

Effect Of Combination of Wheat Flour with Yellow Pumpkin Paste and Yeast Concentration on The Quality of Yellow Pumpkin Donuts (*Cucurbita Moschata*)

¹Novi Mailidarni, ²Jauhari

¹Agrotechnology, Faculty of Agriculture Iskandar Muda Univesity, novimailidarni92@gmail.com

²Agrotechnology, Faculty of Agriculture Iskandar Muda Univesity, jauhariamin016@gmail.com

Corresponding author : Novi Mailidarni, email: novimailidarni92@gmail.com

ABSTRACT

The aim of this research was to determine the effect of the ratio of pumpkin paste and yeast concentration on donuts. The variables used include the effect of the ratio of wheat flour to pumpkin pasta and the concentration of yeast on the quality of pumpkin donuts, the ratio of 40% pumpkin paste: 60% wheat flour, 50% pumpkin pasta: 50% wheat flour, 60% pumpkin pasta: 40% and pumpkin paste 1%, 2% and 3% respectively. Meanwhile, the parameters explained are water content, ash content, and organoleptic tests (color, taste, aroma and texture). The research data were processed using a Factorial Completely Randomized Design (CRD) with 2 replications, data analysis using ANOVA and the Least Significant Difference Follow-up Test (BNT).

The best treatment in this study was the T2L2 treatment and the SNI 01-2000 donut quality requirements were 50% pumpkin pasta donuts with a wheat flour ratio of 50: 50% (T2) and a yeast concentration of 2% (L2) with a water content value of 20.71%, ash content value 0.91%, organoleptic test color value 3.37%, taste value 3.83%, aroma value 3.37% and texture value 3.54%.

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Introduction

Yellow pumpkin (*Curcubita moschata*) has complete nutritional content including carbohydrates, proteins, and vitamins. Additionally, the carotene content in pumpkin fruit is very high, measuring 180.00 SI. Due to its high carotene content and complete nutritional content, pumpkin can be a processed food that is rich in nutrients and the price is affordable for the community (Sudarto, 2018).

So far, processed pumpkin products are still limited. One of the processed products that can be developed is pumpkin donuts. Processing pumpkin into donuts is an alternative to increase the economic value of pumpkin, in addition to diversifying processed pumpkin products. Donuts are a kind of small cake that has a distinctive shape, which has a hole in the middle like a ring shape. The shape of the hole in the middle aims for the donuts to cook evenly. It is suspected that donuts were first discovered in the Netherlands, namely in the Manhattan area and are one of the types of food that people like (Lanny, 2019). Donuts are made from the basic ingredients of wheat flour which contains carbohydrates and protein in the form of gluten which play a role in developing the dough and keeping the donuts from hardening quickly (Yulistia, 2020).

One way to reduce the need for wheat flour in making donuts is to replace some of the flour with local ingredients, for example with pumpkin flour.

Yellow pumpkin can be an alternative to reducing the use of wheat, because of its abundant amount and high carbohydrate content (Yanuwardana, 2018). All types of pumpkin have a tough skin. *Cucurbita moschata* is a type of pumpkin that is commonly consumed in Asian countries and the United States. The yellow-orange color of pumpkin is due to the presence of beta carotene (See, *et.al.*, 2019).

In making donuts, it is necessary to pay attention to the expansion volume of the dough, namely the ability to produce gas and the ability to hold gas during fermentation. The main function of yeast is to develop dough. Dough development occurs because yeast produces carbon dioxide gas (CO₂) during fermentation. This gas will then be trapped in the gluten network which causes the bread to expand (Arlene, *et.al.*, 2019). Yeast is a source of protein, so it is called a single cell protein (Nasseri, 2019). This study aims to study the effect of the ratio of wheat flour and pumpkin paste and yeast concentration on the quality of donuts.

Donuts are known as daily food, especially among the general public. This can be proven by the increasing number of donut industries, both on a household and medium industrial scale, donuts are made from almost the same raw materials as bread. This food has a distinctive round shape with a hole in the middle. Currently donuts have developed a variety of different shapes and flavors,

according to the topping and adjust the desired taste. Creating bread is essentially the same as creating donuts; the cooking method is different (Bakhtiar *et al.*, 2019; Ayunda, 2016). The donuts that are bought and sold in the market today are only made from wheat flour. Snacks or snacks can be said to be currently very often sought after by people to buy and consume, this is because these snacks are very easy to get and also very practical. Donuts can be consumed by children to adults (Marleen, 2020).

In making donuts, yeast is needed so that the dough can expand. Yeast (yeast) is usually added after the flour is added to the water and then stirred thoroughly, then the dough is left for some time. Yeast itself is a microorganism, a small living creature, usually of the type *Saccharomyces cerevisiae* which is used in making donuts. In conditions of sufficient water and the presence of food for yeast (yeast), especially sugar, the yeast will grow by converting sugar into carbon dioxide gas and flavorful compounds. The carbon dioxide gas that is formed is then held in by the dough so that the dough expands (Rukmana, 2021).

In making good pumpkin paste donuts (pumpkin donuts) the addition of 6 g of yeast and 150 g of steamed pumpkin and the addition of 200 g of flour, so that the donuts can float perfectly the length of time for fermenting the donut dough is 30 minutes, in donut processing Pumpkin pasta requires substitution of 200 g of wheat flour, 150 g of pumpkin paste, 5.5 g of yeast with 3 minutes of frying time (Hesti, 2021).

Method

This research was conducted in February - March 2023 at the Basic Laboratory of the Faculty of Agriculture, Iskandar Muda University, Banda Aceh. The tools used in this research are: basin, stove, mixing spoon, frying pan, cake scale, and oil filter. The materials used in this study were flour, granulated sugar, vanilla, eggs, fermipan instant yeast, powdered milk, salt, pumpkin paste, and cooking oil.

The experimental design used was a completely randomized design (CRD) with a factorial pattern consisting of two research factors. The first factor is the ratio of wheat flour (T) to pumpkin paste which consists of 3 levels and the second factor is the duration of yeast fermentation (L) which consists of 3 levels.

Factor 1: The effect of the comparison of Yellow Pumpkin Paste and Wheat Flour is as follows: T₁ : Wheat Flour 40% Yellow Pumpkin Paste 60%, T₂ : Wheat Flour 50% Yellow Pumpkin Paste 50%, T₃ : Wheat Flour 60% Yellow Pumpkin Paste 40%, Factor 2: Concentration of Yeast (R) which consists of 3 levels, namely: R₁ = 1%, R₂ = 2%, R₃ = 3%

Table 1. The treatment combination was 3 x 3 = 9, with 2 repetitions so that 18 treatment units were obtained.

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ = 1 %	R ₂ = 2 %	R ₃ = 3 %
T ₁ = 40% : 60%	T ₁ R ₁	T ₁ R ₂	T ₁ R ₃

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ = 1 %	R ₂ = 2 %	R ₃ = 3 %
T ₂ = 50% : 50%	T ₂ R ₁	T ₂ R ₂	T ₂ R ₃
T ₃ = 60% : 40%	T ₃ R ₁	T ₃ R ₂	T ₃ R ₃

The data obtained were processed using analysis of variance, Analysis of variance (ANOVA) with a mathematical model. The research that will be carried out is guided by the variables that are tested, namely fixed variables and changing variables. 1). Fixed Variable: 20% granulated sugar, 6.6% egg yolk, 8.3% powdered milk, 1% vanilla. 2). Variable changed: Comparison of pumpkin paste with wheat flour (40%:60%, 50%:50%, 60%:40%) and Yeast Concentration (R) = 1%, 2% and 3%, 1). Making pumpkin paste, 2). Making pumpkin donuts.

Research Procedure

How to make pumpkin pasta donuts:

1. Pumpkin fruits are sorted and peeled using a knife.
2. Pumpkin fruits were cleaned using clean water.
3. Steamed pumpkin fruit with a temperature of 80°C until cooked.
4. Remove the steamed pumpkin and crush it using a blender.
5. Pumpkin paste is ready to use
6. Mix pumpkin paste dough with flour (40%:60%, 50%:50%, 60%:40%), sugar, egg yolk, milk powder, vanilla.
7. Instant yeast is added according to the treatment (1%, 2%, and 3%), the dough is stirred until smooth, the fermented dough is then covered with a wet cloth for 30 minutes.
8. The dough that has risen is shaped into a ring bracelet.
9. Second fermentation was carried out for 20 minutes.
10. The dough is fried until browned
11. Drain the donuts that have been cooked
12. Pumpkin pasta donuts were analyzed.

Results

Moisture content

The highest value of water content is found in the ratio of 40% pumpkin paste to 60% wheat flour (T₁) and 1% yeast concentration (R₁) with a value of 25.85%. While the lowest value in this treatment is the ratio of 50% pumpkin paste to 50% wheat flour (T₂) and 1% yeast concentration (R₁) with a value of 20.06%.

Table 2. The average results of the analysis of the water content of pumpkin donuts at each treatment level ratio of pumpkin paste to wheat flour and yeast concentration.

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ (1%)	R ₂ (2%)	R ₃ (3%)
T ₁ (40% : 60%)	25,85 %	24,43 %	24,34 %
T ₂ (50% : 50%)	20,06 %	20,71 %	25,14 %
T ₃ (60% : 40%)	21,51 %	22,93 %	21,86 %

The results of the analysis of variance showed that the effect of the ratio of pumpkin paste and wheat

flour (T), the concentration of yeast (R) and the interaction between the ratio of pumpkin paste and wheat flour and the concentration of yeast (TR) had no significant effect ($P \leq 0.05$) on water content pumpkin donut. The water content value of the resulting pumpkin donuts is in accordance with SNI, which is a maximum of 40%.

From the results of the comparison of wheat flour with pumpkin paste and concentration there was no significant effect on the interaction between the two. This is due to the addition of wheat flour and pumpkin paste which bind the water content in the ingredients, resulting in a low water content.

Discussion

Ash Content

Ash is a substance left over from the combustion of organic compounds (Sudarmadji, 2021). In foodstuffs, apart from containing ash content components, there are also other components, namely minerals. The ash content in foodstuffs greatly affects the properties of food ingredients. Ash content is a measure of the total amount of minerals contained in food.

The results showed that the average ash content of pumpkin donuts ranged from 0.88% - 1.35% with an average of 0.98%.

Table 3. Data on Ash Content Analysis Results

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ (1%)	R ₂ (2%)	R ₃ (3%)
T ₁ (40% : 60%)	0,91 %	0,96 %	0,95 %
T ₂ (50% : 50%)	0,88 %	0,91 %	0,88 %
T ₃ (60% : 40%)	0,89 %	1,13 %	1,35 %

The highest value in this treatment was found in the ratio of 60% pumpkin paste to 40% wheat flour (T₃) and 3% yeast concentration (R₃) with a value of 1.35%. While the lowest value in this treatment is the comparison of 50% pumpkin paste with 50% wheat flour (T₂) and 1% yeast concentration (R₁) and 50% wheat flour (T₂) and 3% yeast concentration (R₃) with a value of 0.88%.

Analysis of variance showed that yeast concentration treatment significantly affected the ash content of pumpkin donuts ($P \geq 0.05$), while yeast concentration (R), and interaction between pumpkin paste and wheat flour and yeast concentration (TR) had no significant effect ($P \leq 0.05$) on the ash content of pumpkin donuts.

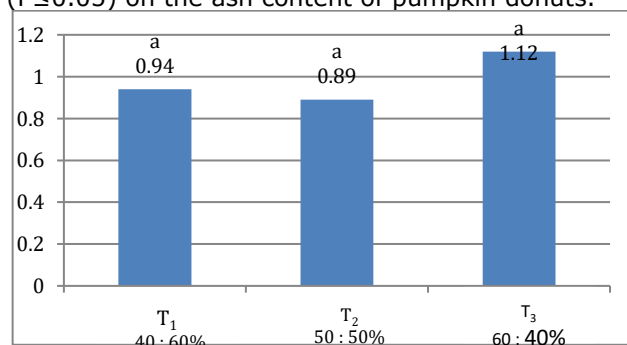


Figure 1. The effect of the ratio of wheat flour to pumpkin paste (T) on the ash content of

pumpkin donuts, at $KK = 11.18\%$, $BNT 0.05: 0.25$

From Figure 1, it can be stated that the effect of adding wheat flour with pumpkin paste (T) on the ash content of pumpkin donuts looks significantly different because the higher the addition of wheat flour and pumpkin paste, the higher the percentage of ash content in pumpkin donuts.

The ash content of donuts, the ratio of wheat flour to pumpkin paste shows that the addition of wheat flour to pumpkin paste 60: 40% (T₃) has a high ash content of 1.12%. While pumpkin donuts with a ratio of flour to pumpkin paste 50: 50% (T₂) have an ash content of 0.89%.

The ash content of pumpkin donuts in this study has not been listed as SNI for donuts but is in the SNI quality requirements for white bread so that the ash content for sweet bread is a maximum of 3% so that it can be concluded that the ash content in pumpkin donut products meets the SNI donut requirements.

Most of the food, i.e. 96% consists of organic matter and water. The remainder consists of mineral elements. Mineral elements are known as inorganic substances or ash content. In the combustion process, organic materials are burned but inorganic substances are not, that's why it is called ash. Minerals consist of calcium, sodium, chlorine, phosphorus, sulfur, magnesium and other components in small amounts (Winarno, 2018).

Organoleptic Test (Hedonic Test)

Color

From the results of the color organoleptic test, it was obtained that the average panelists' preference for pumpkin donut colors ranged from 3.04 (likes) - 3.70 (likes), with an average of 3.27 (likes).

Table 4. The average results of the color analysis of pumpkin donuts at each treatment level, the ratio of pumpkin paste to wheat flour and yeast concentration.

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ (1%)	R ₂ (2%)	R ₃ (3%)
T ₁ (40% : 60%)	3,04	3,04	3,24
T ₂ (50% : 50%)	3,20	3,37	3,27
T ₃ (60% : 40%)	3,24	3,37	3,70

The highest value in this treatment was found in the ratio of 60% pumpkin paste to 40% wheat flour (T₂) and 3% yeast concentration (R₂) with a value of 3.70. While the lowest value in this treatment is the ratio of 40% pumpkin paste to 60% wheat flour (T₁) and 1% yeast concentration (R₁) with (R₂) 2% with a value of 3.04%.

Analysis of variance showed that the comparison between pumpkin paste and wheat flour (T) and yeast concentration (R) and the interaction between pumpkin paste and wheat flour and yeast concentration (TR) on pumpkin donuts had no significant effect on the organoleptic color of pumpkin donuts. yellow ($P \leq 0.05$).

Flavor

In conclusion, the more flour and pumpkin paste added and the concentration of yeast, the more the panelists liked the taste of pumpkin paste donuts. From Table 5. it is known that the highest value in this treatment was found in the ratio of 50% pumpkin paste to 50% wheat flour (T_2) and 2% yeast concentration (R_2) with a value of 3.83. While the lowest value in this treatment was the ratio of 40% pumpkin paste to wheat flour (T_1) and yeast concentrations of 1% (R_1) and 3% (R_3) with a value of 3.27.

Table 5. The average results of the pumpkin donut taste analysis at each treatment level, the ratio of pumpkin paste to wheat flour and yeast concentration

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ (1%)	R ₂ (2%)	R ₃ (3%)
T ₁ (40% - 60%)	3,27	3,53	3,27
T ₂ (50% - 50%)	3,30	3,83	3,74
T ₃ (60% - 40%)	3,57	3,60	3,77

Analysis of variance showed that the ratio of pumpkin paste to wheat flour (T) had a significant effect ($P \geq 0.05$) and the interaction of the two comparisons of pumpkin paste and wheat flour (TR) had a very significant effect ($P \geq 0.01$) on the organoleptic taste pumpkin donut. Meanwhile, yeast concentration (R) had no significant effect ($P \leq 0.05$).

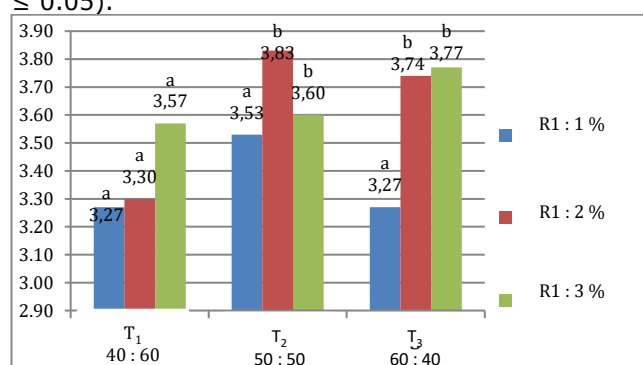


Figure 2. Interaction between pumpkin paste and wheat flour (T) and yeast concentration (R) on the organoleptic taste test at $KK = 0.08$ and $BNT 0.05 = 0.32$

In the interaction graph the ratio of wheat flour to pumpkin paste 50:50% (T_2) and a concentration of 2% (R_2) has a value of 3.83 which is very significantly different and very different from the treatments (T_1R_1) and (T_3R_3). Comparison of pumpkin paste with wheat flour (T) and concentration (R) shows that at a ratio of 50%: 50% and 2% yeast (R) the taste is better and many people like it.

The organoleptic taste of pumpkin donuts in the interaction between wheat flour and pumpkin paste and a yeast concentration of 50: 50% (T_2) and a yeast concentration of 2% (R_2) had a high organoleptic taste, reaching 3.83, in the interaction between flour and pasta ratio pumpkin and yeast concentration showed that the treatment of adding wheat flour with pumpkin paste was 40: 60% (T_1),

and yeast concentrations of 1% (R_1) and 3% (R_3) had a low taste of 3.27%.

Aroma

From the results of the aroma organoleptic test, the organoleptic value of pumpkin aroma was 3.28 – 3.59 (Like), with an average of 3.43 (Like).

Table 6. The average results of the analysis of the organoleptic test for the taste of pumpkin paste donuts.

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ (1%)	R ₂ (2%)	R ₃ (3%)
T ₁ (40% : 60%)	3,34 %	3,28 %	3,45 %
T ₂ (50% : 50%)	3,43 %	3,37 %	3,47 %
T ₃ (60% : 40%)	3,57 %	3,59 %	3,40 %

The highest value in this treatment was found in the ratio of 60% pumpkin paste to 40% wheat flour (T_3) and 2% yeast concentration (R_2) with a value of 3.59%. While the lowest value in this treatment was the ratio of 40% pumpkin paste to 60% wheat flour (T_1) and 2% yeast concentration (R_2) with a value of 3.28%.

The results of the analysis of variance showed that the ratio of pumpkin paste to wheat flour (T) and the ratio of pumpkin paste to wheat flour (R) and the interaction of the ratio of pumpkin paste to wheat flour and yeast concentration (TR) had no significant effect ($P \leq 0.05$). on the organoleptic value of pumpkin paste donut aroma.

Texture

From Table 7. it is known that the highest value in this treatment was found in the ratio of 60% pumpkin paste to 40% wheat flour (T_3) and 2% yeast concentration (R_2) with a value of 3.64. While the lowest value in this treatment is the ratio of 50% pumpkin paste to 50% wheat flour (T_2) and 1% flour concentration (R_1) with a value of 3.17.

Table 7. Average texture analysis results for pumpkin donuts at each treatment level.

Comparison of Wheat Flour and Yellow Pumpkin Paste	Yeast Concentration (R)		
	R ₁ (1%)	R ₂ (2%)	R ₃ (3%)
T ₁ (40% - 60%)	3,20	3,43	3,44
T ₂ (50% - 50%)	3,17	3,54	3,44
T ₃ (60% - 40%)	3,53	3,64	3,40

The results of the analysis of variance showed that the comparison between pumpkin and wheat flour (T) and the addition of yeast concentration (R) and the interaction between pumpkin paste and wheat flour and yeast concentration (TR) of pumpkin donut flavor had no significant effect ($P \leq 0.05$).

The texture produced in the making of pumpkin donuts has a crunchy, crunchy and soft donut texture with values ranging from 3.17 (likes) – 3.64 (likes), with an average value of 3.42 (likes).

Conclusions

1. The best treatment in this study was the T_2R_2 treatment and the SNI quality requirements for

donuts 01-2000 were 50% pumpkin paste donuts with a ratio of 50:50% flour (T₂) and 2% yeast concentration (R₂) with a water content value of 20, 71%, ash content value 0.91%, organoleptic test color value 3.37%, taste value 3.83%, aroma value 3.37% and texture value 3.54%.

2. So far, pumpkin processing is still limited, therefore pumpkin is processed into a processed product that has the possibility to be developed into processed pumpkin donuts. In addition, processing pumpkin into donuts is an alternative to increase the economic value of pumpkin, as a diversity of processed pumpkin products.
3. It is necessary to carry out further research on the shelf life of pumpkin paste donuts
4. For the business community, try to make pumpkin paste donuts with more attention to fiber content and healthier quality.

Author Contributions and Competition Interest

The first author contributed to drafting the manuscript and designing and analyzing the data. The second author collected data to prepare samples. We declare that there is no conflict of interest.

References

- Arlene, et.al., 2019. Pembuatan roti tawar dari Tepung Singkong dan Tepung Kedelai. *Jurnal Simposium Nasional RAPI VIII* (1412-9612).
- Ayunda, H. M. 2016. Penambahan Tepung Tulang Ikan Bandeng (*Chanos chanos*) Sebagai Sumber Kalsium dan Fosfor Pembuatan Donat Panggang. Skripsi. Universitas Syiah Kuala.
- Bakhtiar, B., Rohaya, S., & Ayunda, H. M. A. (2019). Penambahan Tepung Tulang Ikan Bandeng (*Chanos chanos*) Sebagai Sumber Kalsium dan Fosfor Pembuatan Donat Panggang. *Jurnal Teknologi dan industri pertanian Indonesia*, 11(1), 38-45.

- Hesti, 2021. Pengolahan Pumkin Doughnut. Penebar Swadaya.
- Lanny, 2019. Pembuatan Pasta Labu Kuning, Pembuatan dan pemanfaatannya. Kanisius, Yogyakarta.
- Marleen, 2020. Teknologi Pengolahan Donat. Jakarta: Gramedia
- Nasseri, 2019. Pembuatan dan Analisis Kandungan Gizi Tepung Labu Kuning (*Cucurbita moschata Duch*). Jakarta: Gramedia
- Rukmana, 2021. Penggunaan Ragi Pada Pengolahan Donat. IPB: Bogor.
- See, et.al., 2019. Physico-Chemical and Sensory Evaluation of Breads Supplemented With Pumpkin Flour. *ASEAN Food Journal* 14 (2): 123-130.
- Sudarmadji, 2021. Kandungan Gizi Waluh. Bandung: Unpad Press.
- Sudarto, 2018. Kandungan Gizi Waluh. Bandung: Unpad Press.
- Winarno, F.G. 2018. Potensi dan Peran Tepung-tepungan bagi Industri Pangan dan Program Perbaikan Gizi. Makalah pada Seminar Nasional Interaktif Penganekaragaman Makanan Untuk Memantapkan Ketersediaan Pangan: Jakarta
- Yulistia, 2020. Nilai Gizi Donat Tape. Teknologi Industri Pangan : Jakarta.
- Yanuardana, 2018. Kajian Karakteristik Fisikomia Tepung Labu Kuning (*Cucurbita Moschata*) Termodifikasi dengan Variasi Lama Perendaman dan Konsentrasi Asam Laktat. *Jurnal Teknosains Pangan*. Vol 2 No 2.
