Bulletin of Culinary Art and Hospitality
Vol 2, No 1, June 2022, pp. 25-32
ISSN 2797-8249

Quality Test of Peanut Sauce Made from Different Ratio of Komak Beans (*Lablab purpureus (L.) Sweet*) and Peanuts (*Arachis hypogaea L.*)

Budi Wibowotomo[a]*, Issutarti[a], Jesi Kurnia Dewi Treeseff[b]

[a]*Department of Industrial Technology, Faculty of Engineering, Universitas Negeri Malang, Jl. Semarang, No. 5, Malang 65145, Indonesia*
[b]*Culinary Education Program, Faculty of Engineering, Universitas Negeri Malang, Jl. Semarang, No. 5, Malang 65145, Indonesia*
** corresponding author, email: budi.wibowotomo.ft@um.ac.id*

ARTICLE INFO

Article history:
Received: 07-03-2022
Revised: 20-04-2022
Accepted: 27-06-2022

Keywords:
Groundnut
Hyacinth Beans
Peanut Sauce
Ratio

ABSTRACT

This study aims to analyze the proximate content (protein, fat, water content, ash content, and carbohydrate), as well as the effect of hyacinth beans and groundnuts ratios on the organoleptic properties of peanut sauce. This study was an experimental study using a Completely Randomized Design (CRD). The results showed that the hyacinth beans and groundnuts ratio significantly affected the proximate test results, hedonic quality of texture, color, and panelist preferences on the color of peanut sauce. The highest protein content was found in the 50:50 hyacinth beans and groundnuts ratio with the lowest water and carbohydrate content. Meanwhile, the lowest fat and ash content were observed in the 90:10 ratio of hyacinth beans and groundnuts. The highest texture hedonic qualities were identified in peanut sauce with a 50 percent: 50 percent hyacinth and groundnuts ratio, compared to the crude category (3.61). Additionally, the highest hedonic color values were observed in the peanut sauce made from 50:50 and 70:30 ratios, with the values of 3.63 and 3.7, respectively. Meanwhile, in the category of slightly dark chocolate, the preferred level is the value of 4.19 and 4.21, respectively. The hedonic quality of taste and flavor ranges between 4.11-4.17 (delicious, tasty) and 4.51-4.66 (a bit not rotten-rotten). The preference level for texture, taste, and flavor showed no significant difference with the values of 4.24-4.31 (similar), 4.13-4.16 (similar), and 4.1-4, 39 (similar), respectively, on all samples.

I. Introduction

Peanuts are widely used as a base for peanut butter and sauce. Peanut sauce is very well known in the community as it is generally used in local Indonesian cuisines, such as *pecel*, *gado-gado*, satay, and *rujak*. The essential ingredients of peanut sauce are peanuts, added with various spices. Due to the high price of peanut sauce's raw materials, people frequently use cassava, sweet potato, or wheat flour for peanut sauce to get a lower selling price. However, substituting peanuts with cassava, sweet potatoes, or wheat flour resulted in a lower protein than peanuts (27 grams/100gram) since the substitutes contain deficient protein.

Komak beans are a type of pea widely grown in East Java and Nusa Tenggara, Indonesia (Setyorini in Jayanti, 2009). Komak has extensive production, reaching 6-10 tons per hectare, but it is recently underutilized (Ome, 2012). As Komak beans possess a high protein content, it is considered the best substitute for peanuts (Hapsari, 2009; Kay, 1979). Besides, it also presents a relatively lower price, Rp. 20,000 – Rp. 24,000 per kilogram, than peanuts.

Accordingly, komak beans (*Lalablab purpureus* (L.) sweet) were selected as peanuts substitution in the manufacture of peanut sauce. Komak beans were chosen since they have a higher vegetable protein than the other substitutes (cassava, sweet potato, and wheat flour). This study was expected to enhance the utilization of Komak (*Lalablab purpereus* (L.) sweet) as a food base and alternative substitute for peanut sauce, as well as improve its selling price.

DOI: 10.17977/um069v2i12022p25-32

II. Method

This experimental research used CRD on three samples with different Komak and ground nuts ratios, (50%:50%), (70%:30%), and (90%:10%). Further, the chemical analysis covered the test of proximate levels (Protein, Fat, Water, Ash, and Carbohydrates), hedonic quality, and preference test analysis covering texture, taste, color, and aroma of peanut sauce.

In the preparation of peanut sauce using Komak beans, we used numerous tools, such as digital scales, *stainless bowls*, stoves, pans, wooden spatulas, and blenders. Meanwhile, during the chemical analysis, we used *Kjeldahl* flask, a set of distillation apparatus, burette, *beaker glass*, Erlenmeyer, measuring cup, pipette, *soxhlet extraction apparatus*, oven, paper hulls, cup, bunsen burner, furnace, desiccator, vacuum pump, upright cooler and Büchner funnel.

In the chemical analysis, the protein content was analyzed using the *Kjeldahl method*, fat content was analyzed using the *Soxhlet method*, ash content using the oven method, moisture content using the oven method. The carbohydrate content was investigated using the *by different method*, as well as hedonic quality testing and testing. Besides, the preference level was examined using an assessment sheet for the product presented to the panelists.

III. Results and Discussion

The protein content of peanut sauce with different Komak beans and peanuts ranged from 17.23 to 21.51 %. The total average protein content is presented in Table 1. The results suggest different protein content from each distinctive ratio of Komak beans and peanuts.

Table 1. Average Protein Content of Peanut Sauce from Different Ratios of Komak and Peanuts

Ratio Komak Beans: Peanuts	Repetition		Average
	1	2	
50:50	21.31	21.70	21.51
70:30	19.75	19.58	19.68
90:10	17.15	17.30	17.23

The fat content of peanut sauce from different Komak and peanuts ratios ranged from 14.36 to 26.12%, as presented in Table 2. The results confirm different fat content in peanut sauce with varying Komak beans and peanuts ratios.

Table 2. Average Fat Content of Peanut Sauce with Different Komak Beans and Peanuts Ratios

Ratio Komak Beans: Peanuts	Repetition		Average
	1	2	
50:50	26.06	26.19	26.12
70:30	19.84	19.55	19.70
90:10	14.27	14.44	14.36

With different ratios of Komak and peanuts, the obtained moisture content of prepared peanut sauce ranged from 37.75 to 39.55%, as presented in Table 3. The results affirm distinctive moisture content produced from different Komak and peanuts ratios.

Table 3. Average Moisture Content of Peanut Sauce from Different Ratios of Komak Beans and Peanuts (%)

Ratio	Repetition		Average
	1	2	
50:50	37.73	37.77	37.75
70:30	38.33	38.37	38.35
90:10	39.52	39.58	39.55

The ash content of peanut sauce produced from different Komak and peanuts ratios ranged from 2.24 to 2.47%, as shown in Table 4. Similar to the other content, different Komak beans and peanuts ratios generate different ash content in the peanut sauce.

Table 4. Average Ash Content of Peanut Sauce from Different Ratios of Komak Beans and Peanuts

Ratio	Repetition		Average
	1	2	
50:50	2.44	2.49	2.47
70:30	2.34	2.34	2.34
90:10	2.23	2.24	2.24

The Carbohydrate levels in peanut sauce with different ratios of Komak beans and peanuts ranged from 2.24-2.47%, as shown in Table 5. The ratio of Komak beans and peanuts produces different carbohydrate content in the peanut sauce.

Table 5. Average Carbohydrate Content of Peanut Sauce from Different Komak and Peanuts Ratios

Ratio	Repetition		Average
	1	2	
50:50	12.47	11.85	12.16
70:30	19.74	20.16	19.95
90:10	26.82	26.44	26.63

The results of the average texture hedonic quality test for peanut sauce textures from different Komak beans and peanuts ratios are illustrated in Figure 1. The texture hedonic quality test results from peanut sauce with 50:50 and 90:10 Komak beans and peanuts ratios were substantially different. Meanwhile, the peanut sauce from 70:30 Komak and peanuts ratio presented no significant differences with the peanut sauce with 50:50 and 90:10 ratios.

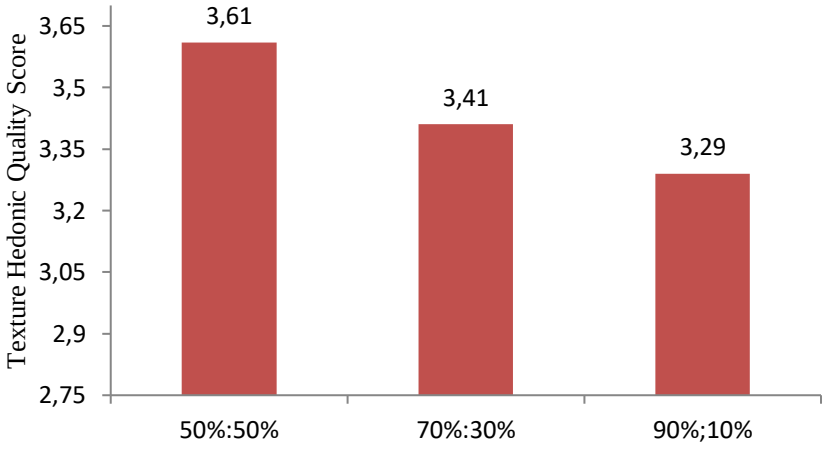

Fig. 1. Average Texture Hedonic Quality Test Results of Peanut Sauce from Different Komak and Peanuts Ratios

Table 6 shows the average taste hedonic quality test results for peanut sauce from different Komak and peanuts ratios, suggesting no substantial differences between the peanut sauce made from different Komak beans and peanuts.

Table 6. Results of Taste Hedonic Quality Test for Peanut Sauce from Different Ratios of Komak Beans and Peanuts

Ratio	Value of Hedonic Quality Test Results	Criteria
	1	
50:50	4.2	Delicious, tasty
70:30	4.16	Delicious, tasty
90:10	4.09	Delicious, tasty

The results of the average color hedonic quality test for peanut sauce made from different Komak and peanuts ratios are illustrated in Figure 2. The results suggested contrasting color between the peanut sauces from 90:10 ratio with the peanut sauces with 50:50 and 70:30 ratios. Besides, no different color hedonic quality result was observed between peanut sauces with 50:50 and 70:30 ratios.

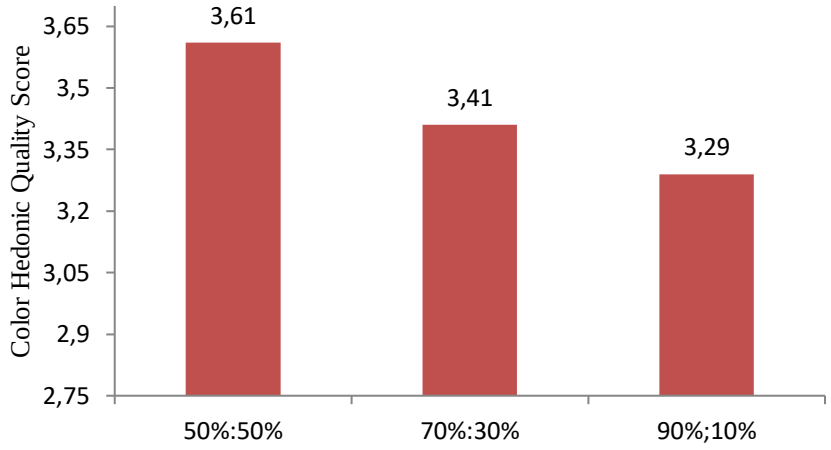

Fig. 2. Average of Color Hedonic Quality Test Results of Peanut Sauce with Different Ratios of Komak Beans and Peanuts

The average results of the flavor hedonic quality test for peanut sauce made from different Komak and peanuts ratios are shown in Table 7. All the peanut sauce samples presented no substantial different flavor.

Table 7. Flavor Hedonic Quality Test Results of Peanut Sauce from Different Ratios of Komak Beans and Peanuts

Ratio	Value of Hedonic Quality Test Results	Criteria
	1	
50:50	4.66	It is not completely absurd
70:30	4.59	It is not completely absurd
90:10	4.51	It is not completely absurd

Table 8 presents the texture-preference test result for peanut sauces made from different Komak and peanuts ratios. The results show no substantial difference in texture preference from all the samples.

Table 8. Texture Preference Test Results of Peanut Sauce from Different Ratios of Komak Beans and Peanuts

Ratio	Value of Hedonic Quality Test Results	Criteria
	1	
90:10	4.31	similar
70:30	4.27	similar
50:50	4.24	similar

The average of the taste preference test results for peanut sauce from different Komak and peanuts ratios are presented in Table 9. No substantial difference was also observed in the preference level of peanut sauces made from different Komak and peanuts ratios.

Table 9. Taste Preference Test Results for Peanut Sauce from Different Komak and Peanuts Ratios

Ratio	Value of Hedonic Quality Test Results 1	Criteria
50%:50%	4.16	similar
70%:30%	4.14	similar
90%:10%	4.13	similar

The results of the color preference test value of the peanut sauce made from different Komak beans and peanuts ratios are shown in Figure 3. The results suggest that peanut sauces from 50:50 and 70:30 Komak beans and peanuts ratios were significantly different from the sauce made from the 90:10 ratio. Meanwhile, the peanut sauce with 50:50 and 70:30 Komak beans and peanuts ratios were not substantially different.

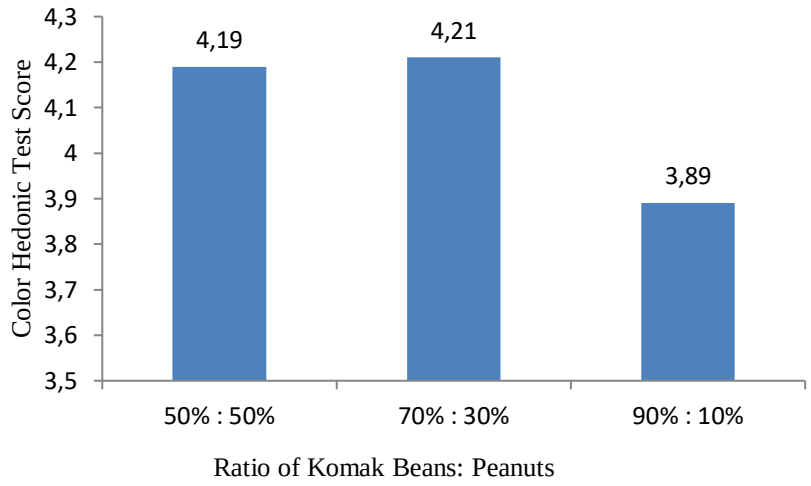

Fig. 3. Results of Color Preference Test Value on the Peanut Sauce with Different Komak Beans and Peanuts Ratios

Table 10 presents the results of the flavor preference test value on the peanut sauces made from different ratios of Komak beans and peanuts, suggesting no significant difference in results from all samples.

Table 10. Results of Flavor Preference Test on Peanut Sauce from Different Komak beans and Peanuts Ratios

Ratio	Value of Flavor Preference Test Results 1	Criteria
50:50	4.39	Slightly like
70:30	4.26	Slightly like
90:10	4.1	Slightly like

Our analysis results showed that different Komak and peanuts ratios resulted in peanut sauce with different protein levels. This difference is influenced by the Komak beans and peanuts protein content since Komak beans contain a lower protein content. According to Schaefer and Love, quoted in Permana (2001), varieties of beans with a higher protein content generally produce products with a higher protein content than beans with lower protein content. A study carried out by Ratnaningtyas (2003) on the use of Komak as a substitute for tofu processing shows that 10% and 20% Komak bean

substitution result in tofu with 56.99 and 55.53% protein levels, respectively. Similarly, we identify that the greater the percentage of Komak beans produce peanut sauce with lower protein content.

Different fat content was also observed in peanut sauce made from different ratios of Komak beans and peanuts, as the ingredients' have different fat content levels. A study from Febrial's research (2009) on the use of Komak beans as a primary flour ingredient for brownie cakes shows that the use of Komak beans reduces the brownies' fat content from 19.59% to 13, 14%-14.27%. In line with that study, our results signified that the higher ratio of Komak beans results in peanut sauce with lower fat content.

Different Komak beans and peanuts ratios also produce peanut sauce with distinctive moisture content caused by different moisture content in Komak beans and peanuts. The average water content increased along with the more significant ratio of Komak beans. In addition, during peanut sauce production, the ingredients undergo a process of soaking and steaming. The soaking process improves the moisture content of the beans as the bean seeds absorb the water, and the space in the cells absorbs more water (Lamid, Almasyhuri, & Sundari, 2015).

Different ash content is also observed in the peanut sauce made from different Komak beans and peanuts ratios. Komak beans have a reasonably good mineral content (3.8 grams per 100 grams) and higher ash content (2.4 grams per 100 grams) than peanuts (Direktorat Gizi Departemen Kesehatan RI, 1981).

In peanut sauce production, the Komak beans undergo a soaking process, causing some macro and micro minerals such as phosphorus, calcium, and sodium to dissolve in water. Additionally, higher water temperature largely reduces the water-soluble components such as water-soluble vitamins and other water-soluble minerals (Salunkhe in Hapsari, 2003). The most potential mineral sources in nuts are calcium and phosphorus. However, the phosphorus content in nuts is mostly in phytic acid, which can be released during processing (Syapri, 2010).

The results of carbohydrate content analysis showed that different Komak beans and peanuts ratios in peanut sauce produce a significantly different carbohydrate content. The diverse results are induced by the dissimilar carbohydrate content of Komak beans and peanuts. Similarly, a study from Ratnaningtyas (2003) suggested that 20% Komak substitution in tofu production enhances the tofu's carbohydrate content by 3.97%. Correspondingly, a higher Komak percentage in the peanut sauce production results in higher carbohydrate content.

Different ratios of Komak and peanuts also result in contrasting peanut sauces' textures. Karunia and Yuwono (2015) described that carbohydrates in a food ingredient facilitate the formation of good texture-forming consistency. The starch content in Komak beans is 52.70% (wk), 20.68, and 32.02% of amylose and amylopectin contents (Hartoyo & Rohmawati, 2010). According to Sugandhi (2016), products containing high amylopectin have a crisp and crumbly texture after being exposed to dry heat during the preparation process. Amylose within an instant food product (pregelatinized) causes the product to absorb water more efficiently. The amylose content in carbohydrates will interact with water, resulting in a softer texture (Karunia & Yuwono, 2015).

In addition, our results signified that no significant difference in the panelists' texture preference was observed in the peanut sauce made from different Komak beans and peanuts ratios. The texture is one of the dominant attributes of consumer food product acceptance (Alamsyah, 2015). The different hedonic texture quality test results did not affect the texture preference of peanut sauce. Universally, the panelists gave a relatively favorable rating on the hedonic quality, with coarse and slightly coarse texture in peanut sauce made from different ratios of Komak beans and peanuts.

The different Komak beans and peanuts ratios produce no significantly different peanut sauce taste. Ratnasari (2015) mentions that the food's taste relies on its ingredients and processing. A study from Syapri (2010) on the use of Komak beans in meatballs processing suggests that the produced meatball is tasty but leaves a bitter taste, the typical taste of processed peanut foods. This bitter aftertaste of the meatballs can be disguised by adding spices. Meanwhile, our analysis suggested that most of the panelists rated the produced peanut sauce as delicious and savory. Panelists were unable to distinguish the peanut sauce made from 90:10 and 50:50 Komak and peanuts ratios. The addition of only 10% peanuts already gives a savory taste to the peanut sauce. Winarno (2004) describes that fat gives a savory taste.

No significant difference in peanut sauce flavor preference was observed in peanut sauce made from different Komak beans and peanuts ratios. Komak beans have a relatively low-fat content (Kay, 1979), resulting in no savory peanut sauce. Kania et al., (2015), a beverage made from Komak beans has a non-acceptable taste, requiring the addition of other ingredients.

In this study, the peanut sauce was made from different ratios of Komak beans and peanuts, added spices, such as candlenut and garlic. Candlenut contains high fat (Arlene et al., 2010), while garlic functions as a flavoring agent (Rusminandar, 1989). Candlenut and garlic can help improve the taste of peanut sauce so that peanut sauce has an acceptable taste. On average, the panelists in this study gave a relatively favorable rating correlating to the taste hedonic quality. They rate the peanut sauce as delicious and savory.

Based on visual observations, the use of Komak beans in peanut sauce results in a significantly different peanut sauce color. The peanut sauce made from 90% Komak beans has a fainter color compared to peanut sauce from 50% and 70% Komak beans. The fainter color is affected by the Komak beans' protein content. Additionally, during the cooking process, the protein experiences a *Maillard reaction*, which is a non-enzymatic browning reaction that occurs between carbohydrates, significantly reducing sugars with primary amine groups (proteins) (Martinus 2012). The higher the protein content enhances the browning process in peanut sauce, resulting in a more dominant brown color (Ratnasari, 2015). In this study, the larger Komak beans ratio produces a paler color due to its lower protein content.

The results of the color preference test showed that the use of different Komak beans and peanuts ratios affects panelists' peanut sauce color preference. The panelists prefer peanut sauce with a darker level of browning. The highest protein content was observed in peanut sauce with 50:50 Komak beans and peanuts ratios, with a slightly dark brown color. Thus, the peanut sauce attains a darker color if the protein content gets higher.

The different Komak beans and peanuts ratios also produce no significantly different peanut sauce aroma. Kania et al. (2015) described that processed Komak beans still have an unpleasant aroma. It has a beany flavor that will result in an awful aroma without proper processing. According to Endy et al. (2010), the unpleasant smell is induced by the activity of the *lipoxygenase* enzyme, which will be inhibited through the cooking process. During the steaming or boiling process, the *lipoxygenase enzyme* activity decreases, reducing the Komak beans' unpleasant odor.

To remove the Komak beans aroma, the peanut sauce was prepared through numerous stages. Steaming and frying for a specific time can remove the unpleasant aroma of Komak beans. Our result suggests that different Komak beans and peanuts ratios produced peanut sauce with no different panelist aroma preferences. The cooking process helps remove unpleasant aromas so that the results of panelist aroma preferences are not different. On average, the panelists gave a somewhat favorable rating on the aroma of peanut sauce made from different ratios of Komak beans and peanuts.

IV. Conclusion

Our results suggested that the peanut sauce made from different Komak beans and peanuts ratios have significantly different proximate content (protein, fat, moisture content, ash content, and carbohydrates), hedonic quality of texture, color, and color preference. The Komak beans did not cause the different hedonic quality of taste and flavor and the level of preference for texture, taste, and flavor. Peanut sauce with the highest ratio of Komak beans and peanuts (90:10) was still acceptable to the panelists. The peanut sauce made from 90:10 Komak beans and peanuts ratio have a protein content of 17.22%, a fat content of 14.35%, a fairly high-water content of 39.55%, a low ash content of 2,24%, and 26.63% carbohydrate content. The moderate results of the hedonic test were obtained in the category of savory taste, brown color, and unpleasant aroma. Due to its high-water content, a further study on the shelf life of peanut sauce made from different ratios of Komak beans and peanuts is required. Further, future researchers may investigate the design of the peanut sauce product made from different ratios of Komak beans and peanuts. In the preparation process, the Komak beans should be soaked to reduce their unpleasant aroma.

References

Alamsyah, M. F. (2015). *Formulasi, daya terima, dan kandungan gizi selai kacang-galohgor (formulation, acceptability, and nutrients content of galohgor-peanut spread)*.

Arlene, A., Suharto, I., & Jessica, J. N. R. (2010). *Pengaruh temperatur dan ukuran biji terhadap perolehan minyak kemiri pada ekstraksi biji kemiri dengan penekanan mekanis*.

Direktorat Gizi Departemen Kesehatan RI. (1981). *Daftar komposisi bahan makanan*. Jakarta: Bhratara Karya Aksara.

Febrial, E. (2009). *Pengembangan produk pangan fungsional brownies kukus dari tepung kecambah dan tepung tempe kacang komak (lablab purpureus (l.) Sweet)*.

Hapsari, A. W. (2009). *Studi sifat fisiko-kimia, fungsional protein, dan kapasitas antioksidan pada konsentrat protein kecambah kacang komak (Lablab purpureus(L) Sweet)*. Departemen Ilmu dan Teknologi Pangan Fakultas Teknologi Pertanian Institut Pertanian Bogor, Bogor.

Hartoyo, A., & Rohmawati, E. (2010). Pengaruh fraksi nonprotein kacang komak (Lablab purpureus (L.) Sweet) terhadap kadar glukosa darah dan malonaldehida tikus diabetes [effect of nonprotein fraction of hyacinth bean (Lablab purpureus (L.) Sweet) diet on glucose and malonaldehyde serum of diabetic rats. *Jurnal Teknologi dan Industri Pangan*, *21*(1), 40-44.

Kania, W., Andriani, M. A. M., & Siswanti, S. (2015). Pengaruh variasi rasio bahan pengikat terhadap karakteristik fisik dan kimia granul minuman fungsional instan kecambah kacang komak (Lablab purpureus (L.) sweet). *Jurnal Teknosains Pangan*, *4*(3), 32-37.

Karunia, N., & Yuwono, S. S. (2015). Pengaruh proporsi kacang tanah dan petis dengan lama pemanasan terhadap karakteristik bumbu rujak cingur selama penyimpanan. *Jurnal Pangan dan Agroindustri*, *3*(1), 259–270.

Kay, E. D. (1979). *Food Legumes*. London: Tropical Products Institute.

Lamid, A., Almasyhuri, A., & Sundari, D. (2015). Pengaruh proses pemasakan terhadap komposisi zat gizi bahan pangan sumber protein. *Media Penelitian dan Pengembangan Kesehatan*, *25*(4), 20747.

Permana, I. (2001). *Pengaruh Varietas Kedelai (Glycine Max Merr.) dan Jenis Koagulan pada Rendemen dan Kualitas Tahu*. Bogor Agricultural University (IPB).

Ratnaningtyas, A. (2003). *Tahu dari kacang non kedelai: Studi kasus kacang komak*. IPB (Bogor Agricultural University).

Ratnasari, D. (2015). *Pengaruh proporsi tepung kacang hijau (Phaseolus radiatus) dan tepung labu kuning (Cucurbita moschata Duch) dengan penambahan margarin terhadap sifat fisikokimia dan organoleptik biskuit*. Universitas Brawijaya.

Syapri, A. R. (2010). *Kajian Pembuatan Texturized Vegetable Protein (TVP) berbasis tepung kecambah kacang komak (Lablab purpureus (L.) sweet) sebagai alternatif pengganti Texturized Soy Protein (TSP) dan Aplikasi Penggunaannya pada Produk Bakso*. IPB.

Winarno, F. G. (2004). *Kimia pangan dan gizi*. Jakarta: *PT. Gramedia Pustaka Utama*.