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TEST THE EFFECTIVENESS OF ROSE FLOWER WATER (*ROSA DAMASCENA* MILL) AS A POTENTIAL HERBAL DRINK HEALTH

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Abstract

Roses (Rosa damascena Mill) are a commodity that has economic value that is not utilized optimally. Research on roses shows that roses have potential as a source of natural antioxidants. Some of the chemicals contained in roses include tannin, geraniol, nerol, citronellol, geranic acid, terpenes, flavonoids, pectin polyphenols, vanillin, carotenoids, stearopten, farnesol, eugenol, phenylethyl alcohol, vitamins B, C, E, and K. There is a need for further research regarding the active compounds contained in rose water which can have the potential to be used as a herbal drink for human health that meets standards by showing appropriate tests. The aim of this research is to determine the value, total flavonoids and vitamin C value in waste and rose water. This research was designed with stages of determination of rose plants, preliminary tests, phytochemical screening of rose waste and water including: organoleptic observations, total flavonoids and vitamin C. From the research, it was found that the total value of flavonoids in mamar flower waste water was 1.24 ± 0.03, while in rose water it was 0.68 ± 0.02. The main flavonoid compound is quercetin which consists of lutein, luteoxanthin and β-carotene and is correlated with antioxidant activity. The level of Vitamin C in C rose flower waste is 2.958 ± 0.018 mg/g, while in rose water it is 2.399 ± 0.005 mg/g, this is due to the ascorbic acid content. From the results, the value of vitamin C shows a correlation with flavonoids. The higher the flavonoid value, the higher the vitamin C value. With the flavonoid and vitamin C content, rose flower waste and water have the potential as a health herbal drink.

***Keywords** : rose water, flavonoids, vitamin C*

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INTRODUCTION

Roses (*Rosa damascena* Mill) are a commodity that has high economic value that has not been utilized optimally. Much research has been carried out on roses, where roses have potential as a source of natural antioxidants. Some of the chemicals contained in roses include tannin, geraniol, nerol, citronellol, geranic acid, terpenes, flavonoids, pectin polyphenols, vanillin, carotenoids, stearopten, farnesol, eugenol, phenylethyl alcohol, vitamins B, C, E, and K (Wahyuni *et al.,* 2020). Based on the various benefits of roses, further tests need to be carried out to determine the potential for making herbal drinks that have health benefits. There is a need for herbal drinks for the health of the human body that comply with standards by showing the tests and equipment that must be prepared in the production process so that it can provide economic development and maintain public health (Jackie Kang Sing Lung, 2018). The aroma of roses (*Rosa damascena* Mill) is caused by the essential oil content in them, the main component of which is *2-phenylethyl alcohol* . Apart from having a high anthocyanin pigment, red roses also have a high vitamin C content which has the potential to be an antioxidant component. Rose water is a type of product produced from processing rose flowers. Rose water has high value in the food industry, it has been used for food flavoring and as an ingredient in food processing (Norbu & Roder, 2001). Antioxidants are substances that at low concentrations can prevent or slow down the oxidation process by binding free radicals and highly reactive molecules so that cell damage is inhibited. Antioxidants generally occur naturally in plants and have an important role in protecting the body's health. This compound can prevent oxidative damage and reduce the risk of disease. Free radicals are very reactive molecules because they have unpaired electrons in their outer orbitals so they can react with body cell molecules by binding the molecules' electrons. Free radicals are produced continuously during normal cell metabolic processes, causing damage to body cell function which can trigger degenerative diseases (Rahman *et al.*, 2014). However , nature provides natural antioxidants such as flavonoids, vitamin C, beta-carotene, etc. so that natural ingredients can be explored as sources of antioxidants. Flavonoids are phenolic compounds so their color changes when alkali or ammonia are added. Generally, flavonoids are bound to sugar as glycosides and aglycones. Flavonoid compounds play a role in providing many colors in nature. Flavonoids also significantly influence the taste of food, for example some plants have a bitter and harsh taste (Tinta Julianawati Hendy Hendarto, 2020). In the background Because rose flowers are rich in bioactive compounds which have the potential to be a source of antioxidants, activity testing research was carried out on waste and rose water from the flowers so that rose water will be produced which has a strong aroma and high antioxidant activity and has the potential to be used as a herbal drink that can improve people's welfare and health. .

1. Research purposes

The aim of this research is to determine the total value of flavonoids and determine the value of vitamin C in waste and rose water which has the potential to be used as a herbal drink as an effort to improve the economy.

2. Benefits of research

The benefits of the proposed research are based on several aspects, namely a scientific aspect. This research is important to carry out as a follow-up to the results of previous research to provide development of natural ingredients that have been scientifically proven to be flavonoids . Economic aspect, creating innovative herbal drink products from waste and rose water in the surrounding environment so that they can be used daily by the community to maintain immunity and health .

LITERATURE REVIEW

Relevant Previous Research

Roses (*Rosa damascena* Mill) are a commodity that has high economic value that has not been utilized optimally. Much research has been carried out on roses, where roses have potential as a source of natural antioxidants. Some of the chemicals contained in roses include tannin, geraniol, nerol, citronellol, geranic acid, terpenes, flavonoids, pectin polyphenols, vanillin, carotenoids, stearopten, farnesol, eugenol, phenylethyl alcohol, vitamins B, C, E, and K (Wulandari, 2016). Research conducted by (Imran, 2023) entitled "Potential of the Red Rose Plant (Rosa damascena) and its Compound Content." This research aims to determine the compound content contained in Rosa damascena so that we can determine the potential of the red rose plant as a source of natural medicine that can be used as an effort to cure a disease. Red roses have a high vitamin C content which has the potential to be an

antioxidant component. The antioxidant activity test was carried out using the DPPH method. From this research, the results showed that the vitamin C content reached 1,342.67 ± 2.52 mg/ 100g to 2,201.67 ± 2.89 mg/ 100g. The length of time of the steam distillation process has a significant effect on the phenolic compounds and vitamin C content in rose water. The longer the steam distillation treatment time, the more there is a tendency for the content of phenolic compounds to decrease
significant vitamin C ($p<0.05$).

1. Theoretical basis

Vitamin C or L- ascorbic acid is a vitamin that is classified as soluble in water, vitamin C is easily oxidized by heat and light, vitamin C is the most easily damaged vitamin of all existing vitamins

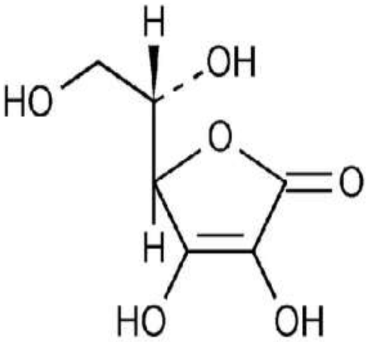


Figure 1. Chemical structure of ascorbic acid

Vitamin C or ascorbic acid with the chemical structure $C_6H_8O_6$ is known as the largest source of antioxidants found in food and beverages. These antioxidants can act as inactivators of oxidation reactions and free radicals. The need for vitamin C is usually obtained from fruits such as oranges, papaya, mango, grapes, watermelon, and others. The greater the level of vitamin C in a fruit, the greater its ability as an inactivator of oxidation reactions

To calculate the levels of vitamin C, antioxidants and total flavonoids using a spectrophotometer. The science that studies the use of spectrophotometers is called spectrophotometry (Gusnedi, 2013) .. A spectrophotometer is a tool used to measure absorbance by passing light of a certain wavelength through a glass or quartz object called a cuvette. Some of the light will be absorbed and the rest will be passed. The absorbance value of the absorbed light is proportional to the concentration of the solution in the cuvette (Pratama *et al* ., 2019) .

The advantage of using UV-Vis spectrophotometry is that it can be used to analyze organic or inorganic substances, selectively, with high accuracy with an error of 1-3%, analyzing using a UV-Vis spectrophotometer instrument is also easy to get quite accurate results and this instrument can be used as a determination of very small quantities of substances (Rohmah *et al* ., 2021) . The working principle of UV-Vis spectrophotometry is that when a light source in the form of mochromatic is transmitted through a medium which is a sample, some of the light is absorbed, some is reflected, and some is transmitted (Yanlinastuti and Fatimah Syamsul, 2016) . The following is a scheme of how the UV-Vis spectrophotometer works:

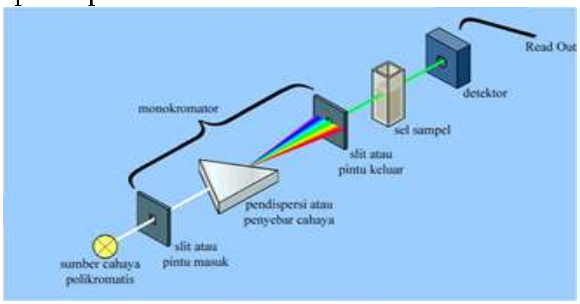
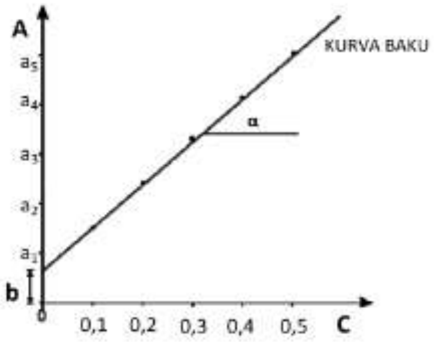


Figure 2. Schematic of the UV-Vis Spectrophotometer

The relationship between light absorbance and the concentration of the absorber and the distance the light travels in solution (thickness of the solution) is directly proportional. If the absorbance value is greater, the concentration of the absorber and the distance traveled by the light will also be greater, and vice versa (Warono and Syamsudin, 2013) . If the absorbance value of the solution is in the range of 0.2-0.8 then the correlation between absorbance and concentration will be linear ($A \approx C$) which is called the area where the Lambert-Beer law applies. If a higher absorbance value is obtained, the absorbance correlation is no longer linear (Nisyak *et al* ., 2019) .

The requirement for determining the concentration of a compound is that it must have a standard compound. Standard compounds are compounds that have known physical and chemical properties. Physical properties include: refractive index, boiling point, melting point, optical rotation, while chemical properties include functional groups, molecular formulas and compound structures. The next step is to determine the absorbance at the wavelength. The results obtained were made into a concentration vs absorbance curve as in Figure 2.5 (Agustina & Sujana, 2020)



Source: Sastrohamidjojo, 2013

Figure 3. Standard Curve

Linear curve: y=ax + b
y = absorbance;
a = direction tangent;
x = concentration;
b = *intercept*

RESEARCH METHODS

The research method used was descriptive experimental using wastewater and rose water as active substances. The research steps are:

1. Sampling

Rose water samples were taken from KUB Aroma Alam, Sruni Village, Musuk District, Boyolali Regency

2. Plant Determination

Rose flowers were deterhlmined at the Biology Laboratory of FKIP Muhamadiyah University, Surakarta

3. Preliminary Test

Organoleptic tests of rose water were observed including shape, color and smell (Herdi *et al* ., 2020) .

4. Phytochemical Screening

Phtochemical screening was carried out on waste and rose flower water by carrying out Vitamin C Test, Flavonoid Test, Saponin Test, Tannin Test (Maryam *et al* ., 2016) .

5. Determination of Total Flavonoid Value

Determination of total flavonoid levels was carried out based on the colorimetric method using modified aluminum chloride AlCl3 2% (Arif *et al.* , 2014). Each sample was weighed 200 mg and dissolved in 10 ml of ethanol pa (2,000 ppm) and the solution was diluted to 200 ppm. 1 ml of the sample solution was pipetted into a brown vial and 1 ml of 2% AlCl3 solution was added, incubated at 37°C during OT. The absorbance was measured in 3 replications with a UV-Vis spectrophotometer at a wavelength of 427 nm. Total flavonoid levels can be calculated using the following formula:

6. Vitamin C Levels

Samples of rose water and rose water waste were made into 1 ml, then put into a 10 ml measuring flask, then distilled water was added until the limit mark, then homogenized. Next, the absorption is measured at the maximum wavelength obtained. The test was carried out 3 times or in triplicate. The results of the extract spectrophotometer show the levels of vitamin C in rose water and rose water waste. The results are in the form of absorbance values and processed using linear regression. Regression analysis is a branch of statistics that studies the form of functional relationship between an independent variable and other variables. Linear regression analysis is if the relationship between a pattern of equations between the independent variable (X) and the variable (Y) is in the same direction and forms a straight line pattern. So, if the value of the variable (X) increases, then the value of the variable (Y) also increases. Vice versa, if (X) and (Y) experience a negative relationship (Tutik *et al* ., 2018) .

7. Data Collection and Analysis Techniques

The research data were analyzed using SPSS 2 0 with the *One Way Anova* or Kruskall Wallis method

8. Drawing Conclusions

Writing the conclusion is adjusted to the background and problem formulation written in the introduction.

RESULTS AND DISCUSSION

The research method used was descriptive experimental using wastewater and rose water as active substances. The research steps are:

1. Sampling

Rose water samples were taken from KUB Aroma Alam, Sruni Village, Musuk District, Boyolali Regency

2. Plant Determination

Plant determination is the process of determining a specific name or type of plant so that its use can be targeted. Moringa determination was carried out at the Biology Laboratory of FKIP Muhammadiyah University of Surakarta as stated in the determination result letter number 035/A.E-1/LAB.BIO/XI/2023 dated 21 November 2023. The plant determination results showed that the plant used in the research was the Mawar species (*Rosa damascena* Mill).

3. Preliminary Test

Organoleptic tests of rose water were observed including shape, color and smell (Herdi *et al* .,

2020) . Organoleptic examination of waste and rose water was carried out using the five senses by observing shape, color and smell. In this research, the organoleptic test results obtained on waste and rose water it is known from the table that there is a color difference between rose water which is clear and rose water waste which is red. Organoleptically it can be used to evaluate the use of materials, formulations and the use of new equipment.

4. Phytochemical Screening

Phtochemical screening was carried out on waste and rose flower water by carrying out Vitamin C Test, Flavonoid Test, Saponin Test, Tannin Test (Maryam *et al* ., 2016) . Phytochemical screening was carried out to assess the active compounds in waste and rose water by carrying out Vitamin C Test, Flavonoid Test, Saponin Test, Tannin Test which showed all tests were positive (+) except for the tannin test in rose water which showed negative (-).

5. Total Flavonoid Value

Determination of total flavonoid levels was carried out based on the colorimetric method using modified aluminum chloride AlCl3 2% (Arif *et al.* , 2014). Each sample was weighed 200 mg and dissolved in 10 ml of ethanol pa (2,000 ppm) and the solution was diluted to 200 ppm. 1 ml of the sample solution was pipetted into a brown vial and 1 ml of 2% AlCl3 solution was added, incubated at 37°C during OT. The absorbance was measured in 3 replications with a UV-Vis spectrophotometer at a wavelength of 427 nm. A standard curve was created by correlating the concentration of the quercetin standard solution with the absorption results obtained from the measurement results which can be seen in Figure .

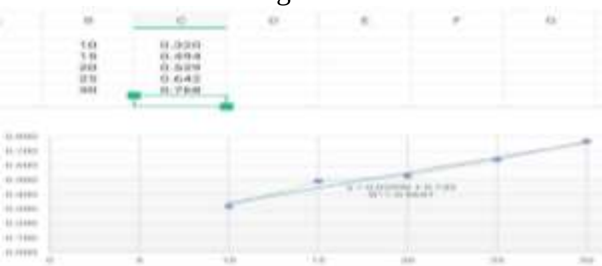


Figure 4. Quercetin Standard Curve

From the calculation results, the standard linear equation for quercetin is produced, namely $y = 0.0209x + 0.133$ with $R^2 = 0.9691$. The R^2 value is 0.9691, close to 1, which shows that there is a relationship between the concentration of the quercetin solution and the absorption value (Agustina & Sujana, 2020). From this equation, the total flavonoid value can be obtained as in Table.

Table 1. Results for Total Waste Flavonoids and Rose Water

Sampel	**Flavonoid±SD (%)**	**CV (%)**
Rose Flower Wast	1,24 ± 0,03 *	2,41
Rose Flower Water	0,68 ± 0,02 *	3,33

Note: *There is a significant difference between samples ($P < 0.05$)

Based on the table, rose flower waste has the highest total flavonoid value, namely 1.24 ± 0.03, while rose flower water is 0.68 ± 0.02. Flavonoids that can react with AlCl3 are hydrolyzed flavonoids which are semi-polar. The main compound of flavonoids is quercetin which consists of lutein, luteoxanthin and β-carotene and is correlated with antioxidant activity.

6. Vitamin C Levels

Samples of rose water and rose water waste were made into 1 ml, then put into a 10 ml measuring flask, then distilled water was added until the limit mark, then homogenized. Next, the absorption is measured at the maximum wavelength obtained. The test was carried out 3 times or in triplicate. The results of the extract spectrophotometer show the levels of vitamin C in rose water and rose water waste. The results are in the form of absorbance values and processed using linear regression. Regression analysis is a branch of statistics that studies the form of functional relationship between an independent variable and other variables. Linear regression analysis is if the relationship between a pattern of equations between the independent variable (X) and the variable (Y) is in the same direction and forms a straight line pattern. So, if the value of the variable (X) increases, then the value of the variable (Y) also increases. Vice versa, if (X) and (Y) experience a negative relationship (Tutik *et al* ., 2018) . This test uses a blank distilled water solution, because pure ascorbic acid is dissolved in distilled water. According to the Indonesian Pharmacopoeia Edition 6, vitamin C or ascorbic acid dissolves easily in water. A blank solution is used to eliminate the absorption of compounds that do not need to be analyzed. Data obtained maximum wavelength value at 265 nm. Measuring the standard solution will produce a standard curve which is used as a guide or reference for measuring vitamin C levels in waste and rosewater. Making a standard curve aims to determine the relationship between the concentration of the solution and the absorbance value so that the sample concentration can be known which can be seen as follows

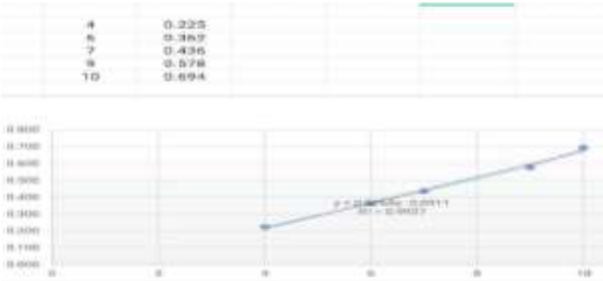


Figure 5 . Vitamin C Standard Curve

From the calculation results, a linear equation is produced, namely $y = 0.0764x - 0.0911$ with $R^2 = 0.9927$. This equation is used as a comparison in the analysis of measuring vitamin C levels and the R^2 value is close to 1, showing a linear curve, meaning that the higher the concentration used, the higher the absorbance value so that the vitamin C value can be obtained which is presented in the table as follow

Table 2. Results for Vitamin C Waste and rose water

Sampel	Vitamin C (mg/g)	Content(%)
Rose Flower Wast	2.958±0.018*	0.295±0.0018
Rose Flower Water	2.399±0.005*	0.239±0.0005

Note: *There is a significant difference between samples ($P < 0.05$)

Based on the table, rose flower waste has a vitamin C content value of 2.958±0.018 mg/g, while rose flower water is 2.399±0.005 mg/g, this is due to the ascorbic acid content. From the results, the value of vitamin C shows a correlation with flavonoids. The higher the flavonoid value, the higher the vitamin C value.

7. Drawing Conclusions

Writing the conclusion is adjusted to the background and problem formulation written in the introduction

CONCLUSION

The conclusion of the research shows that rose flower waste and water contain flavonoids and vitamin C which have the potential to be used as a health herbal drink. It is recommended that further research be carried out on the formulation of herbal health drinks that comply with BPOM regulations.

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