

Making Herbal Tea from a Mixture of Butterfly Pea Flower (*Clitoria Ternatea*) and Ginger Powder (*Zingiber Officinale*) by using Drying Method According to Indonesian National Standards (SNI)

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ABSTRACT

Herbal tea is a term for herb flowers, leaves, seeds, roots or dried fruit that is not derived from the tea plant (*Camellia sinensis*). One of the plants that can be used as herbal teas are butterfly pea (*Clitoria ternatea*) and ginger (*Zingiber officinale*). Butterfly pea is known traditionally as an eye medicine, and a food coloring that gives it its blue color. Butterfly pea and ginger have benefits as antioxidants, antibacterial, anti-inflammatory, antidiabetic, anti-cancer, and immunomodulatory properties. The process of making herbal tea is carried out by a drying process using a Tray dryer with the aim of improving the quality and quality of the herbal tea. The method used is with a variation of the drying time of 2 hours; 2,5 hours; 3 hours; and 3,5 hours with a constant temperature of 60°C, and variations of ginger powder, namely 1%, 2%, and 3% per total weight of 1 gram per tea bag. The analysis carried out is in the form of organoleptic tests (color, taste and aroma), water content, ash content, and antioxidant activity. Based on the results of the analysis of making butterfly pea herbal tea, drying time of 3.5 hours with a concentration of 3% ginger powder is the best condition according to SNI 3836:2013 with the results of water content 4.25%, ash content 5.04%, and antioxidant activity 57.03%.

Keywords: *Butterfly pea, ginger powder, herbal tea, and drying*

1. INTRODUCTION

Indonesia is the best place to find herbal plants that are very nutritious. The Research on herbal plants that are efficacious as herbal drinks continues to be carried out. One of the plants used by the community in making herbal drinks is Butterfly pea flower. In Indonesia, Butterfly pea flower is usually used as food coloring or directly served to make herbal medicine, so it is not popular making Butterfly pea flower to be used as further products [11].

Currently, the development of Butterfly pea flower has not been widely carried out because many people do not know the benefits of the Butterfly pea flower. The utilization of the Butterfly pea flower in the food sector has been carried out in several countries. The blue color of the Butterfly pea flower has been used as a blue dye in sticky rice in Malaysia.

It is also usually eaten as a vegetable in Kerala (India) and in the Philippines [10]. Lately, Butterfly pea flowers are also being consumed by many people around the world because of the trend via social media in the UK as Butterfly Pea Tea [1].

Butterfly pea flower contains a lot of active ingredients that have pharmacological potential widely, including as an antioxidant, antimicrobial, antidiabetic, and anticancer [6]. The processing method of tea herbal which is dried is same with the processing method of dried tea generally include picking, washing, withering and drying.

The addition of ginger in this herbal tea drink is used as a taste and aroma enhancer. Ginger is very effective for preventing or curing various diseases because it contains gingerol which has a very strong anti-inflammatory and antioxidant [2]. One way in food processing can be done by drying method. Traditionally, food was dried by the sun, but

nowadays Some foods are dehydrated under controlled drying conditions by multiple drying methods. One of the methods is the Tray Dryer.

Tray Dryer is one of the dryer method that is used to dry lumpy solids or pastes spread on metal trays with a thickness of 10-100mm. This Drying is used to dry materials that should not be stirred thermally, so that the result is a dry solid. The working principle of the tray dryer is operated in a vacuum and heating. The aims of Drying is to reduce the water content which is contained in the material so that dry tea is obtained, thus the properties of the tea do not change because the fermentation process stops [12].

The purpose of this study is to determine the addition of ginger concentration with a constant drying temperature and variation in drying time in order to obtain herbal tea quality according to standards, determine the physicochemical properties (moisture content, ash content and antioxidant activity) and organoleptic properties in herbal tea of Butterfly pea flower with a combination of ginger and make a herbal tea with a combination of ginger flower Butterfly pea with the Tray Dryer method.

The benefit of this research is to provide added value for the Butterfly pea plant that has not been used optimally, so that it can become a product of higher quality and economic value. Produce Butterfly pea flower drink products that are accepted by the community and become an alternative to herbal products that are rich in benefits. And can be a reference regarding the Butterfly pea plant and the processing of herbal tea drinks for the Butterfly pea flower among academics in particular and the public in general. Provide information for readers, especially chemical engineering students at the Sriwijaya State Polytechnic about making herbal tea drinks using the Tray Dryer method of drying.

A good herbal tea is a product of Butterfly pea flower herbal tea with a combination of ginger in accordance with the Indonesian National Standard (SNI) for dry tea in packaging. The drying time is varied by using a Tray Dryer.

2. MATERIAL AND METHOD

The research was carried out for 2 months, from May to July 2021 which was carried out at the Microbiology Laboratory of the Chemical Engineering Department, Sriwijaya State Polytechnic, Palembang.

2.1 Tools and Materials

The tools used in this study were some unit of Tray Dryer, 12 pieces of 50 ml measuring flask, 4 pieces of baking sheet, 2 pieces of glass funnel, 1 unit

of Blender, 1 piece of 10 ml measuring pipette, 12 pieces of Porcelain Cup, 2 pieces of 100 ml Beaker, 12 pieces of Crucibel Cup, 12 pieces of 150 ml Plastic Bottle, 1 unit of 100 ml Analytical Balance, 2 pieces of 100 ml, 1 unit of Oven, 1 unit of Spectrophotometry UV-Vis, 1 unit of Furnice, 2 pieces of Pottery, 1 piece of Spatula, 24 pieces of Filter paper, 2 pieces of watch glass.

The materials used in this study were 2 kg of Butterfly pea Flower, 250 gram of White Ginger, 4 mg of DPPH, 500 ml of Aquades, 500 ml Methanol.

2.2 Treatment and Experimental Design

The treatment and experimental design carried out in the process of making Butterfly pea flower herbal tea are as follows:

1. The process of picking and withering of raw materials. Then the raw material is dried using the Tray Dryer method.
2. Analysis of water content, ash content, and antioxidants.
3. The observation of the color, aroma and taste of beverage products from each variation of the concentration of the addition ginger powder.

This study is conducted to determine the appropriate concentration of ginger powder and the drying time of quality herbal tea drinks according to established standards. The drying temperature which is used in this drying process is 60°C with the time variation of 2 hours; 2.5 hours; 3 hours; and 3.5 hours. And variations in the addition of ginger powder with a concentration level of 1%; 2%; and 3%.

2.3 Observation

The things observed in this study were the effect of drying time and ginger concentration (%) in order to produce an optimal product with a predetermined standard based on SNI 3836:2013 which refers to the dry quality requirements in packaging.

2.4 Research Procedure

2.4.1 Making Dried Herbal Tea

1. Weigh as much as 250 grams of withered flower
2. Drying the Butterfly pea flower into a tray dryer with a temperature of 60°C and with the time of 2 hours; 2.5 hours; 3 hours; and 3.5 hours
3. Weigh the dry peas and then grind them in a blender
4. Weigh 100 grams of dry ginger that has been prepared and then mashed
5. Butterfly pea flower that has been weighed with total weight of 1 gram of ginger powder addition.

With a concentration of 1% ginger powder; 2%; and 3%

6. Put the pea flower powder and ginger powder into the tea bag.

2.5 Result Analysis

The analysis of the results is carried out in several stages, namely as follows:

2.5.1 Analysis of Water Content (SNI 3836:2013)

2 grams sample is put into a porcelain dish that has been weighed previously. Put the porcelain dish in the oven for ± 3 hours and for water content at a temperature of 105°C . After that the porcelain cup and materials are taken and then put into a desiccator for ± 15 minutes. Weigh the final weight of the porcelain cup and calculated by the formula:

$$\text{Moisture content (\%)} = \frac{B - (C - A)}{B} \times 100\%$$

Description :

A = Weight of empty cup (g)

B = Weight of sample (g)

C = Weight of sample + cup after heating (g)

2.5.2 Ash Content Analysis (SNI 3836:2013)

Dry the porcelain dish in a kiln with the temperature of 600°C . Cool the porcelain dish in a desiccator and weigh it as a container. Weigh 2 grams of sample into a porcelain dish whose weight is known. Put the cup containing the sample into the kiln at 600°C for ± 4 hours Cool the ash sample that has been obtained then put it in a desiccator and weigh it. Ash content is calculated by the formula:

$$\text{Ash content (\%)} = \frac{W1 - W2}{W} \times 100\%$$

Description :

W = Weight of sample (g)

W1 = Weight of sample + cup after drying (g)

W2 = Weight of empty cup (g)

2.5.3 Antioxidant Activity Analysis

Weigh 0.5 grams of sample, then dissolve in 50 ml of distilled water. Weigh 4mg of DPPH and dissolve in 100 ml of methanol. 2 ml of Pipette from the sample into a 50 ml volumetric flask then add 2 ml of DPPH solution and incubate in a dark room for 30 minutes. Add 10 ml of methanol to the solution that has been incubated and homogenized. Make a blank by adding 2 ml of DPPH solution and 10 ml of methanol. Analyze using UV-Vis spectrophotometry method with a wavelength of 517 nm. Antioxidant activity is calculated by the formula:

$$\% \text{ Antioxidant} = \frac{\text{Blanko} - \text{Sample}}{\text{Blanko}} \times 100 \%$$

2.5.4 Organoleptic Test Scoring Method (SNI 01-2346-2006)

Prepare samples and containers for panelists. Panelists for 20 people will observe the samples presented to assess the color, aroma, taste and state of the steeping water with the available scores. The preferred value that has been obtained can be calculated by the hedonic test with the formula:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n}$$

$$S^2 = \frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n}$$

$$S = \sqrt{S^2}$$

$$P = (X - (1,96 \frac{s}{\sqrt{n}})) \leq \mu \leq P (X + (1,96 \frac{s}{\sqrt{n}}))$$

Description :

n= number of panelists

S2 = uniformity of quality scores

1.96 = coefficient of standard deviation at 95% level

X = average quality value

S = standard deviation of preference value

X_i = quality value from panelist to i,

where $i = 1, 2, 3, \dots, n$

P = confidence level

μ = range of values

3. RESULT AND DISCUSSION

3.1 Results

3.1.1 Result Analysis of Butterfly Pea Flower Herbal Tea with the Addition of Ginger Powder

The research was conducted to make herbal tea of Butterfly pea flower with the addition of ginger powder. The fixed variable is the drying temperature, which is 60°C, while the independent variables in this study are the drying time (2 hours; 2.5 hours; 3 hours; and 3.5 hours) and ginger powder (1%, 2%, and 3%). Based on the research that has been done, the results of the analysis for Butterfly pea flower herbal tea with the addition of ginger powder are water content, ash content, antioxidants, and organoleptic. The results of the analysis for the herbal Butterfly pea flower before and after adding ginger powder can be seen in table 3.1 and table 3.2 below:

Table 1 Data Analysis of Butterfly pea Flower Herbal Tea Before Adding Ginger Powder

Sample	Drying time (Hour)	Moisture content (%)	Ash content (%)	Antioxidant (%)
Butterfly pea flower	2	9,43	7,51	62,39
	2,5	8,37	7,23	59,93
	3	5,69	5,45	59,35
	3,5	4,12	4,86	56,13
Ginger powder	-	10,11	10,26	58,33

Table 2 Data Analysis of Butterfly pea Flower Herbal Tea After Adding Ginger Powder

Sample Code	Drying time (Hour)	Ginger concentration (%)	Moisture content (%)	Ash content (%)	Antioxidant (%)
T1J1	2	1	9,09	7,21	63,67
T1J2		2	9,53	7,53	59,72
T1J3		3	9,69	7,97	57,01
T2J1	2,5	1	8,02	7,03	59,84
T2J2		2	8,38	7,14	59,43
T2J3		3	8,79	7,63	58,24
T3J1	3	1	5,51	4,85	65,73
T3J2		2	5,69	5,12	58,54
T3J3		3	5,86	6,39	48,62
T4J1	3,5	1	3,73	4,52	61,15
T4J2		2	4,04	4,78	59,71
T4J3		3	4,25	5,04	57,03

3.1.2 Organoleptic Test Results

This research test used untrained panelists. Untrained panelists are a group of average capable people who are not formally trained, but they have the ability to distinguish and communicate reactions from the organoleptic assessments tested [3].

The panelists are D3 Chemical Engineering students at the Sriwijaya State Polytechnic, Palembang. Each panelist will be given 12 samples to

be tested for the level of preference against 4 test criteria, namely color, taste, aroma and the state of steeping water. The hedonic scale (level of preference) and sample code in this test can be seen in Tables 3.3 and 3.4

Table 3 Hedonic Scale

Grade	Score
Like Extremely	4
Like Moderately	3
Like Slightly	2
Dislike	1

Table 4 Average Panelist Likeness Level

Sample Code	Drying Time (Hour)	Ginger Concentration (%)	Hedonic Grade			
			Color	Aroma	Taste	Steeping Water
T1J1	2	1	3,49	2,09	1,8	2,73
T1J2		2	3,49	2,47	2,12	2,9
T1J3		3	3,56	2,53	2,19	2,89
T2J1	2,5	1	3,56	2,38	2,03	2,86
T2J2		2	3,49	2,36	2,25	2,9
T2J3		3	3,56	2,14	2,51	2,97
T3J1	3	1	3,49	2,41	2,27	2,89
T3J2		2	3,56	2,56	2,19	2,86
T3J3		3	3,45	2,59	2,38	2,93
T4J1	3,5	1	3,56	2,17	2,03	2,86
T4J2		2	3,56	2,35	2,45	2,89
T4J3		3	3,62	2,22	2,47	3,00

3.2 Discussion

3.2.1 Effect of Drying Time and Concentration of Ginger Powder on Moisture Content

Moisture content is one of the most important chemical laboratory test methods in the food industry to determine the quality and the resistance of food to possible damage. The higher the water content of a food ingredient, the greater the possibility of its damage either as a result of internal biological activity (metabolism) or the entry of destructive microbes [8].

According to the Indonesian National Standard (SNI) 3836: 2013 regarding the quality requirements for dry tea. The water content contained in dry tea is not

more than 8%. The results of the analysis of the water content of the Butterfly pea flower herbal tea showed that the higher the concentration of ginger powder added, the higher the water content contained in the Butterfly pea flower tea.

From Figure 3.1, it can be seen that the highest water content is found in the drying time of 2 hours

with a concentration of 3% ginger powder where the water content value obtained is 9.69%. The lowest water content is found in the drying time of 3.5 hours with a concentration of 1% ginger powder, which is 3.73%. This is due to the higher water content in ginger powder, which is 10% [13].

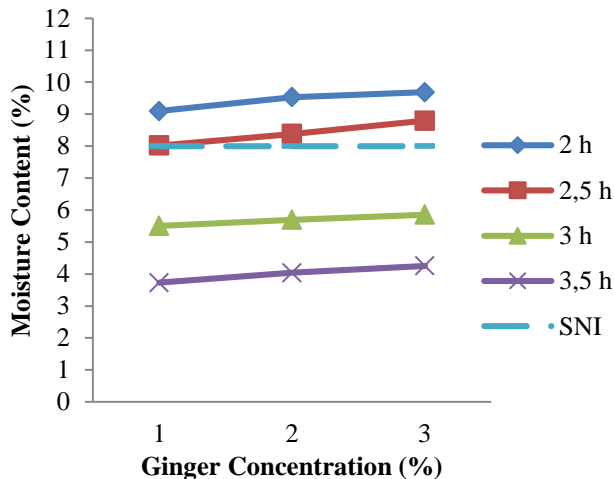


Figure 1 Effect of Drying Time and Concentration of Ginger Powder on Moisture Content

The water content of the Butterfly pea flower herbal tea is also influenced by the drying time, according to Astuti (2013), the longer the drying time, the less the water content contained. The highest water content is found in the 2 hour drying time, which is between the range of 9%. Meanwhile, the lowest water content was found in the drying time of 3.5 hours ranging from 3-4%. Based on the quality standard of packaged dry tea, namely SNI 3836:2013, dry tea has a water content requirement of 8%, where the results for drying time of 2 hours and 2.5 hours do not meet SNI for packaged dry tea. Meanwhile, the drying time of 3 hours and 3.5 hours showed that the water content was in accordance with the SNI for dry tea in packaging.

3.2.2 Effect of Drying Time and Concentration of Ginger Powder on Ash Content

The analysis of ash content in food ingredients aims to determine the mineral content in the tested material, determine whether or not a processing process is good, determine the type of material used, estimate the content of the main ingredients used in the manufacture of a product, ash content is also used as a parameter of nutritional value. foodstuffs [8]. Analysis of the ash content used is the SNI 3836:2013 furnace method. The graph of the effect of drying time and concentration of ginger powder on the resulting ash content can be seen in Figure 3.2.

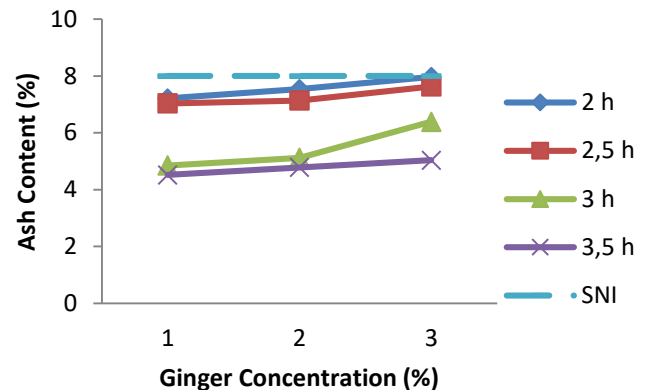


Figure 2 Effect of Drying Time and Concentration of Ginger Powder on Ash Content

From Figure 3.2 it can be observed that the highest ash content value is owned by a drying time of 2 hours with a concentration of 3% ginger powder, which is 7.97%. Furthermore, the lowest ash content value was at a drying time of 3.5 hours with the addition of 1% ginger powder, which was 4.52%. Based on the quality standard of packaged dry tea in SNI 3836:2013, dry tea has an ash content requirement of 8%. The results obtained in Figure 4.2 show that the ash content is in accordance with the SNI standard for dry tea.

3.2.3 Effect of Drying Time and Concentration of Ginger Powder on Antioxidant Activity

Analysis of antioxidant activity was carried out with using the DPPH method, the DPPH free radical color reduction test is a test to determine the antioxidant activity in the sample to be tested by looking at its ability to ward off DPPH free radicals. The source of free radicals in this method is the compound 1,1-Diphenyl-2-Picrylhydrazyl. In the analysis of antioxidant activity, UV-VIS spectrophotometry was used with a wavelength of 516.2 nm. the reason is because at the maximum wavelength the sensitivity is also maximum because at that maximum wavelength, the change in absorbance for each concentration unit is the largest [9].

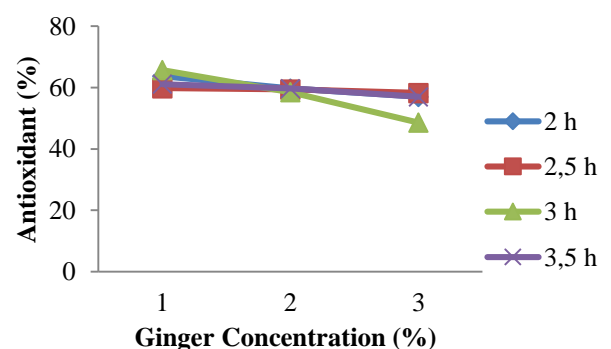


Figure 3 Effect of Drying Time and Concentration of Ginger Powder on Antioxidant Activity

Inhibition Concentration 50 (IC₅₀) is a concentration of antioxidants that can reduce free radicals as much as 50%. In Figure 3.3 it can be observed that the lowest level of antioxidant activity is found in the 3 hour drying time with a concentration of 3% ginger powder, which is 48.62%. While the strongest antioxidant activity was found in 3 hours of drying time with a concentration of 1% addition of ginger powder, which was 65.73%. This is happen because the longer the drying time, the smaller the antioxidant activity formed, because antioxidant compounds are very easy to change, one of which is that various types of processing can result in the loss of antioxidant compounds contained in the sample.

Antioxidation activity test using the DPPH method showed that the Butterfly pea flower extract (*Clitoria ternatea*) had a good ability to capture various kinds of free radicals.

3.2.4 Color Organoleptic Test

Color has an important role in food commodities. This role is very real in three things, namely attractiveness, identification, and quality attributes. Color is one of the results of visualization of the sense of sight (eyes) that can distinguish one color from another, bright, blurry, clear, and so on [7]. Color is one part of the appearance of the product as well as an important sensory assessment parameter. Determining the quality of an ingredient depends on several factors, but before other factors are visually taken into account, the display color factor first determines the quality of the food. The results of the color organoleptic test on Butterfly pea flower herbal tea can be seen in figure 3.4

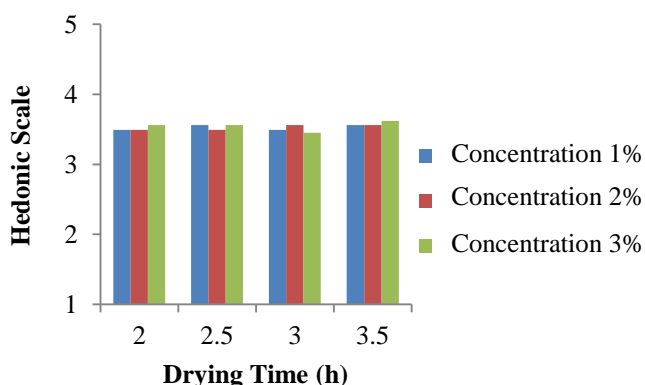


Figure 4 Panelist's Preference for Color

From Figure 3.4 it can be seen that the lowest level of preference is found in the drying time of 3 hours with a concentration of 3% with a preference

value of 3.45 and the highest level of preference is found in the drying time of 3.5 hours with a concentration of 3% with a preference value of 3.62. This is due to the effect of drying time and the addition of ginger powder which makes the color of this Butterfly pea flower herbal tea darker and more attractive.

3.2.5 Aroma Organoleptic Test

The aroma spread by food is a very strong attraction and is able to stimulate the sense of smell so that it arouses the appetite. The results of the aroma organoleptic test on herbal tea of Butterfly pea flower can be seen in Figure 3.5.

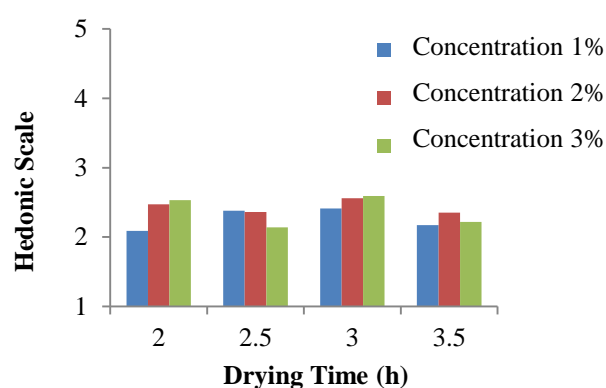


Figure 5 Panelist's Preference to Aroma

From Figure 3.5 it can be seen that the lowest level of preference for aroma is found in the drying time of 2 hours with a concentration of 1% with a preference value of 2.09. For the highest level of preference, there is a drying time of 3 hours with a concentration of 3% with a preference value of 2.59. This is due to the addition of ginger powder which can cover the distinctive odor of Butterfly pea flower. The more ginger powder is added, the aroma of the Butterfly pea flower herbal tea is not unpleasant. This is because ginger contains gingerol and shagaol compounds which give a distinctive aroma and have a pleasant fragrance. strong, and gives a spicy taste [13].

3.2.6 Taste Organoleptic Test

Taste is the most important parameter and has a high weight value in determining the value of a food. The results of the organoleptic scent test for the Butterfly pea flower herbal tea can be seen in Figure 3.6

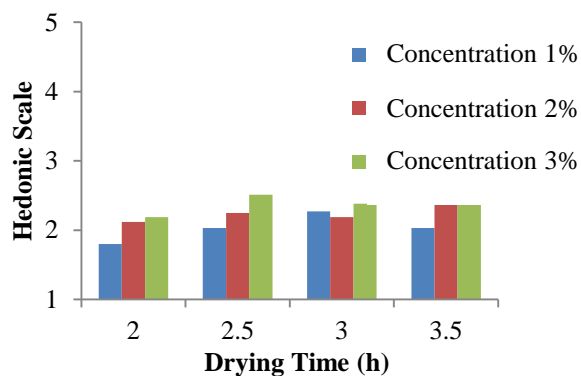


Figure 6 Panelist's Level of Preference for Taste

From Figure 3.6, the lowest panelist preference level was found in the drying time of 2 hours with a concentration of 1% with a value of 1.8. Meanwhile, the highest value of the panelists' preference for the taste of the Butterfly pea flower herbal tea was found at a drying time of 2.5 hours with a concentration of 3% with a preference value of 2.51. The results of the hedonic assessment indicate that the more ginger powder is added, the more the panelists like the taste of steeping Butterfly pea flower herbal tea. The taste of Butterfly pea flower tea steeping is influenced by the taste buds of each panelist.

3.2.7 Organoleptic Test of Steeping Water Condition

The state of brewing water is an overall assessment of the hedonic test on tea brewing, namely an assessment of color, aroma, and taste. The results of the organoleptic test of the state of steeping water in the Butterfly pea flower herbal tea can be seen in Figure 3.7.

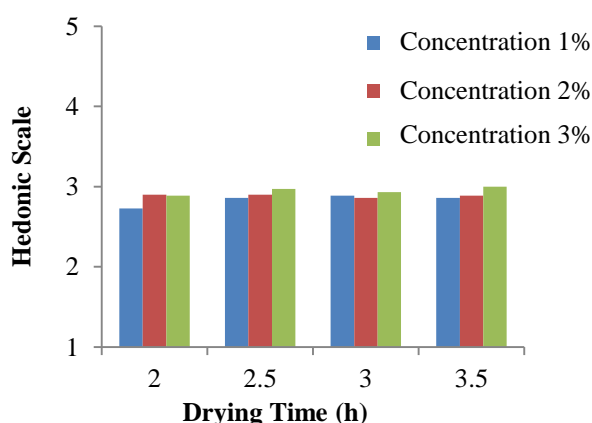


Figure 7 Panelists' Level of Preference for Steeping Water

From Figure 3.7, it can be seen that the level of preference of the panelists to the state of the lowest

steeping water was found in the drying time of 2 hours with a concentration of 1% ginger. And the panelists' highest level of preference for the state of steeping water was found in the drying time of 3.5 hours with a ginger concentration of 3% with a value of 3.00. This is due to the average panelist assessment of the aroma, color, and taste of steeping with the highest variation of drying time with high content of ginger powder.

4. CONCLUSION

From the results of the research that has been done, it can be concluded that:

1. Variations in the addition of ginger powder and the best drying time are found in the condition of the drying time of 3.5 hours with the addition of 3% ginger powder.
2. Characteristics of the best Butterfly pea flower herbal tea according to SNI 3638:2013 for water content at drying time of 3.5 hours and concentration of 1%, ash content at drying time of 3.5 hours and concentration of 1%, and the strongest antioxidant activity at drying time of 3 hours and a concentration of 1%. While the organoleptic test obtained the best sample on the color preference test at a drying time of 3.5 hours and a concentration of 3%, the aroma test at a drying time of 3 hours and a concentration of 3%, a taste test at a drying time of 2.5 hours and a concentration of 3%, and a steeping water state test at a drying time 3.5 hours and a concentration of 3%.
3. With a tray dryer for making Butterfly pea flower herbal tea with a combination of ginger powder packed in a tea bag, the characteristics of dry tea are in accordance with the SNI standard for dry tea in packaging.

REFERENCES

- [1] Andriani, Disa & Mustisiwi. 2016. *Uji Aktivitas Antioksidan Ekstrak Etanol 70% Bunga Butterfly pea (Clitoria ternatea L) dari Daerah Sleman dengan Metode DPPH*. Jurnal Farmasi Indonesia 17 (1): 70 – 76.
- [2] Aryanta, I Wayan Redi. 2019. *Manfaat Jahe Untuk Kesehatan*. E-Jurnal Kesehatan, 1(2). Universitas Hindu Indonesia.
- [3] Ayustaningwarno, fitriyono. 2014. *Teknologi Pangan, Teori Praktis dan Aplikasi*. Yogyakarta: Graha Ilmu.
- [4] Badan Standarisasi Nasional. 2013. *SNI 3836:2013. Teh Kering dalam kemasan*. Jakarta: Badan Standarisasi Nasional.

- Vol 2 no 1.
- [5] Badan Standarisasi Nasional. 2006. *Petunjuk Pengujian Organoleptik dan atau Sensori* (SNI 01-2346-2006). Jakarta: Badan Standarisasi Nasional.
- [6] Budiasih, K. S., 2017. Kajian Potensi Farmakologis Bunga Butterfly pea (*Clitoria ternatea*). *Prosiding Seminar Nasional Kimia UNY*: 201-206.
- [7] Darni, Lamusu. 2012. *Uji Organoleptik Jalangkote Ubi Jalar Ungu (Ipomoea batatas L) Sebagai Upaya Diversifikasi Pangan*. Jurnal Pengolahan Pangan 3 (1) 9-15. Jurusan Agroteknologi. Fakultas Pertanian> Universitas Muhammadiyah: Luwuk.
- [8] Daud.A, Suriati. 2020. *Kajian Penerapan Faktor Yang Mempengaruhi Akurasi Penentuan Uji Fitokimia*. Jurnal Teknologi Pangan.
- [9] Gandjar.I.G., Rohman, A. 2012. *Kimia Farmasi Analisis*, Universitas Gadjah Mada: Yogyakarta.
- [10] Lee, M.P., R. Abdullah and K.L. Hung. 2011. *Thermal degradation of blue anthocyanin extract of Clitoria ternatea flower*. International Conference on Biotechnology and Food Science IPCBEE. Vol 7:49-53.
- [11] Marpaung, A. M. 2020. *Tinjauan dan Manfaat Bunga Butterfly pea (Clitoria ternatea L.) bagi. Kesehatan Manusia*. J. Functional. Food.&. Nutraceutical, 1(2), pp.47-69.
- [12] Nurdahlia. 2015. *Karakteristik Pengeringan Pisang Sale Menggunakan Alat Pengering Hybrid Tipe Rak*. Program Studi Teknik Pertanian. Universitas Mataram. Mataram.