

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 NAAS Rating (2026): 5.29
 IJABR 2026; 10(7): 186-190
www.biochemjournal.com
 Received: 25-04-2026
 Accepted: 29-05-2026

Sumer Kajala
 Department of Fish Processing
 Technology, Faculty of
 Fisheries Science, Kerala
 University of Fisheries and
 Ocean Studies, Kochi, Kerala,
 India

Jashanpreet Singh
 Department of Fish Processing
 Technology, Faculty of
 Fisheries Science, Kerala
 University of Fisheries and
 Ocean Studies, Kochi, Kerala,
 India

Vivek Chauhan
 Department of Fish Processing
 Technology, Faculty of
 Fisheries Science, Kerala
 University of Fisheries and
 Ocean Studies, Kochi, Kerala,
 India

Virbhhan Thakur
 Department of Fish Processing
 Technology and Engineering,
 College of Fisheries, CAU
 (Imphal), Lembucherra,
 Tripura (W), India

Kumar Gaurav
 Department of Fish Processing
 Technology and Engineering,
 College of Fisheries, CAU
 (Imphal), Lembucherra,
 Tripura (W), India

Shyni K
 Department of Fish Processing
 Technology, Faculty of
 Fisheries Science, Kerala
 University of Fisheries and
 Ocean Studies, Kochi, Kerala,
 India

Corresponding Author:
Jashanpreet Singh
 Department of Fish Processing
 Technology, Faculty of
 Fisheries Science, Kerala
 University of Fisheries and
 Ocean Studies, Kochi, Kerala,
 India

Standardization and shelf-life analysis of chutney powder from glassy perchlet (*Ambassis commersoni*)

Sumer Kajala, Jashanpreet Singh, Vivek Chauhan, Virbhhan Thakur, Kumar Gaurav and Shyni K

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i7c.8964>

Abstract

The study examined the Malabar glassy perchlet (*Ambassis commersoni*) to prepare a value-added product, fish chutney powder. It also assessed the biochemical quality, microbial safety and sensory characteristics of these products during storage under both refrigerated and room temperature conditions and the economics of the product. Fish chutney powder was stored for six months under refrigerated (5-8 °C) and room temperature. pH decreased slightly from 5.71 to 5.60 under refrigeration and up to 5.51 at room temperature. Peroxide value increased from 1.95 to 8.91 meq O₂/kg under refrigeration and to 9.87 meq O₂/kg at room temperature, respectively. Total volatile base nitrogen (TVB-N) increased from 5.23 mg/100 g to 22.54 mg/100 g under refrigeration and to 24.89 mg/100 g at room temperature, and trimethylamine (TMA) values rose from 0.87 mg/100 g to 8.67 mg/100 g in refrigerated samples and to 9.69 mg/100 g in room temperature samples. Microbial load remained within safe limits throughout storage, and sensory scores declined gradually during storage but remained within acceptable limits up to 180 days, with better sensory stability under refrigeration. Economic analysis revealed that the production cost of a 50 g pack of chutney powder was approximately ₹20, indicating good commercial feasibility.

Keywords: Chutney powder, TVB-N, TMA, peroxide value, sensory evaluation

Introduction

It was observed that larger or more recognisable fish species are used more frequently than unusually small or weirdly shaped ones, when all other conditions are equal (Hardy *et al.*, 1982) [12]. The global focus on underutilized fish species and the growing need to enhance their use for human consumption have generated significant attention (Venugopal and V., 1995) [24]. A large quantity of harvested fish is underutilized owing to a variety of problems, such as unappealing colour, taste, texture, tiny size, or high fat content. Many of these underutilized species are caught as bycatch in the pelagic zone and *Ambassis sp.* is a common example. Although some of these fish are utilized to make fish meal, there is a rising need to prioritize their preservation for human consumption in order to prevent post-harvest losses. Nutrient profiling of the elongated glassy perchlet is a small but nutrient-rich fish commonly consumed in Assam, India, was done by Chakraborty *et al.* (2018). According to Bogard *et al.* (2015) [4], combining small indigenous fish with other local nutrient-rich ingredients in food products is a promising strategy for improving nutrition and providing additional benefits to communities involved in production. Dreosti (1974) [8] examined the possibilities of powdered fish products such as fish meal, milk replacer solids and fish protein concentrate derived from low-cost fish.

Chutney powder originated in India and is named after the term "Chatni," which means a robust, sweet relish that is spicy. Chutney is often regarded as an essential component of any traditional Indian meal. Beyond the taste of vegetarians, the non-vegetarian fisherman population of the entire coastal area developed a wonderful fish chutney, which is also famous among them. Fish powder, in particular, has the potential to boost newborns' and young children's nutritional intakes since moisture is removed during the drying process, concentrating nutrients. In addition to vitamins, the fish powder used in this recipe contains important fatty acids. Despite the high nutritional content of fish powder, the body's absorption of nutrients is dependent on a number of circumstances.

Anti-nutrients contained in plant-based foods, such as phytates or polyphenols, have the ability to inhibit iron or zinc absorption (Gibson *et al.*, 2018) ^[10], depending on the fish powder offered during lunch. Furthermore, the calcium consumed in entire little fish is naturally high (owing to the retention of bones in the fish) and is absorbed at a similar rate as the calcium in dairy products. Renuka *et al.* (2016) ^[21] prepared chutney powder from jawala shrimp and studied the chemical and microbiological quality of the chutney powder, discovering that the product had an acceptable shelf life after six months.

Scientists all across the world have emphasized the importance of making these fish more usable for humans by developing several new goods, and India has made great progress in this regard. Rapid industrialization and urbanization in India have resulted in an increase in the demand for ready-to-eat or ready-to-cook foods.

Materials and Methods

Procurement of raw material

Perchlets were collected from a local fish market at Thrichattukulam and were iced immediately and brought to the laboratory in insulated boxes. Ingredients used for preparation are shown in Table 1. The recipe was standardised by taking into account the culinary preferences of the region's consumers.

Preparation of chutney powder

Fresh fish were first washed thoroughly in cold water to remove adhering dirt, blood and surface contaminants. The fish were then dressed carefully by removing the gut and fins to improve hygiene and product quality. After dressing, the fish were marinated with 1% salt, 0.2% turmeric powder, and red chilli powder for 1 hour, then fried in half the required quantity of oil until they became crispy. The fried fish were removed and kept aside. Separately, whole red chillies, garlic, coconut powder, turmeric powder and cumin seeds were fried in the remaining oil. The mixture was sautéed continuously until the coconut powder slightly changed colour and developed a characteristic aroma, indicating proper roasting of the ingredients. The fried spice and coconut mixture was then transferred to a blender. A pinch of salt and tamarind were added, and the mixture was ground into a coarse powder. After this, the previously fried fish was added to the blender and ground again to obtain a uniform coarse fish chutney powder. Sodium benzoate was added to the prepared mixture as a preservative and mixed thoroughly to ensure uniform distribution. The ingredients used in the preparation of the chutney powder are listed in Table 1. The chutney powder was then kept overnight under hygienic conditions to allow proper maturation and flavour development. After maturation, the fish chutney powder was packed in clean, dry stand-up pouches and properly labelled. The final product was stored at refrigeration (5-8 °C) and room temperature for quality and shelf-life analysis.

The prepared chutney powder samples were analysed for their biochemical, microbial, sensory analysis and economics of product. Peroxide value was determined by Jacobs (1958) ^[13], TVB-N was estimated using the Conway micro diffusion method (convey E.J. 1947), TMA was determined by the Conway method (1962) ^[7], pH by AOAC (2000) ^[2] and TPC by using standard spread plate method using Nutrient Agar (NA) medium (Surendran *et al.*, 2003) ^[23]. Sensory analysis of the developed chutney powder was

done according to Ribeiro *et al.* (2022) with some modifications. 15 Panellists (10 trained and 05 semi-trained) evaluated prepared chutney powder samples for sensory parameters using 9-point hedonic scale, where 1-dislike extremely, 2-dislike very much, 3-dislike moderately, 4-dislike slightly, 5-neither like nor dislike, 6-like slightly, 7-like moderately, 8-like very much and 9-like extremely for the appearance, texture, flavour, taste and overall acceptability.

Results and Discussion

Biochemical quality parameters, microbiological and sensory analysis of chutney powder during storage

Changes in pH

The initial pH of freshly prepared Malabar glassy perchlet chutney powder was 5.71 under both refrigerated (5-8 °C) and room-temperature storage, reflecting a mildly acidic medium contributed by tamarind. A gradual decline in pH occurred during storage, reaching 5.60 under refrigeration and 5.51 at room temperature (Fig. 1) by Day 180. The greater reduction at ambient temperature suggests more active biochemical and microbial changes. Despite the decline, pH remained within the acidic range favourable for inhibiting spoilage microorganisms, supporting product stability. These observations are consistent with earlier studies on fish and shrimp-based chutneys, which reported moderate pH reductions during storage while maintaining microbial safety (Kumar & Basu, 2001; Rao *et al.*, 2011 and Renuka *et al.*, 2016) ^[15, 19, 21].

Changes in peroxide value

The peroxide value (PV) increased steadily in Malabar glassy perchlet chutney powder during 180 days of storage under both refrigerated (5-8 °C) and room-temperature conditions. The initial PV was low (1.95 meq O₂/kg fat), indicating minimal lipid oxidation at day 0. By day 60, PV rose to 3.55 meq O₂/kg in refrigerated samples and 3.67 meq O₂/kg at room temperature, continuing to increase sharply thereafter. At day 180, PV reached 8.91 meq O₂/kg under refrigeration and 9.87 meq O₂/kg at room temperature (Fig. 2), with the higher values at ambient temperature reflecting accelerated oxidation due to greater exposure to heat and oxygen. These results are consistent with earlier findings that lipid oxidation progresses faster at higher temperatures (Mahakal *et al.*, 2016) ^[16] and is effectively slowed, though not halted, under chilled storage (Renitta & Patterson, 2012) ^[20].

Changes in total volatile basic nitrogen

Total volatile basic nitrogen (TVB-N) values, the initial TVB-N value of Malabar glassy perchlet chutney powder was 5.23 mg/100 g under both refrigerated and room-temperature conditions, indicating excellent freshness at day 0. TVB-N increased gradually during storage, reaching 22.54 mg/100 g (refrigerated) and 24.89 mg/100 g (room temperature) by day 180 (Fig. 3). The faster rise at ambient temperature demonstrates the influence of higher temperatures on proteolysis, microbial activity and enzymatic degradation. Refrigerated storage effectively delayed the accumulation of volatile nitrogenous compounds, while the moderate TVB-N values observed throughout storage may also be attributed to the presence of tamarind, salt and spices, which suppress microbial growth. Similar increasing trends have been reported for chutney

products from shrimp and molluscs (Jeyasanta *et al.*, 2017 and Renuka *et al.*, 2016)^[14, 21].

Changes in trimethylamine

Trimethylamine (TMA) content in Malabar glassy perchlet chutney powder increased progressively during the 180-day storage period under both refrigerated (5-8 °C) and room-temperature conditions, reflecting the gradual microbial and enzymatic reduction of trimethylamine oxide (TMAO). The initial TMA value was low (0.87 mg/100 g), indicating good freshness and hygienic processing. TMA levels increased to 8.67 mg/100 g (refrigerated) and 9.69 mg/100 (room temperature) by day 180 (Fig. 4). The consistently higher values at ambient temperature confirm the accelerating effect of increased temperature on microbial metabolism and protein breakdown. These trends are consistent with earlier findings for fish and molluscan chutney products, where TMA levels increased steadily during storage but remained within safe limits (Renitta & Patterson, 2012 and Mahakal *et al.*, 2016)^[20, 16]. Recent observations by Sedyaw *et al.* (2024)^[22] reporting an increase from 3.23 to 8.59 mg/100 g during storage further support these results.

Microbiological Analysis

The initial bacterial load of fish chutney powder was 3.6×10^3 cfu/g under both refrigerated and room-temperature storage, remaining well below the FSSAI (2020)^[9] permissible limit of 10^5 cfu/g for ready-to-eat fish products. The low initial counts reflect the effectiveness of cooking, hygienic handling and the antimicrobial properties of salt, oil, turmeric, garlic and chilli used in the formulation (Asha *et al.*, 2016)^[11]. During storage, microbial counts in refrigerated samples remained nearly stable (3.7×10^3 cfu/g), whereas room-temperature samples showed a gradual increase, reaching 4.3×10^3 cfu/g by day 180 (Fig. 5). The stable counts across treatments suggest that acidic pH, along with the presence of salt and spices, created an unfavorable environment for bacterial multiplication, exerting strong bacteriostatic effects (Gopakumar, 2002)^[11]. These observations align with previous studies in shrimp and fish chutney, where microbial safety was maintained over extended storage due to ingredient-based preservation and low moisture content (Bhosale *et al.*, 2014; Renuka *et al.*, 2016; Sedyaw *et al.*, 2024)^[3, 21, 22].

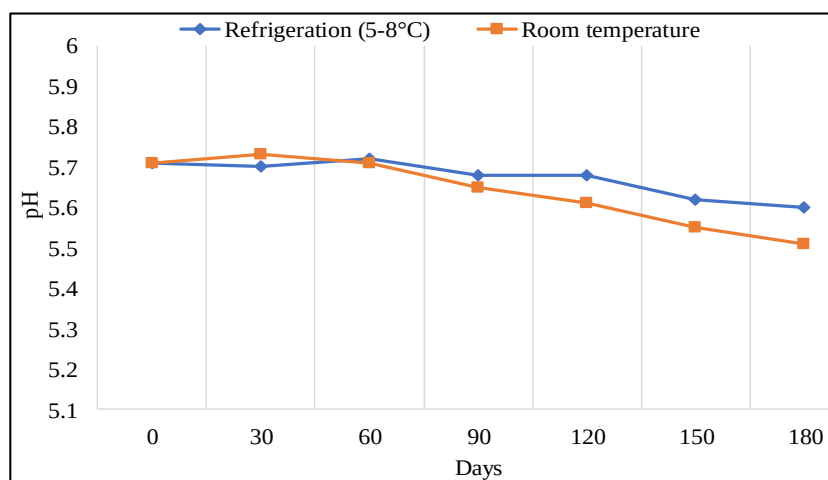


Fig 1: pH content of chutney powder

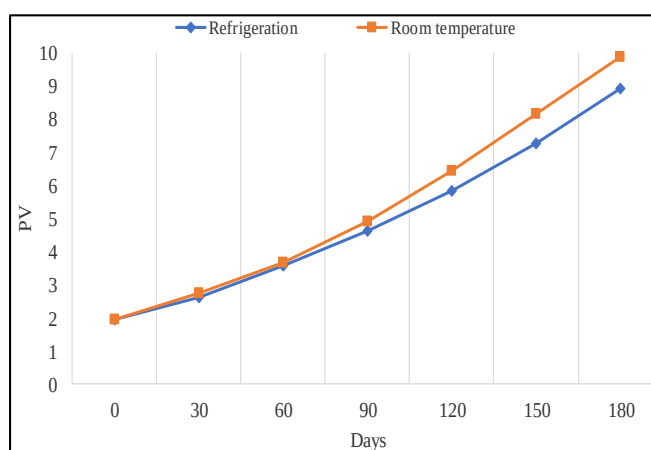


Fig 2: Pv content of chutney powder

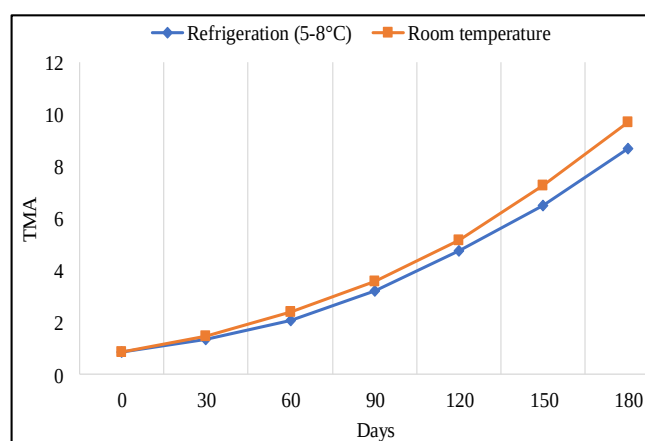


Fig 3: TMA content of chutney powder

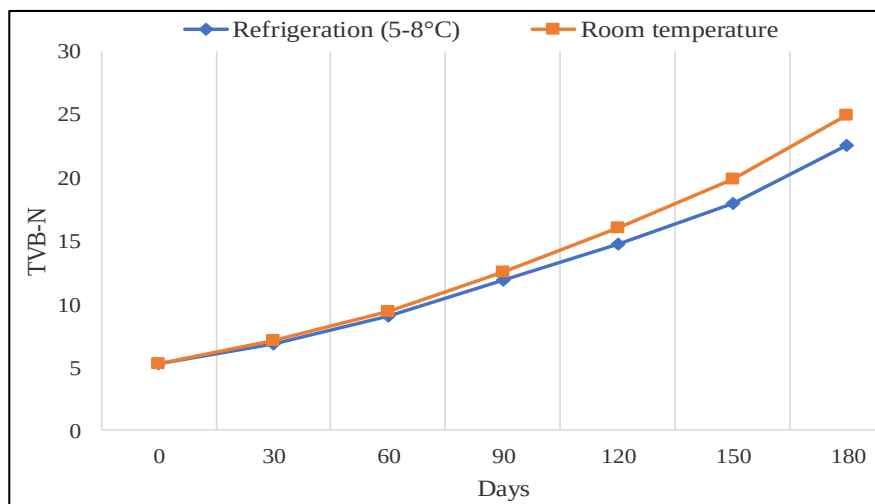


Fig 4: TVB-N content of chutney powder

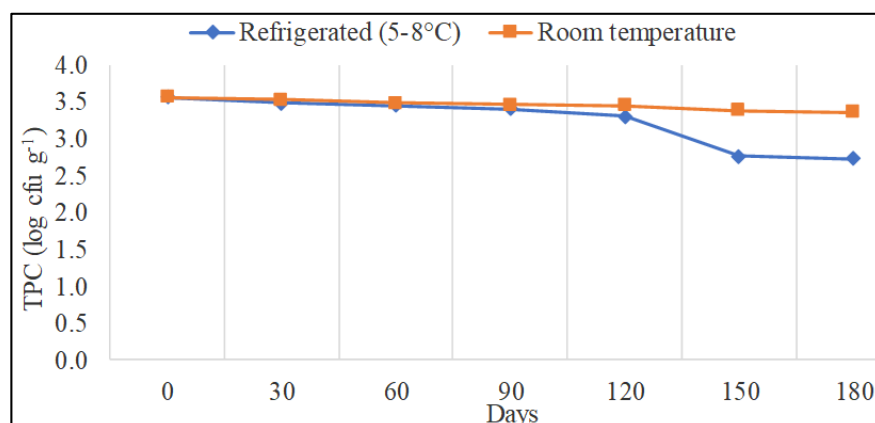


Fig 5: TPC of chutney powder

Sensory analysis

The freshly prepared fish chutney powder showed excellent sensory quality, with appearance, colour, taste and odour scoring 9.5, indicating strong visual appeal, desirable flavour and a fresh, pleasant aroma. Appearance scores dropped to 8.0 under refrigeration and 7.5 at room temperature, while taste declined to 8.0 and 7.5, respectively, reflecting the development of minor off-flavours due to chemical changes. Overall acceptability fell from 8.9 to 7.5 (refrigerated) and 7.0 (room temperature) (Table 2), though the product remained within an acceptable range throughout storage. The slower sensory deterioration

in refrigerated samples agrees with earlier studies on fish and chutneys (Pervin *et al.*, 2010; Renuka *et al.*, 2016; Jeyasanta *et al.*, 2017; Sedyaw *et al.*, 2024)^[18, 21, 14, 22].

Economics of chutney powder

The cost of the product during preparation was estimated for chutney powder and presented for a unit (50 g). There will be 11.5 rupees Miscellaneous cost, 3.05 (Table 1) rupees for a ziplock pack, and the remaining for ingredients like fish, spices, etc. The total cost collectively for a 50-g pack was 20 rupees.

Table 1: Ingredients used for the preparation and economics of chutney powder (50 grams)

Ingredient	Quantity (gram)	Price (rupees)
Fish (Dressed)	24.20	0.48
Coconut powder	11.16	0.85
Gingelly oil	7.14	1.90
Tamarind	2.79	1.17
Garlic	1.86	0.22
Whole red chili	0.93	0.30
Salt	0.47	0.01
Cumin seed	0.30	0.30
Turmeric powder	0.30	0.10
Curry leaves	0.19	0.02
Fenugreek seeds	0.10	0.03
Sodium benzoate	0.03	0.08
Miscellaneous	-	11.5
Packaging	-	3.05
Total	50.00	20

Table 2: Sensory Analysis of Chutney Powder During Storage

Days	Appearance		Colour		Taste		Odour		Overall Acceptability	
	I*	II**	I*	II**	I*	II**	I*	II**	I*	II**
0	9.5	9.5	9.0	9.0	9.5	9.5	9.5	8.9	8.9	8.9
30	9.0	9.0	9.0	9.0	9.0	9.0	8.9	8.7	8.9	8.9
60	9.0	8.7	8.9	8.7	8.8	8.5	8.5	8.5	8.5	8.5
90	8.8	8.6	8.9	8.5	8.5	8.5	8.5	8.2	8.5	8.1
120	8.5	8.5	8.5	8.3	8.5	8.2	8.0	7.6	7.9	7.5
150	8.0	7.8	8.5	8.0	8.0	8.0	7.5	7.5	7.9	7.5
180	8.0	7.5	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.0

*I-Storage of chutney powder at refrigerated room temperature

**II-Storage of chutney powder at room temperature

Conclusion

Malabar glassy perchlet chutney powder remained biochemically, microbiologically and sensorially stable for up to 180 days under both refrigerated and room temperature storage. pH, PV, TVB-N and TMA values increased gradually but stayed within safe limits, while microbial counts remained well below permissible levels. Sensory quality was better retained under refrigeration. The product proved to be safe, acceptable and economically viable, highlighting its potential for value-added utilization of underutilized fish species.

Acknowledgements

The authors place on records their gratitude to the Department of Fish Processing Technology, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, for the financial support and all necessary facilities for conducting this study.

References

- Asha KK, Anandan R, Mathew S, Nair PG. Effect of spices on the quality and shelf life of fish products. *J Food Sci Technol*. 2016;53(4):1954-1961.
- AOAC. Official methods of analysis. 17th ed. Association of Official Analytical Chemists; 2000.
- Bhosale BP, Shingare PE, Patange SB. Quality evaluation of shrimp chutney during storage. *Int J Fish Aquat Stud*. 2014;2(1):12-17.
- Bogard JR, Thilsted SH, Marks GC, Wahab MA, Hossain MAR, Jakobsen J, *et al*. Nutrient composition of small indigenous fish species in Bangladesh. *Public Health Nutr*. 2015;18(2):306-319.
- Chakraborty K, Joseph D, Jayasinghe PS. Nutrient profiling of elongated glassy perchlet (*Ambassis elongata*). *J Food Compos Anal*. 2018;67:102-110.
- Conway EJ. Micro-diffusion analysis and volumetric error. *Biochem J*. 1947;41:1-12.
- Conway EJ. Microdiffusion analysis and volumetric error. 5th ed. Crosby Lockwood; 1962.
- Dreosti IE. Fish protein concentrates and powders from low-value fish. *Food Technol*. 1974;26:195-198.
- FSSAI. Food safety and standards regulations for fish and fish products. Food Safety and Standards Authority of India; 2020.
- Gibson RS, Bailey KB, Gibbs M, Ferguson EL. A review of phytate, iron, zinc and calcium absorption. *Food Nutr Bull*. 2018;39(1):60-84.
- Gopakumar K. Textbook of fish processing technology. ICAR; 2002.
- Hardy R, Pirie BJS, Mackie IM. Fish utilization and consumer preference. *J Food Technol*. 1982;17:417-425.
- Jacobs MB. The chemical analysis of foods and food products. 3rd ed. 1958.
- Jeyasanta KI, Edwin T, Patterson J. Storage stability of shrimp chutney. *Fishery Technol*. 2017;54:79-85.
- Kumar R, Basu S. Quality changes in fish chutney during storage. *Indian J Fish*. 2001;48(2):221-225.
- Mahakal A, Kulkarni GN, Relekar SS. Lipid oxidation in dried fish products during storage. *J Food Sci Technol*. 2016;53:173-179.
- Nayan N, Raghunath MR, Satish HS. Packaging and refrigerated storage effects on fish pickle quality. *J Food Process Preserv*. 2020;44(5):e14421.
- Pervin S, Rahman MS, Khan MA. Storage stability of shrimp pickle. *Bangladesh J Fish Res*. 2010;14(1):85-92.
- Rao BM, Reddy GVS, Naik BR. Chemical quality changes in shrimp chutney. *J Food Sci Technol*. 2011;48(3):347-352.
- Rennita MJ, Patterson J. Shelf-life assessment of fish-based chutney products. *Fishery Technol*. 2012;49:133-139.
- Renuka V, Relekar SS, Bhosale BP. Quality assessment of Jawala shrimp chutney powder during storage. 2016;4(6):406-411.
- Sedyaaw P, Patil P, Kulkarni G. Storage stability of fish chutney powder under ambient conditions. *J Food Process Preserv*. 2024;48(2):e16852.
- Surendran PK, Nambiar VN, Joseph J. Microbial quality standards of seafoods. *Fishery Technol*. 2006;43(2):128-132.
- Venugopal V, Shahidi F. Value-added products from underutilized fish. *Trends Food Sci Technol*. 1995;6:7-12.