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PROXIMATE COMPOSITION ANALYSIS OF SOME COMMONLY AVAILABLE FISHES OF KERALA

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ABSTRACT

Proximate compositional analysis (moisture, crude protein, crude fat, and ash) of eight commonly available fishes in the markets of Kerala during 2021-2022 was analyzed. The eight fishes viz., *Scomber indicus* (Pulli ayala/ Pulli thiriyan), *Megalaspis cordyla* (Vaṅkaṭa), *Sardinella gibbosa* (Matti), *Rastrelliger kanagurta* (Aayla), *Sardinella longiceps* (Neyy matti), *Sardinella fimbriata* (Kāri cāḷa), *Nemipterus japonicas* (Killi meen) *and Stolephorus indicus* (Keāḻuva/ Nettēāli) were collected and analyzed using standard scientific procedures. The study articulates *Sardinella longiceps* has exceptionally high values of crude protein (39.90%) and crude fat (22.66%). The present study also recommends judicious utilization of 20% fish processing waste like head, gut and gill slits in the manufacture of fish meal, fish silage, etc., Because this fish processing waste contains a similar nutritional value as its meat.

Keywords: *Scomber indicus* (Pulli ayala/ Pulli thiriyan), *Megalaspis cordyla* (Vaṅkaṭa), *Sardinella gibbosa* (Matti), *Rastrelliger kanagurta* (Aayla), *Sardinella longiceps* (Neyy matti), *Sardinella fimbriata* (Kāri cāḷa)

1. INTRODUCTION

Several studies articulate that ever since the inspection of humans' on the planet Earth fish was one of the staple diets of many civilizations owing to the health benefits. Globally it is acknowledged that fishes are a good source of animal protein, calcium, phosphorus, etc., for maintaining a healthy body **[1]**. Further, they are abundant source of omega 3 polyunsaturated fatty acid (PUFA) especially eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) **[2]**. The fish meat offers a broad array of health benefits that are absent in other food. The aid in preventing a broad spectrum of diseases like coronary heart disease, improvement of the retina, brain development, reduction of incidence of breast cancer, rheumatoid arthritis, multiple sclerosis, psoriasis, and inflammation **[3-5]**.

In the year 2018, the global marine fish production is estimated to be 84.4 million tonnes. India is one of the top seven marine fish capturing countries **[6, 7]**. The total fishery potential of India accounts for 37.27 lakh tonnes. Kerala ranks fourth nationally in marine fish production. Marine fisheries have an important place in the economy of Kerala. The state of Kerala has a coast length of 590 Km with 174 fish landing centers and comprises 220 fishing villages. The fishery potential for the year 2020-21 was 4.75 lakh tonnes and annual per capita consumption is 19.41kg. Marine fisheries are the only source of livelihood for 601944 fishermen's **[8]**.

The objective of the present study is to quantify the nutritive values of eight commonly available marine fishes in Kerala state.

2. MATERIALS AND METHODS

Eight commonly available marine fishes almost throughout the year were collected from the fish market from 2021to 2022 **(Table 1)**. The collected fish samples were transferred to the polystyrene icebox and escorted to the laboratory. Thereafter the fish containing polystyrene icebox was kept in the deep freezer. Before conducting the proximal composition analysis the fish were thoroughly washed with seawater followed by running tap water. Further, the samples were washed and rinsed with de-ionized water to remove the contaminants if any. Finally, the excess moisture content was removed by wrapping it in a filter paper.

Table 1: List of commonly edible fishes in Kerala

Sl No	Scientific Name	Common Name	Vernacular Name
1	Scomber Indicus	Indian chub mackerel	Pulli ayala/ Pulli thiriyan
2	Megalaspis cordyla	Finletted mackerel	Vaṅkaṭa
3	*Sardinella gibbosa*	Goldstripe sardine	Matti
4	*Rastrelliger kanagurta*	Indian mackerel	Ayala
5	*Sardinella Longiceps*	Indian oil sardine	Neyy matti
6	*Sardinella fimbriata*	Fringe scale sardine	Kāri cāḷa
7	Nemipterus japonicus	Pink perch	Killi meen
8	Stolephorus indicus	Indian anchovy	Keāḻuva/ Nettēāli

2.1. Proximal Composition Analysis of fish waste

2.1.1. Determination of moisture content

0.5 – 1g of the pulverized fish sample was taken in a porcelain crucible known weight for the determination of moisture. The contents were heated in an electric oven at 105 °C for about 15 hours until a constant weight was obtained. The thus oven-dried sample was placed in a desiccator until the contents attains room temperature. Later the dried sample was weighed accurately along with the crucible to quantify the loss of moisture. The loss of moisture was calculated in percentage **[9]**.

Moisture% = (Sample Fresh weight with crucible – Crucible weight)-(Sample dry weight with crucible – Crucible weight) / Sample fresh weight * 100.

2.1.2. Determination of crude protein

Accurately weighed 0.25g of the fish sample was transferred into a Kjeldahl flash for the assessment of crude protein followed by the addition of one teaspoon of catalyst mixer and 5ml of con.H_2SO_4. The Kjeldahl flask with the contents was placed on the digestion apparatus and boiled until a clear solution is obtained. Then the contents were cooled and 25ml of 4% boric acid was added to the series of 250ml conical flasks placed on the distillation apparatus. Later 5ml of distilled water was added to each tube. The conical and Kjeldhal tube was attached to the distillation unit and preheated. Finally, the flask containing boric acid was titrated with 0.1N H_2SO_4.

Percentage of crude protein = (burette reading * Normality of H_2SO_4 * 8.75) / (Weight of sample * dry matter%)

2.1.3. Determination of crude lipids

On an asbestos thimble, 1gm of the dry sample was placed. 310ml of acetone was added to sterile and dry fat extracting beaker. The fat extracting beaker along with the sample on the asbestos thimble was mounted on a fat extracting apparatus and heated for 4-5 hours at 60ºC. The extracted fat in the beaker was transferred into a vacuum oven at 80ºC and weighted.

Percentage of Crude Fat = (weight of fat/weight of dry sample *dry matter) *100

2.1.4. Determination of Ash

The moisture content in the porcelain crucible was removed using a drying oven for one hour. Later the crucible was placed in a desiccator until it attains room temperature. About 3-5g of sample was taken in the porcelain crucible and placed in a muffle furnace at 550 °C for six hours. Later the contents of the porcelain crucible were cooled to room temperature in a desiccator for weighing.

Percentage of Ash (dry matter basis) = (sample ash weight / sample dry weight) *100

Eight commonly available fishes viz., *Scomber indicus* (Pulli ayala/ Pulli thiriyan), *Megalaspis cordyla* (Vaṅkaṭa), *Sardinella gibbosa* (Matti), *Rastrelliger kanagurta* (Aayla), *Sardinella longiceps* (Neyy matti), *Sardinella fimbriata* (Kāri cāḷa), *Nemipterus japonicas* (Killi meen), *and Stolephorus indicus* (Keāl̲uva/ Nettēāli) in the fish markets of Kerala was chosen for the study. *Scomber indicus* a new species of mackerel was discovered in the Kerala coast **[10]**. Proximal composition analysis like moisture, crude protein, crude fat, and ash contents of eight fish meat and fish processing waste like head, gills, and guts were analyzed and the results are presented in **Table 2**.

3. RESULTS & DISCUSSION

Table 2: Proximate composition analysis of eight commonly available fishes of Kerala

Sl No	Scientific Name	Moisture%	Crude Protein%	Crude Fat%	Ash%
1	*Scomber indicus*	75.41	20.15	2.79	1.65
2	*Megalaspis cordyla*	76.17	18.13	3.2	2.5
3	*Sardinella gibbosa*	75.40	18.81	3.46	2.33
4	*Rastrelliger kanagurta*	76.19	19.12	2.99	1.70
5	*Sardinella longiceps*	35.49	39.90	22.66	1.95
6	*Sardinella fimbriata*	72.51	17.17	5.88	4.44
7	*Nemipterus japonicus*	77.64	16.74	4.3	1.32
8	*Stolephorus indicus*	75.32	12.50	8.91	3.27

From the proximal composition analysis, it was understood that the moisture content is highest followed by crude protein in all the fishes except *Sardinella longiceps.* The moisture content (35.49%) is less when compared to the crude protein (39.90%). Also, the fat content (22.66%) is also high when compared to other fishes. Henceforth it is aptly called Neyy matti (meaning ghee sardine) in Malayalam. The results of the present study on *Sardinella longiceps* are at par with the results **[11]**. Similarly, the proximal composition of *Rastrelliger kanagurta* and *Megalaspis cordyla* are in close accordance with the results **[12]**.

While moisture content of the rest seven fishes ranges from 72.15% (*Sardinella fimbriata*) to 77.64% (*Nemipterus japonicus*). Least protein content was recorded in *Stolephorus indicus* (12.50%) while the highest was in *Scomber indicus* (20.51%). The crude fat content ranged from 2.79% (*Scomber indicus*) to 8.91% (*Stolephorus indicus*). The highest mineral content was found in *Sardinella fimbriata* (4.44%) and the least in *Nemipterus japonicas* (1.32%). From the study, it was understood that the fish processing waste contains the same amount of nutritive values as the meat.

Since the fishes chosen for the study are available throughout the year. The nutritive value of fishes like *Sardinella gibbosa* **[13]**, *Rastrelliger kanagurta* **[14]**, *Sardinella longiceps,* and *Sardinella fimbriata* **[15]**, *Nemipterus japonicas* **[16]** varies seasonally. Further, the proximal composition varies with size, sex, and maturation as well **[17]**.

4. CONCLUSION

The proximate composition of eight different and commonly available fishes throughout the year reveals that these fishes have very good nutritional value. Especially, *Sardinella longiceps* has exceptionally high values of crude protein (39.90%) and crude fat (22.66%). The study also reveals that the fish processing waste like the head, guts, and gill slits contain the same nutritional value as the fish meat as well. In addition, the waste generated due to the processing of fish accounts for 20%. Owing to the availability of the fish round the year the 20% fish processing waste may be productively utilized in manufacturing fish silage, fish meal, or compost.

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