



**Special Issue (NSAZ-2022)**

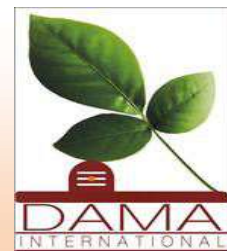


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**On**

# **Applied Zoology, Profitable Animal Production, and Health: Current Status and Future Progress (NSAZ-2022)**

**Organized by**

**Department of Zoology and Fishery Science,  
Rajarshi Shahu Mahavidyalaya (Autonomous),  
Latur- 413531, Maharashtra**

**On**

**23<sup>rd</sup> & 24<sup>th</sup> September- 2022**

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## **Comparative Study of Major Carps DNA-RNA Ratio At Same Acceptance In Relation To Nutritional Condition And Their Growth Rate In Latur, Dist Latur [M.S.], India**

**Raut K.S., K.D.Savant., Nagime P.S., Mahamuni P.B and Mali.P.P**

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### **Abstract**

The present work was undertaken to study the nutritional condition of major carps with the help of Nucleic acids. The DNA and RNA can be used as indicators at the present time Nucleic acids ratio has been extensively used as a bio-indicator of the physical as well as nutritional status of aquatic organisms in natural environment and artificial environment. [1]. Nucleic acid derived indices RNA : DNA ratio has been applied in the determination of potential survival of fishes in aquatic environment. Thus RNA: DNA ratio can be used successfully used in the aquaculture to increase the aquatic food production to decrease the food gap by and to fight against the malnutrition and to improve our meat production rank.

**Key words:** Major carps in Latur, nutritional and physical status ,DNA : RNA ratio.

### **Introduction:**

Indian major carps have the top position in Inland/Freshwater Fishery in different water bodies like the Rivers, Lakes, Reservoirs Streams and Ditches etc as major carps have the protein value 12 to 22% along with Fats 0.5 to 16%, Minerals 0.1 to 3%, omega 3 fatty acids Vitamin A and D etc. So fish's food value is beyond any debate. The growth of any fish in any water will when fish is getting food regularly it means the natural food chain is important for the growth. Such fish is good for human consumption also. There are three macromolecules in the body cells which are important are DNA, RNA and Proteins which are life as well as these form backbones of molecular biology. The central dogma given by Watson and Crick plays a very important role in a life of organism in metabolism, growth, Maturation and Reproduction. These macromolecules are blinded with each other by Central Dogma given by Francis Crick.

DNA [Replication] → DNA → Transcription → RNA → Translation Protein

As it is well known fact that This is the flow of genetic information's in the cell which plays vital role in the growth of cell. When cell needs a certain protein it activate the protein gene the portion that codes for that protein of that piece of and produces multiple copies that piece of DNA in the form of messenger RNA[m-RNA] Protein synthesis Transcription. The RNA expands the quantity of a given protein that can be made at one time from one given gene and it provides an Important control point for regulating when and how much protein is to be synthesized. Protein is the most important nutrient for fish growth and plays a central role in the structure and functioning of all living organism. According to Shang,(1996) fish is an important component of total human food consumption and a principal source of animal protein for more than half of the world's population. Carps like all other animals require protein. DNA is biologically essential for life it is found in all the living organisms in every cell and it contains the complex information's about the nature, behavior of a specific organism. It is found in nucleus on chromosomes the repair and growth of the body can take place easily as DNA is present in every cell of the body. It provides the commands for growth, development, Functioning and reproduction.

### **Importance of DNA –RNA Ratio**

One of the more promising and widely used physiological measure of individual condition is the DNA : RNA ratio method for monitoring the better nutritional benefits. The utility of this ratio as a measure of condition lies in the fact that cellular DNA is relatively constant per cell on a species specific basis, While RNA content changes in response to the demand for protein synthesis. Thus ,the DNA : RNA ratio is an index of protein synthesis occurring on per cell basis in an individual at a given time. Since growth is achieved primarily through protein synthesis RNA: DNA is generally regarded as an index of growth potential[ Bulow, 1970] Individuals in good condition are generally characterized by higher RNA: DNA ratio than those in poor condition and ratios havebeen shown to respond to changes in feeding condition rapidly. Latency has demonstrated to be as short as 1-3 days in some fish species [Martin and wright1987, Clemamesen 1996] , making the ratio generally suitable for use as a short term index of condition.RNA: DNA. The use of RNA:DNA has been studied extensively in relation to nutritional condition and many fish species [21]for a thorough review, but has less frequently been used as an indicator of habitat quality. The potential for its use in this setting lies in the ability of RNA :DNA ratio to detect changes to the biochemical precursors of growth before somatic changes are manifested changes in growth can be caused not only by lack sufficient food, but also sub optimal environmental conditions or other stressors. Biochemical changes are known to be introduced by both biotic and biotic factors including ontogenetic stage [19 , 20] Major carps are widely distributed throughout India, the species posses high demand in market of Latur District and they are used as food to fulfill protein deficiency and a dietary item . So this topic was selected for focusing their growth rate, fresh condition, etc in major carps like Catla,Labeo and Mrigal the modern tools of Molecular Biology help for determining growth RNA: DNA ratio which can be correlated with the status and portability of the selected fish.



## **Material and Method:-**

The Major carps Catla, Labeo and Mrigal with same weight were the fishes were collected from market to the laboratory in Department of Zoology and Fishery science at Rajarshi Shahu College Latur. The sacrificed distended fishes from market were brought in the laboratory and the muscles were collected and kept in the Freeze till the next step. For the isolation of DNA and RNA from the fish muscles tissue method of the Sambrook molecular cloning Vol- 1 protocol book which is famous. DNA For the DNA the isolation of high molecular weight DNA from cells using proteinase R and Phenol this procedure is derived from a method Orcinol described by Darly Stafford and colleagues. RNA for the RNA the purification of RNA from cell and tissue by Acid phenol - Guanidinium Thiocyanate-chloroform--extraction protocol 1 for Isolation of

### **Isolation of RNA:**

Buffers and Solutions used in laboratory analysis :-

Ammonium Acetate, Dialysis buffer, Ethanol – Used an alternative to dialysis buffer, Lyses buffer, Enzymes and buffers and Centrifuges and rotors.

### **Cells or tissue samples for DNA isolation:**

As the tissues contain the large amounts of fibrous material it is difficult to extract genomic DNA in high yield. The efficiency of extraction is greatly improved if the tissue is reduced to powder before homogenization in lyses' buffer. If a large amount of fresh tissue [less than 1 g] is available, powdering can be accomplished using a blender. Additional material :- Beaker, Liquid Nitrogen, polypropylene centrifuge tube [50ml], Waring blender equipped with a stainless steel container Mortar and pestle, prechilled with liquid nitrogen, it is important to cool the mortar slowly by adding small amounts of liquid nitrogen over a period of time filling the mortar to the brim, care must be taken while we add the nitrogen to the mortar. Standard methods were followed for isolating the DNA Centrifuges and rotors. Prepare the cells or tissue samples for isolation of RNA as appropriate for the material under study. Isolate the desired tissue by sacrificing the organisms under study and transfer them to liquid nitrogen. The standard method was followed for isolation of RNA.

## **Result and Discussion**

One of the more promising and widely-used physiological measures of individual condition is the RNA:DNA ratio. The utility of this ratio as a measure of condition lies in the fact that cellular DNA is relatively constant per cell on a species-specific basis, while RNA content

changes in response to the demand for protein synthesis. Thus, the RNA:DNA ratio is an index of protein synthesis occurring on a per-cell basis in an individual at a given time (Raae et al. 1988). In the present study carried out in Dec 2016 –March 2017 in the three major carps in Latur were selected for the knowing their RNA :DNA ratio for fresh condition and comparative nutritive value among themselves. The three same weight 200 grams and four months age. It was found that the RNA :DNA ratio in the major carps showed the reflection of the rate of protein synthesis and other growth criteria in Catla, Labeo and Mrigal . As we compared the ratio we came to know that the results are little bit better in Cirrhina mrigala table no.1 and it can be seen in the graph Graphs. We can correlate results with the protein value with the RNA :DNA ratios an indicator of protein value and growth rate indicator similar type of findings were recorded by [11-17] and many others. The RNA: DNA ratio is considered as a bio-indicator for nutritional status of fishes as DNA amount is stable under changing environmental conditions [6-10], whereas the amount of RNA which is primarily involved in protein synthesis varies with the changing environmental conditions along with physiological conditions [6]. In aquaculture today feed accounts major part of project cost. Assessment of RNA: DNA ratio can be useful for the cost effective business of freshwater fish culture. As RNA: DNA ratio can correlate with food availability of water, accurate output of RNA: DNA ratio can results in proper feeding of fishes in Aquaculture thus by reducing the project cost. Starvation studies done by [6, 11] Clemmesen [8] explained RNA: DNA ratio an index of the cell's metabolic intensity and its use as measurement for recent growth in fishes. [16] reported usefulness of Protein: RNA ratio as an indicator of starvation studies with phosphorous. Availability of food in respect to seasonal changes to the Channapunctatus can be a cause depletion of its production. The status of RNA: DNA ratio shall be helpful to know about requirement of food at proper time without loss in production growth of fishes. Higher RNA: DNA ratio indicates good growth condition of the organism whereas the lower RNA: DNA ratio indicates poor growth condition of the organism, which could be due to the environmental changes like adverse variations in water productivity and also inadequate availability of the food. Assessment of usefulness of RNA/DNA ratio is mostly done one larval and early juvenile fish. Limited work has been done to assess the effect of fasting and feeding conditions on nucleic acid ratio and protein content on the Akarte and Mudgal ABR Vol 5 [4] December 2014 37 | P a g e ©2014 Society of Education, India different tissues of freshwater fishes. Response of individual tissue of fish to nucleic acid may be different in varied physiological conditions [11]. Growth pattern of different organ may vary and interpretation of RNA/DNA ratio in whole fish could lead to difficulty in assessing as an index condition [12].

## Conclusion



RNA/DNA ratio plays important role in knowing the nutritional and Physical condition of a Fish. Fresh fish shows better RNA/DNA ratio. Decayed or inedible or poorly preserved fish shows low RNA/DNA ratio. RNA/DNA ratio can be used for studying and monitoring the quality of fish.

**Table no.1 Comparative account of Major Carps DNS-RNA and RNA DNA Ratio**

Fish Species	Fish Morphometric		Weight of muscles Tissue sample RNA	Weight of muscles Tissue sample DNA	RNA conc. Between 260-280 absorbance	DNA conc. Between 260-280 absorbance	RNA:DNA ratio
	Weight of fish	Age of fish					
Catla	200	4 months	0.1gm	0.1gm	1.68	1.65	1.68
Labeo	200	4 months	0.1gm	0.1gm	1.56	1.66	1.56
Mrigal	200	4 months	0.1gm	0.1gm	2.1	1.56	2.1

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