# Consumer Acceptance of Herbal Tea Brewing Based on The Infusion Time and Ratio of Cascara: Dayak Onion

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**Abstract.** The post-COVID-19 pandemic shifted public perception to a healthier lifestyle, such as the consumption of herbal tea daily. Herbal tea refers to an infusion of grounded dried parts of the plant, either singular or mixed materials which are reported to contain a beneficial compound that improves human health, i.e. mixture of cascara and Dayak onions. Cascara is reported to have antioxidant compounds and is available in abundant quality. On the other hand, the Dayak onion previously acknowledged as a medicinal plant is high in price but has a low acceptance level. Therefore, here we demonstrated how well the consumer accepted the infusion of cascara Dayak onion herbal tea using the simple average weighed (SAW) method. The herbal tea was packed in an instant tea bag with seven different ratios, such as 100:0; 80:20; 60:40: 50:50; 40:60; 20:80, and 0:100, and then it was infused with brewing water for 5 and 8.5 minutes. 30 respondents who are regular herbal tea consumers were interviewed and organoleptically tested their acceptance of the color, aroma, flavor, and aftertaste of our herbal tea using a 1 to 5 hedonic scale (very dislike to very like). Most of the respondents are women (83%) aged from 35 to 55 years old and consume herbal tea daily. Their acceptance of the color, aroma, and flavor of herbal tea infusion ranged from dislike to just right with an average of just right for all sensory properties. By using SAW, respondents claimed that the flavor of herbal infusion is an important sensory property with a value of 31,67%, over other sensory properties. By calculating the SAW matrix, herbal tea with a ratio of 60% cascara: 40% Dayak onion and infused for 5 minutes is considered as best treatment with an optimum score is 0,97. However further research is required to acknowledge all quality parameters of produced herbal tea.

**Keywords:** cascara, tisane, dayak onion, infusion, optimisation, SAW.

## 1    Introduction

The Pandemic Covid-19 has heightened consumer awareness of a healthy lifestyle. There is an increasing demand for functional beverages, particularly those that are both healthy and enjoyable to drink, such as tea. One of the popular herbal tea, known as

cascara [1,2]. Cascara is a byproduct of coffee production, has recently attracted significant interest due to its abundant metabolite compounds [3]. The term "cascara" originates from Spanish, which means "skin" [4]. As an herbal tea, cascara contains various active compounds with the highest percentage of anthocyanins, followed by tannins, pectin, chlorogenate, and secondary metabolites such as caffeine and polyphenols which are beneficial for the body to ward off free radicals [5,3].

The potential of cascara is not solely based on its quality compounds but also its sustainable availability. In 2021 world coffee consumption reached 166.346 thousand of 60 kg bags, with an annual increase of 1.20%. The amount of coffee consumption directly impacts the productivity of coffee plantations in Indonesia. As the fourth largest coffee producer in the world, Indonesia's coffee production in 2021 reached 774.60 tons, marking a of 1.62% increase from 2020 [6]. These numbers are directly proportional to the rise in residual waste generated from pulping, one of the common steps in coffee processing, such as coffee pulp [7]. Approximately 43.2 kg of coffee pulp is produced by removing the pulp from 100 kg of coffee cherries [8]. This significant percentage of coffee pulp has the potential to be utilized as a product with higher economic value, such as cascara.

The infusion of cascara is known for its pronounced strong sour and astringent taste [3]. This sensory profile hardly distinguishes it from infusion made from tea leaves. Reserchers consider it is necessary to position cascara as distinct from ordinary tea in the market. Positioning cascara as herbal tea could be a viable option. However, combining cascara with other plants might yield even better reuslts and enhance the synergy of active compounds, such as Dayak onion bulbs (Eleutherine palmifolia). Dayak onions are categorized as a medicinal forest plants and are used by various ethnic groups in Kalimantan as alternative ingredients [9]. Dayak onions are reported to contain flavonoids and have the potential to act as hypertension drugs, reduce cholesterol levels and improve blood circulation systems, control blood sugar levels, and optimize pancreatic function [10,11,12]. Furthermore, Dayak onion is also proven to cure hemorrhoids or stop bleeding as its tannin compounds possess anti-inflammatory and hemostatic properties [29].

Hidayat et al. [13] created Dayak onion tea to maximize its function, but the panelists dislike the flavor since it has a strong bitter taste. Therefore, this research aims to determine a preferable formulation of cascara and Dayak onion as well as the optimal infusion time to produce a preferred herbal tea from cascara and dayak onion. Previously, Hasni et al, [14] stated that the 60:40 cascara and Dayak onion formulation and infused for 6 minutes has the best sensory properties. There is no overpowering taste of this formulation because of its balanced score for astringent, sour, and bitter tastes. However, since the hedonic test is very subjective, the researchers propose to examine the panelist's preference for cascara and Dayak onion herbal tea in two different lengths of infusion times using the Simple Average Weighed (SAW) Method. Using SAW enables the researcher to calculate and normalize the data based on its weighted criteria, such as sensory attributes. This concept emphasizes the portion of each sensory attribute in the determination of overall preferences and product rankings. This differs from a common hedonic test which calculates the overall preferences by generating the mean value of each attribute in a similar weight.

## 2 Materials and Methods

### 2.1 Materials Equipment

Cascara in this research originated from Arabica coffee skin planted in Sialaman Village, Sipirok District, South Tapanuli Regency, North Sumatra. The Dayak onion was also planted in a similar village. Tea paper bags with abaca fiber was bought from the online marketplace. Hedonic test materials used were unsalted crackers and mineral water. The tools used include a packaged sealer, spoon, 20 mesh sieve, basin, blender, knife, label paper, analytical scale, plastic cup, sensory test code paper, and sensory test assessment form using Google Forms.

### 2.2 Materials Preparation

Cascara preparation was referred to Muzaifa et al., [15] and Puspaningrum [16] with slight modification. Fresh Arabica coffee cherries were harsh ground using a pulper machine to separate the pulp from the coffee beans. Then the coffee pulp was washed using clean water and drained. Then the clean coffee pulp is sundried to a moisture content of about 12% (about 4 days of drying until the pulp was being easily broken). Then, the size of the cascara was reduced using a blender and then the cascara was sieved 20 mesh until its particle size was uniform.

The preparation of Dayak onion powder refers to Duweini and Tribaditia [17] and Saragih et al., [18] with a slight modification. In the initial stage, the stems and tubers of Dayak onions were separated. The tubers then were peeled off the outer skin and then washed with running water and drain. Furthermore, the Dayak onion bulbs are thinly sliced to facilitate the drying process. Drying was carried out in the sun for $\pm2$ days. Furthermore, the dried tubers are powdered using a blender. Then sieved with 20 mesh siever.

### 2.3 Preparation and Infusion of Herbal Tea

Production of herbal tea bags refers to Rahimah [19], cascara powder and Dayak onion powder are packaged in tea paper bags by adding both materials based on the formulation in Table 1. Each bag was weighed according to the treatment with a total weight of 3 grams. Then it is glued with a sealer so that the cascara powder and Dayak onion do not come out of the filter paper. When packaging was done, the brewing of herbal tea bags are carried out by the infusion of an herbal tea bag into 250 ml hot water in a beaker glass. The brewing process for herbal teabags is carried out with a brewing time of 5 and 8 minutes [20]. Each formulation as written in Table 1 was infused 2 times for each different time, 5 minutes and 8 minutes. In total, there are 14 samples are available.

**Table 1.** Weight of cascara and Dayak onion based on its formulation

| Total Weight (mg) | Formulation Cascara: Dayak Onion | Cascara Weight (mg) | Dayak Onion Weight (mg) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 3000 mg | K1= 100 : 0 | 3000 | 0 |
| | K2= 80 : 20 | 2400 | 600 |
| | K3= 60 : 40 | 1800 | 1200 |
| | K4 = 50: 50 | 1500 | 1500 |
| | K5= 40 : 60 | 1200 | 1800 |
| | K6= 20 : 80 | 600 | 2400 |
| | K7= 0 : 100 | 0 | 3000 |

## 2.4    Data Collection: Hedonic Test

The hedonic test was conducted by interviewing herbal tea consumers as panelists. Panelists were selected based on the demographic criteria (women are preferable), the age range of 30-60 years old, not smokers, regular drinkers of herbal tea (frequency one to two cups per day), and the capability to describe their sensory perception with their terms. From 40 consumers, 30 consumers compiled the required criteria. The next stage is the introduction of the sensory attributes of herbal tea to panelists as explained in Table 2, namely the description of color, aroma, flavor, and aftertaste. Discussion took place for around 30 minutes to allow panelists to familiarize themselves with the product in general. As the panelists understand the terms they will ask how important each attribute is for them by giving the weighted percentage with a total of 100%. The given score is recorded and will be used later in the calculation of the SAW Method.

**Table 2.** Sensory attributes description of herbal tea

| Parameter | Description | Weighed Criteria (%) |
|---|---|---|
| Color | How the color appearance of brewed herbal tea, the color range from bright yellow to brownish dark red. | .......... |
| Aroma | The fragrance of brewed tea is identified by sniffing the tea with or without a spooning and mixing | ......... |
| Flavor | Combination of taste perceived by mouth or taste bud and aroma which is strongly sniffed by nose simultaneously. | ......... |
| Aftertaste | Duration of how long the positive flavor and aroma of brewed tea stay in the palate or the back of the mouth after being discarded or swallowed. | ......... |
| **Total** | | **100 %** |

Next, consumer acceptance of the herbal tea of cascara and Dayak Onion were evaluated. Every 30 consumers evaluated their liking for the color, aroma, flavor, and aftertaste of seven formulations simultaneously in two sets of a sample. The first sample was 7 tea formulations with 5 minutes of brewing time, and the second row was 7 tea formulations with 8 minutes of brewing time. Panelists were asked to score each sample with a 1-5 hedonic scale (very dislike it to very like it). They were also asked to take a break and neutralize their palate after finishing the evaluation of one sample. Each sample was coded in three random numbers and placed in uniform transparent cups. All

samples in one set were served at a similar temperature of 80-700C and panelists evaluated each set in their booth.

## 2.5     Data Analysis : Simple Average Method

The basic concept of the SAW method is to find the sum of the ranking weights of each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix (X) to a scale comparable to all available alternative ratings. Scale of the panelists' assessment results cannot be directly multiplied by the weight of importance because the scale on the weight of importance uses a scale of 0-1, while the panelist assessment uses a hedonic scale of 1-5, so it needs to be done normalization matrix to uniform the rating scale for all panelists, with equation below, with Rij as normalized rate of performance and Max Xij is a maximum value from both column and row. The Rij then used to calculate a Vi, which is ranking for each criterion with knowing wj as weight of each criteria. Sample with the highest score of Vi is considered as the preferred sample.

$$Rij = Xij/(Max\ Xij) \tag{1}$$

# 3     RESULTS AND DISCUSSION

## 3.1     Characteristics of Respondents

**Table 3.** Respondents of herbal tea characteristics

| Characteristics | | Percentage |
|---|---|---|
| Gender | Men | 17% |
| | Women | 83% |
| Range of Age | 20-29 years old | 3% |
| | 30-39 years old | 47% |
| | 40-49 years old | 17% |
| | 50-59 years old | 33% |
| Occupation | Officers | 27% |
| | Enterprenuers | 13% |
| | Housewives | 23% |
| | Students | 3% |
| | Civil Servants | 34% |

Based on selection and screening categories, the selected respondents are 83% women with 47% majority ages ranging between 30-39 years old and work either as 27% officers, 23% housewives, and 34% civil servants. Their knowledge of herbal tea benefits are adequate since they consume 1 cup of herbal tea mostly every morning.

## 3.2    Hedonic Test

Figure 1 illustrates that most of the respondents tend to prefer the color of herbal tea with prolong brewing time. For all formulations, all brewed herbal teas with 8 minutes of brewing time have better color acceptance than 5 minutes of brewing time. Prolonged infusion time leads to higher absorption of catechin and tannin from materials [21]. The presence of higher tannins will impact the darker color of tea infusion as suggested by Puspaningrum and Kadek [22]. As most consumers still visualize the better quality of tea as infused tea with brownish-red color [23], their liking toward herbal tea with longer infusion time is higher. Hasni et al., [14] reported that cascara - Dayak onion herbal tea has a bright yellow-brownish to brownish-red color, and the intensities of red color will increase as the portion of Dayak onion in herbal tea formulation increases, which means K5, K6, and K7 produce more intense color and are preferred by panelists over K1, K2, and K3.
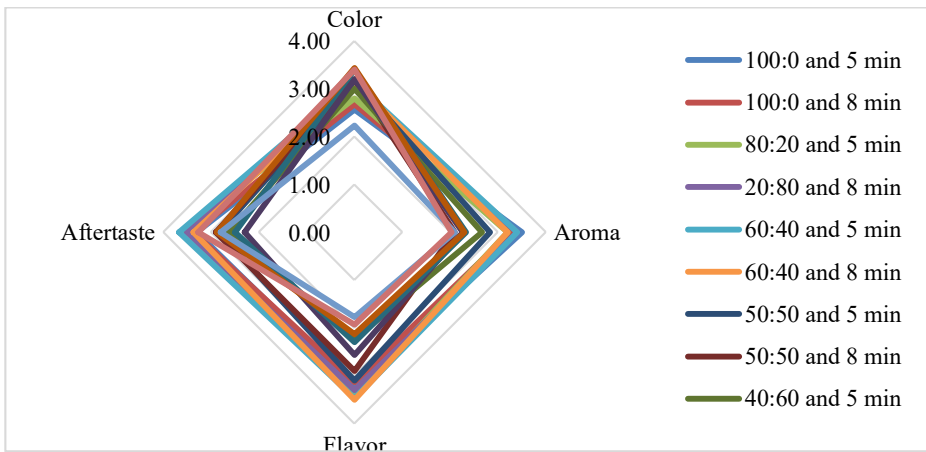


**Fig. 1.** Profile of consumer acceptance of herbal tea based on cascara and Dayak onion formulation and brewing time (scale hedonic 1-5 very dislike to very like) n=30.

The aroma of herbal tea, as defined as the fragrance of brewed tea is identified by sniffing the tea with or without a spooning and mixing, ranging between 2,03 to 3,50. Panelists tend to like a fresh and fruity aroma of cascara over the Dayak onion. Therefore herbal tea with a greater portion of cascaras such as K1, K2, and K3 has higher aroma acceptance than K5, K6, and K7. K4 which has 50:50 cascara and Dayak onion only has 2,83 (just above right liking) for 5 minutes infusion time and decreased to 2,10 (dislike) when the infusion is prolonged up to 8 minutes.

For the flavor and aftertaste of cascara-Dayak onion herbal tea, prolonged infusion time led to a lower acceptance level of flavor and aftertaste. As catechin and tannin contents increase, the bitterness and astringency perceived by panelists are also increased, but the sweetness tends to have lower intensity [24]. The presence of these three basic tastes in a good balance and not overpowering will lead better sensory acceptance for overall flavor and aftertaste. And in terms of the formulation of cascara

and Dayak Onion, as reported by Hasni et al., [14] herbal teas with a greater portion of cascaras such as K1, K2, and K3 will have a more intense astringent and sour taste compared to herbal teas with a greater portion of Dayak onion that have a stronger bitter taste. This astringency caused to the presence of catechin [25], and sour taste is the impact of higher acid contents such as chlorogenic acids [26], which is presented in higher value in arabica coffee [27]. The bitter taste is an impact of saponin which is present in the Dayak Onion [28]. Therefore a formulation that produces a balanced combination of astringency, sourness, and bitterness is preferred by panelists.

### 3.3    Consumer Acceptance by SAW Method

During data collection, panelists also determined that over four evaluated sensory properties of herbal tea flavor has important point contributing to their overall liking of 31,67%, followed by the color at 25,50%, aroma at 20,00%, and aftertaste at 21,83%. This weighed criteria is used for data normalization in the next SAW Method calculation as presented in Table 3. Then Figure 3 shows the normalized score of four sensory properties for each treatment. It can be seen that for color attributes, herbal tea from formulation 20:80 of cascara and Dayak onion with an 8-minute infusion time has the highest normalization score, followed by herbal tea with 100% of Dayak onion and herbal tea with 80:20 cascara and Dayak onion with 5 minute infusion time with a normalized score of 0,99.  The flavor and aftertaste of herbal tea have a similar trend. Herbal teas with a portion of cascara up to 60% time have a high normalized score than herbal teas with a larger portion of Dayak onion for both 5 and 8-minute infusion time. For aroma, flavor, and aftertaste 60:40 cascara and Dayak onion formulations have a high normalized score for both 5 and 8-minute infusion time as well. In normalization data, a maximum score is 1,00 since all the data of each sensory properties for all treatments are calculated based on its weighed criteria. Therefore, for treatment which is given low hedonic score and perceived as less important attributes, its normalized data is lower than vice versa.

**Table 4.** Mean and weighed criteria of sensory attributes of herbal tea

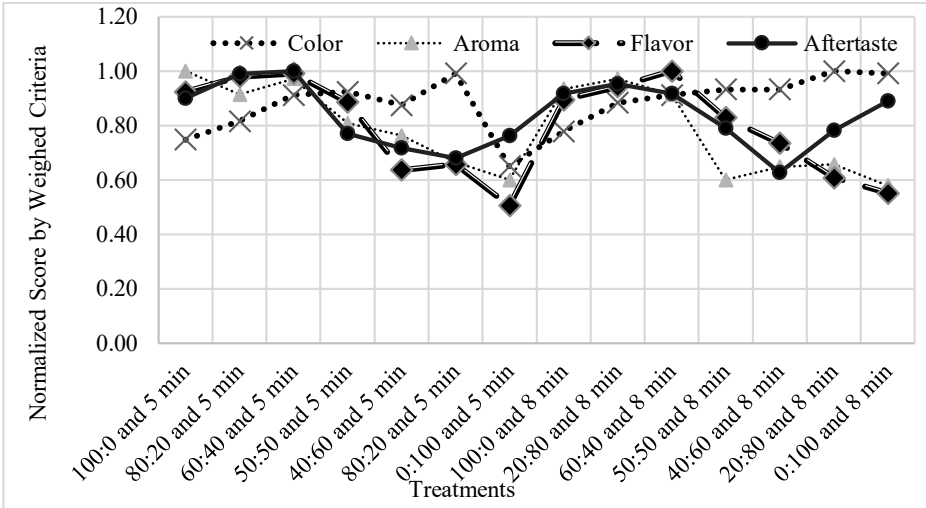| Mean & Weighed Criteria (n=30) | Sensory Attributes | | | |
|---|---|---|---|---|
| | Color | Aroma | Flavour | Aftertaste |
| Mean of Hedonic Test | 3,03 | 2,76 | 2,79 | 3,07 |
| Weighed Criteria (%) | 25,50 | 22,00 | 31,67 | 20,83 |

**Fig. 2.** Normalized score of sensory attributes cascara Dayak onion herbal tea

Furthermore, the normalized data is used for calculating the best treatment and ranking the treatment based on its total score. The maximum score is 1.00. A total score of treatments is a summation of multiplying the result of each sensory attribute with its weighted criteria.

**Table 5.** Measurement of best treatments of cascara dayak onion herbal tea

| Formulation Cascara: Dayak Onion | Infusion Time | Total Score | Rank |
|---|---|---|---|
| 100:0 | 5 minutes | 0,89 | 5th |
|  | 8 minutes | 0,88 | 6th |
| 80:20 | 5 minutes | 0,93 | 4th |
|  | 8 minutes | 0,94 | 3rd |
| 60:40 | 5 minutes | 0,97 | 1st |
|  | 8 minutes | 0,94 | 2nd |
| 50:50 and 5 min | 5 minutes | 0,85 | 7th |
|  | 8 minutes | 0,80 | 8th |
| 40:60 and 5 min | 5 minutes | 0,74 | 12th |
|  | 8 minutes | 0,74 | 11th |
| 80:20 and 5 min | 5 minutes | 0,75 | 10th |
|  | 8 minutes | 0,76 | 9th |
| 0:100 and 5 min | 5 minutes | 0,62 | 14th |
|  | 8 minutes | 0,74 | 13th |

Table 5 shows that formulation K4, 60:40 cascara, and Dayak onion with 5 minutes infusion time took 1st ranking followed by similar treatment with longer infusion time as 2nd place. If we analyze each sensory attribute of K4 formulation as presented in Figure 2, this treatment has a high score over others. This finding is also supported by Hasni et al [14], K4 with formulation of 60% cascara and 40% Dayak onion is most preferred by panelists, with 6,5 minutes of infusion time. The descriptive test of this herbal tea with 6.5 minutes of infusion time mentioned that the astringency, bitterness, and sour flavor are in balance intensities. Compared to other treatments which is too bitter as perceived by panelists in K5, K6, and K7, or too sour for K1, K2, and K3.

## 4        CONCLUSION

Taking everything into consideration we can conclude that respondents claimed that the flavor of herbal infusion is an important sensory property with a value of 31,67%, over other sensory properties. By calculating the SAW matrix, herbal tea with a ratio of 60% cascara: 40% Dayak onion and infused for 5 minutes is considered as best treatment with an optimum score is 0,97. This finding strengthens a previous finding that herbal tea with 60% cascara and Dayak onion formulation produces most preferred herbal tea infusion even during infusion time 5 minutes, 6m5 minutes and 8 minutes

## References

1. Juwita, A. and Risna, T.: Studi Pemanfaatan Kulit Kopi Arabika (Coffea arabica L.) Sebagai Mikroorganisme Lokal. Jurnal Agroteknologi 11: 45-53. (2017).
2. Rahayu, W. E., Purwasih, R., & Hidayat, D.: Pengaruh penambahan sari nanas terhadap karakteristik kimia dan sensori minuman teh cascara. Teknologi Pangan : Media Informasi Dan Komunikasi Ilmiah Teknologi Pertanian 11(2): 144–151. (2020). https://doi.org/10.35891/tp.v11i2.1900
3. Ariva, A. Nur,. Widyasanti A,. Nurjanah S.: Pengaruh Suhu Pengeringan Terhadap MutuTeh Cascara dari Kulit Kopi Arabika (Coffea arabica). Jurnal Teknologi dan industri Pertanian Indonesia 12(1): 21-28. (2020).
4. Bondesson, E.: A Nutritional Analysis on Tea By-Product Coffee Husk and Its Potential Utilization in Food Production. Bachelor Thesis. Department of Food Sciences.Faculty of Natural Resources and Agricultural Sciences Swedish University of Agricultural Sciences. (2015).
5. Sumihati, Isroil, M., & Widiyanto: Utilitas Protein Pada Sapi Perah Friesian Holstei yang Mendapatkan Ransum Kulit Kopi Sebagai Sumber Serat yang Diolah dengan Teknologi Amonisiasi Fermentasi (Amofer) 15(1): (2019)

6.  Badan Pusat Statistik Indonesia: Statistik Kopi Indonesia. Badan Pusat Statistik. Jakarta. (2020).
7.  Harahap, Muzaifa, M., & Hasni, D.: Kajian Literatur Pemanfaatan Cascara Sebagai Formulasi dalam Pembuatan Teh Herbal. Jurnal Ilmiah Mahasiswa 7(1): 1–39. (2022).
8.  Erwanti, Erwan, & Supeno, B.: Diversifikasi Pemanfaatan Limbah  Kulit Buah Kopi untuk Produk yang  Bernilai Ekonomis Tinggi di  Kabupaten Lombok Utara. Prosiding PKM-CSR. 1. (2018).
9.  Widians, J., Puspitasari, N., & Kurniawan, T.: Sistem Pakar Bawang Dayak sebagai Obat Alternatif. Jurnal Bina Komputer 2(2): 122–130. (2020).
10. Galingging, R.: Potensi Plasma Nutfah Tanaman Obat sebagai Sumber Biofarmaka di Kalimantan Tengah. . Jurnal Pengkajian Dan Pengembangan Teknologi Pertanian 10: 76–83. (2007).
11. Setyawan, A.: Efektifitas Teh Bawang Dayak Untuk Menurunkan Tekanan Darah Pada Pasien Hipertensi. Seminar Ilmiah Nasional Teknologi, Sains Dan Sosial Humaniora 2(1): (2019).
12. Hasni, Y., Aminah, D., & Tri, W.: The Effect Of Ethanolic Extract Of Dayak Onion (Eleutherine palmifolia (L) Merr) Tuber On Blood Glucose And Insulin Level Of Strepzotocin-Induced Diabetic Wistar Rat. Asian Journal of Pharmaceutical  Research  and Development 7(4): 38–42. (2019).
13. Hidayat, M. R,. Rahmi, A,. Agustina, L,. Firdaus, A.: Pengaruh Formulasi UkuranPartikel dan Suhu Pengeringan Terhadap Aktivitas Antioksidan Teh Herbal Celup Bawang Dayak (*Eleutherine* palmifolia (L.) Merr.). Ziraa'ah 43(3): 283-292. (2018).
14. Hasni, D. Muzaifa, M., Nilda, C, Harahap, R.M.R.: Pengaruh Formulasi Kulit Buah Kopi Arabika Dan Umbi Bawang Dayak Terhadap Mutu Seduhan Minuman Herbal Carcara. Jurnal Tanaman Industri dan Penyegar 9(2): 57-68. (2022).
15. Muzaifa, M., D. Hasni., N. Arpi. M. I. Sulaiman., M. S. Limbong: Kajian Pengaruh Pelakuan Pulp dan Lama Penyeduhan terhadap Mutu Kimia Teh Cascara. Jurnal Teknologi Pertanian Andalas 23(2): 136-142. (2019).
16. Puspaningrum, D. H. D. and Sari, N. K Y.: Pengaruh Pengeringan dan  Rasio Penyeduhan terhadap Sifat Fisik dan Kimia Teh Cascara Kopi Arabika (Coffea  arabika L.). Jurnal Ilmu dan Teknologi Pangan 6(2): 710-718. (2020).
17. Duweini, M and R. Tribaditia: Penentuan Formulasi Optimum Pembuatan Minuman Fungsional dari Bunga Rosella (Hibiscus sabdariffa L.) dengan Penambahan Bawang Dayak (Eleutherine palmifolia (L.,) Merr.) Menggunakan Metode RSM (Response Surface Method).  Agroscience 7(2): 234-248. (2017).
18. Saragih, Bernatal:  Minuman fungsional herbal celup bawang tiwai (*Eleutherine americana* Merr). Jurnal Badan Penelitian dan Pengembangan Daerah 5(1): 15-21. (2011).
19. Rahimah, S.: Karakteristik Mutu Seduhan Teh Celup Cascara dengan Penambahan Bubuk Kayu Manis (Cinnamomum burmanii). Skripsi. Universitas Syiah Kuala. Banda Aceh. (2020).
20. Heeger, A., Kosinska- Cagnazzo, A., Cantergiani, E., and Andlauer, W.: Bioactives of Coffee Cherry Pulp and its Utilsation for of Cascara Beverage. Food Chemistry. 221: 969-975. (2017).
21. Cao, Q. Q., Wang, F., Wang, J. Q., Chen, J. X., Yin, J. F., Li, L., & Xu, Y. Q.: Effects of brewing water on the sensory attributes and physicochemical properties of tea infusions. Food Chemistry, 364, 130235. (2021).
22. Puspaningrum, D. H. D. and Kadek, N. Y. S.: Pengaruh metode Pengeringan dan Rasio Penyeduhan terhadap Total Asam, pH dan Warna Teh Cascara Kopi   Arabika     (Coffea arabika L.). Sinesa Prosiding 2020. Universitas Dhyana Pura, Bali. (2021).

23. Ramadhani, F. Barokah, U., Sutrisno, J.: Analisis Preferensi Konsumen Terhadap Pembelian Teh di Kabupaten Sukoharjo. Agrisaintifika. Jurnal Ilmu Ilmu Pertanian: 4(1), 21-29. (2020).
24. Liu, Y., Luo, L., Liao, C., Chen, L., Wang, J., & Zeng, L.: Effects of brewing conditions on the phytochemical composition, sensory qualities and antioxidant activity of green tea infusion: A study using response surface methodology. Food Chemistry 269: 24-34. (2018).
25. Adri, D and Hersoelistyoriny, W.: Aktivitas Antioksidan dan Sifat Organoleptik Teh Daun Sirsak (Annona muricata Linn.) Berdasarkan Variasi Lama Pengeringan. JurnalPangan dan Gizi 04(07): 1-12. (2013).
26. Farah, A.: 2 Coffee Constituents. Coffee: Emerging Health Effects and Disease Prevention, 59. (2012).
27. Shabri and Rohdiana, D.: Optimization and Characterization of Green Tea Polyphenol Extract from Various Solvents. Jurnal Penelitian Teh dan Kina. 19(1): 57-66. (2016).
28. Cahyadi, W., Gozali, T., and Fachrina, A.: Pengaruh Konsentrasi Terhadap Karakteristik Gula Stevia dan Penambahan Asam Askorbat Terhadap Karakteristik Koktil Bawang Dayak (Eleutherine palmifolia. Pasundan Food Technology Journal 5(2): 154-163. (2018).
29. Lesmana, H., & Parman, D. H.: Utilization of Dayak onion as healthy snacks. International Journal of Nursing and Health Services (IJNHS) 2(4): 397–402. (2019).