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Organoleptic Test of Herbal Tea Made with Corn Silk (*Zea Mays L.*), Papaya Seeds (*Carica papaya L.*) and Dragon Fruit Peels (*Hylocereus polyrhizus L.*)

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Abstract: Tea (*Camellia sinensis*) is one of the most widely consumed beverages globally, valued for its economic, health, and cultural benefits. In Indonesia, abundant natural materials with antioxidant properties, such as dragon fruit peels, corn silk, and papaya seeds, are often discarded as waste. This study aimed to utilize these materials to create teatrasi herbal tea and evaluate its antioxidant and flavonoid content, sensory attributes, and overall acceptability. method and analysis the process involved material preparation, thorough washing, drying at specific temperatures and times, grinding, and packaging. Three formulations were tested, with Formula 3 (40% corn silk, 20% papaya seeds, and 40% dragon fruit peels) being the most favored based on hedonic tests. Antioxidant and flavonoid analyses confirmed strong antioxidant activity (IC50: 89.27 ppm) and high flavonoid content (884.64 mg/L QE) in Formula 3. Results organoleptic tests highlighted its distinctive corn silk aroma, reddish-brown color, and mild flavor. Respondents rated its aroma, color, and taste with favorability levels of 93.75%, 90.62%, and 92.70%, respectively, achieving an overall acceptance rate of 92.29%. Conclusion, this research demonstrates the potential of converting underutilized natural resources into sustainable, health-enhancing beverages.

Keywords: Antioxidants, corn silk, dragon fruit peels, flavonoids, papaya seeds.

Introduction

Tea (*Camellia sinensis*) ranks among the most popular beverages globally. with significant economic, health and cultural value. Globally, tea consumption continues to increase, reaching more than 6 million tons per year (Wang et al. 2020, 2021; Xia et al. 2020). In general, plant species used for tea making including black tea and green tea belong to the genus *Camellia*. However, there are some plants outside the *Camellia* group that are processed into herbal teas or tea substitutes. Tea is known to have various health benefits, such as improving heart function, lowering the risk of diabetes, and fighting free radicals thanks to its antioxidant content. Herbal tea is the term used for beverages made from a mixture of dried flowers, leaves, seeds, roots, or fruits that have been processed. Although called "tea", these beverages do not actually contain leaves from the commonly used tea plant (Rahayu and Rahmadina 2024).

Herbal teas have been valued for their therapeutic properties and cultural significance for centuries. Among the many benefits attributed to herbal tea, its antioxidant properties are particularly valuable. This introduction explores the potential of herbal tea as a rich source of antioxidants, highlighting its nutritional profile, health benefits, and the scientific basis for including it in the daily diet (Zhang et al., 2022).

Antioxidants are recognized for their ability to reduce or prevent the impact of free radicals, which may trigger a series of reactions leading to oxidative stress and cellular damage (Aboagye et al., 2021). Herbal teas are rich in antioxidants such as flavonoids, polyphenols, and vitamins, which protect the body from oxidative damage. Flavonoids are particularly recognized for their antihypertensive effects and their ability to safeguard endothelial health by reducing triglycerides and harmful lipid buildup. Many flavonoid compounds have shown significant therapeutic benefits for cardiovascular diseases (CVD), including endothelial dysfunction, coronary artery disease, cardiac fibrosis, myocardial infarction, ischemic reperfusion injury, and more (Khan et al., 2021). Polyphenols, being primary secondary metabolites in tea, are commonly regarded as physiological indicators of tea quality (Sun et al. 2022). Vitamins C and E in tea enhance immune function and support skin protection. These antioxidants act by neutralizing free radicals, chelating metal ions that promote free radical generation, and suppressing oxidative enzymes. This helps reduce the likelihood of chronic diseases and slows aging processes. Their health benefits include enhanced cardiovascular health, decreased cancer risks, anti-inflammatory effects, and neuroprotection.

Indonesia has an abundance of natural resources, rich in antioxidant compounds with tremendous health benefits. Unfortunately, many of these resources, such as papaya seeds, corn silk and dragon fruit peels, are often overlooked and end up as waste. In fact, these materials contain high-value bioactive compounds, such as flavonoids, saponins, phenolics, and betalains, which play a role in fighting free radicals, preventing cell damage, and supporting heart, kidney, and immune system health. Despite its significant potential, this resource remains underutilized, even though appropriate processing can aid in preventing chronic illnesses like cancer, diabetes, and cardiovascular diseases, while also minimizing organic waste and benefiting the environment. It is important to raise public awareness and encourage innovation in the processing of these materials, so as to not only support overall health, but also create sustainable economic opportunities based on abundant local resources.

Papaya (*Carica papaya* L.) originates from southern Mexico and the Central American region. It is a widely cultivated fruit crop belonging to the *Caricaceae* family. Papaya is valued both as a nutritious fruit and a medicinal plant (Fatima and Shahid, 2018). Papaya (*Carica papaya L.*) seeds are often discarded, even though papaya seeds are a treasure trove of nutrients and bioactive compounds. Traditionally, papaya seeds have been used in various cultures for their medicinal properties. Papaya seeds are rich in essential fatty acids, proteins, and a wide variety of phytochemicals, including alkaloids, flavonoids, and phenolic compounds. This nutritional profile makes papaya seeds an excellent addition to herbal teas, which provide numerous health advantages. Papaya seeds also exhibit pharmacological properties, including antiseptic effects against diarrhoea-causing bacteria such as Escherichia coli and Vibrio cholerae (Martiasih *et al.*, 2014; Pratiwi *et al.*, 2024). Research indicates that the ethyl acetate extract of papaya seeds possesses antioxidant activity, which is crucial for protecting the body from oxidative stress, maintaining cellular health, and reducing inflammation (Sharma et al., 2020; Zhou et al., 2011).

Studies indicate that papaya seeds are abundant in saponins and exhibit antimicrobial activity. They also contain alkaloids, steroids, tannins, and essential oils. (Mursyida *et al.*, 2022) Papaya seeds are particularly rich in unsaturated fatty acids, such as oleic and palmitic acids. They also contain chemical compounds from the phenol, terpenoid, and saponin groups, which are recognized for their cytotoxic, anti-androgenic, and estrogenic properties. Moreover, papaya seeds offer minor quantities of carbohydrates, water, protein, and fats, all of which contribute positively to overall health (Bani et al., 2023; Mulyadi et al., 2023). Regular consumption of papaya fruit can help reduce the risk of bladder, colon, pancreatic, and lung cancers. Furthermore, it decreases intestinal mucus that disrupts digestion and helps eliminate intestinal parasites (Hidayati et al., 2020). These findings validate the traditional use of papaya seeds in herbal medicine and emphasize their potential as a potent antioxidant source.

Corn silk (*Zea mays L.*) is an organic waste that bacteria can quickly decompose. If untreated, it may contribute to environmental pollution by emitting a strong rancid odor (Salsabila et al., 2021). Herbal beverages have been traditionally valued for their nutritional and health benefits in various cultures. Research increasingly highlights that plants are rich in bioactive compounds with notable health benefits. Corn silk (*Zea mays L.*), often undervalued, holds great potential as a key ingredient for healthy herbal beverages. It is rich in secondary metabolites, including phenols, flavonoids, tannins, alkaloids, terpenoids, saponins, and glycosides, which function as natural antibiotics (Wijayanti and Ramadhian 2016). The body's limited antioxidant reserves are insufficient to counteract excessive free radicals, necessitating exogenous antioxidants. These compounds in corn silk provide antioxidant activity, playing a crucial role in preventing degenerative diseases such as cardiovascular disorders, cancer, atherosclerosis, osteoporosis, and others (Wahyudi et al., 2021).

Research has also shown that antioxidants in corn silk can help protect cells from oxidative stress, which is linked to aging and various chronic diseases. For example, flavonoids in corn silk have been found to exhibit strong free radical scavenging activity, which helps reduce oxidative damage to cells (Wahyudi et al., 2024). Studies reveal that corn silk is beneficial for managing various conditions, including hypertension, tumors, hyperglycemia, hepatitis, cystitis, kidney stones, diabetes, nephritis, and prostate disorders. Furthermore, traditional medicine has employed corn silk as a treatment for gout, a diuretic, and as an antimitotic and uricosuric agent. It is also commonly used to address issues such as cystitis, kidney stones, nephritis, and prostatitis (Anggraini, 2017). Incorporating corn silk into herbal teas not only enhances its nutritional and health benefits, but also promotes sustainability. By utilizing parts of the corn plant that are usually discarded, we can reduce food waste and make better use of natural resources. This is in line with contemporary environmental goals and supports the development of sustainable health solutions.

Dragon fruit plants, a type of cactus, produce both fruits and flowers. Among them, the red dragon fruit (*Hylocereus polyrhizus*) is currently being widely cultivated in Indonesia (Direktorat Budidaya Tanaman Buah 2009; Jaya 2010). Dragon fruit offers a delicious flavor and delivers various health benefits. Hylocereus polyrhizus is rich in lycopene, a natural antioxidant known for its potential to fight cancer, heart disease, and lower blood pressure (Rouf et al. 2023). While the flesh is commonly consumed, the bright red skin is often discarded as waste. Dragon fruit skin is found to have a higher antioxidant content that is higher than the flesh (Hendra et al., 2020).

Herbal tea made from dragon fruit peel is rich in antioxidants that aid in preventing cancer in the body. While tea is typically made from tea plants, other leaves, such as guava leaves, are also processed to make tea. The process of making tea primarily involves drying parts (leaves or skin) of plants to reduce their moisture content (Ghani, 2022). Research indicates that tea bags can be made from dragon fruit skin, including those from red and white dragon fruit varieties. Drying the dragon fruit skin can be done using a cabinet dryer at 60ºC for 6 hours (Shofiati et al., 2014). Dragon fruit peels are more beneficial than the pulp, as they contain various bioactive compounds, such as phenolic acids, flavonoids, and carotenoids, which contribute to significant antioxidant activity. These antioxidants are crucial for protecting the body from oxidative stress, supporting cellular health, and reducing inflammation. Antioxidant compounds help counteract oxidation in the body. Research by (Farnsworth 1966) shows that red dragon fruit peel has higher antioxidant activity than the fruit pulp. A concentration of 1 mg/ml of red dragon fruit peel inhibits 83.48 ± 1.02% of free radicals, whereas the pulp only inhibits 27.45 ± 5.03%.

Utilizing natural ingredients as a source of antioxidants in the form of herbal tea not only provides health benefits, but also contributes to waste reduction and supports sustainability. Papaya seeds, corn silk, and dragon fruit peels-which are often considered waste-have great potential to be processed into practical and high-value health drinks. With bioactive compounds such as flavonoids, saponins, phenolics, and betalains, these ingredients can be processed into herbal teas that are rich in antioxidants, help fight free radicals, promote cellular health, and prevent chronic diseases. Innovations like *Teatrasi* show how combining traditional knowledge and modern science can transform organic waste into products that benefit people and the environment. In addition to supporting good health, these herbal teas also have a positive impact on sustainable lifestyles, reducing organic waste and promoting the wise use of natural ingredients. By utilizing natural resources that are often overlooked, *Teatrasi* not only creates a cost-effective healthy drink but also provides a tangible example of how innovative approaches can raise awareness of the importance of natural resource management for human health and planetary sustainability.

Overall, herbal tea processed from papaya seeds, corn silk, and dragon fruit skin can be an innovative option in utilizing natural ingredients for health. The purpose of this study was to test the antioxidant levels and flavonoid levels in papaya seeds (*Carica papaya L.*), corn silk (*Zea mays L.*), and dragon fruit peel (*Hylocereus polyrhizus*) at SMAN 10 Bekasi. By utilizing these three ingredients, the researchers not only maintain the health of the body through antioxidant intake, but also support environmentally friendly practices and reduce negative impacts on nature. This innovation is not only beneficial for individual health but also for public health.

Materials and Methods

Research Time and Location

The research was conducted from November to December 2024 at SMA 10 Bekasi and the Laboratory of the Faculty of Pharmacy, University of Indonesia.

Tools and Materials

Experimental

A test was carried out using a herbal tea bag weighing 3 grams, containing Corn Silk, Papaya Seeds, and Dragon Fruit Peel, with the proportions of each ingredient listed in Table 1. The tools used to prepare Teatrasi herbal tea included scissors, a gram scale, stirrer, filter, drying tissue, Teflon, stove, spatula, spoon, glassware, plate, knife, tray, oven, blender, baking paper, and tea bags. The ingredients for this preparation were corn silk (*Zea mays*), papaya seeds (*Carica papaya*), and dragon fruit peel (*Hylocereus polyrhizus*).

Preparation of herbal tea

The procedure for making herbal tea from corn silk (*Zea mays*), papaya seeds (*Carica papaya*), and dragon fruit peel (*Hylocereus polyrhizus*) is as follows:

Material preparation

Start by preparing sweet corn, California papaya, dragon fruit, and salt for the next steps.

Separation of materials and waste

Set aside a plate to separate the corn silk from the cob, papaya seeds from the fruit, and dragon fruit peel from the flesh.

Material washing

After separating the materials from waste, wash them thoroughly. For papaya seeds, use 1 teaspoon of salt to remove the mucus, then rinse several times with clean water to eliminate any remaining salt.

Draining the ingredients

Use a tissue dryer to drain the washed ingredients until they are completely dry and ready for the oven drying stage.

Dragon fruit skin cutting

Slice the dried dragon fruit peel into small pieces using a knife and cutting board to aid in the oven drying process.

Roasting papaya seeds

Roast the dried papaya seeds in Teflon to remove the mucus layer. The roasting process takes about 10 minutes until the seeds are fully dry.

Drying the ingredients

Once prepared, arrange the ingredients on oven trays lined with baking paper for drying. The drying conditions are: 150°C for corn silk for 15 minutes, 150°C for papaya seeds for 30 minutes, and 180°C for dragon fruit peel for 4.5 hours.

Material crushing

Use a blender to crush the dried dragon fruit peel and papaya seeds briefly, achieving a crushed texture rather than a smooth one. For the corn silk, cut it into small pieces.

Packaging of ingredients

Prepare the crushed ingredients for packaging into tea bags according to the formula.

Formulation of ingredient preparation in product manufacturing

Each ingredient that has been pureed will be packed into 5.5 x 7 cm tea bags. The tea bags in each formula will be brewed with 200 ml of hot water at 90°C, with the bags being dipped up and down for about 5 minutes. The formulations of each tea bag, made from corn silk, papaya seeds, and dragon fruit peel, are as follows (see Table 1).

Table 1. Formulation of Tea Bags

Materials	Weight of Ingredients in Formulation (%)		
	Formulations 1	Formulations 2	Formulations 3
Corn Silk	40%	20%	40%
Papaya Seeds	40%	40%	20%
Dragon Fruit Peels	20%	40%	40%

DPPH Antioxidant Analysis Test and Flavonoid Total Compound Content

Antioxidant analysis and flavonoid content in this study were conducted at the Quality Testing Service Laboratory (PPM) of the Faculty of Pharmacy, University of Indonesia. The product samples were transported to the laboratory using a Cool Box, which contained dry ice to maintain a low temperature. The UV-Vis spectrophotometric test was then immediately performed (see Table 2):

Table 2. Teatrasi Herbal Tea Drink Formula

Ingredients	Formula	Function
Corn Silk, Dragon Fruit Peel, Papaya Seeds	3 grams	Control blood pressure and blood sugar levels, increase immunity, antioxidant and free radical prevention
Honey	15 millilitres	As a natural sweetener
Aquadest	q.s.	As a solvent

Evaluation of Physical Characteristics

The testing involves evaluating the colour, aroma, taste, and texture. The samples were stored for 24 hours before being assessed based on these characteristics.

Hedonic Test

This test was conducted with 120 respondents, determined by multiplying the total population in the research area by 10%. The respondents were given a questionnaire to record their identity and level of preference. The evaluation was based on a preference scale ranging from 1 to 4, categorized as Highly Favoured (HF), Favoured (F), Disliked (D), and Highly Disliked (HD) (see tables 3-6).

Table 3. Organoleptic Test Scale for Taste

Hedonic Scale	Numeric Scale
Highly Favoured	4
Favoured	3
Disliked	2
Highly Disliked	1

Table 4. Organoleptic Test Scale for Fragrance

Hedonic Scale	Numeric Scale
Highly Favoured	4
Favoured	3
Disliked	2
Highly Disliked	1

Table 5. Organoleptic Test Scale for Color

Hedonic Scale	Numeric Scale
Highly Favoured	4
Favoured	3
Disliked	2
Highly Disliked	1

Table 6. Organoleptic Test Scale for People Like

Hedonic Scale	Numeric Scale
Highly Favoured	4
Favoured	3
Disliked	2
Highly Disliked	1

Results and Discussion

Composition Analysis

In the composition analysis, researchers developed three formulas with different ingredient ratios. The first formula, containing 40% Corn Silk, 40% Papaya Seeds, and 20% Dragon Fruit Peel, showed that respondents generally liked the aroma of Corn Silk. However, the taste of Papaya Seeds was quite dominant, and the color was less appealing due to the small proportion of Dragon Fruit Peel. The second formula, with 20% Corn Silk, 40% Papaya Seeds, and 40% Dragon Fruit Peel, had a less pronounced Corn Silk aroma due to its lower proportion, while the strong scent of Papaya Seeds reduced its overall appeal. Despite this, the color produced was not very intense but still attractive to respondents. In the third formula, which included 40% Corn Silk, 20% Papaya Seeds, and 40% Dragon Fruit Peel, the aroma was dominated by Corn Silk, which was appealing to respondents. The Papaya Seeds' aroma was well-balanced, and the color was a reddish-brown, typical of tea, with a hint of red that caught the respondents' attention. This reddish-brown color was due to anthocyanin pigments in the dragon fruit peel, which are soluble in polar solvents and contribute to the red hue.

DPPH Antioxidant Analysis Test

Antioxidants are molecules that fight free radicals in the body. Free radicals, generated from normal metabolism and environmental exposures, can trigger oxidative stress, which damages cells, tissues, and DNA, and plays a role in premature aging and various chronic diseases such as cancer, diabetes, and heart disease. Therefore, antioxidants are essential in guarding the body against oxidative damage as well as maintaining cellular health (Natzir and Syamsul 2024). Antioxidants work by protecting the body's cells from invading free radicals. Free radicals are formed from the body's exposure to harmful substances or conditions such as sunlight, chemicals, pollution, stress, smoking, junk food, alcohol, and lack of rest. This exposure creates molecules that take away the electrons of normal cells. As a result, the cells become unstable and undergo damage. Over a long period of time, cell damage can lead to organ damage that causes disease. Antioxidants work by fighting these free radicals. Antioxidants can also restore electrons to unstable cells. Thus, organ damage can be prevented (Lobo et al. 2010; Martemucci et al. 2022; Sayuti and Yenrina 2015; Tim CNN 2020).

Based on the **Table 7** of Antioxidant test results, formula 3 contains the strongest antioxidant activity of 89.27 in IC50(ppm), formula 1 contains the second strongest antioxidant activity of 91.55 in IC50(ppm), and finally formula 2 contains antioxidant activity classified as medium at 103.84 in IC50(ppm). Antioxidant activity evaluation methods are able to identify differences in antioxidant characteristics in a sample. There are various methods used to measure the total antioxidant characteristics, but no single method is considered to be the most optimal. The variety of activity evaluation methods may result in a varied understanding of antioxidant mechanism of action. Secondary metabolite compounds in plants have a role as antioxidants in the human body and can be used as materials to eliminate free radicals. Secondary metabolites are usually collected in plant organs such as leaves, roots, stems, seeds, fruits, and fruit skins. Therefore, to evaluate the antioxidant activity of the Teatry Herbal Tea, a study was conducted using the diphenyl picrylhydrazyl (DPPH) method.

Table 7. Teatrasi Antioxidant Test Results

Sample Name	Formulation	IC_{50} (ppm)	Description
Corn Silk + Papaya Seeds + Dragon Fruit Peels	40%:40%:20%	91,55	Strong
	20%:40%:40%	103,84	Medium
	40%:20%:40%	89,27	Strong

Dragon fruit peel (**IC_{50}** = 0.3 mg/mL) has a higher level of antioxidant activity compared to the antioxidant activity of the fruit flesh (**IC_{50}** > 1 mg/mL). Red dragon fruit skin is also known to contain betalain color pigment which has antioxidant activity of 5.6. The **IC_{50}** value of the n-hexane fraction of red Dragon Fruit Peels is 206.591 µg/mL, while vitamin C as a positive control has an **IC_{50}** value of 2.971 µg/mL (Budilaksono, Wahdaningsih, and Fahrurroji 2014). The results of measuring the antioxidant activity of 70% ethanol extract of Papaya Seeds (Carica papaya L.) with DPPH method obtained **IC_{50}** value of 83.790 ± 0.588 ppm, and ascorbic acid obtained **IC_{50}** value of 2.074 ± 0.0.44 ppm. The total content of phenolic compounds is closely related to the antioxidant activity of a sample. This shows that the higher the content of flavonoid compounds, the higher the antioxidant ability in donating electrons (Mustawil, 2023). According to the results of the study, Corn Silk in the ethanol-soluble fraction - n-hexan soluble has a total carotenoid content of 434.68 mg/kg. While for extracts using methanol solvent amounted to 8.35 mg/kg and ethyl acetate amounted to 35.42 mg/kg. Corn Silk herbal tea has the potential as a source of antioxidants because it contains bioactive compounds such as phenolics, flavonoids and carotenoids. These active compounds are known to have the function of counteracting free radicals resulting from oxidation reactions (Alwi and Laeliocattleya 2020).

The DPPH method was used for the antioxidant activity test due to its simplicity, speed, ease of use, and minimal sample requirement. This assay is designed to detect antioxidants in a sample and, if present, determine their concentration and/or percentage. It works by measuring antioxidant activity with organic radicals, and is considered simpler and more cost-effective compared to other similar methods. According to the results in Table 7, the antioxidant concentration for the formula containing 40% Corn Silk, 20% Papaya Seed, and 40% Dragon Fruit Peel was classified as strong. A substance is considered an antioxidant if its $\mathbf{IC_{50}}$ value is less than 200 ppm (Molyneux 2004). The $\mathbf{IC_{50}}$ value, measured in ppm (part per million) or µg/mL (microgram per milliliter) using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method, quantifies free radicals. A compound is considered a very strong antioxidant if its IC_{50} value is less than 50 µg/mL, strong if it is between 50 and 100 µg/mL, moderate if it is between 101 and 150 µg/mL, and weak if the $\mathbf{IC_{50}}$ value is between 151 and 200 µg/mL (Mardawati, Achyar, and Marta 2008).

The variation in $\mathbf{IC_{50}}$ values may be due to the differing amounts of antioxidants in the extract. In experiments lasting 60 and 75 minutes, the $\mathbf{IC_{50}}$ value decreased, likely because of antioxidant degradation due to prolonged contact between the active substance and the solvent, which was affected by increasing temperature from extended heating (Budilaksono et al. 2014) Therefore, it can be concluded that Teatrasi Herbal Tea has strong antioxidant activity, as indicated by its second-lowest $\mathbf{IC_{50}}$ value.

Total Flavonoid Analysis Test

Flavonoids are secondary metabolite compounds that act as antioxidants that have the ability to stop or prevent lipid oxidation. Flavonoid compounds are the largest group of phenols that can be found in nature. Flavonoids are plant pigments with yellow, orange-yellow, and red colors found in fruits, vegetables, nuts, seeds, stems, flowers, herbs, and spices. Flavonoids have many good effects on the health of the human body. Researchers have found that flavonoids are beneficial as antioxidants, anti-inflammatory by interfering with the effects of arachidonic acid metabolic pathways, antitumor by interfering with tumor promoter activity, and antiviral which is thought to interfere with nucleic acid synthesis (Bangun et al., 2021). Flavonoids also have benefits such as, potential as a sunscreen because they are photoprotective (Anggraini 2017), overcome hypertension by lowering blood pressure, and can reduce insulin resistance to glucose (Salsabila et al. 2021).

Qualitative analysis of flavonoids can be performed using UV-Vis spectrophotometry. Ultraviolet and visible light absorption spectra are the most effective methods for identifying flavonoid structures. The flavonoid content was determined using a UV-Vis spectrophotometer and expressed in mg QE/g of sample. Each of the Teatrasi raw materials contains flavonoids, with Corn Silk having a range of 204.22-219.44 ppm (Hidayah and Nisak, 2019). Papaya Seeds contain 15.8181 ppm (Bangun et al., 2021), and dragon fruit peel ranges from 88.695 to 108.184 ppm (Pujiastuti and El'Zeba 2021).

Table 8. Total Flavonoid Test

Sample Name	Formulation	mL QE
Corn Silk + Papaya Seeds + Dragon Fruit Peels	40%:40%:20%	879,23
	20%:40%:40%	881,37
	40%:20%:40%	884,64

Based on the table of Flavonoid test results, formula 3 has the highest flavonoid content of 884.64 in mg/L QE, formula 2 has the second highest flavonoid content of 881.37 in mg/L QE, and finally formula 1 has the lowest flavonoid content of 879.27 in mg/L QE (See Table 8).

Organoleptic Test Results

The organoleptic test was conducted by observing the aroma, color, taste, and how much respondents liked the antioxidant herbal tea using the five senses. The aroma of Corn Silk is based on the drying process carried out, the higher the drying temperature of Corn Silk, the stronger the aroma. The aroma of Corn Silk herbal tea is produced by volatile compounds contained in foodstuffs. The higher the drying temperature, the volatile compounds contained in Corn Silk will come out optimally (Garnida, Suliasih, and Ismaya 2018).

Table 8. Organoleptic Test

Organoleptic Test Result				
Formula	**Fragrance**	**Colour**	**Taste**	**People Like**
Formula 1	Typical Corn Silk	Reddish Brown	Typical Papaya Seeds	Like
Formula 2	Typical Corn Silk	Reddish Brown	Typical Papaya Seeds	Like
Formula 3	Typical Corn Silk	Reddish Brown	Typical Papaya Seeds	Like

Formula 1: Formula 1 with the composition 40% Corn Silk, 40% Papaya Seeds, and 20% Dragon Fruit Peels.
Formula 2: Formula 2 with the composition 20% Corn Silk, 40% Papaya Seeds, and 40% Dragon Fruit Peels.
Formula 3: Formula 3 with the composition of 40% Corn Silk, 20% Papaya Seeds, and 40% Dragon Fruit Peels.

The resulting color is reddish brown, based on the raw material, namely the presence of dragon fruit skin which contains reddish color. The color of tea will be more intense if the contact time of tea and solvent lasts long (Fadilah et al., 2021). The taste is strongly influenced by Papaya Seed, but the resulting flavor is dominant in the taste of roasted Papaya Seed similar to coffee beans. This antioxidant herbal tea does not produce papaya fruit flavor.

Hedonic Test

According to (Triandini and Wangiyana 2022) hedonic testing as a method for studying consumer acceptance plays a crucial role in the development of herbal tea products. The hedonic test was conducted by receiving respondents' opinions regarding aroma, color, taste, and liking. Aroma is an important factor in determining the quality of a product, a delicious and fragrant aroma is more attractive to respondents. The distinctive aroma of Corn Silk produced depends on the drying process. Color is one of the important things to determine respondents' interest and the first benchmark to assess a product. Each respondent judges whether or not they like a product based on the taste of the product, the taste produced from herbal tea is mild and not bitter, so it can be accepted by all respondents (See Table 10).

Table 10. Hedonic Test

Formula	Fragrance	%	Colour	%	Taste	%	People Like	%
Formula 1	432	90	390	81,2	434	90,4	400	83,3
Formula 2	425	88,5	420	87,5	440	91,6	430	89,5
Formula 3	450	93,7	435	90,	445	92,7	443	92,2

pH test

The pH test is conducted to measure the acidity and alkalinity levels of antioxidant herbal tea when consumed by humans. pH measurement can be performed using a pH meter. The pH results for herbal tea must meet the pH requirements (3-8). The pH test result for corn silk is 5, for papaya seeds is 5, and for dragon fruit peel is 5. The pH result for the herbal tea is 5. The pH test is very important because the pH value is related to the product's shelf life. The lower the pH value of the product, or the more acidic the product, the longer the product's shelf life can last. This aligns with the opinion of (Siagian, Bintoro, and Nurwantoro 2020) (Yuliastuti, Safira, and Sari 2022)that the pH value is related to the product's shelf life because it affects the microorganism content and sensory evaluation of the product.

Conclusion

Research shows that papaya seeds, corn silk, and dragon fruit peel, often discarded as waste, have great potential as high-value health drinks. Teatrasi herbal tea demonstrates strong antioxidant activity in Formula 3 (89.27) and the highest flavonoid content (884.64 mg/L QE). The tea features a distinctive corn silk aroma, reddish-brown color, papaya seed flavor, and liquid texture. Hedonic test results revealed Formula 3, with 40% corn silk, 20% papaya seeds, and 40% dragon fruit peel, as the top choice, scoring 83.33% for aroma, 85.33% for color, and 82.00% for taste. The acidic pH of 5 across all formulas suggests better product longevity. Formula 3 combines excellent antioxidant properties, high flavonoid content, and appealing sensory attributes, making it the most favorable option.

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