carried out. From the difference of the sample and blank the Hardness of water is calculated.

14. **Calcium Hardness:** Many indicators such as ammonium purporate, calcon etc. form a complex with only calcium but not with magnesium at higher pH. As EDTA is having a higher affinity towards calcium; the former complex is broken down and a new complex is formed. However, EDTA has property to combine with both Ca^{++} and Mg^{++}, therefore, magnesium is largely precipitated as its hydroxide at sufficiently higher pH. The calcium present in water was determined using EDTA titration as described in literature.

15. **Magnesium Hardness:** Calcium and magnesium form a complex of wine red colour with Eriochrome Black at pH 10.0 the EDTA has got a stronger affinity for Ca^{++} and Mg^{++} the former complex is broken down and a new complex of blue colour is formed. The value of Mg^{++} can be obtained by subtracting the value of calcium from the total of $Ca^{++} + Mg^{++}$.

16. Chloride: Taken 100 ml of the sample and adjusted the pH between 7.0 and 8.0 to this solution 1 ml of potassium chromate is added. The solution is titrated with standard silver nitrate till silver chromate starts precipitating. Similarly a blank sample also run with same quantity of distilled water. From the burette reading the amount of chloride is calculated.

17. Length, Breadth and Weight of crabs: All these parameters were measured at the side by carrying calibrated instruments.

3. Result and Discussion:

a. Physico-Chemical parameters: Crabs were collected from June 2012 to May 2014 and simultaneously water samples also collected at the site only. During the study air temperature was recorded at the site only. It was observed that average air temperature was 24 ^{0}C with maximum 32.4 ^{0}C and minimum of 15.8 ^{0}C. The water temperature was 23.44 ^{0}C in average and ranging from 30 ^{0}C to 18.8 ^{0}C. The pH varies from 8.0 to 8.8 with an average of 8.3. Conductivity is due to ions present in the water and it was from 252 mS to 322 mS with an average of 281.66

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mS. Dissolve oxygen which supplies the fresh oxygen to the marine animals and a taste to water found to be in the range of 2.6 ppm to 7.0 ppm with an average of 5.19 ppm. During the course of study remaining parameters were found within the permissible limits.

b. **Correlation study:** A correlation study was carried out between the physico-chemical parameters and the morphometric parameters. The study reveals that weight of male and dissolved oxygen having a good correlation of 0.79.Similarly phosphate and nitrite of 0.98, weight of male and total alkalinity 0.83, length of female and total alkalinity -0.85, pH and conductivity 0.99, turbidity and TDS of 0.90, calcium hardness and magnesium hardness of 0.85, and chloride with nitrite having a correlation of 0.85.

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WtM	LM	WM	WtF	LF	WF	pH	Turbi Dity	Sp. Cond (mS)	TDS ppm	D. O. ppm	Free CO_2 ppm	P. A. ppm	T. A. ppm	CO_3 ppm	HCO_3 ppm	T.H. ppm	Ca.H. ppm	Mg.H ppm	Cl^- ppm	PO_4 ppm	NO_3
1.00	0.17	0.65	0.31	-0.39	-0.32	0.45	0.76	0.47	0.60	0.51	0.49	0.42	0.55	-0.42	-0.20	-0.42	-0.38	-0.48	-0.07	-0.18	-0.21
	1.00	0.28	0.16	-0.03	0.12	0.29	0.28	0.30	0.18	0.22	-0.17	-0.15	-0.07	-0.17	-0.40	-0.37	-0.04	-0.32	-0.07	-0.15	-0.20
		1.00	0.64	-0.79	-0.38	0.16	0.76	0.19	0.72	0.79	0.57	0.62	0.83	-0.57	-0.36	-0.31	-0.07	-0.35	-0.12	-0.32	-0.30
			1.00	-0.73	-0.49	0.29	0.58	0.29	0.46	0.67	0.42	0.58	0.64	-0.08	-0.11	-0.22	0.27	-0.15	-0.04	-0.13	-0.13
				1.00	0.34	-0.03	-0.66	-0.05	-0.65	-0.71	-0.67	-0.64	-0.85	0.36	0.33	0.24	-0.11	0.17	0.12	0.29	0.26
					1.00	-0.62	-0.44	-0.63	-0.19	-0.60	-0.15	-0.58	-0.39	0.15	-0.08	0.31	-0.02	0.43	0.14	0.08	0.11
						1.00	0.39	0.99	-0.02	0.46	0.05	0.27	0.09	0.01	0.05	-0.46	-0.26	-0.53	-0.12	-0.01	-0.07
							1.00	0.41	0.90	0.60	0.51	0.48	0.67	-0.45	-0.32	-0.53	-0.28	-0.46	-0.11	-0.21	-0.21
								1.00	-0.01	0.48	0.06	0.29	0.11	0.00	0.03	-0.51	-0.29	-0.61	-0.12	0.00	-0.07
									1.00	0.40	0.50	0.35	0.64	-0.46	-0.31	-0.34	-0.15	-0.24	-0.01	-0.16	-0.13
										1.00	0.54	0.71	0.77	-0.42	-0.33	-0.45	-0.05	-0.52	-0.15	-0.25	-0.23
											1.00	0.65	0.73	-0.35	-0.36	-0.14	-0.07	-0.12	0.04	-0.04	0.01
												1.00	0.65	-0.19	-0.22	-0.31	-0.04	-0.28	-0.26	-0.22	-0.17
													1.00	-0.46	-0.31	-0.16	0.01	-0.18	-0.09	-0.20	-0.18
														1.00	0.36	0.20	0.19	0.14	0.23	0.35	0.33
															1.00	0.27	0.19	0.20	0.22	0.24	0.23
																1.00	0.58	0.85	0.51	0.38	0.41
																	1.00	0.52	0.44	0.31	0.35
																		1.00	0.18	0.09	0.16
																			1.00	0.85	0.85
																				1.00	0.98
																					1

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References:

1. Y. Dayakar and K. V. Ramana Rao; Breeding Periodicity of the Paddy Field Crab Oziotelphusa senex senex (Fabricius) (Decapoda:Brachyura), a Field Study, *Journal of Crustacean Biology,* 12 (4), 655-660, 1992.
2. Christine M. Kondzela and Thomas C. Shirley; Survival, Feeding, and Growth of Juvenile Dungeness Crabs from Southeastern Alaska Reared at different Temperatures, *Journal of Crustacean Biology,* 13 (1), 25-35, 1993.
3. Fernando Alvarez and José Luis Villalobos; Six New Species of Fresh-Water Crabs (Brachyura: Pseudothelphusidae) from Chiapas, Mexico, *Journal of Crustacean Biology,*18 (1), 187-198, 1998.
4. Luke Victor Rostant, Mary Alkins-Koo and David P. Maitland; Growth and Maturity in the Manicou Crab Eudaniela garmani (Brachyura: Pseudothelphusidae) from Trinidad, West Indies, *Journal of Crustacean Biology,* 28 (3), 485-493, 2008.
5. Wataru Doi, Masashi Yokota, Carlos Augusto Strüssmann and Seiichi Watanabe; Growth and Reproduction of the Portunid Crab Charybdis bimaculata (Decapoda: Brachyura) inTokyo Bay, Journal of Crustacean Biology, 28 (4), 641-651, 2008.
6. Taku Sato, Kenzo Yoseda, Osamu Abe and Takuro Shibuno; Male Maturity, Number of Sperm, and Spermatophore Size Relationships in the Coconut Crab Birgus latro on Hatoma Island, Southern Japan, *Journal of Crustacean Biology,* 28 (4), 663-668, 2008.
7. Bandral M., Gupta K. And Seema Langer ; A Survey On Physico-Chemical Parameters In Relation To Abundance/ Distribution Of Fresh Water Crab (Paratelphusa Masoniana) In Gho Manhasan Stream Of Jammu Region, India, *Research Journal Of Animal, Veterinary And Fishery Sciences,*1(9), 1-6, 2013.
8. Hendra Wijaya, FransiskaRungkat Zakaria, Dahrul Syah, Endang Prangdimurti; Extraction of crab (Scylla serrata) myofibrillar and sarcoplasmic proteins to create a skin prick test reagent for crab allergy diagnosis, Procedia Food Science 3, 52 – 68, 2015.
9. A. Maharajan , Y. Narayanasamy, V. Ganapiriya, K. Shanmugavel; Histological alterations of a combination of Chlorpyrifos and Cypermethrin (Nurocombi) insecticide in the fresh water crab, Paratelphusa jacquemontii (Rathbun), The Journal of Basic & Applied Zoology, 72, 104–112, 2015.
10. Sapto P. Putro, Haikal H. Fahrian, Widowati, and Suhartana; Application Of Environmental Management On The Farming Practice Of Mud Crab *Scylla Serrata* At Coastal Area Of Ujung Alang, Cilacap, Indonesia: Efforts Toward Sustainable Aquaculture, Procedia Environmental Sciences, 23, 297 – 306, 2015.

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Title Key: Correlation study between physic-chemical …

11. C. Viswanathan, S.M. Raffi; The natural diet of the mud crab Scylla olivacea (Herbst, 1896) in Pichavaram mangroves, India, Saudi Journal of Biological Sciences, 22, 698–705, 2015.
12. Mohamad N. Azra, Mhd Ikhwanuddin; A review of maturation diets for mud crab genus Scylla broodstock: Present research, problems and future perspective, Saudi Journal of Biological Sciences, 23, 257–267, 2016.