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Tempoyak as a Traditional Fermented Food from Jambi: Integrating Tradition with Modern Food Technology Innovation

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Abstract:
Tempoyak, a traditional fermented food derived from durian (Durio zibethinus), which holds considerable cultural, nutritional, and health significance, and plays an important role in Jambi's distinctive culinary heritage. This product is generally produced through spontaneous fermentation dominated by Lactic Acid Bacteria (LAB), which plays a crucial role in shaping its sensory attributes, texture, and antimicrobial properties. Nevertheless, such traditional fermentation practices often lead to inconsistent product quality due to variability in raw materials, fermentation conditions, and microbial composition. This review provides a comprehensive examination of the integration of modern food technologies aimed at improving the quality, safety, and functional potential of tempoyak, including molecular-based microbial identification, the use of starter cultures and standardized durian raw materials, as well as the application of innovative packaging technologies such as High Pressure Processing (HPP) and vacuum packaging. These approaches are anticipated to ensure more consistent and safe production of tempoyak, while simultaneously enhancing its functional and economic value, thereby reinforcing its recognition as a heritage food with global market potential.

Keywords: Tempoyak, spontaneous fermentation, molecular identification, starter culture, innovative packaging

1. Introduction

Tempoyak, a traditional fermented product derived from durian (Durio zibethinus), is highly popular in Jambi. It is notable for its distinctive aroma, unique sour taste, and cultural significance, particularly as a key ingredient in local cuisine such as Gulai Ikan Patin Tempoyak, which serves as a culinary hallmark of the region. Beyond its role as a condiment or side dish, tempoyak also holds a central place in various customary ceremonies and local traditions (Rajagukguk & Arnold, 2021; Anggadhania et al., 2023). During the durian harvest season, members of the Malay community often reside in orchards for extended periods, constructing temporary huts to facilitate harvesting and post-harvest processing. Overripe or unconsumed durians are traditionally converted into tempoyak, a practice that not only reduces post-harvest waste but also fosters social cohesion, collective participation, and the communal value of cooperate (Rajagukguk & Arnold, 2021; Lestari & Ikhsan, 2025). The production process is grounded in indigenous knowledge passed down through generations, involving the selection of ripe fruits, the addition of salt, and natural fermentation without artificial starter cultures, relying instead on native microbial communities (Alang, H et al., 2024; Anggadhania et al., 2023).

The fermentation of tempoyak occurs spontaneously with the addition of salt, which promotes the predominance of Lactic Acid Bacteria (LAB), such as Lactobacillus plantarum, L. fermentum, L. curvatus, and Fructobacillus durionis. These LAB metabolize sugars into lactic acid, resulting in a decrease in pH (Leisner et al., 2001; Ardilla et al., 2022; Marwati et al., 2025). The product contains various organic acids, notably lactic, acetic, and propionic acids, alongside a high moisture content (70–85%), protein levels ranging from 2.8–5%, and fat levels of 3–6%. Such composition enhances the antimicrobial properties of LAB,

enabling them to suppress the growth of pathogenic microorganisms, including Staphylococcus aureus, Escherichia coli, Listeria monocytogenes, and Salmonella spp. (Chuah et al., 2016; Juliyarsi et al., 2018; Hendry et al., 2021). Consequently, tempoyak is considered a promising functional food with potential benefits for digestive and metabolic health, making it a promising candidate for development as a healthy fermented food product.

The development of tempoyak processing is of great interest within modern food technology since its fermentation involves LAB, which not only contributes to distinctive flavor and texture but also enhances food safety. The integration of biotechnology with advanced food processing approaches such as molecular-based microbial identification, the application of defined starter cultures with standardized durian substrates, and the adoption of innovative packaging techniques including high pressure processing and vacuum packaging offers considerable potential for improving the quality, consistency, and market competitiveness of tempoyak as a functional food (Figure 1). This review underscores the importance of leveraging modern food technologies and biotechnological strategies to enhance the quality, safety, and industrial prospects of tempoyak, thereby fostering its development as an innovative product and reinforcing its position as a Jambi heritage food with global competitiveness.

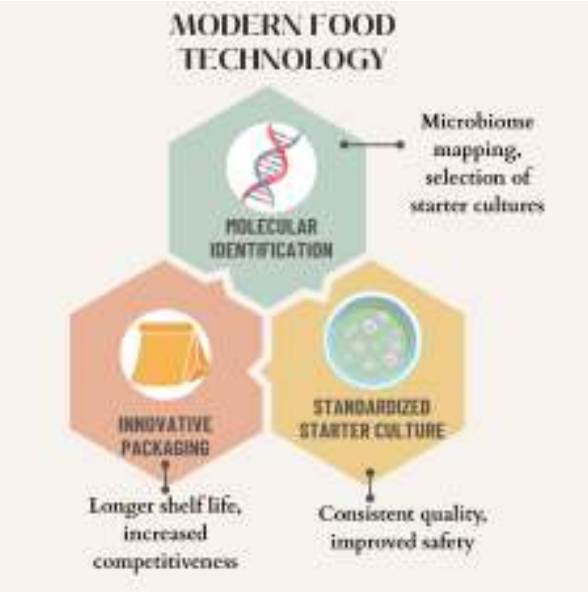

Figure 1. Integration of Modern Biotechnology to Improve the Quality, Consistency and Competitiveness of Tempoyak

2. Traditional Making of Jambi Tempoyak

Jambi Province is known as a region with a strategic position and abundant agricultural and plantation products. One of the commodities that is plentiful in this area is durian. The abundant availability of durian has encouraged local communities to process it into a more durable and higher-value product. From this need came tempoyak, a fermented durian product that can be stored for a longer period. Etymologically, the term “tempoyak” comes from the word “poyak”, meaning “torn”, referring to the traditional method of processing durian flesh by tearing it apart (Wulandari et al., 2022).

The making of tempoyak in Jambi generally involves adding salt during fermentation. Spontaneous fermentation is more commonly used by local communities, although fermentation using microbial starters can also be applied in tempoyak production. Fermentation takes place over 7 to 10 days at room temperature in tightly sealed containers, such as earthenware jars, glass jars, or closed bamboo tubes, which are commonly used by inland communities. During fermentation, the sugar content in the durian flesh serves as a substrate for the growth of lactic acid bacteria. The lactic acid produced by these bacteria helps extend the shelf life of tempoyak (Permana et al., 2021; Safitri & Mustakim, 2025).

Tempoyak comes in variations depending on added ingredients and processing methods. Different types of tempoyak are produced based on the type and concentration of added ingredients, such as salt and chili, as well as the processing technique used. There is plain tempoyak, which contains only durian flesh and salt, tempoyak with added chili, and salty versus sour tempoyak, which are distinguished by the amount of salt used. Salty tempoyak uses more than 5% salt, while sour tempoyak uses less than 5% salt, which affects both the taste and the growth of lactic acid bacteria. In addition, tempoyak is also processed into derivative products such as tempoyak chili sauce and traditional regional side dishes (Rajagukguk & Arnold, 2021; Ardilla et al., 2022; Anggadhania et al., 2023; Marwati et al., 2025). In Jambi, tempoyak is used as the main ingredient in making gulai tempoyak with patin fish. The use of freshwater fish from the Batang Hari River, especially patin fish, is a defining feature of this dish, due to the abundant supply of fish in that area. Besides that, tempoyak can also be mixed into dishes such as fish pepes, shrimp sambal, and grilled fish. This variety of uses makes tempoyak popular among the people of Jambi and reinforces its identity as a distinctive regional dish (Wulandari et al., 2022).

3. Integration of Modern Food Technology in Tempoyak Production

Molecular-Based Microbial Identification

Microbial identification from tempoyak samples collected at traditional markets in Jambi has been carried out by Safitri & Mustakim (2025). The study found colonies of lactic acid bacteria, appearing as rod-shaped and pale yellow in color, grown on MRS medium. However, further research regarding microbial identification in Jambi tempoyak has not yet been conducted. Microbial identification is important to characterize and explore the potential of local bacteria from Jambi tempoyak as a functional food. Molecular-based microbial identification has become the primary method for understanding the lactic acid bacteria (LAB) community involved in tempoyak fermentation. Techniques such as 16S rRNA gene sequencing and MALDI-TOF/MS allow species identification down to the strain level, revealing microbial diversity and dynamics during fermentation (Table 1). Molecular studies show that the microbial community in tempoyak is dominated by lactic acid bacteria, especially *Lactobacillus plantarum, Fructobacillus durionis*, and *Levilactobacillus brevis*. In addition, species such as *Lactobacillus fermentum*, *Lactobacillus buchneri*, *Lactobacillus paracasei, Leuconostoc mesenteroides*, and *Pediococcus acidilactici*. This composition may vary depending on the fermentation stage and the origin of the tempoyak (Chuah et al., 2016; Juliyarsi et al., 2018; Khalil et al., 2018; Salleh et al., 2021; Murwani et al., 2024; Soleha & Hanifa, 2024; Swestyani & Hujjatusnaini, 2024).

In addition, microbiome mapping of tempoyak can also be key to identifying and understanding the potential of lactic acid bacteria (LAB) present within it (Table 1). This approach reveals the dominance, diversity, and probiotic potential of LAB that play a crucial role in the quality and health benefits of tempoyak. Microbiome mapping enables the specific identification of LAB strains with probiotic potential, such as tolerance to stomach acid and bile, ability to adhere to intestinal cells, and antimicrobial activity against pathogens. LAB strains *L. plantarum* and *L. brevis* from tempoyak have been proven to survive under simulated digestive tract conditions and show inhibitory activity against pathogenic bacteria, making them potential candidates for development as functional probiotics (Ahmad et al., 2018; Khalil et al., 2018; Murwani et al., 2024).

Table 1. Molecular-based microbial identification has been applied to tempoyak

Identification Method	Main Species Successfully Identified	Source
16S rRNA, genotyping	*F. durionis, L. plantarum*	(Chuah et al., 2016)
16S rRNA	*L. plantarum, L. fermentum, L. reuteri*	(Khalil et al., 2018)
DNA barcoding (microbiome)	*L. brevis, L. plantarum*	(Murwani et al., 2024)
MALDI-TOF/MS	*L. buchneri, L. plantarum, L. paracasei*	(Salleh et al., 2021)

Use of Starter Culture and Standardized Durian Raw Material

Spontaneous or natural fermentation is the primary method used in traditional tempoyak production, but it often results in products with inconsistent quality (Permana et al., 2021; Safitri & Mustakim, 2025). This is due to various factors such as the type of durian, salt concentration, temperature, fermentation duration, and container sanitation. The varying microbial composition depends heavily on the natural microbes present in the durian flesh, equipment, and environment. In addition, shifts in microbial dominance also occur throughout the fermentation process. These factors can lead to significant variations in the nutritional content, taste, aroma, and texture of tempoyak (Leisner et al., 2001; Chuah et al., 2016; Anggadhania et al., 2023). Therefore, standardizing starter cultures and durian raw materials can serve as a solution to improve the consistency and quality of tempoyak.

The use of standardized starter cultures in tempoyak production aims to produce a more consistent, safe, and high-quality product compared to spontaneous fermentation. Starter selection has been carried out by Rahayu & Qurbaniah (2019) by identifying and testing superior lactic acid bacteria (LAB) from tempoyak. Isolation and selection of LAB from tempoyak were based on acid-producing ability, enzyme activity (lactase, protease), as well as morphological and biochemical characteristics, and were subsequently used as starters in yogurt production. Out of dozens of LAB isolates, only a few strains, such as Tp 12 and Tp 28, showed superior characteristics: gram-positive, catalase-negative, non-spore-forming, and non-motile. Strain Tp 12, for example, produced yogurt with the highest organoleptic acceptance and lactic acid content, indicating its potential as a standardized starter for fermentation. The use of pure starter cultures, such as Pediococcus acidilactici, has also been applied in tempoyak production. Tempoyak produced using standardized starters shows better sensory and physical characteristics and is more preferred by panelists compared to spontaneously fermented tempoyak. The use of starter cultures can also reduce the presence of wild microbes and enhance food safety (Yuliana & Garcia, 2009).

In addition to starter cultures, standardizing the durian raw material is also crucial. Determining cultivars and conducting genetic population analysis of durian is essential to ensure consistent, high-quality raw material that matches the desired characteristics for tempoyak production. Molecular technologies such as SSR (Simple Sequence Repeat) and SNP (Single Nucleotide Polymorphism) can serve as standards for selecting and tracing durian varieties. SSR has been successfully used to distinguish and map genetic variation among durian cultivars. A study by Siew et al. (2018) showed that SSR was able to generate unique DNA fingerprints for most durian types in Malaysia and revealed high genetic diversity.

Innovative Packaging

People generally use plain transparent plastic, plastic jars, or unlabeled plastic bags as the main packaging for selling tempoyak. This type of packaging is easy, cheap, and in line with tradition, but it lacks visual appeal and provides minimal product information (Erlyana, 2018). Innovative packaging is crucial to maintain the quality and safety of tempoyak and to extend its shelf life, especially since this product is highly perishable due to microbial activity. Modern packaging innovations such as High-Pressure Processing (HPP) and vacuum packaging can be applied to tempoyak. HPP is a non-thermal technology that applies very high pressure (300–600 MPa) to food already sealed in flexible packaging (usually vacuum-packed). This process effectively inactivates pathogenic microorganisms and spoilage enzymes without damaging the food's flavor, color, texture, or nutritional content. Meanwhile, vacuum packaging removes air from the package, slowing down oxidation and the growth of aerobic microbes, while preserving product freshness. Vacuum packaging is also essential to ensure the package can withstand high pressure during the HPP process (Abera, 2019; Marangoni Júnior et al., 2019; Gomathy et al., 2021).

The combination of HPP and vacuum packaging has been applied to various food products such as meat, fish, dairy products, juices, smoothies, sauces, and ready-to-eat meals (Table 2). According to Abera (2019), the use of HPP can extend the shelf life of food by more than double compared to conventional methods. For example, processed ready-to-eat meat can last up to 10 weeks. HPP is also effective in reducing pathogenic bacteria such as *Listeria, Salmonella*, and *S. aureus* to nearly zero, while better preserving antioxidant and vitamin content compared to thermal processing (Abera, 2019; Diachkova & Tikhonova, 2019; Tikhonov et al., 2021; Tsevdou et al., 2023).

Table 2. Application of HPP and vacuum packaging in the packaging of various food products.

Product Category	Example Product	Source
Meat and fish	Sausage, ham, fish fillet, ready-to-eat meat	(Abera, 2019; Diachkova & Tikhonova, 2019; Tikhonov et al., 2021; Tsevdou et al., 2023)
Dairy and dairy products	Ricotta cheese, yogurt	(Stefanini & Vignali, 2020; Wu et al., 2022)
Juices and smoothies	Apple juice, carrot juice, mango juice, mixed smoothies	(Abera, 2019; Houška et al., 2022)
Sauces and purees	Salsa, guacamole, fruit/vegetable puree	(Abera, 2019; Houška et al., 2022)
Other ready-to-eat products	Macaroni salad, artichoke dip	(Abera, 2019)

4. Conclusion

Tempoyak is a traditional fermented food from Jambi with high cultural, nutritional, and health value. Integrating modern food technologies, such as molecular-based microbial identification, the use of standardized starter cultures and raw materials, and innovative packaging technologies, can strengthen the quality, safety, and functional potential of tempoyak. The application of modern food technology is expected to enhance tempoyak's potential as a leading regional product with economic value and international competitiveness.

References

Abera, G. (2019). Review on high-pressure processing of foods. *Cogent Food & Agriculture*, *5*(1), 1568725. https://doi.org/10.1080/23311932.2019.1568725

Ahmad, A., Yap, W. B., Kofli, N. T., & Ghazali, A. R. (2018). Probiotic potentials of Lactobacillus plantarum isolated from fermented durian (Tempoyak), a Malaysian traditional condiment. *Food Science & Nutrition*, *6*(6), 1370–1377. https://doi.org/10.1002/fsn3.672

Alang, H, Khairillah, Y, Febrianty, R., Novita, N., Ningsih, D., & Pratama, S. (2024). Inventarisasi Produk Pangan Fermentasi Lokal Pada Pasar Tradisional di Pontianak Sebagi Sumber Belajar Mikrobiologi. *Symbiotic: Journal of Biological Education and Science*, *10*. https://doi.org/10.32939/symbiotic.v5i1.115

Anggadhania, L., Setiarto, R. H. B., Yusuf, D., Anshory, L., & Royyani, M. F. (2023). Exploring tempoyak, fermented durian paste, a traditional Indonesian indigenous fermented food: Typical of Malay tribe. *Journal of Ethnic Foods*, *10*(1), 42. https://doi.org/10.1186/s42779-023-00206-2

Ardilla, Y. A., Anggreini, K. W., & Rahmani, T. P. D. (2022). The role of indigenous lactic acid Bacteria Genus Lactobacillus in the fermentation process of Durian (Durio zibethinus) for Tempoyak production. *Berkala Ilmiah Biologi*, *13*(2), 42–52. https://doi.org/10.22146/bib.v13i2.4619

Chuah, L.-O., Shamila-Syuhada, A. K., Liong, M. T., Rosma, A., Thong, K. L., & Rusul, G. (2016). Physio-chemical, microbiological properties of tempoyak and molecular characterisation of lactic acid bacteria isolated from tempoyak. *Food Microbiology*, *58*, 95–104. https://doi.org/10.1016/j.fm.2016.04.002

Diachkova, A., & Tikhonova, N. (2019). Preservation of Freshness and Shelf Life Extension of Perishable Products (Meat and Fish) in Vacuum Packaging by Experimental Hydrostat. *Food Industry*, *4*(3), 22–33. https://doi.org/10.29141/2500-1922-2019-4-3-3

Erlyana, Y. (2018). Analisis Peranan Desain Kemasan Terhadap Brand Identity Dari Sebuah Produk Makanan Lokal Indonesia Dengan Studi Kasus: Produk Oleh-Oleh Khas Betawi 'Mpo Romlah.' *National Conference of Creative Industry*. https://doi.org/10.30813/ncci.v0i0.1316

Gomathy, K., Pandiselvam, R., Kothakota, A., & Ramesh, S. V. (2021). High-Pressure Processing: Potential Applications for Foods. In *Handbook of Research on Food Processing and Preservation Technologies*. Apple Academic Press.

Hendry, N., Aldi, Y., Syukur, S., Juliyarsi, I., & Purwati, E. (2021). Tempoyak from Agam district of West Sumatera, Indonesia as a local probiotic super food candidate. *IOP Conference Series: Earth and*

Environmental Science, *888*(1), 012048. https://doi.org/10.1088/1755-1315/888/1/012048

Houška, M., Silva, F. V. M., Evelyn, Buckow, R., Terefe, N. S., & Tonello, C. (2022). High Pressure Processing Applications in Plant Foods. *Foods*, *11*(2), 223. https://doi.org/10.3390/foods11020223

Juliyarsi, I., Hartini, P., . Y., Djamaan, A., . A., Purwanto, H., Aritonang, S. N., Hellyward, J., & Purwati, E. (2018). Characterization of Lactic Acid Bacteria and Determination of Antimicrobial Activity in Tempoyak from Padang Pariaman District, West Sumatra, Indonesia. *Pakistan Journal of Nutrition*, *17*(10), 506–511. https://doi.org/10.3923/pjn.2018.506.511

Khalil, E. S., Abd Manap, M. Y., Mustafa, S., Alhelli, A. M., & Shokryazdan, P. (2018). Probiotic Properties of Exopolysaccharide-Producing Lactobacillus Strains Isolated from Tempoyak. *Molecules*, *23*(2), 398. https://doi.org/10.3390/molecules23020398

Leisner, J. J., Vancanneyt, M., Rusul, G., Pot, B., Lefebvre, K., Fresi, A., & Tee, L. K. (2001). Identification of lactic acid bacteria constituting the predominating microflora in an acid-fermented condiment (tempoyak) popular in Malaysia. *International Journal of Food Microbiology*, *63*(1), 149–157. https://doi.org/10.1016/S0168-1605(00)00476-1

Lestari, I., & Ikhsan, M. (2025). Exploring Local Wisdom: Ethnoscientific Study of Durian Tempoyak-Making in Indragiri Hilir as a Source of Science Learning. *Jurnal Pijar Mipa*, *20*(2), 239–245. https://doi.org/10.29303/jpm.v20i2.8532

Marangoni Júnior, L., Cristianini, M., Padula, M., & Anjos, C. A. R. (2019). Effect of high-pressure processing on characteristics of flexible packaging for foods and beverages. *Food Research International*, *119*, 920–930. https://doi.org/10.1016/j.foodres.2018.10.078

Marwati, Candra, K. P., Emmawati, A., Rohmah, M., & Apriadi, R. (2025). Tempoyak: Nutritional Composition, Probiotic Potential, and Health Benefits of a Traditional Fermented Durian Product - A Review. *Journal of World Science*, *4*(2), 256–269. https://doi.org/10.58344/jws.v4i2.1306

Murwani, R., Anggraeni, R., Setiawan, G. N. A., Astari, P. D., Cahyani, N. K. D., Sibero, M. T., & Ambariyanto, A. (2024). Lactic Acid Bacteria Isolates and the Microbiome of Cincalok, Tempoyak, and Mandai: A Traditional Fermented Food from Kalimantan Island, Indonesia. *International Journal of Food Science*, *2024*(1), 6589766. https://doi.org/10.1155/2024/6589766

Permana, L., Pangastuti, H. A., & Wahyuningtyas, A. (2021). Young Adult Perception of Fermented Durian (Tempoyak) in Lampung Province, Indonesia. *Journal of Science and Applicative Technology*, *5*(1), 38–42. https://doi.org/10.35472/jsat.v5i1.392

Rahayu, H. M., & Qurbaniah, M. (2019). Selection of Tempoyak Lactic Acid Bacteria As Candidate Strain for Yoghurt Starter Culture. *Biosaintifika: Journal of Biology & Biology Education*, *11*(1), 39–46. https://doi.org/10.15294/biosaintifika.v11i1.16769

Rajagukguk, Y. V., & Arnold, M. (2021). *Tempoyak*: Fermented durian paste of Malay ethnic and its functional properties. *International Journal of Gastronomy and Food Science*, *23*, 100297. https://doi.org/10.1016/j.ijgfs.2020.100297

Safitri, S., & Mustakim, A. (2025). Isolasi dan Identifikasi Mikroorganisme dari Tempoyak: Produk Fermentasi Tradisional dari Jambi. *Algoritma : Jurnal Matematika, Ilmu Pengetahuan Alam, Kebumian Dan Angkasa*, *3*(5), 84–90. https://doi.org/10.62383/algoritma.v3i5.760

Salleh, F., Lani, M. N., Kamaruding, N. A., Chilek, T. Z. T., & Ismail, N. (2021). Lactic Acid Bacteria Producing Sorbic Acid and Benzoic Acid Compounds from Fermented Durian Flesh (Tempoyak) and Their Antibacterial Activities Against Foodborne Pathogenic Bacteria. *Applied Food Biotechnology*, *8*(2), 121–132. https://doi.org/10.22037/afb.v8i2.32749

Siew, G. Y., Ng, W. L., Tan, S. W., Alitheen, N. B., Tan, S. G., & Yeap, S. K. (2018). Genetic variation and DNA fingerprinting of durian types in Malaysia using simple sequence repeat (SSR) markers. *PeerJ*, *6*, e4266. https://doi.org/10.7717/peerj.4266

Soleha, S., & Hanifa, A. Q. (2024). A Polyphasic Approach to the Exploration of Lactic Acid Bacteria from Tempoyak in South Sumatra. *JST (Jurnal Sains Dan Teknologi)*, *13*(3), 523–536. https://doi.org/10.23887/jstundiksha.v13i3.85208

Stefanini, R., & Vignali, G. (2020). *The effects of different packaging and pressures on a dairy product treated with the high pressure processing*. 14–19. https://doi.org/10.46354/i3m.2020.foodops.003

Swestyani, S., & Hujjatusnaini, N. (2024). Identifikasi Keragaman Mikroflora dan Pengaruhnya pada Kualitas Organoleptik Tempoyak Khas Suku Dayak di Kalimantan Tengah. *Bioscientist : Jurnal Ilmiah Biologi*,

12(1), 1112–1125. https://doi.org/10.33394/bioscientist.v12i1.11008

Tikhonov, S., Tikhonova, N., Lazarev, V., & Zhang, N. (2021). Ultra-high pressure food processing as a promising storage method. *AIP Conference Proceedings*, *2419*(1), 050008. https://doi.org/10.1063/5.0070936

Tsevdou, M., Dimopoulos, G., Limnaios, A., Semenoglou, I., Tsironi, T., & Taoukis, P. (2023). High Pressure Processing under Mild Conditions for Bacterial Mitigation and Shelf Life Extension of European Sea Bass Fillets. *Applied Sciences*, *13*(6), 3845. https://doi.org/10.3390/app13063845

Wu, C.-P., Wu, S.-M., Lin, Y.-H., Wu, Y.-H., Huang, B.-C., Huang, H.-W., & Wang, C.-Y. (2022). High pressure processing-based hurdle strategy for microbial shelf life of packed food in the Cold Chain. *Food Packaging and Shelf Life*, *34*, 100983. https://doi.org/10.1016/j.fpsl.2022.100983

Wulandari, R. A., Fatonah, F., Adiguna, R., Kurniawan, M. R., Aditiya, R. D., Angelina, N., Fajhira, S., & Nurhaliza, D. R. (2022). Tempoyak Sebagai Makanan Khas Jambi. *Prosiding Seminar Nasional Humaniora*, *2*, 25–37.

Yuliana, N., & Garcia, V. (2009). Influence of Pediococcus acidilactici as a starter on the flavour of tempoyak (fermented durian). *Indian J Biotechnol, 8*.