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Research Article

PROXIMATE COMPOSITION OF *GARRA MULLYA* (SYKES, 1839) AND *PARAMBASSIS RANGA* (HAMILTON, 1822) FROM UJANI WETLAND, MAHARASHTRA, INDIA

Vinod Kakade

Department of Zoology, Eknath Sitaram Divekar Arts, Science and Commerce College, Varvand (Affiliated to Savitribai Phule Pune University, Pune).

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ABSTRACT

Fish is rich in animal proteins and good source of polyunsaturated fatty acids especially the (ω)-3 polyunsaturated fatty acids and micronutrients. Proximate composition comprising moisture, ash, protein, fat and carbohydrates content and minerals composition including magnesium, potassium, calcium, iron, zinc, phosphorus and iodine of 2 small indigenous fish species (SIFS) *Garra mullya* (Sykes, 1839) and *Parambassis ranga* (Hamilton, 1822) from Ujani wetland was studied to create a baseline data on the nutritional quality of both fishes. The moisture content recorded for *G. mullya* (76.25%) and *P. ranga* (73.98%). The ash content observed for *G. mullya* (3.91±0.306) and *P. ranga* (3.56±0.258) during this study. Protein by dry weight basis for *Garra mullya* (54.44±0.492) and *Parambassis ranga* (52.73±0.507) was significant and lipids content for *G. mullya* found 26.37±0.435 and for *P. ranga* was 19.77±0.310. Minerals composition of both fishes showed abundance of minerals in them. Inclusion of these fishes in diet will be helpful in combating nutritional and mineral deficiency.

Keywords: *Garra mullya,* Minerals composition, Nutritional value, *Parambassis ranga*, Small indigenous fish, Ujani.

INTRODUCTION

Fish are classified as the highest trophic level of the aquatic food chain and exhibit a vast variety of shapes, sizes, habitats and biological characteristics (More *et al.,* 2022). Their presence reflects on the health of the aquatic ecosystem (Gorman and Karr, 1978). 35100 fish species from fresh and marine waters have been documented worldwide (Froese and Pauly, 2024). India is a global biodiversity hotspot with more than 10% of the world's fish diversity. It has the capacity to supply food and nutritional security as well as meet the daily requirement of key nutrients for human health (Mohanty *et al*., 2019). The importance of addition of fish in the human diet for its beneficial effects and its role in providing food security is well understood (More & Sarwade, 2022). Fish as a source of macro as well as micronutrients helps in combating malnutrition and micronutrient deficiencies in developing countries (Kawarazuka & Bene, 2011). Biochemical makeup of any edible organism is crucial since it indicates its nutritional worth (Nagabhushanam & Mane, 1978). Generally fresh fish contains 66-81% water/moisture content, 16-21% crude protein, 0.2-15% fats, 1.2-1.5% minerals, and 0-0.5% carbohydrate content (Mazumder *et al*., 2008). Omega-3 and omega-6 fatty acids, which are essential for heart health, are abundant in fish (Chattipakorn *et al*., 2009). Even small quantities of fish in diet can enhance the bioavailability of minerals like iron and zinc, which are also provided by cereal and tuber-based diets (Lim *et al*., 2013). In addition to essential nutrients, fish contains significant amounts of fatty acids, amino acids, and important vitamins and minerals therefore sometimes wisely referred to as 'rich food for poor people'(Balami *et al*., 2019).

The comparison of fish with other animal protein sources highlighted on high amino acids content in fish and it's easy to digestion ability (Louka *et al*., 2004). It additionally carries poly unsaturated fatty acids (PUFA), 3 fatty acids which play hugerolein the prevention and remedy of coronary heart disease, cancer, diabetes and inflammation (Hu *et al*., 2003). Fish species which grow to a size of 25

*Corresponding Author: Vinod Kakade, Department of Zoology, Eknath Sitaram Divekar Arts, Science and Commerce College, Varvand (Affiliated to Savitribai Phule Pune University, Pune). Email: vbkakade156@gmail.com.

cm or 9 inches in adult stage in their life cycle are known as Small Indigenous Fish Species (SIFS) or Small Indigenous Species (SIS) (Rahman, 1989). Around 450 SIFS have been recorded in India from inland water bodies such as rivers and tributaries, floodplains, reservoirs and ponds, lakes, beels, streams, marshes, wetlands and paddy fields (Sarkar *et al*., 2021). In addition to essential protein rural poor rely on small native fish species from freshwater environments for micronutrients like fatty acids, zinc, iron, calcium, magnesium, phosphorus, iodine, and sodium. (Roos *et al*., 2007; Halwart, 2008). Compared to fish with hard, inedible bones small fish with delicate bones are more likely to be eaten with their bones and therefore contain more calcium (Larsen *et al*., 2000; Roos *et al*., 2003).

For consumers, dieticians and nutritionists understanding the nutritional makeup of fish is fundamental to laying the groundwork for nearly every aspect of nutrition. The objective of this study was to estimate and generate analytical data on the proximate composition and minerals of two SIFS *Garra mullya* (Sykes, 1839) and *Parambassis ranga* (Hamilton, 1822) from Ujani wetland, Maharashtra, India. The results of this study will help determine the nutritional quality of both study fishes.

MATERIALS AND METHODS

Fish Collection and Sample Preparation

Fish species, *Garra mullya* and *Parambassis ranga* utilized in this study were obtained from local fishermen at Ujani wetland and marketplace of Bhigwan and Indapur in Pune district of Maharashtra. Fishes were kept in ice packed boxes and brought to laboratory. In laboratory they were washed under tap water, descaled, eviscerated and filleted manually using a sharp knife then edible portions were sun-dried. After complete drying of fish, fine powder was prepared by using mixer grinder. This powder was then packed in plastic jars and stored at -20˚C for further use.

Proximate Composition and Minerals Analyses

After preparation of edible parts of fish as described, proximate composition analyses were performed according to AOAC (2010) procedures. Moisture/ Water content was determined by drying fresh fish sample in oven at 105±2˚C until a constant weight was obtained. Ash was obtained after the incineration of moisture free dry samples in a muffle furnace at 600 °C for 6 h. (AOAC, 2016). Fishes were Sun-dried and powdered, dried powder was used for estimation of crude fat, protein, carbohydrates and mineral contents. Crude protein was determined following the Kjeldahl methods (AOAC, 2016). Crude fat was measured by solvent extraction method in a soxhlet system where n-hexane was used as solvent. Mineral analysis was carried out in Flame photometer (Systronics, Model: 128). Samples were digested using Nitric acid and Hydrogen peroxide (Cindric *et al*., 2012). Micronutrient minerals and metal were estimated with the help of Idera *et al*., 2014; Mohanty *et al*., 2016. Total Potassium was determined by using dry ash and dissolving ash in concentrated hydrochloric acid (Isaac & Kerber, 2015).

RESULTS AND DISCUSSION

Proximate composition of two small indigenous fish species, *Garra mullya* and *Parambassis ranga* inhabiting Ujani wetland were estimated. The findings of study showed that protein and ash content of in fishes did not differ significantly. Moisture, ash, protein, total fats and total carbohydrates assessed on dry weight basis of the samples, expressed as g/100 g edible portion, are shown in Table 1. The moisture content of *G. mullya* 76.25 ± 0.290 and *P. ranga* 73.98 ± 0.206 were much similar to the moisture content of *Mystus vittatus* (72.67±0.30), *Ompok bimaculatus* (75.17 ± 0.34), *Channa striata* (76.11 ± 0.17), *Wallago attu* (74.25±0.42) (Paul *et al*., 2018). Moisture content in *P. ranga* was lower than 77.47 ± 0.15 reported earlier by Subramaniyan *et al*., 2022. The ash quantity for *G. mullya* (3.91 ± 0.306) and *P. ranga* (3.56 ± 0.258) recorded in this study was close to 3.92% for *Chanda nama* recorded by Mohanty *et al*., 2013 and lower than 4.83% in *Pseudotolithus elongates* (Abraham-Olukayode *et al*., 2010) and 5.36 ± 0.12 in *Puntius sophore* (Mahanty *et al*., 2014).

Table 1. Moisture, ash, protein, total fats and total carbohydrates assessed on dry weight basis of the samples.

Parameters	Content (g/ 100 g dry tissue) *Garra mullya*	Content (g/ 100 g dry tissue) *Parambassis ranga*
Moisture	76.25 ± 0.290	73.98 ± 0.206
Ash	3.91 ± 0.306	3.56 ± 0.258
Protein	54.44 ± 0.492	52.73 ± 0.507
Total Lipids	26.37 ± 0.435	19.77 ± 0.310
Total carbohydrates	0.81 ± 0.026	1.08 ± 0.029

The protein content for *Garra mullya* (54.44 ± 0.492) and *Parambassis ranga* (52.73 ± 0.507) recorded during present study was lower thansmoke-dried mullet (57.32 ± 1.24) and higher than smoke-dried carp (48.57 ± 0.64) (Tenyang *et al*., 2020). Their results showed proteins content of processed fish samples between 48.57% and 68.92% and revealed that Sun-dried sample had the highest proteins value. The protein values of present study were higher than oven, smoke and sun-dried *Bonga* sp., *Sardinella* sp. and *Heterots niloticus* reported by Akinneye *et al*., 2010. Their findings for protein content varied between ranges of (13.04 ± 0.04) to (51.06 ± 0.06). Total fats observed for *G. mullya* (26.37 ± 0.435) and *P. ranga* (19.77 ± 0.310) in this study was close to the findings of Djimbie *et al*., 2017 in *Chrysichthys nigrodigitatus*. They recorded lipids value 22.06±5.40 for raw sample, 26.79±2.3 for smoked sample and 19.08±4.6 for boiled sample. The lipids and fatty acids composition in fish are greatly affected by feed composition as well as rearing system and feeding routine (Khalili Tilami & Sampels, 2018). Total carbohydrates content found in *G. mullya* was 0.81 ± 0.157 and in *P. ranga* was 1.08 ± 0.107 during present study.

Table 2. Minerals Composition.

Particulars	Content (mg/ 100 g dry tissue) *Garra mullya*	Content (mg/ 100 g dry tissue) *Parambassis ranga*
Iron	40.40	39.49
Magnesium	228.19	155.52
Zinc	10.5	13.871
Potassium	936.79	715.62
Phosphorous	133.083	131.11
Calcium	4400.90	5346.93
Iodine	0.978	0.665

Concentration of mineral elements for both *G. mullya* and *P. ranga* were detected in decreasing order as Ca>K>Mg>P>Fe>Zn>I. Mayanglambam and Chungkham, (2018) found Concentration of mineral elements in decreasing order as Ca>Mg>K>Na>Fe>Zn>Mn>Cu. In the previous report of Bogard *et al*., (2015) they observed mineral elements in the decreasing order of Ca>P>K>S>Mg>Se>I>Fe>Zn>Mn>Cu in important small fishes of Bangladesh. Abdul, 2012 reported in the decreasing order of K>P>Mg>Na>Ca> Fe>Co>Cu>Ni>Mn>Cu>Cr in smoke dried hill stream fishes of Manipur. This variation in concentration of elements is due to the chemical forms of the elements and their concentration in the local environment (Window *et al*., 1987). Variation in proximate composition also exists within the same species depending upon the fishing ground, age and sex of the individual, geographical location of catch, environmental conditions, sexual maturity, size and reproductive status of the fish (Padmavati, 2017).

CONCLUSION

Animal protein sources such as eggs, meat, chicken and fish are popular among consumers. Nutrient compositions of *G. mullya* and *P. ranga* revealed richness of protein, lipid and minerals like calcium, potassium, magnesium and iron. Calcium is abundantly present in both the species and can be helpful in calcium deficiency. Inclusion of these species in diet can be beneficial to supplement nutrients requirement. As a cheaper alternative to meat and other animal protein sources these fish can be affordable to poor population of rural and urban areas.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

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AI TOOL DECLARATION

The authors declare that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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