International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 02-06-2024, Accepted: 23-06-2024, Published: 17-07-2024
Volume 9, Issue 7, 2024, Page No. 83-85

Estimation of protein in *Clarias batrachus* under the three different photoperiods

Shweta Agniwanshi[1*], Atul Trivedi[2]
[1] Department of Zoology, Dr. R.B. Govt. N. K. Mahavidyalaya, Raipur, Chhattisgarh, India
[2] Department of Zoology, Swami Atmanand Govt. English Medium Model College, Jagdalpur, Chhattisgarh, India

Abstract
Fishmeat is a good source of protein and changes in standard value in protein amount act as an indicator of stress and health. The present study has been designed to investigate the different photoperiodic effects in protein under natural day-night (12L:12D), continuous illumination (24L:00D) and continuous dark (00L:24D) conditions in four different phases *viz*., Resting Phase, Pre Monsoon Phase, Monsoon Phase and Post Monsoon Phase. The experiment was conducted for 60 days, during this period counting of Protein assessed at the interval of 15 days after the commencement of the experiment. **A** four-way ANOVA was employed to examine the effect of factors, "Year" (1,2&3), "Phase" (Resting, Pre Monsoon, Monsoon and Post Monsoon), "Treatment" (LD=NormalDay-night condition, LL=Continuous illumination and DD=continuous dark condition)) and "Interval" (15 days, 30days, 45days and 60 days) on muscle Protein level of Clarias batrachus. All the parameters except year produce a significant effect on the muscle Protein level of *Clarias batrachus* ($p<0.01$).

Keywords: Photoperiod, *Clarias batrachus*, Muscle Protein, Fish meat

Introduction
In Islam and Joaddar's (2005) [9] study, it is emphasized that fish consumption plays a crucial role in providing essential nutrients to a significant global population, thereby making a substantial contribution to nutrition.

Light is one of the rearing conditions that can be easily manipulated in recalculating water systemsand most of the research work focused on the photo-period is man dintensity of light (Bouef and Bail, 1999) [4].

Light sensitivity plays a crucial role in the lives of fish, influencing their behavior, diurnal activities, and various other aspects of their existence (Marchesan *et al*., 2005; Dou and Tsukamoto, 2003; Maheshwari, 1998) [11, 7]. It has been noted that light exposure can induce compositional changes in fish during their growth stages. Physiological and biological data play a crucial role in understanding how light influences fish growth by improving food conversion efficiency, rather than solely stimulating food intake.

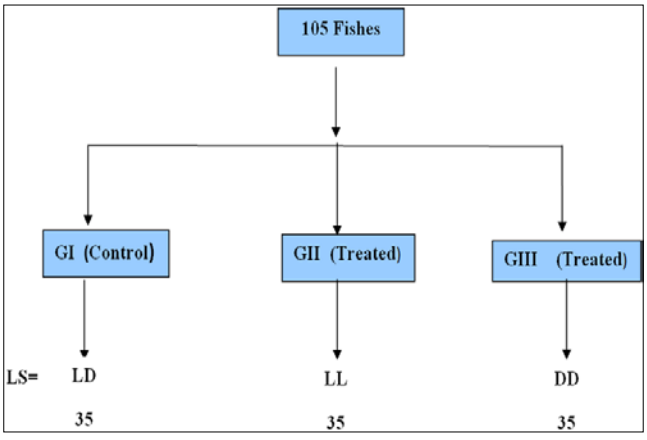
Fish are known for their sensitivity to environmental changes, making them valuable bioindicator species. Photoperiodic manipulation is increasingly recognized as a practical approach for regulating physiological functions in fish farming. Photoperiod techniques have been shown to significantly influence various physiological functions in fish species, including growth, reproduction, gonadal maturation, and protein composition (Boeuf and Bail, 1999; Rodriguez *et al*., 2001; Biswas and Takeuchi, 2003; Gines *et al*., 2004) [4, 13, 3, 8].

Material and methodology
The experiment involved 105 Clarias batrachus conducted continuously over three years. During the study, the fish were fed alternating between pieces of dried fish and boiled eggs every other day. The water in the aquarium was changed on the same days as the feeding schedule.

Prior to the start of the experiment, 105 acclimatized Clarias batrachus fish weighing approximately 70 ± 2 grams were randomly selected from stock aquaria. They were properly acclimatized under a 12 hours light:12 hours dark photoperiod for 24 hours.

The experiment was conducted under three light conditions *viz*. LD, LL and DD. For the experiment fish were divided into three groups (groups I, II and III). Each group with N=35 fishes. Fishes of group I were treated as control under LD12:12 while fishes of group II and group III were treated as experimental groups under LL and DD conditions respectively. Eight fish from each group were examined in every 15-day interval.

Experimental protocol for groups and light.



G=Group,
LS=LightSchedule,
LD=Natural daylight condition (12L:12D)
LL= Continuous light condition (24L:00D)
DD=Continuous dark condition (00L:24D) N=Number of fishes.

Muscleprotein
Collection of muscle from the dorsal side of the fish to study for estimation of proteint hrough the Folin-Phenol method.

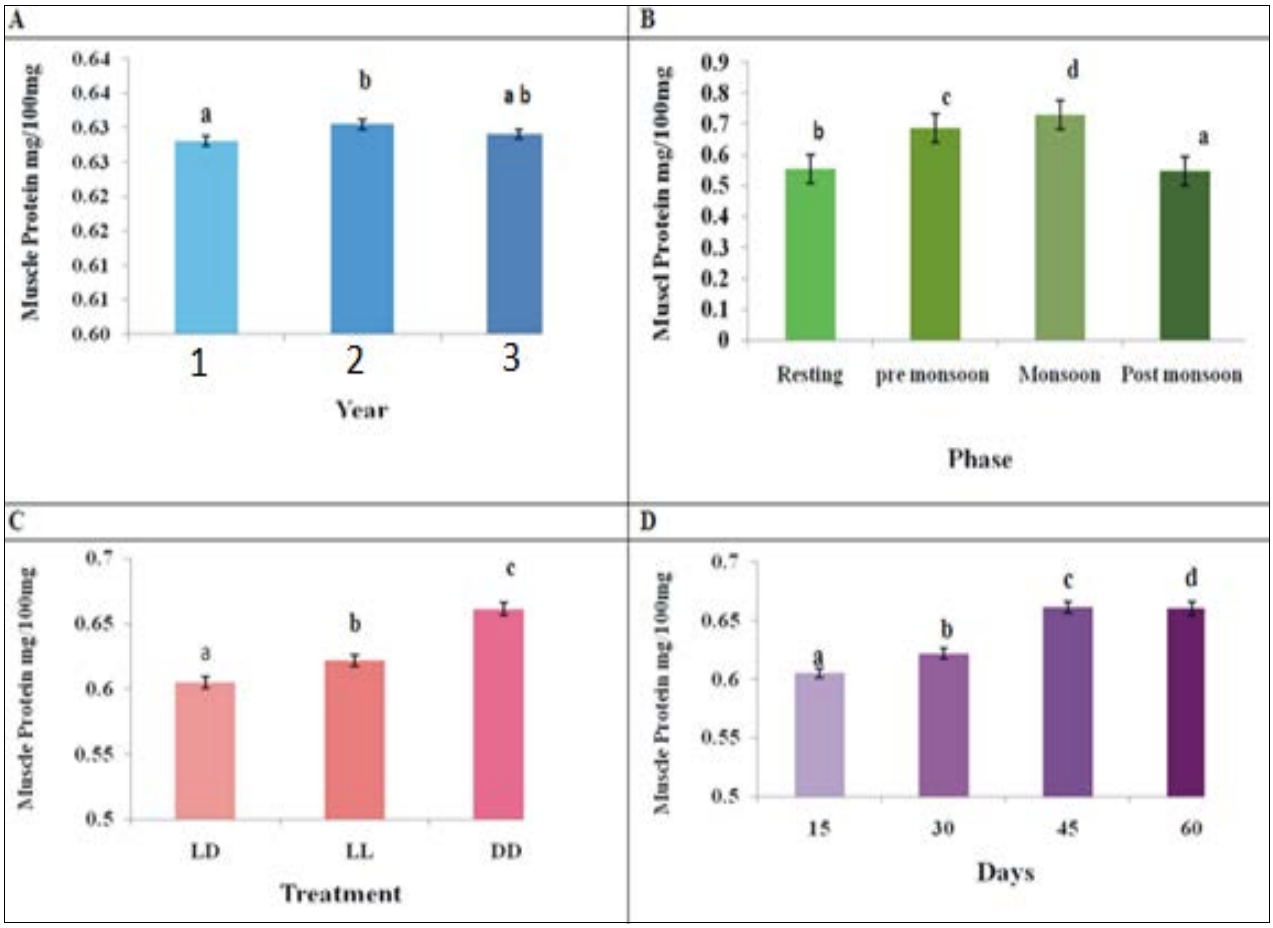


Fig 1: Graphical presentation for different four factors on Muscle Protein in C.batrachus. A.Muscle Proteinin *C.batrachus* at different year. B**.**Muscle Proteinin *C.batrachus* at different phases. C**.**Muscle Proteinin *C.batrachus* at different treatment conditions. D**.**MuscleProteinin *C.batrachus* at different time interval

A four-way analysis of variance (ANOVA) was conducted to assess the influence of the factors "Year" (1, 2, 3), "Phase" (Resting, Pre Monsoon, Monsoon, Post Monsoon), "Treatment" (LD = Normal day-night condition, LL = Continuous illumination, DD = Continuous dark condition), and "Interval" (15 days, 30 days, 45 days, 60 days) on the muscle protein levels of Clarias batrachus. It was found that all factors except for "Year" significantly affected the muscle protein levels ($p < 0.01$).

Results and Discussions

The muscle protein of *Clarias batrachus* has been investigated in this experiment. The amount of muscle of muscle protein was calculated in mg/ml. The result showed that, 1. The amount of muscle protein showed variation in different photic conditions. 2. The value of protein in the resting phase in all the experimental groups was almost similar but continueddarkness showed a comparatively higher amount in comparison group II group III. 3. The highest value of muscle (0.80mg/ml) has been recorded during the monsoon phase in continuous dark conditions. 4. Protein value has been observed from resting to monsoon phase in each group but a tremendous fall has also been noticed in themonsoon phase in each group. 5. Muscle protein is related tothe length and weight of fish. The Ist interval (15 days) showed a comparatively lower value while the IV th (60 days) interval showed a higher value.

Fish is a source of high-quality balance and easily digestible protein. It is an easily available animal protein in the diet of the man said by Ravichandran *et al*., (2011) [12] Protein is an essential nutrient for animal growthand development and represents the most expensive portion in the aquaculture diet (Cho *et al*., 2003) [6] Artificial photoperiod regimes alteration in the natural light-dark cycle and any other alteration or manipulation of environmental parameters will cause stress and may affect abrupt changes, Barton and Iwama (1991) [2]. Brewer *et al*., (2008) [5] and Shinju and Geraldine (2011) [15] opinioned that fluctuation in biochemical composition of muscles of fish species is due to changes in their ecology.

Islam and Joadder (2005) [9] noticed that variation of protein might be influenced by their feeding and breeding capabilities this statement supports the present findings in which dark-red fishes (Group III) showed significantly. Almazán-Rueda *et al*., (2005) [1] suggested that the fish were more stressed and aggressive, compared to those under a reduced number of light hours this statement enhances our findings that fishes of group II showed comparatively lesser activity with group III. Jafri, (1965, on NET 2004) worked on freshwater catfish *Wallago attu* and resulted that protein values in all the tissues were generally low in winter. Shamsan and Ansari (2010) [14] worked on *S.sihama* and concluded that the amount of protein gradually increases from January to June and decreasesfromDecember to February.

Conclusion

The photoperiod plays a crucial role in influencing both the growth and biochemical composition of fish. The quantity of muscle protein serves as a reliable indicator of fish health

within their biotic environment. Manipulating photoperiods and responding to seasonal variations significantly affect muscle protein levels in Clarias batrachus, underscoring the critical role of environmental factors in fish physiology and the practices of aquaculture.

References

1. Almazán Rueda PA, Van Helmond TM, Verreth JAJ, Schrama JW. Photoperiod affects growth, behaviour and stress variables in Clarias gariepinus Journal of Fish Biology,2005:67(4):1029–1039.
2. Barton BA, Iwama GK. Physiological changes in fish from stress in aquaculture with emphasis on the response and effects of corticosteroids. Annu. Rev. Fish Dis,1991:1:3–26.
3. Biswas AK, Takeuchi T. Effects of photoperiod and feeding interval on food intake and growth rate of Nile tilapia Oreochromis niloticus L. Fish. Sci,2003:69:1008–1014.
4. Boeuf G, Le Bail PL. Does light have an influence on fish growth? Aquaculture,1999:177:129–152.
5. Brewer SK, Rabeni CF, Papoulias DM. Comparing histology and gonadosomatic index for determining spawning condition of small-bodied riverine. fishes. Ecology of Freshwater Fish,2008:17:54–58.
6. Cho PS, Williams M. Fisheries production in Asia: Its role and food securities and nutrition. Paper presented at the IX Asian Congress of Nutrition, February 23-27. New Delhi, India In: NAGA, World fish center Quarterly,2003:26:11-16.
7. Dou Z, Tsukamoto K, Observations on the nocturnal activity and feeding behaviour of Anguilla japonica glass eels under laboratory conditions. Environmental Biology of Fishes,2003:67:389-395.
8. Gines R, Afonso JM, Arguello A, Zamorano MJ, Lopez JL. The effects of long-day photoperiod on growth, body composition and skin colour in immature gilthead sea bream (Sparus aurata L) Aquaculture Research,2004:35:1207-1212
9. Islam M, Nazrul, Joaddar Mm, Abdur Razzaq. Seasonal variation of the proximate composition of fresh water gobi Glossobus giuris (Hamilton) journal of biological science Pakistan,2005:8(4):532-536.
10. Jafari AK, Ph. D Thesis Aligarh Muslim University U.P. Maheshwari, R., (1998). An analysis of the air gulping behavior of the cat fish Heteropneustes fossilis with reference to hormonal regulation.Ph.D. thesis. Pt. Ravi Shankar Shukla University Raipur (M.P.), 1965, 9.
11. Marchesana Mara, Maurizio Spotob, Laura Verginellab, Enrico A, Ferrero. Behavioural effects of artificial light on fish species of commercial interest Fisheries Research,2005:73:171–185.
12. Ravichandran S, Kumaravel K, Pamela Florence E. Nutritive Composition of Some Edible Fin Fishes. International Journal of Zoological Research,2011:7:241-251.
13. Rodriguez L, Zanuy S, Carrillo M. Influence of day length on the age at first maturity and somatic growth in male sea bass (Dicentrarchus labrax L.) Aquaculture,2001:196:159–175.
14. Shamsan EF. Ansari ZA. Biochemical composition and caloric content in sand whiting Sillago sihama (Forsskal), from Zuari Estuary, Goa E.F. Indian J. Fish,2010:57(1):61-64.
15. Shinju S, Geraldine P. Quantitative protein profile of three Macrobranchium species during reproductive cycle. Asian Journal of Animal and Veterinary Advances. Academic Journal Inc, 2011.