

EFFECT OF RAW MATERIALS VARIATIONS AND FERMENTATION TIME ON THE SENSORY CHARACTERISTICS OF TERASI

Pengaruh Variasi Bahan Baku dan Waktu Fermentasi Terhadap Karakteristik Sensori Terasi

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ABSTRACT

Terasi is a traditional fermented product from Indonesian. Terasi was favoured by Indonesian people and used as spice in various dishes. The purposed of this study was to evaluate the effect of raw materials variations and fermentation time on the sensory hedonic of terasi. There were four varitions, terasi made from rebon, vaname shrimp, lemuru fish meat and lemuru fish head and bones. Each terasi was fermented for 4,5 and 6 weeks. Data anlysed used ANNOVA followed by Duncan's further test for result that showed significant differences. The result showed that variations in raw materials showed a significantly different effect ($P<0,05$) on the sensory-hedonic (appearance, smell, taste, and tecture) of terasi, while variations in fermentation time didn't show a significantly different ($p>0,05$). In general, terasi that was most preferred by panelists was terasi made from rebon which was fermented for 4 weeks with the specifications of clean appearance, specific to very specific terasi types, which has a distinctive shrimp-like smell and flavour. It also has dry and crumble texture.

Keywords: Fermented Time, Raw Materials, Terasi

ABSTRAK

Terasi merupakan produk fermentasi tradisional asli Indonesia yang disukai masyarakat dan digunakan sebagai bumbu dalam berbagai masakan. Tujuan dilakukannya penelitian ini adalah untuk mengevaluasi pengaruh variasi bahan baku dan waktu fermentasi terhadap karakteristik sensori-hedonik terasi. Terdapat 4 jenis variasi bahan baku yaitu terasi berbahan baku udang rebon, udang vaname, daging ikan lemuru beserta terasi yang berbahan baku kepala dan tulang ikan lemuru. Masing-masing terasi tersebut difermentasi selama 4, 5 dan 6 minggu. Analisis data menggunakan ANOVA yang diikuti uji lanjut Duncan untuk hasil yang menunjukkan adanya perbedaan yang signifikan. Hasil uji sensori-hedonik menunjukkan bahwa variasi bahan baku menunjukkan pengaruh yang berbeda signifikan ($p<0,05$) terhadap karakteristik sensori-hedonik terasi sedangkan variasi waktu fermentasi tidak menunjukkan pengaruh yang berbeda signifikan ($p>0,05$) terhadap karakteristik sensori-hedonik terasi yang meliputi atribut kenampakan, bau, rasa dan tekstur terasi. Secara umum terasi yang paling disukai oleh panelis yaitu terasi berbahan baku udang rebon yang difermentasi selama 4 minggu dengan spesifikasi kenampakan bersih, spesifik hingga sangat spesifik jenis terasi udang. Bau dan rasa spesifik

terasi udang, serta memiliki tekstur yang kering dan mudah pecah.

Kata Kunci: Bahan Baku, Terasi, Waktu Fermentasi

INTRODUCTION

One of Indonesia's traditional fishery products is shrimp paste. Prihantono & Muyasyaroh (2021) state that shrimp paste is an authentic Indonesian product originating from Cirebon, West Java, and has been circulating on the island of Java since before the 6th century. Firdaus *et al.* (2021) state that shrimp paste is a fermented product that has benefits as a flavor enhancer in food. Shrimp paste is a food condiment rich in glutamate, making it a flavor enhancer (Pongsetkul *et al.*, 2017; Belleggia & Osimani, 2023; Herlina & Setiarto, 2024). Shrimp paste is generally dark brown, gray, or red in color.

In Indonesia, shrimp paste is commonly used as a flavoring in various dishes, such as vegetable dishes, chili sauce, and rujak (Fadilla *et al.*, 2023). Surya & Tedjakusuma (2022) stated that shrimp paste is most commonly used as an ingredient in traditional Indonesian chili sauce.

Shrimp paste is known for its distinctive aroma and flavor. Surya *et al.* (2023) stated that fermentation in the shrimp paste-making process is the main factor determining the characteristics of the resulting shrimp paste. Ambarita *et al.* (2019) stated that the distinctive aroma and flavor produced by shrimp paste depend on the raw materials used and the manufacturing method. Information regarding the sensory evaluation of shrimp paste with different raw materials and fermentation times is still limited. Therefore, this study was conducted to identify the effect of differences in raw materials and fermentation times on the sensory-hedonic characteristics of shrimp paste and to determine the best shrimp paste.

METHODS

The main raw materials used in this study were rebon (*Acetes indicus*), whiteleg shrimp (*Litopenaeus vannamei*), and lemuru fish (*Sardinella lemuru*). The rebon shrimp and lemuru fish were obtained from Pasar Negara, Jembrana Regency, Bali. The whiteleg shrimp used in this study were size 120 shrimp obtained from a partial harvest byproduct of the Jembrana Marine and Fisheries Polytechnic ponds. Other ingredients used in this study were table salt.

The shrimp paste used in this study was made from four different raw materials: rebon shrimp, whiteleg shrimp, lemuru meat, and lemuru heads and bones. The shrimp paste production process was based on the research of Mulyati *et al.* (2024) with modifications. The shrimp paste production process begins with washing the raw materials to remove impurities, followed by drying, size reduction, 15% salt addition, drying, and fermentation. The fermentation process was carried out for 4, 5, and 6 weeks for each type of shrimp paste with different raw materials.

Sensory testing was conducted on rebon shrimp paste, whiteleg shrimp paste, lemuru meat shrimp paste, and lemuru head bone shrimp paste. The sensory testing conducted in this study refers to the SNI 2716:2016 scoresheet (BSN 2016). Hedonic testing refers to Farida & Khairunnisa (2024). Hedonic testing uses a scale range of 1-9 where panelists assess the attributes of appearance, smell, taste, and texture of shrimp paste ranging from "very much dislike" to "very much like". Sensory-hedonic testing was conducted by 30 untrained panelists. The panelists were employees and cadets of the Marine Product Processing Study Program, Jembrana Marine and Fisheries Polytechnic. The hedonic data obtained in this study were analyzed using ANOVA and further tested using Duncan's New Multiple Range Test (DMRT) at the 5% level.

RESULTS

This study conducted the production of shrimp paste from shrimp and fish raw materials. The raw materials used in making this shrimp paste are plankton shrimp better known as rebon shrimp (*Acetes indicus*), whiteleg shrimp (*Litopenaeus vannamei*) size 120 which is a byproduct of partial harvest of shrimp ponds of the Jembrana Marine and Fisheries Polytechnic, and Lemuru fish (*Sardinella lemuru*). The abundance of lemuru fish in the Bali Strait and molting shrimp remaining from the partial harvest of ponds of the Jembrana Marine and Fisheries Polytechnic presents an opportunity to increase the added value of non-economic fishery commodities.

This study produced 12 types of shrimp paste made from rebon shrimp, whiteleg shrimp, lemuru fish meat, and lemuru fish heads and bones, with fermentation times of 4, 5, and 6 weeks, respectively. The attributes observed in the sensory-hedonic testing included appearance, odor, taste, and texture.

a. Appearance

Hudayati *et al.* (2021) stated that appearance is a very important attribute in sensory assessment because it is the first attribute assessed by consumers before any other attributes. The resulting hedonic response to the appearance attribute of shrimp paste can be seen in Figure 1.

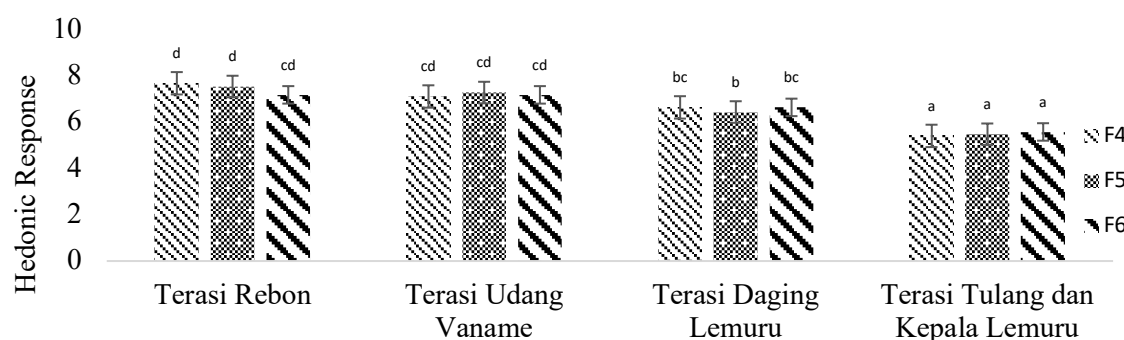


Figure 1. Panelists' Hedonic Response to the Appearance of Shrimp Paste

b. Smell

Hudayati *et al.* (2021) stated that smell is one of the sensory attributes that determines consumer acceptance of food products. The smell or aroma of shrimp paste is produced by volatile compounds during the fermentation process. Suwandi *et al.* (2017) stated that during fermentation, microbes are capable of transforming chemical compounds, resulting in the production of volatile derivatives. Volatile compounds are complex organic compounds that evaporate easily at room temperature. Panelists' hedonic responses to the odor attribute of shrimp paste can be seen in Figure 2.

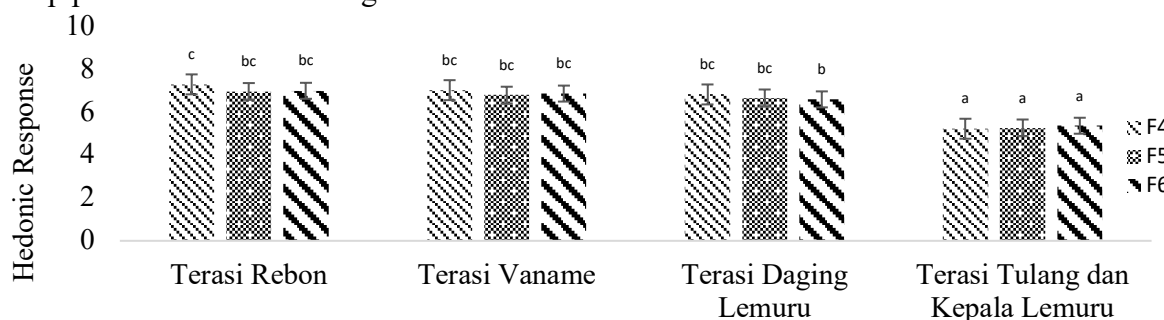


Figure 2. Panelists' Hedonic Response to the Smell of Shrimp Paste

c. Taste

Hudayati *et al.* (2021) stated that taste is the most important attribute in evaluating food products because if the taste is unpleasant or unpopular, the product will be rejected. Panelists' hedonic responses to the taste attribute of shrimp paste can be seen in Figure 3.

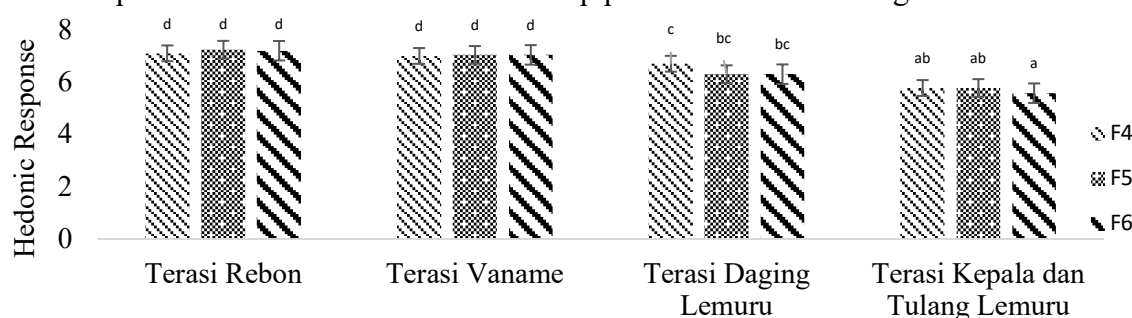


Figure 3. Panelists' Hedonic Response to the Taste of Shrimp Paste

d. Texture

Texture is one of the attributes assessed by panelists when evaluating food products. Hudayati *et al.* (2021) stated that the texture and consistency of ingredients will influence the taste of a product. Panelists' hedonic responses to the texture attribute of shrimp paste can be seen in Figure 4.

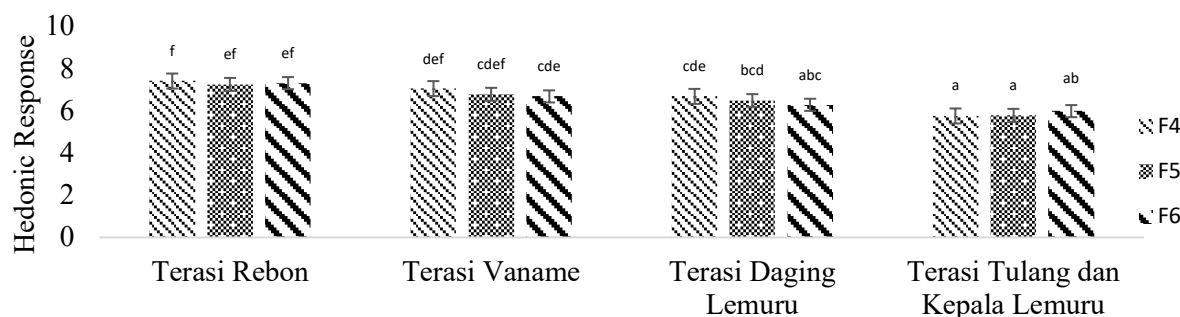


Figure 4. Panelists' Hedonic Response to the Texture of Shrimp Paste

DISCUSSION

The shrimp paste produced in this study was powdered shrimp paste with 15% added salt. Pakaya *et al.* (2023) stated that powdered shrimp paste has advantages including a long shelf life and easy dissolution when added to dishes/food. The results of research by Aristyan *et al.* (2014) showed that the best shrimp paste product was shrimp paste added with 15% salt.

In this study, variations in fermentation time for 4, 5, and 6 weeks did not significantly affect the appearance, odor, taste, and texture of shrimp paste. This is suspected because by week 4 the bacteria have entered a stationary phase, so that increasing fermentation time cannot improve panelists' acceptance of the sensory attributes of appearance, odor, taste, or texture of shrimp paste. Several studies have shown that the best shrimp paste is obtained from a fermentation time of less than 4 weeks. Research by Nenabais *et al.* (2018) showed that the best shrimp paste was obtained after a fermentation time of 15 days. Sephariadi *et al.* (2024) stated that the best shrimp paste was obtained from a fermentation time of 8 days.

a. Appearance

The hedonic response to shrimp paste appearance ranged from 5.4 to 7.67. Statistical tests showed no significant difference ($P > 0.05$) in the appearance of shrimp paste made from rebon shrimp and whiteleg shrimp at fermentation times of 4, 5, and 6 weeks. Statistical tests also showed a significant difference ($P < 0.05$) in the appearance of shrimp paste made from

lemuru meat and shrimp paste made from lemuru bones and heads.

Based on the general test results, it can be seen that the highest level of preference for appearance attributes is in shrimp paste made from rebon shrimp with a fermentation period of 4 weeks, where the panelists rated 7.67 with an acceptance level of "very like". The appearance specifications of the shrimp paste are clean, specific to very specific for the type of shrimp paste. The lowest level of preference for appearance attributes is in shrimp paste made from lemuru fish heads and bones with a fermentation period of 4 weeks, where the panelists rated 5.4 with an acceptance level of "neutral". The appearance specifications of the shrimp paste are dull and dirty, not specific for the type of shrimp paste.

In general, panelists preferred the appearance of shrimp paste made from shrimp (rebbon shrimp and whiteleg shrimp) compared to fish paste (lemuru fish meat and head bones). Sumardiyanto *et al.* (2019) stated that most people prefer shrimp paste compared to fish paste because shrimp paste has a more attractive color. Mulyati *et al.* (2024) stated that shrimp paste made from rebon shrimp has a higher sensory value compared to fish paste because rebon shrimp paste has a brighter color compared to fish paste.

b. Smell

The hedonic response to the shrimp paste odor attribute ranged from 5.23 to 7.3. Statistical testing showed no significant difference ($p > 0.05$) in the odor of shrimp paste produced from rebon shrimp, whiteleg shrimp, and lemuru fish meat. However, there was a significant difference ($p < 0.05$) in the odor of shrimp paste made from lemuru bones and heads. The test results show that, in general, the highest preference for the odor attribute was for shrimp paste made from rebon shrimp fermented for 4 weeks, with panelists rating it 7.3, indicating a "like" rating. This odor attribute indicated the specific odor of shrimp paste. The lowest hedonic response to the odor attribute was for shrimp paste made from lemuru fish heads and bones fermented for 4 weeks, with panelists rating it 5.23, indicating a "neutral" rating. This odor characteristic of shrimp paste was not specific to shrimp paste.

c. Taste

The hedonic response for the resulting shrimp paste flavor attribute ranged from 5.6 to 7.27. Statistical testing showed no significant difference ($p > 0.05$) in the flavor attributes of shrimp paste made from rebon shrimp and whiteleg shrimp fermented for 4, 5, or 6 weeks. Test results showed a significant difference ($p < 0.05$) in the flavor attributes of shrimp paste made from lemuru meat and lemuru head and bones. Overall, panelists' preference for the shrimp paste flavor attribute was highest for shrimp paste made from rebon shrimp fermented for 5 weeks, with a hedonic score of 7.23 and an acceptance rating of "like." This shrimp paste has a specific shrimp paste flavor. The lowest hedonic response was for lemuru head and bone shrimp paste fermented for 4 weeks, with a hedonic score of 5.8 and an acceptance rating of "somewhat like." This shrimp paste has a less specific shrimp paste flavor.

Ukhty *et al.* (2017) stated that in the fermentation process of shrimp paste, protein is broken down into the amino acid glutamate which is the source of the umami taste in shrimp paste. Murti *et al.* (2021) stated that the glutamate content in shrimp paste increases along with the growth of lactic acid bacteria and the amount of protein in the raw material. In general, the taste of shrimp paste made from shrimp (rebbon shrimp and vaname shrimp) is preferred by panelists compared to shrimp paste made from lemuru fish (lemuru fish meat, head and bones). This study is in accordance with the study of Mulyati *et al.* (2024) which stated that consumers prefer the taste of shrimp paste made from rebon shrimp compared to fish paste. The results of the study by Karim *et al.* (2014) stated that shrimp paste made from rebon shrimp has a higher glutamic acid content compared to shrimp paste made from anchovies and petek fish.

d. Texture

Panelists' hedonic responses to the texture attributes of the shrimp paste produced ranged from 5.77 to 7.43. Statistical testing showed no significant difference ($p > 0.05$) in the texture

attributes of shrimp paste fermented for 4, 5, and 6 weeks compared to whiteleg shrimp paste fermented for 4 and 5 weeks. The test results showed that the highest preference for the texture attribute of shrimp paste was found in shrimp paste fermented for 4 weeks, with a hedonic score of 7.43 and an acceptance rating of "like," with the characteristic of the shrimp paste being dry and easily broken. The lowest hedonic response was found in shrimp paste made from lemuru fish heads and bones fermented for 4 weeks, with a hedonic score of 5.77 and an acceptance rating of "somewhat like." The characteristic of this shrimp paste was that it was not dry and easily broken.

CONCLUSION

Based on the statistical test results, it can be concluded that differences in raw materials significantly ($P < 0.05$) influenced the hedonic characteristics of shrimp paste, while differences in fermentation time did not significantly influence the hedonic characteristics of the resulting shrimp paste ($p > 0.05$). In general, the best shrimp paste, preferred by panelists, was made from rebon shrimp with a fermentation time of 4 weeks. The appearance of this shrimp paste was clean, with a specific to very specific shrimp paste characteristic. The shrimp paste had a specific odor and taste, and a dry, brittle texture.

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