International Conference on Biology Education, Natural Science, and Technology
Vol. 1 No. 1 (2023)

The Characteristics of Herbal Tea Combination Between Butterfly Flower with Mint and Pandan Leaf on Drying Duration Variation

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KEYWORDS:

herbal tea, butterfly flower, mint leaf, pandan leaf, drying duration, antioxidant activity, organoleptic quality

ABSTRACT

Herbal tea is a functional bevarage made from leaf or flower. Butterfly flowers contain flavonoids, anthocyanins and flavonol glycosides. Mint leaf contain 1-2% essential oil and 80-90% menthol. Pandan leaf contain 10% essential oil, aromatic compounds 2-acetyl-1 pyrroline, flavonoids. The purpose of this study was to determine the characteristics (antioxidant activity and organoleptic quality) of herbal tea combination between butterfly flowers with mint leaf and pandan leaf on drying duration variations. This research method was an experiment with Completely Randomized Design (CRD), two factors. Factor I: combination of flowers butterfly : mint leaf (6 g : 2 g) and combination of butterfly : pandan leaf (6 g : 2 g). Factor II : drying duration of 90 minutes and 120 minutes The results showed that the highest antioxidant activity was K_1L_1 treatment (combination of butterfly flower: mint leaf with drying duration of 90 minutes) that was 83.147%. The best organoleptic quality of herbal tea in K_1L_1 treatment (combination of butterfly flowers: mint leaf with drying duration of 90 minutes), dark blue color, mint aromatic, not bitter taste, fresh and quite like.

1. INTRODUCTION

Herbal tea is one of the functional bevarage made from leaf or flowers processed as tea making (Yamin, 2017), can improve taste without reducing its taste (Mu'nim, 2008), also can be consumed as a practical drink to maintain health. One type of plant can be used as an ingredient herbal tea is the butterfly flower. Butterfly flowers are indigo blue (purple) with the middle of white color (Putri, 2018), contain antioxidants, Flavonoids (20.07 ± 0.55 mmol/mg flowers), Anthocyanins (5.40 ± 0.23 mmol/mg flowers), Flavonol glycosides (14.66 ± 0.33 mmol/mg flower), Kaempferol glycoside (12.71 ± 0.46 mmol/mg flower), Querserin glycoside (1.92 ± 0.12 mmol/mg flower), and also myricetin glycosides (0.04 ± 0.01 mmol/mg flowers) (Kazuma, 2003). Flavonoids are potential antioxidants, anti-radicals of butterfly flowers (Soeharto, 2004). Antioxidants are compounds that can delay, slow, or inhibit oxidation reactions and can fight free radicals (Agustina, 2017). Free radicals are highly reactive molecules because they have one or more unpaired electrons. Excess free radicals can attack any compound and have implications for the

emergence of various diseases such as heart disease, cancer, arteriosclerosis and symptoms of aging (Kusumowati, 2012).

The flavor of herbal tea enhances the taste due to the loss or reduction of aromatic compounds which are partly composed of volatile alcohols, aldehydes and ketones. Butterfly flower tea does not smell like grass (Jeremy, 2019), therefore, in processing herbal tea, it is necessary to add flavor. The addition of the flavor of butterfly flower tea is mint leaf. Peppermint extract is menthyl acetate produces "minty" aroma and flavor of lemon tea, while pandan leaf (Sukardi, 2009) have a fragrant and fresh aroma due to the essential oil content of mint leaf and fragrant pandan leaf as a flavor of tea bevarage (Wartini, 2015).

Mint leaf (*Mentha piperita*) contain essential oil 1% essential oil, 78% free menthol, 2% menthol mixed with esters, tannins, menthone (21.45%), isomenthone (2.87%), menthofuran (1-17%), carvone, linalool and piperitone oxide (Moghtader, 2013). The most ideal content of mint leaf in herbal tea is 3%, because the higher the percentage of mint content, the spicier it tastes when brewed. The addition of mint leaf to reduce the bitter and astringent taste so that it is fresh and has a distinctive minty flavor (Anggraini, 2014).

Pandan leaf as an ingredients of bevarage and aroma contain tannins, alkaloids, flavonoids, and polyphenols as antioxidant activity, antidiabetic of water extracts, antioxidants of water and methanol extracts, anticancer of ethanol and methanol extracts, and antibacterial of ethanol and ethyl extracts acetate (Prameswari and Widjanarko, 2014). The addition of antioxidants can reduce the level of oxidative stress, therefore slowing the occurrence of premature aging and complications of various diseases. Fragrant pandan leaf have a distinctive aroma of essential oil, consisting of 6–42% sesquiterpene hydrocarbons and 6% monoterpene linalool and 10% aromatic compound form of 2-acetyl-1 pyrroline (Priastomo, 2018). 2-acetyl-1-pyrroline (2-AP) is the largest component of pandan leaf, volatile oils, alcohols, aromatic aldehydes, ketones and esters. Pandan leaf extract can act as a natural antioxidant (Tasia & Widyaningsih, 2014).

The addition of flavor or taste, drying time in the making of herbal tea affects antioxidant activity (Adri,2013). The longer the drying, the lower the levels of flavonoids and phenolics (antioxidant compounds). Drying at high temperatures and for quite long time can reduce antioxidant activity of dry material (Yamin, 2017). The results of the study (Yamin, 2017) state that ketepeng leaf of herbal tea has the highest antioxidant activity at 110 minutes of drying time. The results of Rofiah's research (2018) state the highest antioxidant activity were in tin leaf of herbal tea with drying time of 120 minutes. The longer the drying, the higher the temperature and the lower the antioxidant activity.

The purpose of this study was to determine the characteristics (antioxidant activity and organoleptic quality) of herbal tea combination of butterfly flowers with mint and pandan leaf on drying duration variations.

2. METHODS

This research used experimental method and completely randomized design (CRD), two factors. Factor 1 : combination between butterfly flower and mint leaf K1 (6 g : 2 g) and combination between butterfly flower and pandan leaf K2 (6 g : 2 g), Factor 2 : drying durations of L1 (90 minutes) and L2 (120 minutes), 3 repetitions. The research procedurs included: making herbal tea, drying duration, testing antioxidant activity with the DPPH method and organoleptic quality as well as public acceptance involving 15 panelists. The research data were analyzed descriptively qualitatively and quantitatively.To find out the results of this study, the data analysis used was descriptive qualitative to determine the differences in each treatment. Data collection was carried out using experimental methods, measuring antioxidant activity, organoleptic quality, observation methods, literature methods and research documentation.

3. RESULTS AND DISCUSSION

3.1. Antioxidant Activity

The results of the antioxidant activity herbal tea of the combination between butterfly flower with mint leaf and pandan leaf on variations of drying duration for 90 minutes and 120 minutes at 55°C can be seen in the table below:

Table 3.1. Average Antioxidant Activity of Herbal Tea Combination between butterfly Flower with Mint Leaf and Pandan Leaf on Variations of Drying duration

Treatment	Antioxidant activity (%)
K_1L_1 (butturfly flower : mint leaf) + drying duration 90’	83,147**
K_2L_1(butterfly flower : pandan leaf)+ drying duration 90’	60,589
K_1L_2 (butterfly flower : mint leaf)+ drying duration 120’	78,664
K_2L_2(butterfly flower :pandan leaf)+ drying duration 120’	59,473*

Explanation: * the lowet of Antioxidant activity terendah, ** the highest of Antioxidant activity

Table 3.1 showed that the highest antioxidant activity was in the K_1L_1 treatment (butterfly flower : Mint leaf) + 90 minutes drying duration of 83.147%, while the lowest antioxidant activity was in the K_2L_2 treatment (butterfly flower: Pandan leaf) + 120 minutes drying duration of 59.473%. This showed that the variations of drying duration provide different antioxidant activity.

The longer the drying, the less the antioxidant activity, because the longer the drying, the antioxidant compounds will be damaged so that it will affect the antioxidant activity. This is supported by research (Rusnayanti, 2018) stated that antioxidant activity will decrease if the drying temperature and drying time are higher, because the higher the temperature and drying duration result in secondary metabolite compounds that act as antioxidants being damaged. In accordance with Yamin's research (2017), showed that drying Chinese ketepeng leaf at 55°C with a drying duration of 110 minutes provided the highest antioxidant activity of 43.79 µg/ml (IC50 µg/ml unit) compared to 130 minutes of drying that was 60 .18µg/ml. The IC50 value is inversely proportional to the ability of the compound to act as an antioxidant. The smaller the IC50 value, the greater the antioxidant activity.

This was supported by Andesa research (2020) stated that the antioxidant activity of herbal tea of butterfly flowers and basil leaf at 90 minutes of drying duration was higher than 120 minutes of drying duration. There was the highest antioxidant activity of the herbal combination between butterfly flowers and mint leaf. According to Cahyaningsih research (2019) stated that butterfly flowers have antioxidant activity with an IC50 value of 87.86 ppm. Specifically, an antioxidant is categorized as very strong if the IC50 value is less than 50 ppm,however it is strong if the IC50 is 50-100 ppm,and moderate if the IC50 is 100-150 ppm, and an antioxidant is categorized as weak if the IC50 is 150-200 ppm. The smaller the IC50 value means the stronger the antioxidant activity. This shows that the greater the ratio of the composition of the butterfly flower, the higher the antioxidant activity. This was confirmed by Rohmadianto's research (2009) stated that antioxidant activity was concentration of corn-rosella hair 55:45 with a drying duration of 2.5 hours was 90.63%, while the lowest antioxidant activity was concentration of corn hair : rosella (85:15)at drying time 1.5 hours is 63.15%. The reason for the high antioxidant activity is due to the high concentration of rosella. The higher the concentration of rosella, the higher the antioxidant activity. This is because rosella contains flavonoid compounds and anthocyanin pigments which act as antioxidants.

Variation of drying duration gives different antioxidant activity. The longer the drying, the lower the antioxidant activity. This is because the longer the drying time, the antioxidant compounds will be damaged so that it will affect the antioxidant activity. Strengthened by Hartiati's research (2009) states that raw materials that through the drying process, the antioxidant activity produced is smaller, this is due to damage or degradation of the gossyperin, antiocyanin and glucoside hibiscin compounds in rosella damaged during the drying process. The longer the drying process. it will increase the damage to the antioxidant constituent compounds. In accordance with Yamin's research (2017) showed that drying Chinese ketepeng leaf at 55°C with

drying time of 110 minutes provided the highest antioxidant activity of 43.79 µg/ml (IC50 µg/ml unit) compared to 130 minutes of drying that 60 .18µg/ml. The IC50 value is inversely proportional to the ability of the compound to act as an antioxidant. The smaller the IC50 value, the greater the antioxidant activity. This is supported by Andesa research (2020) that the activity of herbal tea of butterfly flowers and basil leaf at 90 minutes of drying duration has higher antioxidant activity than 120 minutes of drying duration.

3.2. Organoleptic Quality and Acceptance

The results of organoleptic quality are presented in the table below:

Table 3.2. Organoleptic Quality of Herbal Tea Combination betweeen butterfly Flower with Mint Leaf and Pandan Leaf on Variation of Drying Duration.

Treatments	Organoleptic quality			Acceptability
	Color	Smell	Flavor	
K_1L_1	Dark blue	Mint specific	Not bitter, fresh	Quite like
K_1L_2	Purplish blue	Mint specific	No bitter, fresh	Quite like
K_2L_1	Dark blue	pandan specific	No bitter, fresh	like
K_2L_2	Purplish blue	Pandan specific	No bitter, fresh	like

Explanation:

K_1L_1 = Butterfly : Mint leaf + 90 minutes of drying duration

K_1L_2 = Butterfly : Mint leaf + 120 minutes of drying duration

K_2L_1 = Butterfly : Pandan leaf + 90 minutes of drying duration

K_2L_2 = Butterfly : Pandan leaf + 120 minutes of drying duration

Table 3.2 showed that the color of the herbal tea combination between butterfly flower and mint leaf was purplish blue and dark blue because the anthocyanin contains 14.66 ± 0.33 nmol/mg flowers (Wiyantoko, 2020). Differences in the color of the tea produced in each sample The combination between butterfly flower and mint leaf of herbal tea showed that the butterfly flower dominates the color of the herbal tea . The more the butterfly flower composition is added, the darker or blue color of the herbal tea will be. This was reinforced by Fizriani's research (2020) stated that the addition of 0.75 gram of butterfly extract, the color of the cendol is blue than the addition of 0.25 gram of butterfly extract, so the more powdered butterfly extract is added to the cendol, the bluer the color of the resulting cendol. The aroma of herbal tea combination between butterfly flowers and mint leaf is specific mint, because mint leaf contain 0.5 - 4% essential oil, 30-55% menthol (Setiawan, 2019). This is in accordance with Kamilia's research (2009) stated that butterfly flowers do not contain essential oils, but are influenced by mint leaf. The taste of

herbal tea can be influenced by the ingredients used. The taste of the herbal tea of combination between butterfly flowers and mint leaf is not bitter and fresh. Butterfly flowers and mint leaf contain tannins which cause an astringent taste (Hussein, 2019 and Manjula, 2013). The low tannin content is covered by the high essential oil content of mint leaf,

The color of the herbal tea is a combination between butterfly flowers and pandan leaf, dark blue and purplish blue, has a distinctive pandan aroma, tastes not bitter and fresh, and like acceptance. The acceptability, color, aroma of the herbal tea is in accordance with SNI 3836 (2013). The difference in the color of the herbal tea indicated that the drying duration and the combination between butterfly flowers and pandan leaf had an effect on the color of the herbal tea. The shorter the drying time and the greater the mixture of butterfly flower and pandan leaf, the resulting darker blue color causes the color of the anthocyanin pigments in the butterfly flower to dissolve in water. Agree with Pratimasari's research (2018) which shows that the color of the syrup with 0.25% butterfly extract shows better color stability compared to 0.5% butterfly extract. The difference of color herbal tea is caused by the quality of vision and sharpness of the panelists. The aroma of herbal tea mixed with butterfly flowers and pandan leaf is typical of pandan produced in accordance with SNI 3836 (2013) the aroma of good tea is typical of tea products. This is in accordance with Faras' research (2014) that pandan leaf contains essential oils and aromatic compounds which are volatile or easily evaporate so that it has a strong distinctive aroma of pandan. Pandan leaf have a distinctive aroma from a derivative of the amino acid phenylalanine, that is 2-acetyl-1pyroline. According to Fabra (2009) 2-acetyl-1pyroline is a component very soluble in water and alcohol, the same as in the combination between butterfly flower and pandan leaf in herbal tea, 2-acetyl-1pyroline is much extracted by water so that the aroma is characteristic of pandan. The taste of the herbal tea, which is combination between butterfly flowers and pandan leaf, is not bitter and is quite fresh or fresh. The butterfly flower is not bitter, however the fresh taste of pandan leaf, the tannin content which is very low in the butterfly flower and pandan leaf produce a taste that is not bitter. The acceptance of the combination between butterfly flower and pandan leaf of herbal tea was liked by the panelists.

4. CONCLUSION

The characteristics of the best herbal tea of combination between butterfly flowers and mint leaf and drying duration of 90 minutes was antioxidant activity of 83.147% and the best organoleptic quality of herbal tea was dark blue color, mint aroma, taste not bitter, fresh and quite like.

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