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Study of Essential Oil Extraction of Rosella Flower Petals (Hibiscus Sabdaíiffa L.) Water Steam Destilation Method

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A B S T R A C T

Indonesia had a tropical climate, rosella can grow abundantly. The problem that exists is how to extract essential oils from these plants and screen for phytochemicals in plant organs. The aim of the research was to study the extraction of essential oils from rosella flower petals and phytochemical screening, sensory testing of the oil results. The research method is essential oil extraction using water steam distillation, color and aroma analysis using the hedonic method and the DPPH test. The research results are as follows. The yield of essential oils in flower petals is 0.0136% in 1.1 kg of dry material. The color test was 60% very like it, 40% liked it and the aroma test for essential oils was around 55%, they really liked it and 45% liked it, while the panelists didn't like it 0%. Results of analysis of the antioxidant activity of rosella flower petal extract with a concentration of 5 ppm = 30.6%; 10 ppm = 33.7 %; 25 ppm = 41.7 %; 50 ppm = 45 %; 100 ppm = 48.3%; 200 ppm = 57.5 %

INTRODUCTION

Rosella flowers were red flowers because of their high anthocyanin content. The types of anthocyanins found in rosella were delphinidin 3 sambusiode and cyaniding 3 sambusiode. The advantage of rosella is that apart from its attractive color and distinctive aroma, rosella was also called a functional food because of its high antioxidant content. namely the anthocyanin content found in rosella.). Apart from that, rosella flower petals also contain coloring mater. This coloring mater was the substance contained in anthocyanin as a natural dye. Every plant can be used as a source of natural color because it contains natural pigments. Rosella flowers are believed to have quite high health benefits and have a unique taste. In various studies, rosella flowers can cure various diseases and prevent various disease transmissions and can be used as a natural coloring and preservative in food or drinks. However, the method of cultivating the rosella plant greatly influences the efficacy or quality and quantity of the product produced. So it is necessary for the public to understand the cultivation of rosella plants. Currently, there are many rosella flower tea products circulating on the market, but their use was very limited.

The problem with the rosella plant was that it was only used for drinks and dyes. What was not yet understood and analyzed was the essential oil of rosella flower petals. The formulation of the problem is that the Rosella plant has been widely used in the fields of food security and herbal medicine based on research results, but relatively few have studied other parts of the Rosella plant such as stems, leaves and flowers, roots and stems. The aim of the research was to study the content of essential oil compounds in fresh fruit petals using the Water Steam Distillation method. Then the results of the essential oils are tested for yield, hedonic tests as well as DPPH and phytochemicals. The benefit was to know the physicochemical and organoleptic characteristics of the material.

LITERATURE REVIEW

Rosella is a plant that grows widely in tropical areas such as Indonesia. Rosella flowers are used in Kediri as functional drinks and food coloring and are marketed as dried for traditional drinks. The rosella plant was known to have functional food benefits, namely its flower petals are rich in antioxidants and are often used as natural coloring ingredients [Handarini, 2014]. Rosella flower petal extract contains high levels of vitamin C and also contains succinic acid, the dominant oxalic acid. The opinion of other researchers is that rosella flower petal extract has higher levels of ascorbic acid than oranges or mangoes [Suwandi, 2012]. The chemical compound components of rosella flower extract in rocking peanut products which function as food coloring and also have medicinal properties are [Fauziati and Sampepana, 2016.]. According to researcher [Gustiarani. and Yuyun Triastuti, 2021] , rossela flowers can be made into soy milk bavarois pudding which was useful and liked by consumers. Natural substances extracted from plants can act as a potential source of anti-aging because they are photoprotective. This anti-aging is believed to help slow down the effects of premature aging [Fauzi, et al., 2012]. This provides some insight into the ability of plants to protect the skin through the compounds contained in plants in the form of bioactive compounds such as phenolic compounds and

supported by the presence of compounds that were antioxidants [Prasiddha, et al., 2016]. In Indonesia with a tropical climate, rosella can grow abundantly.

METHODOLOGY

The research was carried out from June to October 2023 at the Agrotechnology Laboratory and Chemistry Laboratory, Faculty of Agriculture, Kadiri Islamic University, Kediri and the Essentials Laboratory, Brawijaya University, Malang. Equipment used includes: Erlenmeyer, funnel, volume pipette, measuring cup, refrigerator, oven, UV spectrophotometer, stirrer magnetic, electric stove. Materials needed include distilled water, roots, stems, leaves, fruit, seeds, rosella flower petals, water. Ethanol, ether, hexene, filter paper, aluminum foil, DPPH solution, chemical analysis methods using quantitative and qualitative tests including essential oil yield, DPPH test, organoleptic test.

The distillation of rosella flower petal essential oil was as follows: Ingredient weighing is the activity of weighing the ingredients to be distilled. Purpose: This procedure aims to determine the weight of the material to be distilled to calculate the % yield of the oil that will be produced. Scope: This Technical Standard applies to determine the amount of material to be distilled. The capacity of the refining furnace is 5 kg of dry leaves. The method was as follows: 1. Make a selection by paying attention to the quality level of the materials. 2. Weighing raw materials. Preparing LPG fuel, opening the distillator. 3. Take 1 kg of dry leaves and put them in the distillator and record the amount of ingredients on the distillation form. then close the distillator tightly. 4. Check and adjust the distillation network (clavenger and condenser) so that no leaks occur during distillation and record each condition on the maintenance form. If it was not suitable, the production staff adjusts and repairs the refinery network and records it on the maintenance form. 5. Turn on the burner. 6. Distill for approximately 6 hours for each production batch. 7. Collect each distillation result in the existing clavenger and record each result on the refining form. 8. Collect the distilled oil in an oil collection bottle. 9. The condition and quantity of oil that has been stored in the drum is recorded on the production results form by the production staff. Then calculate the yield.

Stage 2 was an organoleptic test of color and aroma using the hedonic method. Hedonic method to test the sensory results of essential oils produced with color and aroma test parameters consisting of 1 sample. The panelists who tested 20 people used tools.

Stage 3. DPPH Test:

The procedure was adapted by adding 1 mL of 0.3 mM DPPH in methanol solution with 2.5 mL of extract solution and then leaving it at room temperature for 30 minutes to react. Then the absorbance was measured at 518 nm

DPPH inhibition (%) = (Control absorbance – Sample absorbance)/(control absorbance) x 100%

RESULTS

The results of distilling essential oil from rosella flower petals can be seen in Table 1.

Table 1. Observation Data from Studies on The Extraction of Essential Oils from the Rosella Plant

No	Sample	Metodology	time	Weight	Oil essential	Yield
1	Kelopak bunga	Destilasi Uap air	4,5 jam	1100 gr	0,1494 gr	0,0136 %

Test data for DPPH rosella flower petals and Ascorbic Acid (experimental control) can be seen in Table 2 and Table 3.

Table 2. Results of DPPH Analysis of Rosella Flower Petals

Number	Test sample concentration (ppm)	DPPH (%)
1	5	30,6
2	10	33,7
3	25	41,7
4	50	45,8
5	100	48,3
6	200	57,5

Table 3. Results of DPPH Analysis of Ascorbic Acid (Test Control)

Number	Test sample concentration (ppm)	Score DPPH (%)
1	5	26
2	10	79
3	25	82,5
4	50	85,4
5	100	86,6
6	200	90,2

The results of the table above can be made into a bar diagram like Figure 2. Which shows the comparison of the DPPH test between flower petals and ascorbic acid.

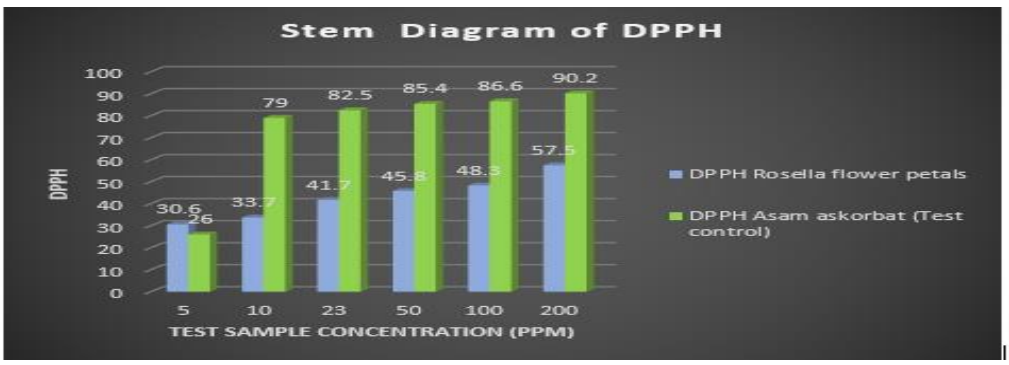

Figure 1. Steam Diagram DPPH

The results of phase 3 research activities were sensory tests of the color and aroma of essential oils on rosella plants. The method used was hedonic, testing samples for types of essential oils and 20 panelists assessing them.The results of the hedonic test can be seen in Figure 1.

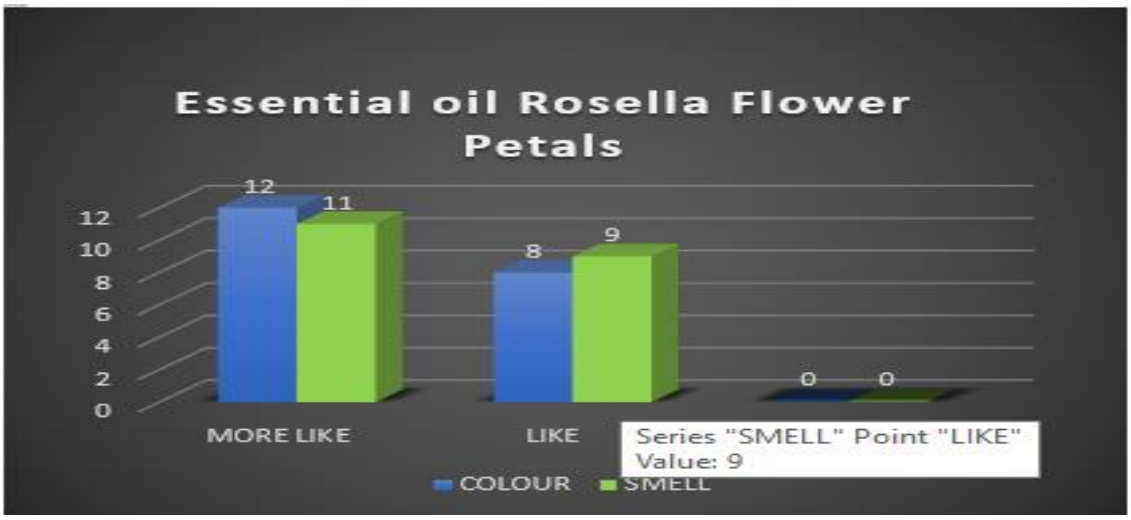

Figure 2. The Hedonic Test

DISCUSSION

The yield of essential oil from rosella flower petals was relatively small, namely 0.0136% in 1.1 kg of dried flower material. This shows that there was not much to be gained from the oil, but what was more dominant is the bioactive compounds and natural dyes which are more optimal for use as health drinks. The DPPH test showed relatively high levels of 200 ppm, which was 57% lower than the experimental control, namely ascorbic acid, which was 90.2%. The Hedonic Analysis obtained by many people liked the color of the oil and its aroma. Functional food was food that, because of its active component content, can provide health benefits, beyond the benefits provided by the nutritional substances contained therein (Suter 2013). Three basic functions of functional food, namely: 1) Sensory (attractive color and appearance and delicious taste), 2) Nutritional (high nutritional value), and 3) Physiological (provides beneficial physiological effects on the body) (Astawan 2011) . Roselle has enormous potential as a functional food. This is because roselle meets the criteria for functional food, both sensory, nutritional and physiological. Functional drinks from a combination of roselle and honey with a concentration of 15% are able to capture DPPH free radicals of 30.23%; total phenol 0.59 mg/g; and total antisionin of 1.24 mg/g, taste score 7.65 (like very much), color 3.96 (like); and aroma 7.4 (like it a lot). The results of analysis using GC-MS on roselamdu drinks identified the hydroxyl methyl furfurole compound (3.5%) which acts as an antioxidant (Hastuti 2012).

Besides that, the nutritional content of herbal roselle fruit is 9.2% water content, 1.145% protein, 2.61% fat, 12% fiber, 12.0% calcium, 273.2 mg phosphorus, 6.7 mg ascorbic acid (Mahadevan et al., 2009). The phytochemical content of red roselle fruit consists of alkaloids, flavonoids, phenol hydroquinone, steroids, triterpenoids, tannins and saponins (Mardiah et al.

2015). This phytochemical group has bioactive compounds with antioxidant and antibacterial activity. Setyo-Budi & Purwati (2014) roselle kalik contains high levels of vitamin C, ranging from 188 ± 2,033.52 mg/100 g of dry petals. Alshami & Alharbi (2014) explained that extracting roselle calluses using 80% methanol using the maceration method resulted in an extract solution which had strong antifungal activity against Candida albicans fungus and there was a synergistic interaction with voriconazole (an antifungal drug). Herbal roselle extract is effective in causing the amount of p inhibition. Herbal roselle extract is a strong inhibitor of this fungus and can be said to be comparable in ability to standard fungicides (Goussous et al. 2010). In Indonesia with a tropical climate, rosella can grow abundantly. This research shows that the essential oil content found in the natural ingredients of the rosella plant is relatively different in yield. This is because metabolism, which includes catabolism and anabolism, produces metabolites that are used by plant organs to grow and develop and have different functions in their life cycle. Flower petals contain more essential oils than leaves, stems, seeds and roots. The DPPH test for rosella flower petals was relatively good, with a concentration of 200 ppm showing the highest.

CONCLUSIONS

The results of the study concluded that the yield of essential oil in rosella flower petals was relatively small at 0.0136%, the antioxidant activity in 200 ppm was 57.5%, ascorbic acid (control) was 90.2% higher than the flower petals and the hedonic test was the most favorable 12 people liked the yellow color and 8 people liked the aroma very much and 11 people liked the aroma very much and 9 people liked it out of a total of 20 panelists.

RECOMMENDATIONS

It is recommended to continue testing essential oils as useful perfume ingredients for clothing, fragrance additives for soap, detergent and aromatic candles.

FURTHER STUDY

This research still has limitations so it is necessary to carry out further research regarding the topic study of essential oil extraction of rosella flower petals (hibiscus sabdaíiffa l.) water steam destilation method.

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