

Utilization of Durian Seed Flour (*Durio Zibethinus Murr*) in the Manufacture of Cookies

Meitycorfrida Mailoa¹, Agustina Souripet² and Apeles Jhon Pakendy³

Abstract

The aim of the study was to determine the characteristics of cookies which is produced by adding durian seed flour and determining the best formulation of wheat flour and durian seed flour in process of making cookies. A completely randomized design (CRD) one factorial with five levels of ratio of wheat flour(TT) and durian seed flour (TBD) that is = 100 % TT and 0 % TBD; F2 = 75 % TT and 25 % TBD; F3 = 50 % TT and 50 % TBD; F4 = 25 % TT and 75 % TBD; F5 = 0 % TT and 100 % TBD. The results showed that substitution of derian seed flour in the manufacture of cookies will increase the protein content and ash content of cookies, but reduce the water content. The greater proportion of durian seed flour used, refers to the lower panelists preference for color, texture, aroma, taste and overall cookies. The best treatment was substitution of 50%durian seed flour with moisture content of cookies 2.95%, 1.99% ash content, 6.83% protein content with hedonic characteristics showed that the cookies was preferred by panellists on its color (3.07), texture (3.08), aroma (2.25), taste (2.98) and overall (2.95).

Keywords: *Durian Seed Flour, Wheat Flour, Cookies.*

INTRODUCTION

Durian (*Durio Zibethinus Murr*) is one of the most popular fruits in Indonesia. This fruit is nicknamed The King of Fruits and belongs to the Bombacaceae family. Based on data from the Central Statistics Agency (BPS) and the Directorate General of Horticulture (2018), durian production in Indonesia increased every year by 759,055 tons in 2018. The part of durian fruit that is consumed by the community is the pulp of durian fruit because it has high nutritional value and good taste. Even though the percentage of durian meat is low, which is only 20-25% of the total fruit. This means that the skin, which is 60-75% and durian seeds 5-15%, has not been utilized optimally and becomes waste (Djaeni and Prasetyaningrum, 2010). The results of Afif (2009) research, durian seeds have a fairly high starch content of around 42.1% compared to sweet potato starch of 27.9% or cassava 34.7%. Thus, durian seeds can be processed into durian seed flour which can be used as a substitute for wheat flour in the manufacture of processed foods.

The amylose content from durian seed starch obtained was 26.607% while amylopectin was 73.393% (Jufri, 2006). Amylose can affect the development of starch and the viscosity level of starch. The amylose content in starch will give it a hard property (pera) while amylopectin causes sticky properties (Haryadi, 2006). High amylopectin levels will form a brittle texture when dry after gelatinization, so durian seed flour is more suitable for application in food products that require a crispy texture such as *cookie products*.

Cookies are food products that are baked in the oven, made from wheat flour, sugar, fat and eggs with a moisture content of less than 4% and can be stored for a long time, namely 4 - 6 months (Paran, 2009). In making *cookies*, the main ingredient is needed in the form of wheat flour. However, considering that wheat flour is still an imported product, it is necessary to reduce its use by substituting wheat flour with other flours such as durian seed flour so that it can utilize durian seeds which were initially just waste. The addition of durian seed flour in the manufacture of *cookies* will certainly affect the characteristics of the cookies produced considering the characteristics of durian seed flour which is different from wheat flour.

¹ Pattimura University, PDD Masohi Polytechnic, Indonesia, Email: meitymailoa64@gmail.com, (Corresponding Author)

² Pattimura University, Indonesia

³ Pattimura University, Indonesia

Thus, this study aims to determine the characteristics of *cookies* produced with the addition of durian seed flour and determine the best formulation of wheat flour and durian seed flour in the manufacture of *cookies*

METHODS

Durian Seed Cookies Research Procedure

The design used in this study was a one-factor Complete Random Design (RAL), namely the comparison of the composition of wheat flour (TT) with durian seed flour (TBD) which consisted of 5 treatments and 2 replicates. The proportion of wheat flour (TT) with durian seed flour (TBD) is: F1 = 100 % TT and 0 % TBD; F2 = 75 % TT and 25 % TBD; F3 = 50 % TT and 50 % TBD; F4 = 25 % TT and 75 % TBD; F5 = 0 % TT and 100 % TBD.

Manufacturing process *Cookies* in this study based on reference from Gunawan (2019) with slight modifications. Starting with the preparation and mixing of ingredients which are divided into 2 stages, mixing ingredients I consists of margarine (75 g), salt (0.5 g) and powdered sugar (62.5 g) is first beaten using a mixer for 3 minutes at high speed. Mixing ingredient II, which consists of a mixture of egg yolk (1 egg), flour composition (wheat and/or durian seed flour) (150 g), milk powder (27 g) and baking powder (0.5 g), then mixed again with a mixer at low speed. After that, the dough is molded by first weighing 6 g per *Cookies*. Then the dough is formed into a circle using your hands and placed on a baking sheet. Next *Cookies* baked using an oven at 160°C for 20 minutes.

The *cookies* that have been obtained are then chemically analyzed in the form of water content analysis (Thermogravimetry), protein content (Kjeldahl) and ash content (Gravimetry) and organoleptic in the form of hedonic color, texture, aroma, taste and overall. The organoleptic assessment uses a score of 1-4, namely dislike, somewhat like, like and very like.

Analyzes Data

The data from the study were analyzed using the *analysis of variance* (ANOVA) fingerprint in accordance with the design carried out and continued with the Duncan test ($\alpha = 0.05$). Minitab 17 software is used for research data analysis.

RESULTS AND DISCUSSION

Chemical Characteristics

Up to Air

The moisture content for *cookies* according to the characteristics or quality requirements of *Cookies* based on SNI 2973:2011, the maximum is 5%. The results of the moisture content test of *cookies* made from a combination of wheat flour and durian seed flour can be seen in Figure 1. The results showed that the moisture content of *cookies* ranged from 2.00% to 3.16%. The results of the differential test showed that the treatment of wheat flour and durian seed flour had a real effect on the moisture content of the cookies produced.

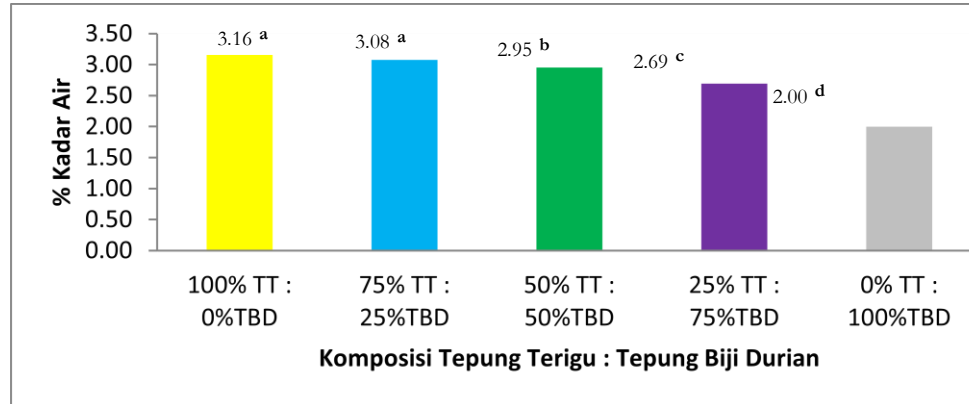


Figure 1. Moisture Content *Cookies* Made with Wheat Flour Substitution with Durian Seed Flour

The data from the study showed that the greater the concentration of durian seed flour added in the manufacture of *cookies*, the lower the moisture content of the cookies produced. This decrease in moisture content is caused by the fact that durian seed flour contains high amylose compared to wheat flour. Hartika (2009) stated that amylose is a fraction found in starch, the more amylose content is used, it will reduce the moisture content of food because the more water is bound and released by the starch in the dough. The same results were also shown by Aditama, et al (2014) who researched the addition of durian seed flour in the manufacture of chicken nuggets. Where the more durian seed flour is added, the lower the moisture content of the nuggets produced. The lower moisture content of durian seed flour (6.60%) compared to wheat flour (12%) also contributed to the moisture content of the cookies produced. The moisture content of cookies according to SNI is a maximum of 5%. Thus, the moisture content of cookies produced in this study is in accordance with SNI.

Up to Abu

The data from the research results in Figure 2 shows that the ash content of cookies ranges from 1.52% to 2.67%. The results of the differential test showed that the substitution treatment of durian seed flour had a real effect on the ash content of the cookies produced. Where the more durian seed flour is added, the more ash content of the cookies produced.

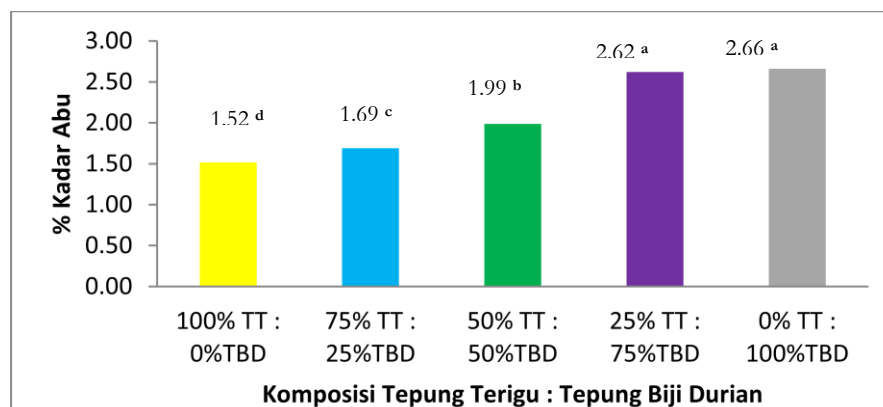


Figure 2. Ash Content *Cookies* Made with Wheat Flour Substitution with Durian Seed Flour

The mineral content of durian seed flour is quite high, this can be seen from the difference in ash content in wheat flour, which is 0.43% (Astawan, 2006), while the ash content of durian seed flour is higher, which is

5.84% (Hutapea, 2010). The determination of ash content is closely related to the mineral content contained in a material, the purity and cleanliness of a material produced (Sudarmadji *et al*, 1997). The mineral content found in durian seed flour is magnesium (mg) 1,751.30 ppm, potassium (K) 9,117.86 ppm, and sodium (Na) 18.07 ppm (Nuriana, 2010). The ash content for *cookies* according to the characteristics or quality requirements of *cookies* based on SNI 01-2973-1992, the maximum is 1.6% so that in this study the ash content obtained in accordance with the SNI quality requirements is the first treatment, namely the formulation of 100% wheat flour and 0% durian seed flour with a value of 1.52%.

Up to Protein

The results showed that the protein content of *cookies* ranged from 6.63% to 9.41% and this amount varied between treatments. The results of the differential test showed that the substitution treatment of durian seed flour provided a real difference in the protein content in the resulting cookies. According to Nuriana (2010), the protein content of durian seed flour is 14.17% while according to Astawan (2006), the protein content of wheat flour is 12%.

This shows that the protein content of durian seed flour is higher than wheat flour so that it can increase the value of the protein content of *cookies* with the raw material of durian seed flour. Riwati (2002) stated that the use of ingredients with high protein content can increase the protein content of foodstuffs. The protein content of *cookies* is in accordance with SNI, which is a minimum of 5, thus all treatments carried out in this study, produce *cookies* with protein levels that are in accordance with SNI.

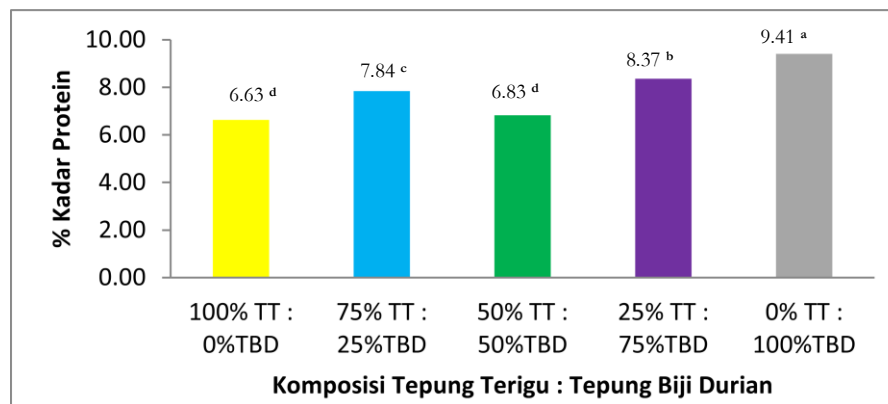


Figure 3. Protein Content Cookies Made with Wheat Flour Substitution with Durian Seed Flour

Organoleptic Characteristics

Hedonic Color

The results of the study showed that the panelists' preference for *cookies* in terms of color varied, namely in the category of like to very like. The treatment without the addition of durian seed flour and the addition of durian seed flour by 25% statistically did not show a real difference and both were highly favored by the panelists. The two treatments showed a real difference with the treatment of adding durian seed flour by 50%, but the color of the *cookies* from this third treatment was still preferred by the panelists. *Cookies* with the addition of 50% durian seed flour were significantly different from all treatments and the panelists gave the lowest rating on the 100% durian seed flour treatment which was not significantly different from the panelists' assessment of *cookies* with the addition of 75% durian seed flour.

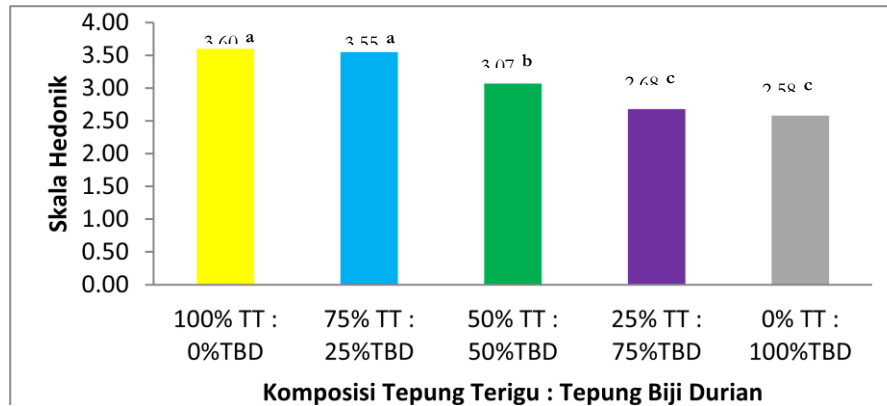


Figure 4. Sensory Characteristics of Hedonic Color *Cookies* made with Wheat Flour Substitution with Durian Seed Flour

The addition of durian seed flour in the manufacture of *cookies*, makes the color of *the cookies* darker. Overall, the panelists' preference for color decreased with the increasing amount of biji durian flour added. Where the panelists prefer *cookies* with bright colors to slightly darker colors. The color of cookies plays an important role because it can provide attractiveness. This is in accordance with the opinion of Winarno (2002) that panelists prefer food products with lighter colors than dark colors. In this study, it can be seen that the greater the concentration of durian seed flour, the darker the color of *the cookies*, and cause a decrease in the level of preference of the panelists. This is in accordance with the statement of Mulyati, et al (2016) who stated that the color change in cookies is influenced by the addition of durian seed flour.

Hedonic Texture

The results of the study (Figure 5), show that although there is a very real difference between the treatments, at least the treatment without the addition of wheat flour is still in the category of somewhat favorable

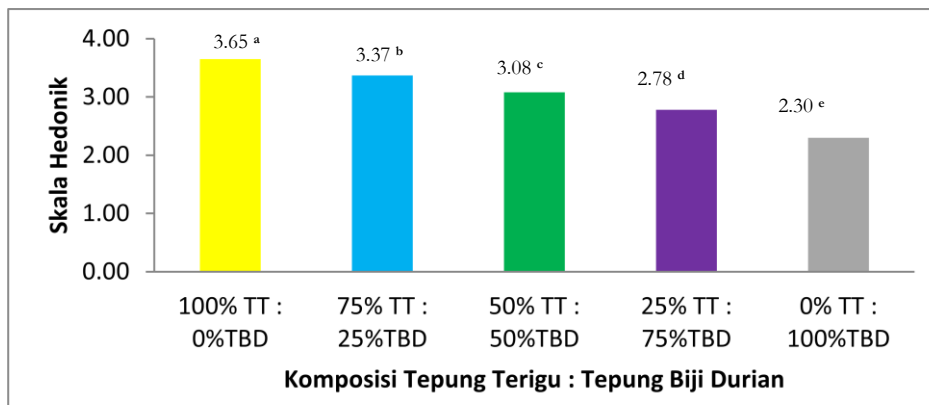


Figure 5. Sensory Characteristics of Hedonic Texture *Cookies* made with Wheat Flour Substitution with Durian Seed Flour

Panelists gave the largest assessment of the texture of cookies made with 100% wheat flour and the lowest rating on *cookies* made with 100% durian seed flour and all showed a very real difference between the treatments. The decreasing level of the panelists' preference for the texture is suspected to be due to the decreasing gluten content caused by the smaller concentration of wheat flour used. This is in accordance with the opinion of See et al (2007), that the decrease in gluten content can affect the texture of the product. *Cookies* with 100% durian seed flour have a chewier texture and are a bit hard so they are less liked by the panelists.

Hedonic Aroma

The results of the aroma hedonics research in Figure 6 show that there is a variation in the level of preference of the panelists in terms of scent. Cookies made with 25% durian seed flour and 50% durian seed flour substitution treatment did not show any real difference (still in the like category), but even though they are different from the aroma of cookies made without the addition of durian seed flour which are the cookies with the highest aroma rating from the panelists and are in the category of very liked. Cookies made with 75% substitution treatment and 100% durian seed flour have an aroma that can still be liked by the panelists.

This shows that the aroma of cookies made using the formulation of durian seed flour only, is still preferred by the panelists even though the value has decreased slightly. This is suspected because the additional ingredients used in making cookies are able to produce an aroma that masks the aroma of durian seed flour so that it is still considered acceptable to the panelists.

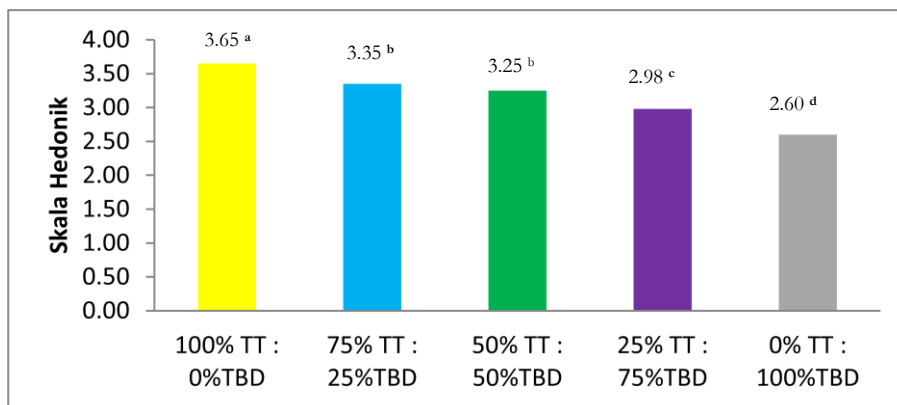


Figure 6. Sensory Characteristics of Hedonic Aroma Cookies made with Wheat Flour Substitution with Durian Seed Flour

Hedonic Taste

The data in Figure 7 shows that there is a variation in the level of liking for taste, from somewhat liking to liking. The panelists gave the highest rating to the flavor category in cookies made from 100% wheat flour and the lowest in cookies made with 100% durian seed flour. However, in general, the panelists still liked the taste of cookies for all treatments, although it was decreasing with the increasing amount of durian seed flour used.

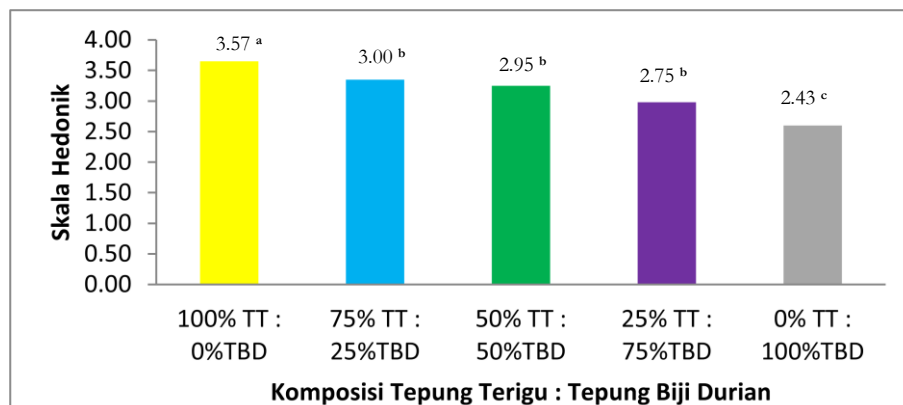


Figure 7. Sensory Characteristics of Hedonic Flavor Cookies Made with Wheat Flour Substitution with Durian Seed Flour

This shows that the addition of durian seed flour does not change the taste of the *cookies*, allegedly because durian seeds do not have the same taste as the flesh which tastes sweet, also durian seeds do not have a sweet, salty or bitter taste and this has an impact on the taste of *cookies* which are also in the normal category and are still liked by the panelists. This can be influenced by the mucus content that has not completely disappeared during the processing of durian seeds into durian seed flour. According to Afif (2006) stated that durian seeds when peeled or cut will emit mucus that has no smell and taste and dissolves in cold or hot water.

Hedonik Overall

The results of sensory testing of overall *cookies* substitution of durian seed flour and wheat flour on 30 panelists can be seen in Figure 8, which varies between treatments. Panelists gave the highest overall rating on *cookies* made without the addition of durian seed flour and were significantly different from all treatments. Meanwhile, the next highest overall hedonic assessment level was given to *cookies* with the addition of 25% durian seed flour which was not significantly different from *cookies* made with the addition of 50% durian seed flour and was still in the like category. Likewise, *cookies* with the addition of 75% durian seed flour, are still liked by the panelists and the lowest rating, which is somewhat liked, was given to *the panelists on cookies* made from 100% durian seed flour

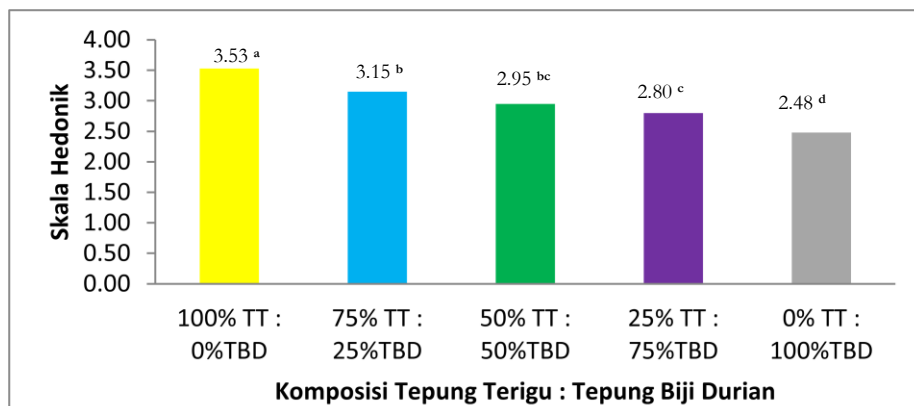


Figure 8. Sensory Characteristics of Hedonic Overall *Cookies* made with Wheat Flour Substitution with Durian Seed Flour

Panelists tend to like *cookies* that don't use durian seed flour. The more durian seed flour substitutions, the overall liking level of *cookies* tends to decrease, but until the formulation without wheat flour, the panelists still somewhat like *the cookies*. This indicates that the cookies generated for all treatments still have a color, aroma, taste, and texture that is acceptable to the panelists. As stated by Irmawati et al., (2014) that the overall acceptability assessment of food can be measured in terms of color, aroma, taste, and texture.

CONCLUSION

The substitution of durian seed flour in making *cookies* will affect the chemical characteristics of the cookies produced, namely increasing the protein content and ash content of *cookies* but decreasing the moisture content of *cookies*. The effect of substitution also affects sensory characteristics, namely decreasing the level of preference of the panelists for the color, texture, aroma, taste and overall of the *resulting cookies*, with the increasing amount of durian seed flour used. The best treatment was the substitution treatment of 50% durian seed flour with a moisture content of 2.95%, ash content of 1.99% and protein content of 6.83% and was tastefully preferred for color characteristics (3.07), texture (3.08), aroma (3.25), taste (2.98) and overall (2.95).

REFERENCES

- Afif, M., 2009. Pembuatan Jenang dengan Tepung Biji Durian (*Durio zibethinus* Murr). Skripsi. Teknologi Jasa dan Produksi. Fakultas Teknik Universitas Negeri Semarang, Semarang.
- Badan Pusat Statistik (BPS). 2018. Statistik Produksi Hortikultura Tahun 2017. Kementerian Pertanian, Jakarta.
- Badan Standarnisasi Nasional, 1992. Bhratara Karya Aksara, Jakarta.

Utilization of Durian Seed Flour (Durio Zibethinus Murr) in the Manufacture of Cookies

- Djaeni, M dan A, Prasetyaningrum. 2010. Kelayakan Biji Durian Sebagai Bahan Pangan Alternatif. Aspek Nutrisi Dan Tekno Ekonomi. Riptek, Vol. 4, No. 11. Pp. 37 – 45.
- Hartika Widya, 2009. Kajian Sifat Fisik dan Kimia Tepung Biji Nangka (*Artocarpus heterophyllus lamk*) dan Aplikasinya dalam Pembuatan Roti Manis. Skripsi, Tidak dipublikasikan. Padang
- Haryadi, 2006. Teknologi Pengolahan Beras. Gajah Mada University Press. Yogyakarta.
- Hutapea, P. 2010. Pembuatan Tepung Biji Durian (*Durio Zibethinus Murr*) dengan Variasi Perendaman dalam Air Kapur dan Uji Mutunya. Skripsi. Universitas Sumatera Utara.Medan.
- Irmawati et al. 2014. Pemanfaatan Tepung Umbi Garut (*Maranta Arundinacea L.*) Sebagai Pengganti Terigu dalam Pembuatan Biskuit Tinggi Energi Protein dengan Penambahan Tepung Kacang Merah (*Phaseolus Vulgaris L.*). [Jurnal]. Surakarta (ID): Universitas Sebelas Maret
- Jufri et al. 2006. Studi Kemampuan Pati Biji Durian Sebagai Bahan Pengikat Dalam Tablet Ketoprofen Secara Granulasi Basah. Majalah Ilmu Kefarmasian, volume3,78-86 Kerjasama dengan Pusat Antar Universitas Pangan Dan Gizi IPB.
- Nuriana, W. 2010. Pemanfaatan Biji Durian Sebagai Upaya Penyediaan Bahan Baku Alternatif Terbarukan Ramah Lingkungan. Fakultas Teknik. Universitas Merdeka. Madiun.
- Paran, S. 2009. 100+ Tips Anti Gagal Bikin Roti, Cake, Pastry dan Kue Kering. Kawan Pustaka. Jakarta
- Sudarmadji, S., B. Haryono dan Suhardi, 1997. Prosedur Analisa untuk Bahan Makanan dan Pertanian. Liberty. Yogyakarta.
- Winarno, F.G. 2002. Kimia Pangan dan Gizi. Gramedia Pustaka Utama. Jakarta.