

## Consumer Preference Study on Myrtaceae Fruit Collection of Bogor Botanic Gardens

### *Studi Preferensi Konsumen terhadap Buah Jambu-jambuan Koleksi Kebun Raya Bogor*

Irfan Martiansyah<sup>1\*</sup>, Muhammad Rifqi Hariri<sup>1</sup>, Melza Mulyani<sup>1</sup>, Iin Pertiwi A Husaini<sup>1</sup>, Arief Hidayat<sup>1</sup>, Syamsidah Rahmawati<sup>2</sup>

<sup>1</sup>Research Center for Plant Conservation and Botanic Garden, Indonesian Institute of Sciences  
Jl. Ir. H. Juanda No. 13, Bogor 16122, Indonesia

<sup>2</sup>Research Center for Biotechnology, Indonesian Institute of Sciences  
Jl. Jakarta-Bogor Km 46, Bogor 16911, Indonesia

\*imartiansyah6311@gmail.com

Received: 26<sup>th</sup> June, 2020; 1<sup>st</sup> Revision: 12<sup>th</sup> October, 2020; 2<sup>nd</sup> Revision: 10<sup>th</sup> November, 2020; Accepted: 05<sup>th</sup> April, 2021

#### Abstract

Myrtaceae fruit in Bogor Botanic Gardens (BBG) can be potentially developed as a unique and new fruit consumption style. The study aimed to determine the consumer preferences on Myrtaceae fruit. The method used was organoleptic testing, including a description, hedonic and rank tests. The parameters measured in this study are taste, color, flavor, texture, sound, and size of the fruit. Data analysis performed by the Kruskal-Wallis test. The results showed that most of the respondents preferred the fruit with a medium-size, tastes sour but not bitter, has attractive colors, has no pungent flavor, has soft and smooth texture, and is not crispy when it is bitten and chewed. The hedonic test showed that sample #4 and #7 have the highest average value of 4.7. The lowest average obtained in sample #3, where respondents did not like the sample. There was no significant difference of the average. The ranking of hedonic test result indicates the level of respondents' preferences in sequence are *Eugenia* sp. from Southeast Sulawesi, *Myrtus pendula*, *Syzygium bankense*, *Syzygium aqueum*, *Eugenia* sp. from Papua, *Syzygium* sp. from Seram Island, and *Syzygium polycephaloides*.

**Keywords:** Bogor Botanic Gardens, consumer preference, Myrtaceae fruits, organoleptic test

#### Abstrak

Buah jambu-jambuan koleksi Kebun Raya Bogor berpotensi dijadikan buah konsumsi baru. Tujuan penelitian adalah untuk mengetahui dan menilai preferensi serta tingkat kesukaan masyarakat terhadap jenis buah jambu-jambuan koleksi Kebun Raya Bogor. Metode yang digunakan adalah uji organoleptik melalui metode uji deskriptif, uji kesukaan, dan uji rangking. Parameter uji meliputi rasa, warna, aroma, tekstur, suara, dan ukuran. Analisis data dilakukan secara deskriptif dan non-parametrik Kruskal-Wallis. Hasil penelitian memperlihatkan sebagian besar responden menyukai jenis buah berukuran sedang, rasa dominan masam tetapi tidak pahit, warna mencolok, aroma tidak menyengat, tekstur lunak dan halus, serta tidak renyah saat digigit. Hasil uji kesukaan menunjukkan nilai rata-rata tertinggi sebesar 4,7 terdapat pada sampel #4 dan #7. Rata-rata terendah ditunjukkan pada sampel #3 sebesar 3,0, yaitu responden tidak menyukai sampel tersebut. Perbedaan rata-rata tersebut tidak signifikan. Perangkingan hasil uji kesukaan menunjukkan tingkat kesukaan responden secara berturut-turut adalah *Eugenia* sp. asal Sulawesi Tenggara, *Myrtus pendula*, *Syzygium bankense*, *Syzygium aqueum*, *Eugenia* sp. asal Papua, *Syzygium* sp. asal Pulau Seram, dan *Syzygium polycephaloides*.

**Kata kunci:** buah jambu-jambuan, Kebun Raya Bogor, preferensi konsumen, uji organoleptik

## INTRODUCTION

Myrtaceae fruits are collections of the Bogor Botanic Gardens (BBG) which have a high potential as new trend in fruits consumption. The collections of Myrtaceae fruits at BBG in 2019

were 460 in total consisting of 96 species and 23 genus. The three largest genus of the Myrtaceae collection are *Syzygium* (44 species), *Eugenia* (7 species), and *Psidium* (6 species) (Ariati et al., 2019). The three genus are known to have the potential to be consumed by humans, animals, or

birds (de Sousa Sabino et al., 2018; Tavares et al., 2016). Myrtaceae fruits collections of BBG such as *Kupa* (*Syzygium polycephaloides*), *Jamblang* (*Syzygium cumini*), and non-native collections which are not yet popular have the potential to be better known to the public. The fruits of the genus *Eugenia* and *Syzygium* (the species has not been identified yet in BBG) were identified as new trend in fruit for consumption because they have an attractive taste and color.

Myrtaceae fruits have the potential to be developed as innovative fresh fruit or processed products (Altendorf, 2019; de Sousa Sabino et al., 2018). Many types of Myrtaceae fruits are economically valuable and have high nutritional content and produce bio-active compounds (de Araújo et al., 2019; Seraglio et al., 2018). Organic acids, sugars, vitamins, polysaccharides, polyphenols and several other important minerals are found in fruit, seeds, leaves, stems, and roots (Cock & Cheesman, 2018; de Paulo Farias et al., 2020). Myrtaceae fruit is generally a berry type and has fruit flesh that corresponds to organoleptic characters, such as nutritional aspects and natural chemical content (Cock & Cheesman, 2018; Tavares et al., 2016). Some research are currently being carried out on Myrtaceae fruit for its metabolite compounds because it has the potential to be anti-diabetic, anti-inflammatory, and anti-hypertensive (Ahmad et al., 2019).

Myrtaceae fruits, such as rose apple (*Syzygium aqueum*), Semarang rose apple (*Syzygium samarangense*), Malay apple (*Syzygium malaccense*), and guava (*Psidium guajava*) are generally well known in Indonesia as consumption fruits. The availability of these fruits complements various types of fruit consumption in traditional and modern markets (Altendorf, 2019). Several types of Myrtaceae fruits can produce the fruits throughout the year without being influenced by the season providing good cultivation management, such as guava (Thakre et al., 2016). This is one of the advantages in

developing the Myrtaceae fruits as a potential new consumption fruits.

Initial studies should be carried out to determine the public's preferences of Myrtaceae fruits by organoleptic test (Van et al., 2014). Organoleptic test is commonly used to assess the quality of products in the food industry and agricultural products (Tarwendah, 2017; Van et al., 2014). The organoleptic test includes the descriptive test and the hedonic test. This study aims to determine the preference and level of preference of respondents to the types of Myrtaceae fruit in the collections of BBG. The result of this study can be used as a reference to determine the types of Myrtaceae fruits in the collections of BBG that will be cultivated by farmers or bred by plant breeders. The results of this study are also expected to generate new consumption fruits from Myrtaceae fruits in the collections of BBG to be known by the public, such as guava.

## METHODS

Descriptive quantitative method was used in this study by organoleptic test on Myrtaceae fruits in BBG (Table 1). The tested parameters or attributes are size, taste, color, aroma, texture, and sound. The sample size range for the organoleptic test varies from 25-30 untrained respondents (O'Sullivan, 2017; Stokes et al., 2018). The sampling technique used in this study was an accidental sampling of 30 random respondents (visitors or employees of the BBG).

### Organoleptic Test

#### Descriptive Test

Descriptive test was conducted to determine the response of each respondent to the organoleptic parameters of the samples. The data obtained were then converted into percent units in the form of a distribution frequency table using the following formula (Singarimbun, 1989):

**Table 1.** The sample of Myrtaceae fruits in the collections of Bogor Botanic Garden

Number of Sample	Species	Origin	Location at BBG
#1.	<i>Syzygium bankense</i>	Sumatera	Vak VB. 161
#2.	<i>S. aqueum</i>	Central Sulawesi	Vak VB. 148
#3.	<i>S. polycephaloides</i>	Sulawesi	Vak VB. 57-57a
#4.	<i>Myrtus pendula</i>	Papua	Vak VC. 134
#5.	<i>Syzygium</i> sp.	Seram Island-Maluku	Vak VIC. 315
#6.	<i>Eugenia</i> sp. 1	Papua	Vak. VC. 121
#7.	<i>Eugenia</i> sp. 2	Southeast Sulawesi	Vak XII.B.VIII.58

$$P = \frac{f}{n} \times 100 \quad (1)$$

where,

P = percentage

f = frequency

n = number of respondents

The interpretation of the results in the descriptive test were modified from Singarimbun (1989). The response of the respondents or general description of the sample were determined based on the highest percentage of each category.

### Hedonic Test

The hedonic test was carried out to assess the preference of the respondent. The scoring technique can be used for processing organoleptic test results (Amerine et al., 1959). The hedonic scale responses that can be used are dislike (score 1), somewhat like (score 3), neutral (score 5), like (score 7) and strongly like (score 9) (Suryono et al., 2018). Interpretation of the results of the preference level interval in this study were modified from Suryono et al. (2018). The assessment for the hedonic test was calculated by providing the interpretation interval of the average score: average score  $\leq 1$  (strongly dislike), 1.1 - 3.0 (dislike), 3.1 - 5.0: (neutral), 5.1 - 7.0 (like), and 7.1 - 9.0 (strongly like). The Kruskal-Wallis non-parametric statistical analysis was run on the result of hedonic test. The Kruskal-Wallis test is non-parametric test to determine whether there is a statistically significant difference between two or more groups of independent variables on the dependent variable with a numerical data scale (interval or ratio) and an ordinal scale (Adinsi et al., 2014). The ranking of hedonic test results was then carried out to determine the respondents' preference by ordering their average value from the highest to the lowest (Stokes et al., 2018).

## RESULTS AND ANALYSIS

### **The Result of Descriptive Test**

#### Sizes

Myrtaceae fruit sizes were described in three categories: large, medium and small. The results showed that the respondents described fruit samples #1 and #6 as small with the percentage of respondents being 83.3% and 86.7%, respectively. Other fruit samples were described as being of medium size, namely samples #2, #3, #4, #5, and #7 with the percentage of respondents respectively 90%, 66.7%, 93.3%, 80%, and 83.3% (Table 2). According to Priyambodo et al. (2019), size is an

initial consideration of consumer taste for product satisfaction.

#### Colors

Myrtaceae fruit colors were described into three categories: striking, medium, and inconspicuous colors. The results showed that the respondents described the samples #3, #4, #5, #6, and #7 as being striking colors with a percentage of 83.5%, 76.7%, 60%, 80%, 80% respectively. The five fruit samples were categorized as striking colors because they had attractive colors such as dark purple, red, and pink (Figure 1). Sample #1 which is white and sample #2 which is pale green are described as having inconspicuous colors with the percentage of respondents being 66.7% for both samples (Table 2). Color is a determinant of quality in a product (Pade, 2018). According to Abdi et al. (2017), consumer acceptance can be seen from the color of the organoleptic tested product. An attractive color will invite the respondent's appetite to taste the sample for the first time if the sample arrangement scheme is not in order. Color generally gives the respondent's first impression because it is easy to see and attracts attention (Suryono et al., 2018).

#### Aroma

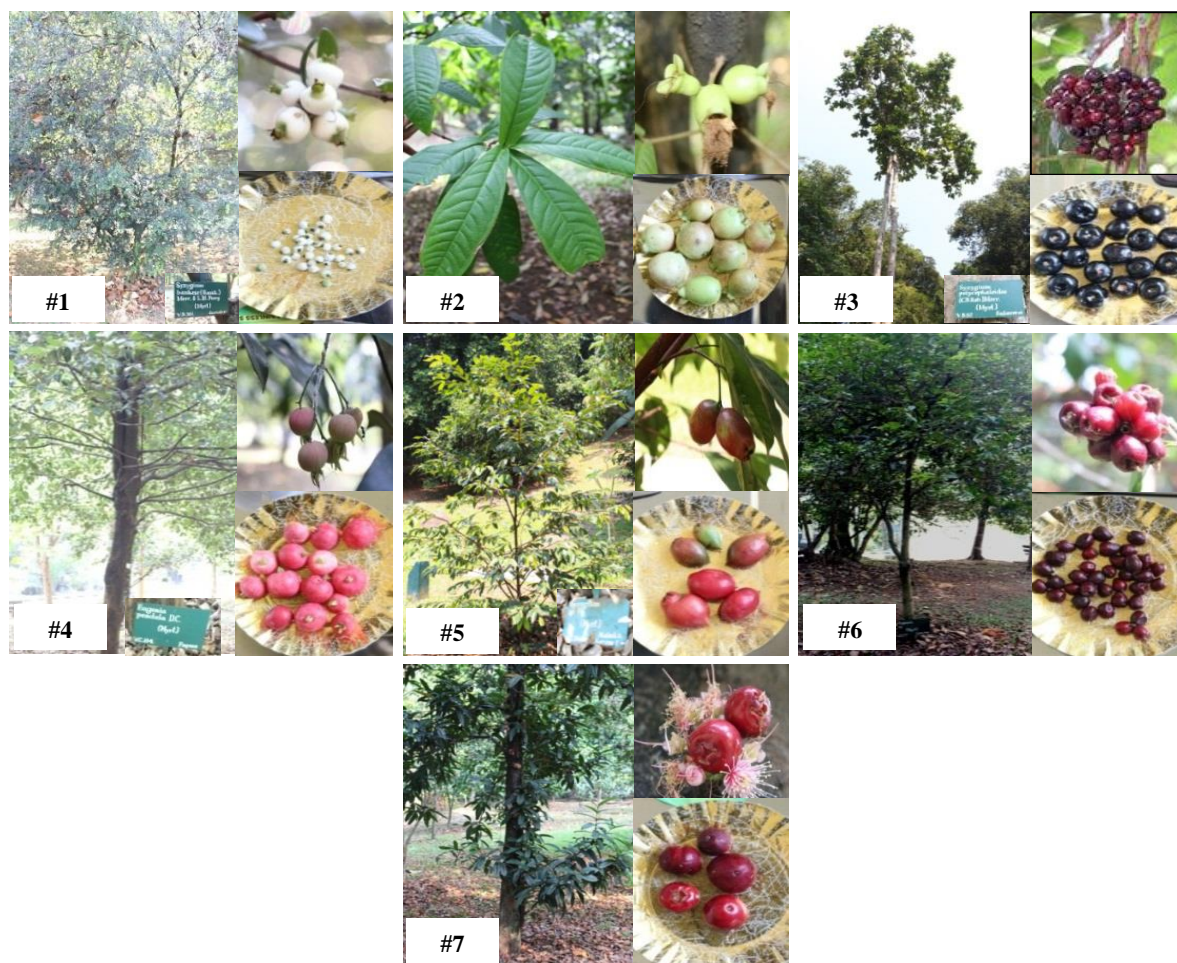
The aroma of Myrtaceae fruit were described into three categories: pungent, moderate, and non-pungent. The results of the observation showed that the respondents described the fruit sample #5 with moderate aroma with a percentage of 43.3%. Six other fruit samples were described as having a non-pungent aroma with the percentage of respondents being more than 50% for all samples (Table 2). Aroma is an organoleptic test parameter that uses the sense of smell. Aroma is classified as a subjective sensation produced by the process of scenting a volatile compound (Kusmawati et al., 2012). According to Agustina & Saptariana (2015), the aroma that comes out of a product is able to stimulate the cells in the sense of smell so that it can trigger a strong attraction to the product. A specific and memorable aroma is also well received by consumers (Kusmawati et al., 2012).

#### Taste

The taste of Myrtaceae fruit was described into four categories: sweet, sour, bitter, and astringent. The results showed that the respondents described fruit samples #4, #5, #6, and #7 as having a dominant sour taste with a percentage of 72.2%, 41.7%, 84.8% and 80% respectively.

**Table 2.** The general response of respondents is based on highest number of respondents percentage to the sample

Attribute/ Parameter	Category	Percentage of Respondents Number to Sample Parameters (%)						
		#1 ( <i>Syzygium bankense</i> )	#2 ( <i>Syzygium aqueum</i> )	#3 ( <i>Syzygium polycephaloides</i> )	#4 ( <i>Myrtus pendula</i> )	#5 ( <i>Syzygium</i> sp. Seram Island-Maluku)	#6 ( <i>Eugenia</i> sp.1 Papua)	#7 ( <i>Eugenia</i> sp.2 Southeast Sulawesi)
Sizes	Small	83.3	0.0	30.0	6.7	10.0	86.7	13.3
	Medium	16.7	90.0	66.7	93.3	80.0	13.3	83.3
	Large	0.0	10.0	3.3	0.0	10.0	0.0	3.3
Colors	Striking	3.3	0.0	83.3	76.7	60.0	80.0	80.0
	Medium	30.0	33.3	13.3	23.3	40.0	13.3	16.7
	Inconspicuous	66.7	66.7	3.3	0.0	0.0	6.7	3.3
Aroma	Pungent	20.0	6.7	3.3	16.7	33.3	6.7	10.0
	Medium	20.0	23.3	23.3	30.0	43.3	40.0	36.7
	Non-pungent	60.0	70.0	73.3	53.3	23.3	53.3	53.3
Taste	Sweet	38.9	8.6	6.5	0.0	13.9	9.1	11.4
	Sour	2.8	0.0	21.7	72.2	41.7	84.8	80.0
	Bitter	5.6	48.6	13.0	2.8	8.3	0.0	2.9
	Astringent	52.8	42.9	58.7	25.0	36.1	6.1	5.7
Texture	Soft	35.3	33.3	40.0	40.0	37.1	45.5	40.0
	Hard	26.5	24.2	25.7	8.6	17.1	12.1	0.0
	Smooth	26.5	33.3	22.9	40.0	17.1	39.4	60.0
	Coarse	11.8	9.1	11.4	11.4	28.6	3.0	0.0
Sounds	Crunchy	23.3	36.7	20.0	50.0	40.0	10.0	6.7
	Non-crunchy	76.7	63.3	80.0	50.0	60.0	90.0	93.3



#1 *Syzygium bankense*, #2 *Syzygium aqueum*, #3 *Syzygium polycephaloides*, #4 *Myrtus pendula*, #5 *Syzygium* sp., #6 *Eugenia* sp. 1, #7 *Eugenia* sp. 2

**Figure 1.** Myrtaceae Fruit Collection of the Bogor Botanic Gardens

Sample #2 had a bitter taste of 48.6% and astringent taste of 42.9%. Samples #1 and #3 had a dominant taste of astringent (Table 2). Taste is something that is accepted by the tongue as a sense of taste, such as sweet, salty, sour and bitter (Al-Jazuly et al., 2016). Taste is the main determining factor in considering consumer preference. Respondents can accept and like a sample or product when it tastes good, even though size, color, aroma, and other attributes are less desirable (Rembulan, 2019).

#### Texture

The texture of Myrtaceae fruit was described into four categories: soft, hard, smooth and coarse. The results showed that the respondents described fruit samples #1, #3 and #5 as predominantly soft with a percentage of 35.3%, 40%, and 37.1%, respectively. Samples #2, #4, #6 and #7 have soft and smooth textures with the percentage of respondents being more than 50% for all samples

(Table 2). Evaluating texture is a process related to the sense of touch. Texture generally describes the hardness, softness, and crunchiness of the sample (Zhu et al., 2018). Fruit texture can be measured quantitatively and qualitatively using a penetrometer or by pressing a finger on the fruit (Abdi et al., 2017).

#### Sounds

The sounds of Myrtaceae fruit were described into two categories: crunchy and non-crunchy. The results showed that the respondents described fruit samples #1, #2, #3, #5, #6 and #7 as not crispy when bitten. Only one sample was crisp, sample #4 (Table 2). Sound cannot be categorized separately by texture because the sensing can occur simultaneously. The soft fruit will provide a non-crunchy sound when bitten. Texture and sound complement taste and aroma so that they can affect sample quality (Khusna et al., 2016; Priyambodo et al., 2019). Fruit with a good level

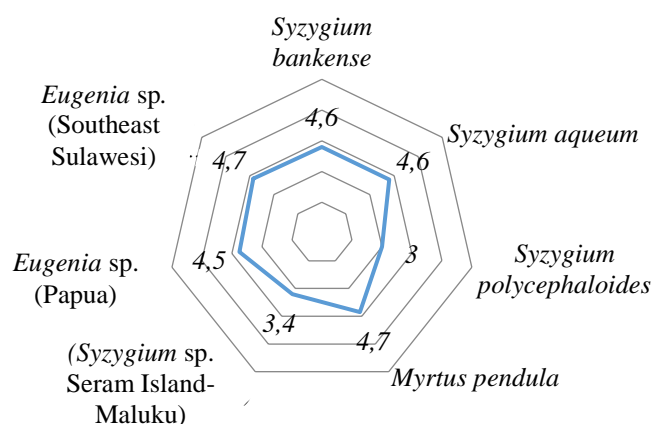
of ripeness generally has a high softness. This is obtained if harvesting is done with the right harvest age (Huda et al., 2018).

The results of the descriptive test show an overview of each parameter and category of Myrtaceae fruit samples selected by the respondent. Respondents described *Syzygium bankense* fruit (sample #1) as small, inconspicuous in color, non-pungent aroma, predominantly astringent taste, soft texture, and not crunchy when bitten. The fruit of *Syzygium aqueum* (sample #2) was described as medium size, inconspicuous color, non-pungent aroma, predominantly bitter taste, soft and smooth texture, and not crunchy. The fruit of *Syzygium polycephaloides* (sample #3) was described as medium size, striking color, non-pungent aroma, predominantly astringent taste, soft texture, and not crunchy. *Myrtus pendula* (sample #4) was described as medium size, striking color, non-pungent aroma, predominantly sour taste, and soft and smooth texture. The sound in this sample was described differently by respondents because the percentage results showed that 50% of respondents said this sample was crunchy, but 50% stated that it was not crunchy. This was presumably because the level of fruit maturity is not evenly distributed. Fruit *Syzygium* sp. 1 from Seram Island (sample #5) was described as medium size, striking color, medium aroma, predominantly sour taste, soft texture and not crunchy. Fruit of *Eugenia* sp. 1 from Papua (sample #6) was described as small, striking in color, non-pungent aroma, predominantly sour taste, soft texture, and not crunchy. Fruit of *Eugenia* sp. 2 from Southeast Sulawesi (sample #7) were described as medium size, striking color, non-

pungent aroma, predominantly sour taste, smooth texture, and not crunchy. Sample #7 was the only sample with a smooth texture. The character of the fruit which was softer than other fruits and its good level of maturity made the texture was smooth. All of the Myrtaceae fruits described by the respondent are shown in Figure 1.

### The Result of Hedonic Test

The hedonic test is a sensory test that is often used to measure the consumer's preference for the tested sample or product. The test is subjective because the panelists only convey their personal opinion whether they like it or not on the product being tested. The hedonic test can be carried out by general respondents who are randomly selected. (Tarwendah, 2017; Suryono et al., 2018). According to Stone & Sidel (1993), professional panelists respondents were used in the differentiation test, while general respondents in the hedonic test. Respondents expressed their personal opinions on this test in the form of impressions related to preferences in the sample to be assessed quickly, without comparing them with other samples (O'Sullivan, 2017). Respondents select the appropriate category according to their level of preference for the sample. According to Suryono et al. (2018), the hedonic test aims to find out which sample (in this case certain sensory properties) can be accepted by the respondent. The results of this test cannot predict commercial income economically nor do they guarantee that the product is easily accepted by the wider community (O'Sullivan, 2017).



Average value: <1 (strongly dislike); 1,1 - 3,0 (dislike); 3,1 - 5,0 : (neutral); 5,1 - 7,0 (like); 7,1 - 9,0 (strongly like)  
**Figure 2.** Respondent's Preference Average Value for the Fruit Samples



The results of the hedonic test in this study (Figure 2) show that there were six fruit samples with neutral liking level and one fruit sample with lowest like level: *Syzygium polycephaloides* (sample #3). This was presumably because this fruit has a predominantly bitter taste so that the respondents do not like it at all. The highest average favorite value of respondents was 4.73 for *Myrtus pendula* fruit (sample #4) and *Eugenia* sp.2 fruit from Southeast Sulawesi (sample #7). Both of these fruits have medium fruit sizes, striking colors that attract the attention of respondents. Both also have a soft to smooth texture and are not crunchy, which causes respondents to like them at the first time they were bitten. The fruits of *Syzygium bankense* (sample #1) and *Syzygium aqueum* (sample #2) had the same mean value of 4.6.

The hedonic scale is a scale that can be widened and shortened based on the desired scale range. Generally, the hedonic scale is converted into a numeric scale with a preference level such as a score of 1, 3, 5 so that it can be continued with the appropriate statistical analysis (Suryono et al., 2018). Data analysis in this study was preceded by the Kolmogorov-Smirnov normality test with a p-value <0.0001 which was smaller than the value of  $\alpha = 0.05$ . This shows that the data distribution does not spread normally so that the statistical analysis is carried out using the Kruskal-Wallis non-parametric method. The Kruskal-Wallis test results showed a p-value of 0.2235. This value is greater than the value of  $\alpha = 0.05$ , so it can be concluded that there is no significant difference from the average value of the respondents' preference for the fruit samples.

The ranking of hedonic test results was then carried out to determine the respondents' preference. The ranking are usually used to complete the hedonic test (O'Sullivan, 2017; Stokes et al., 2018). It is carried out by sorting more than two samples based on the quality parameters and the level of preference of the respondents. It is easy to understand by respondents, both simple data handling and assumptions about measurement levels that need to be displayed in order (Stokes et al., 2018). The results of the hedonic test generally showed that the fruit of *Eugenia* sp. from Southeast Sulawesi and *Myrtus pendula* were in the top rank with the same average score of 4.7. The lowest rank was found in the fruit *Syzygium polycephaloides*. Respondents did not like the fruit of *Syzygium polycephaloides* because it had a predominantly bitter taste. The ranks of Myrtaceae

fruit from the most preferred based on the research results respectively were as follows: *Eugenia* sp. from Southeast Sulawesi, *Myrtus pendula*, *Syzygium bankense*, *Syzygium aqueum*, *Eugenia* sp. from Papua, *Syzygium* sp. origin of Seram Island, and *Syzygium polycephaloides*.

## CONCLUSIONS

The respondents preferred medium-sized Myrtaceae fruit, sour but not bitter, striking fruit color, non-pungent aroma, soft texture to smooth and not crunchy when bitten. The fruit parameter that loved by the respondents was described in the fruit of *Eugenia* sp. from Southeast Sulawesi and *Myrtus pendula*. The level of respondents' preference to the Myrtaceae fruit samples was relatively neutral with the highest average value of 4.7. Analysis of Myrtaceae fruit by considering its commercial and health benefit can be the idea for the future research.

## References

- Abdi, Y. A., Rostiati, R., & Kadir, S. (2017). Mutu fisik, kimia dan organoleptik buah tomat (*Lycopersicum esculentum* Mill.) hasil pelapisan berbagai jenis pati selama penyimpanan. *Agrotekbis: E-Jurnal Ilmu Pertanian*, 5(5), 547–555.
- Adinsi, L., Akissoé, N. H., Dalodé- Vieira, G., Anihouvi, V. B., Fliedel, G., Mestres, C., & Hounhouigan, J. D. (2014). Sensory evaluation and consumer acceptability of a beverage made from malted and fermented cereal: case of gowe from Benin. *Food Science & Nutrition*, 3(1), 1–9. <https://doi.org/10.1002/fsn3.166>
- Agustina, M. W., & Saptariana. (2015). *Pengaruh Substitusi Tepung Kulit Pisang Raja (Musa paradisiaca) terhadap Kualitas Ledre*. Program Studi PKK. Tata Boga. Fakultas Teknik. Universitas Negeri Semarang.
- Ahmad, N., Nawab, M., & Kazmi, M. H. (2019). Medicinal potential of jamun (*Syzygium cumini* Linn): A review. *Journal of Drug Delivery and Therapeutics*, 9(5), 175–180. <https://doi.org/10.22270/jddt.v9i5.3568>
- Al-Jazuly, A. T., Tazi, I., & Rani, E. (2016). *Pengujian Karakteristik dari 16 Array Sensor Lidah Elektronika untuk Identifikasi Empat Rasa Dasar*. Minor Theses. Department of Physics. Faculty of Science and Technology. Universitas Islam Negeri Maulana Malik Ibrahim. Malang.

- Altendorf, S. (2019). Major Tropical Fruits Market Review 2018. In *FAO Food And Agriculture Organization of the United Nations*.
- Amerine, M. A., Roessler, E. B., & Filipello, F. (1959). Modern sensory methods of evaluating wine. *Hilgardia*, 28(18), 477–567. <https://doi.org/10.3733/hilg.v28n18p477>
- Ariati, S. R., Astuti, R. S., Supriyatna, I., Yuswandi, A. Y., Setiawan, A., Saftaningsih, D., & Pribadi, D. O. (2019). *An Alphabetical List of Plant Species Cultivated in The Bogor Botanic Garden*. Bogor: Center for Plant Conservation Botanical Garden.
- Cock, I., & Cheesman, M. (2018). Plants of the Genus *Syzygium* (Myrtaceae): A Review on Ethnobotany, Medicinal Properties, and Phytochemistry. In M. R. Goyal & A. O. Ayeleso (Eds.), *Bioactive Compounds of Medicinal Plants: Properties and Potential for Human Health* (1st ed.). Apple Academic Press. <https://www.taylorfrancis.com/books/9781315147475>
- de Araújo, F. F., Neri-Numa, I. A., de Paulo Farias, D., da Cunha, G. R. M. C., & Pastore, G. M. (2019). Wild Brazilian species of *Eugenia* genera (Myrtaceae) as an innovation hotspot for food and pharmacological purposes. *Food Research International*, 121, 57–72. <https://doi.org/10.1016/j.foodres.2019.03.018>
- de Paulo Farias, D., Neri-Numa, I. A., de Araújo, F. F., & Pastore, G. M. (2020). A critical review of some fruit trees from the Myrtaceae family as promising sources for food applications with functional claims. *Food Chemistry*, 306, 125630. <https://doi.org/10.1016/j.foodchem.2019.125630>
- de Sousa Sabino, L. B., de Brito, E. S., & da Silva Júnior, I. J. (2018). Jambolan— *Syzygium jambolanum*. In *Exotic Fruits* (pp. 251–256). Academic Press. <https://doi.org/10.1016/B978-0-12-803138-4.00032-0>
- Huda, A. N., Suwarno, W. B., & Maharijaya, D. A. (2018). Karakteristik buah melon (*Cucumis melo* L.) pada lima stadia kematangan. *Jurnal Agronomi Indonesia (Indonesian Journal of Agronomy)*, 46(3), 298–305. <https://doi.org/10.24831/jai.v46i3.12660>
- Khusna, K. A. M., Irianto, H., & Setyowati. (2016). Analisis preferensi konsumen terhadap buah semangka di Kota Surakarta. *Journal Agrista*, 4(3), 461–469.
- Kusmawati, D. D., Amanto, B. S., & Muhammad, A. D. R. (2012). Pengaruh perlakuan pendahuluan dan suhu pengeringan terhadap sifat fisik, kimia, dan sensori tepung biji nangka (*Artocarpus heterophyllus*). *Jurnal Technosains Pangan*, 1(1), 41–48.
- O’Sullivan, M. G. (2017). Sensory Affective (Hedonic) Testing. In *A Handbook for Sensory and Consumer-Driven New Product Development* (pp. 39–57). Elsevier. <https://doi.org/10.1016/B978-0-08-100352-7.00003-8>
- Pade, S. W. (2018). Karakteristik antosianin dan tingkat penerimaan minuman fungsional sirup ubi jalar ungu (*Ipomea batatas* L. Poir) dengan variasi lama pemanasan yang berbeda. *Jurnal Technopreneur*, 6(2), 55–61. <https://doi.org/10.30869/jtech.v6i2.197>
- Priyambodo, C. S., Sastryawanto, H., & Hermawati, D. T. (2019). Analisis preferensi konsumen buah jeruk di Pasar Keputran Utara, Surabaya. In *Jurnal Ilmiah SOSIO AGRIBIS* (Vol. 14, Issue 1, pp. 85–103).
- Rembulan, G. D. (2019). Pengembangan industri kecil dan menengah tiwul instan sebagai alternatif pendukung ketahanan pangan dalam perspektif konsumen. *Industria: Jurnal Teknologi Dan Manajemen Agroindustri*, 8(2), 87–94. <https://doi.org/10.21776/ub.industria.2019.008.02.2>
- Seraglio, S. K. T., Schulz, M., Nehring, P., Della Betta, F., Valesse, A. C., Daguer, H., Gonzaga, L. V., Fett, R., & Costa, A. C. O. (2018). Nutritional and bioactive potential of Myrtaceae fruits during ripening. *Food Chemistry*, 239, 649–656. <https://doi.org/10.1016/j.foodchem.2017.06.118>
- Singarimbun, M. (1989). *Metode Penelitian Survei*. LP3ES.
- Stokes, C. N., Kerry, J. P., & O’Sullivan, M. G. (2018). Rapid descriptive consumer analysis using simultaneous and monadic sample presentation for coffee. *Food and Nutrition Sciences*, 9(2), 63–76. <https://doi.org/10.4236/fns.2018.92005>
- Stone, H., & Sidel, J. L. (1993). Discrimination Testing. In *Sensory Evaluation Practices* (pp. 143–201). Elsevier. <https://doi.org/10.1016/B978-0-12-672482-0.50012-5>
- Suryono, C., Ningrum, L., & Dewi, T. R. (2018). Uji kesukaan organoleptik terhadap 5 kemasan dan produk Kepulauan Seribu secara deskriptif. *Jurnal Pariwisata*, 5(2), 95–106. <https://doi.org/10.31311/par.v5i2.3526>
- Tarwendah, I. P. (2017). *Jurnal review: Studi*



- komparasi atribut sensoris dan kesadaran merek produk pangan. *Jurnal Pangan Dan Agroindustri*, 5(2), 66–73.
- Tavares, I. M. de C., Lago-Vanzela, E. S., Rebello, L. P. G., Ramos, A. M., Gómez-Alonso, S., García-Romero, E., Da-Silva, R., & Hermosín-Gutiérrez, I. (2016). Comprehensive study of the phenolic composition of the edible parts of jambolan fruit (*Syzygium cumini* (L.) Skeels). *Food Research International*, 82, 1–13. <https://doi.org/10.1016/j.foodres.2016.01.014>
- Thakre, M., Lal, S., Uniyal, S., Goswami, A. K., & Prakash, P. (2016). Pruning for crop regulation in high density guava (*Psidium guajava* L.) plantation. *Spanish Journal of Agricultural Research*, 14(2), e0905. <https://doi.org/10.5424/sjar/2016142-7846>
- Van, T. K., Burja, K., Thuy Nga, T., Kong, K., Berger, J., Gardner, M., Dijkhuizen, M. A., Hop, L. T., Tuyen, L. D., & Wieringa, F. T. (2014). Organoleptic qualities and acceptability of fortified rice in two Southeast Asian countries. *Annals of the New York Academy of Sciences*, 1324(1), 48–54. <https://doi.org/10.1111/nyas.12506>
- Zhu, L., Lee, C. R., Margolis, D. J., & Najafizadeh, L. (2018). Decoding cortical brain states from widefield calcium imaging data using visibility graph. *Biomedical Optics Express*, 9(7), 3017–3036. <https://doi.org/10.1364/BOE.9.003017>