JOURNAL REGY
RESEARCH IN EDUCATION AND TECHNOLOGY
Vol. 3 – No. 1, October (2024), Page: 40-48
P-ISSN (2963-0002) & E-ISSN (2963-0010)

COMPARISON OF HAIR DYE PREPARATIONS FROM RED DRAGON FRUIT SKIN EXTRACT (HYLOCEREUS POLYRHIZUS) FOR ARTISTIC HAIR COLORING

Izti Zaura Putri Br Situmorang[1], Vivi Efrianova[2*]
[1,2]Makeup and Beauty Education Study Program, Universitas Negeri Padang, Sumatra Barat, Indonesia

* Corresponding Author. E-mail: vivi.efrianova@fpp.unp.ac.id

Abstract

This research aimed to analyze the comparative results of cosmetic formulas of natural hair dye from dragon fruit skin through a maceration extraction process with formulations of 15%, 30%, and 45% as assessed through pH tests (laboratory tests), organoleptic tests, Hedonic test (panelists' preferences) and color stability tests. This research used a quantitative approach with an experimental research design. The data in this research used primary data. Data were collected through observation, documentation, and questionnaires. The research instrument used questionnaires to collect organoleptic test data of dragon fruit skin extra hair dye preparations. The data were analyzed using normality, homogeneity, and ANOVA tests. A comparison of hair dye preparations of red dragon fruit peel extract showed that F1, F2, and F3 dye preparations had pH levels of 11, 10, and 11. The texture on F1 was 43% fine-textured, on F2 it was 57% fine-textured, and on F3 43% was very fine-textured. The aroma on F1 was 43% quite scented dragon fruit skin, on F2 43% was quite scented dragon fruit skin and on F3 57% was quite scented dragon fruit skin. The color in F1 was 43% not purplish red, in F2 29% less colored and not purplish red, and in F3 29% in very colored, colored and not purplish red. There was no significant difference in the comparison results of making natural hair dye preparations of red dragon fruit peel extract (Hylocereus polyrhiuzus).

Keywords: hair dye, hair coloring, red dragon fruit, Hylocereus polyrhizus, artistic hair

INTRODUCTION

Hair is a woman's crown and is an element of beauty that cannot be ignored because hair reflects personality, age, and health (Said, 2009). Hair that grows on the scalp provides warmth, protection, and beauty (Rostamailis, 2008). Hair grows all over the body except the palms of the hands, soles of the feet, and lips. All types of hair grow from hair roots in the dermis layer of the skin. Hair is one part that can support a person's appearance to look more beautiful. In this regard, beauty experts have developed the science of beauty from within, often called "inner beauty" as well as outer beauty or physical health, both for skin and hair.

To get healthy hair beauty supported by the use of the right cosmetics. to get beautiful hair through the process of straightening, curling, hair styling, and hair coloring. Hair cosmetics are cosmetics that maintain the beauty and health of the scalp and hair, one of which is the use of hair coloring cosmetics which consist of 2 types, namely for coloring gray hair and artistic hair coloring.

Hair coloring was first done only to cover up hair color that had changed due to age or what is better known as dyeing gray hair. As time goes by, hair coloring has become the goal of changing hair color according to hair coloring

Submitted	Accepted	Published
18-09-2024	27-10-2024	28-10-2024

trends/models (Rostamailis, 2008). Commercial hair coloring is adding color to hair with a color that is not striking and can be accepted as normal. It is coloring that is liked and used by many people, such as the full-color technique (all hair) and the highlight technique, usually using colors that are currently trending (Sari, 2012). Commercial hair coloring has recently become trendy among women.

The demand for full-color hair coloring using currently trending colors is increasing rapidly, so currently many hair coloring cosmetic products are launching artistic hair coloring trends intending to get more people interested in artistic hair coloring (Sijabat, 2016).

Hair coloring cosmetics include decorative cosmetics used in hairdressing to color hair, either to restore the original hair color or change the original hair color to a new color made from chemicals called synthetic dyes (Ardhany & Soraya, 2017). The composition of active substances and chemical ingredients in synthetic hair dyes is highly diverse, often including chemicals that can damage hair. These dyes may contain hazardous substances such as ammonia, peroxide, and paraphenylenediamine (PPD), which can not only weaken and dry out hair but also lead to more severe effects like allergies, skin irritation, and even respiratory issues with prolonged exposure (Zainuddin et al., 2005).

The dyes used in cosmetic preparations are generally chemical, although the use of these dyes has been regulated in terms of type and content by the National Agency of Drug and Food Control (BPOM) regarding the ingredients, type, and content, violations are often found in the manufacture of cosmetics, one of which is hair coloring cosmetics, both gray hair coloring and artistic (Tranggono et al., 2007).

Artistic coloring is hair coloring that aims to create a beautiful effect by creating a color contrast between a certain part of the hair color and the overall hair color of the other hair through the bleaching technique process (Aliyah & Pritasari, 2020). The hair bleaching technique removes the natural pigment of the hair, making it easier to color so that the results are more optimal for both virgin hair and hair that has undergone the coloring process (Turyani et al., 2016).

The pH requirement for cosmetic hair dye preparations is 4.5-6.5, so hair dye preparations can be said to be safe. Hair dye preparations with a pH of less than 4.5 can cause reactions in the form of irritation on the skin, whereas if the pH of hair dye preparations is more than 6.5, the scalp will become dry (Tranggono et al., 2014).

Hair dye preparations have a pH that is too wet (more than 6.5) then it can cause the scalp to become dry, while if the pH is too acidic (less than 4.5) it can cause the scalp and hair to become irritated. Synthetic hair dye cosmetic preparations are in the form of cream, gel, and pomade, while the color is adjusted to the development of hair coloring trends, synthetic hair dye cosmetic preparations have a pungent aroma because they are made from chemicals, for the adhesion of synthetic hair coloring cosmetic preparations can last a long time on the hair (Tranggono et al., 2014).

The use of synthetic dyes must be in certain amounts and levels, whereas if synthetic dyes are used continuously for a long period and in excessive levels, it can cause various hair health problems such as brain tissue damage, skin irritation, damage to certain organs such as porosity, alopecia, nerve disorders, teratogenic, carcinogenic, mutagenic disorders, wet and dry hair (Masyithah, 2017).

Based on the results of observations conducted by researchers on students taking the Hair Coloring course, it was found that the hair coloring cosmetics used by students still use synthetic hair dyes provided by the Upertis Laboratory. Makeup and Beauty students have also not used natural hair dyes for artistic hair coloring. In addition, hair dyes from natural ingredients have not been widely utilized and used for hair coloring.

For this reason, there needs to be an alternative safe dye, by developing natural dyes from plants for hair dye cosmetic preparations. The use of natural dyes in cosmetic preparations is a much-needed solution because of its relatively small side effects (Nabilah et al., 2020). Most people are unaware of which natural ingredients can be used for hair coloring and lack understanding in selecting natural ingredients suitable for coloring. Natural ingredients that can be used for natural hair dyes can be taken from plant extracts, spices, and fruits, one of which is a natural dye from dragon fruit skin.

Dragon fruit skin is generally rarely used

P-ISSN (2963-0002) & E-ISSN (2963-0010)

and often discarded as waste. The skin accounts for about 30-35% of the fruit's weight and is often disposed of as garbage (Saati, 2010). The skin of red dragon fruit (Hylocereus polyrhizus) contains a high level of a natural coloring compound called betacyanin, a red-violet pigment that can be used as a natural dye in food and beverages (Farida et al., 2014).

In addition to betacyanin found in dragon fruit skin, other natural dyes from plant sources are widely used, such as anthocyanin from grape skins or blueberries, and carotenoids from carrots or bell peppers. These natural colorants provide a safe and healthy alternative for food products. Besides its application in food and beverages, betacyanin in dragon fruit skin also has potential as a safe, natural hair dye due to its high vitamin E content.

Red dragon fruit (Hylocereus polyrhizus) is a plant originating from tropical climates and has fruit with red skin and purplish red flesh (Kristanto, 2003). The taste of the fruit is sweeter than white dragon fruit with a sweetness level of 13-15 degrees. The skin and flesh of the red dragon fruit contain natural pigments, primarily betacyanin, which provides a red-purple color. This betacyanin content has the potential to serve as a natural dye that can replace synthetic dyes in various applications, such as in the textile and food industries. With its natural pigment content, red dragon fruit can be a more environmentally friendly and safe source of dye compared to synthetic dyes.

Natural dyes produced from dragon fruit have been used in previous studies as food coloring, cosmetics, and textile dyes. Dyes that utilize dragon fruit include food coloring (such as cake, candy, and ice cream coloring), cosmetic dyes (such as making lipstick), and textile dyes (such as fabric dyes in the dyeing process) (Butar-Butar et al., 2023).

The results of the previous research showed that the formulation of hair dye using anthocyanin is carried out using the maceration extraction method with the formula F1 = 0.5%, F2 = 1%, and F3 = 2.5% with the addition of color-generating auxiliary ingredients such as pyrogallol 1%, copper, etc. sulfate 1% and xhantam gum 1%, tested by pH testing, organoleptic testing (color, aroma, and texture), color stability testing and homogeneity testing for gray hair coloring. The results of this research indicate that the cosmetic preparation produces a dark black color. So, the resulting color can cover gray hair (Masyithah, 2017).

Meanwhile, other research results show that for artistic hair coloring, with the formulation F1 = 8%, F2 = 10%, and F3 = 12% with the addition of 1% color-enhancing aids, as explained in Table 1.

Table 1 Results of Other Research for Artistic Hair Coloring

Formula	Percentage
F1	8%
F2	10%
F3	12%

The evaluation was carried out on the preparation of hair dye cosmetic formulas through organoleptic testing (color, aroma, and texture) and pH testing. The results of the study indicate that Formula 2 produces the best color, dark purple on bleached hair (Mufidah, 2020).

Based on previous research, it can be concluded that natural ingredients have the potential as an alternative to making natural hair dye cosmetic preparations for coloring gray and artistic hair. Artistic hair dye cosmetic preparations produced from dragon fruit skin extract are an innovation that has the potential to provide benefits for the beauty industry that have commercial value.

METHOD

This research utilized a quantitative approach with an experimental research design to investigate the synthesis of hair dye from dragon fruit. The synthesis process involved extracting the natural pigments from the dragon fruit pulp. First, the fruit was peeled, and the pulp was cut into small pieces and dried in an oven at a low temperature to preserve the pigment’s quality. After drying, the pulp was ground into a fine powder, which was then mixed with a stabilizing agent to create a semi-permanent hair dye. This mixture was applied to test samples to evaluate the effectiveness of the pigmentation.

The data in this research used primary data. The data sources for this research were obtained through observation, documentation, and questionnaires. The research utilized a questionnaire as the primary instrument to collect data for the organoleptic test of the dragon fruit peel extract hair dye. Data was collected for each observed parameter—such as color intensity, fragrance, texture, and overall acceptability—by

P-ISSN (2963-0002) & E-ISSN (2963-0010)

asking participants to rate each attribute on a structured scale. This systematic approach ensured that feedback on all organoleptic characteristics was thoroughly recorded and analyzed.

Data were analyzed using normality, homogeneity, and ANOVA tests. The normality test was done using the Kolmogorov-Smirnov test (K-S Test). The level of significance used as the basis for rejecting or accepting the decision of whether or not a data distribution is normal is 0.05. Normal if the sig score > 0.05. Normal if Sig > Alpha 0.0. The homogeneity test used the Levene statistical test with the SPSS assistance program.

RESULTS AND DISCUSSION

Results

Texture

Based on the frequency distribution of the results of the F1 organoleptic texture test, 28% of panelists stated that the texture of the red dragon fruit skin extract dye preparation had a very smooth texture, 43% stated that it was smooth, and 29% stated that it had a fairly smooth texture. Based on the results of the F2 organoleptic texture test, 14% of panelists stated that the texture of the red dragon fruit skin extract dye preparation had a very smooth texture, 57% stated that it was smooth, and 29% stated that it had a fairly smooth texture.

Based on the results of the F3 organoleptic texture test, 43% of panelists stated that the texture of the red dragon fruit skin extract dye preparation had a very smooth texture, 43% stated that it was smooth, and 14% stated that it had a fairly smooth texture.

Aroma

Based on the results of the F1 organoleptic aroma test, 14% of panelists stated that the aroma of the red dragon fruit skin extract dye preparation had a strong dragon fruit skin aroma, 43% stated that it had a fairly strong dragon fruit skin aroma, 29% stated that it had a low dragon fruit aroma, and 14% stated that it had no dragon fruit skin aroma.

Based on the results of the F2 organoleptic aroma test, 14% of panelists stated that the aroma of the red dragon fruit skin extract dye preparation had a strong dragon fruit skin aroma, 43% stated that it had a fairly strong dragon fruit skin aroma, 29% stated that it had a low dragon fruit aroma, and 14% stated that it had no dragon fruit skin aroma.

Based on the results of the F3 aroma organoleptic test, 15% of panelists stated that the aroma of the red dragon fruit skin extract dye preparation had a strong dragon fruit skin aroma, 57% stated that it had a fairly strong dragon fruit skin aroma, 14% stated that it had a low dragon fruit aroma, and 14% stated that it had no dragon fruit skin aroma.

Table 2 Aroma Test Result

Formula	Stated	Percentage
F1	Strong dragon fruit skin aroma	14%
	Fairly strong dragon fruit skin aroma	43%
	Low dragon fruit aroma	29%
	No dragon fruit skin aroma	14%
F2	Strong dragon fruit skin aroma	14%
	Fairly strong dragon fruit skin aroma	43%
	Low dragon fruit aroma	29%
	No dragon fruit skin aroma	14%
F3	Strong dragon fruit skin aroma	15%
	Fairly strong dragon fruit skin aroma	57%
	Low dragon fruit aroma	14%
	No dragon fruit skin aroma	14%

Color

Based on the results of the F1 organoleptic color test, 14% of panelists stated that the color of the red dragon fruit skin extract dye preparation was purplish red, 29% stated that it was quite purplish red, 14% stated that it was not purplish red enough, and 43% stated that it was not purplish red.

Table 3 Color Test Result

Formula	Stated	Percentage
F1	Very purplish red	0%
	Purplish red	14%
	Quite purplish red	29%
	Not purplish red enough	14%
	Not purplish red	43%
F2	Very purplish red	14%
	Purplish red	14%
	Quite purplish red	14%
	Not purplish red enough	29%
	Not purplish red	29%
F3	Very purplish red	14%
	Purplish red	14%
	Quite purplish red	14%
	Not purplish red enough	29%
	Not purplish red	29%

Based on the results of the F2 organoleptic color test, 14% of panelists stated that the color of the red dragon fruit skin extract dye preparation was very purplish red, 14% stated that it was purplish red, 14% stated that it was quite purplish red, 29% stated that it was not purplish red enough, and 29% stated that it was not purplish red.

P-ISSN (2963-0002) & E-ISSN (2963-0010)

Based on the results of the F3 organoleptic color test, 29% of panelists stated that the color of the red dragon fruit skin extract dye preparation was very purplish red, 29% stated that it was purplish red, 14% stated that it was quite purplish red, and 28% stated that it was not purplish red.

Panelists' Preferences

Based on the results of the F1 hedonic test, 29% of panelists stated that they really liked the color of the red dragon fruit skin extract dye preparation, 29% stated that they like it, 29% stated that they fewer like it, and 14% stated that they did not like it.

Based on the results of the F2 hedonic test, 14% of panelists stated that they really liked the color of the red dragon fruit skin extract dye preparation, 14% stated that they liked it, 29% stated that they fewer liked it, 14% stated that they did not like it, and 14% stated that they really did not like it.

Based on the results of the F3 hedonic test, 29% of panelists stated that they really liked the color of the red dragon fruit skin extract dye preparation, 57% stated that they liked it, and 14% stated that they did not like it.

Table 4 Panelist Preferences Test Result

Formula	Stated	Percentage
F1	Really liked	29%
	Like	29%
	Fewer like	29%
	Not like	14%
	Really did not like	0%
F2	Really liked	14%
	Like	14%
	Fewer like	29%
	Not like	14%
	Really did not like	14%
F3	Really liked	29%
	Like	57%
	Fewer like	0%
	Not like	14%
	Really did not like	0%

Normality Test

The results of the calculation of the normality test of the research data for each indicator are shown in Table 5. Based on Table 5, it can be seen that the significance score was 0.200 > 0.005. This showed that the data was normally distributed.

Homogeneity Test

The results of the homogeneity test of the research data for each indicator are shown in Table 6.

Table 5 Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		21
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.71515022
Most Extreme Differences	Absolute	.109
	Positive	.077
	Negative	-.109
Test Statistic		.109
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

Table 6 Homogeneity Test Results

	Levene Statistic	df1	df2	Sig.
Texture	.021	2	18	.979
Aroma	.337	2	18	.718
Color	3.310	2	18	.060
Favorite	1.873	2	18	.182

Based on Table 6, it can be seen that the significance score for groups F1 (15% preparation), F2 (35% preparation), and F3 (45% preparation). It was found that the texture indicator obtained a Sig value of 0.979 > 0.05, the aroma indicator obtained a Sig value of 0.718 > 0.05, the color indicator obtained a Sig value of 0.060 > 0.05, and the preference indicator obtained a Sig value of 0.182 > 0.5. The homogeneity test obtained a sig value > 0.05. Thus, it can be concluded that all indicators indicate that the data was homogeneous.

Hypothesis Testing

Hypothesis testing was carried out to determine whether or not there were differences in the outcomes of hair dye preparations made from red dragon fruit skin extract.

Table 7 ANOVA Test Results

		Sum of Squares	df	Mean Square	F	Sig.
Texture	Between Groups	1.143	2	.571	.947	.406
	Within Groups	10.857	18	.603		
	Total	12.000	20			
Aroma	Between Groups	.095	2	.048	.025	.975
	Within Groups	33.714	18	1.873		
	Total	33.810	20			
Color	Between Groups	4.095	2	2.048	1.194	.326
	Within Groups	30.857	18	1.714		
	Total	34.952	20			
Favorite	Between Groups	6.381	2	3.190	2.544	.106
	Within Groups	22.571	18	1.254		
	Total	28.952	20			

P-ISSN (2963-0002) & E-ISSN (2963-0010)

Texture indicator

Based on Table 7, it was found that the significance score was 0.406 > 0.05, so it was stated that "there is no significant difference in the results of the comparison of the manufacture of natural hair dye preparations of dragon fruit skin extract based on laboratory tests, organoleptic tests, color stability, and hedonic tests (panelists' preferences) for artistic hair coloring" accepted with a confidence level of 95% and an error rate of 5%. Further tests were carried out to analyze which treatment groups were different, further test analysis was carried out using the Duncan test.

Table 8 Duncan Texture Test

Duncan[a]

Ingredients	N	Subset for alpha = 0.05
		1
15%	7	3.71
30%	7	4.00
45%	7	4.29
Sig.		.209

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 7.000.

Based on Table 8, it can be seen that F1 (15% inventory) with an average of 3.71 was significantly different from group F2 (30% inventory) with an average of 4.00, which was not significantly different from group F3 (45% inventory) with an average of 4.29. Thus, it was stated that F1 was different from F2 and F3, while F2 and F3 were not significantly different (real).

Aroma indicator

Based on Table 7, it can be seen that the significance score was 0.975 > 0.05, so it was stated that "there is no significant difference in the results of the Comparison of the manufacture of natural hair dye preparations of dragon fruit skin extract based on laboratory tests, organoleptic tests, color stability and panelist preferences for artistic hair coloring" accepted with a 95% confidence level and a 5% error rate.

Further tests were carried out to analyze which treatment groups were different, further test analysis was carried out by the Duncan test. Based on Table 9, it can be seen that F1 (15% inventory) with an average of 3.00 was not significantly different from group F2 (30% inventory) with an average of 3.14, and was not significantly different from group F3 (45% inventory) with an average of 3.14. Thus, it was stated that F1, F2, and F3 were not significantly different (real).

Table 9 Duncan Aroma Test

Duncan[a]

Ingredients	N	Subset for alpha = 0.05
		1
15%	7	3.00
30%	7	3.14
45%	7	3.14
Sig.		.856

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 7.000.

Color indicator

Based on Table 7, it can be seen that the significance score was 0.326 > 0.05, so it was stated that "there is no significant difference in the results of the comparison of the manufacture of natural hair dye preparations of dragon fruit skin extract based on laboratory tests, organoleptic tests, color stability, and panelist preferences for artistic hair coloring" accepted with a confidence level of 95% and an error rate of 5%. Further tests were carried out to analyze which treatment groups were different, further test analysis was carried out by the Duncan test, the following are the results of the Duncan test.

Table 10 Duncan Color Test

Duncan[a]

Ingredients	N	Subset for alpha = 0.05
		1
15%	7	2.00
30%	7	2.14
45%	7	3.00
Sig.		.192

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 7.000.

Based on Table 10, it can be seen that F1 (15% inventory) with an average of 2.00 was not significantly different from group F2 (30% inventory) with an average of 2.14, which was significantly different from group F3 (45% inventory) with an average of 3.00. Thus, it was stated that F1 and F2 were not significantly different, while F2 and F3 were significantly different (real).

Panelists' preferences indicators

Based on Table 7, it can be seen that the significance score was 0.106 > 0.05, so it was stated that "there is no significant difference in the results of the comparison of the manufacture of natural hair dye preparations of dragon fruit skin extract based on laboratory tests,

P-ISSN (2963-0002) & E-ISSN (2963-0010)

organoleptic tests, color stability, and panelist preferences for artistic hair coloring" accepted with a confidence level of 95% and an error rate of 5%. Further tests were carried out to analyze which treatment groups were different, further test analysis was carried out by the Duncan test.

Table 11 Duncan Test of Panelists' Preference

Duncan[a]

Ingredient	N	Subset for alpha = 0.05
		1
15%	7	2.86
30%	7	3.14
45%	7	4.14
Sig.		.056

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 7.000.

Based on Table 11, it can be seen that F1 (15% inventory) with an average of 2.86 was significantly different from group F2 (30% inventory) with an average of 3.14 which was significantly different from group F3 (45% inventory) with an average of 4.14. Thus, it was stated that F1 was significantly different from F2 and F3 (real).

Discussion

The process of making this dye preparation refers to relevant research where the results of the study with good stability and safe to use and can be used as a natural dye in hair cosmetic preparations (Mufidah, 2020). The process of making this dye preparation first begins with the red dragon fruit skin being processed into hair dye by first extracting it. The extract is obtained from 7 kg of red dragon fruit skin that has been cleaned, then dried in an oven at a temperature of 50 - 60C within 6 - 12 hours and blended until 500 grams of simple powder is taken.

To obtain dragon fruit skin extract, the extraction process was carried out by maceration with 70% ethanol solvent and 3% citric acid with a ratio of 1:10 for 1x24 hours, then the addition of 1% copper sulfate, 1% nipagin, 1% pyrogallol, and 1% xhantam gum then ground with a mortar until the preparation becomes homogeneous then dragon fruit skin extract was added according to the specified formula, namely in the formula 15%, 30%, and 45%.

After the dye preparation is ready to use, it will then be applied to the hair samples using 9 samples that have first been bleached about 5-10 cm, then washed and dried, and natural dye from dragon fruit skin extract is applied to all samples and left to produce the desired color, then rinsed and dried.

Laboratory test results

Based on the pH test results, it can be observed that the hair dye preparation from dragon fruit skin extract has varying pH levels. The pH of preparation F1 was measured at 11, preparation F2 at 10, and preparation F3 at 11. The pH measurements were conducted using a calibrated pH meter to ensure accuracy. Samples were tested at room temperature by immersing the electrode directly into each hair dye preparation, and readings were recorded once stabilized.

Organoleptic test

Texture

The assessment conducted on seven panelists revealed varying results across formulations. In F1, 43% of panelists noted a smooth texture, while in F2, 57% perceived the texture as smooth, and in F3, 43% observed it as very smooth. This data suggests that F2 had the most consistent smooth texture among the formulations, whereas F3 demonstrated a superior level of smoothness. The trend indicates that certain formulation factors may enhance textural smoothness, aligning with findings from previous studies.

Aroma

The assessment involved 7 panelists, with the results indicating varying degrees of aroma from the dragon fruit skin. In formulation F1, 43% of the panelists noted a moderately aromatic scent, similar to F2, which also received a 43% rating. However, formulation F3 achieved a higher percentage of 57%, suggesting a more pronounced aroma. This trend indicates that increasing the concentration of dragon fruit skin extract in F3 enhances its aromatic profile.

Color

The assessment was conducted with seven panelists, yielding distinct results across the three formulations. In formulation F1, 43% of the panelists reported that the color was not reddish purple, indicating a less pronounced color intensity. Conversely, formulation F2 received a 29% rating for being less colored and also not

P-ISSN (2963-0002) & E-ISSN (2963-0010)

reddish purple, suggesting that this formulation may have had limited dye uptake. Notably, formulation F3 achieved a 29% score for being very colored, while still being categorized as not reddish purple. This trend indicates that while the formulations varied in color intensity, none achieved a strong reddish purple hue.

Hedonic test (panelists' preferences)

The assessment was carried out on 7 panelists and the results were obtained in F1 were 29% for like, fewer like, and did not like, in F2 29% for fewer like, and in F3 57% for like.

Color stability test

From the samples that have been applied with the red dragon skin extract hair dye preparation, it can be seen that the test results that were carried out show that in the F1 hair sample, the hair sample changed to a more reddish blonde color, in F2 the hair sample changed to a more reddish blonde color, and in F3 the hair sample changed to a red color.

Comparison of hair coloring preparations with red dragon fruit peel extract

Based on the statistical test of ANOVA to see the differences in the results of the three groups, namely F1 (15% preparation), F2 (30% preparation), and F3 (45% preparation). It was found that the texture indicator with a significance score of 0.406 (sig > 0.05), the aroma indicator with a significance score of 0.975 (sig > 0.05), the color indicator with a significance score of 0.326 (sig > 0.05), and the panelist's preferences indicator with a significance score of 0.106 (sig > 0.05). Because the significance score > 0.05, it can be stated that there was no significant difference in the results of the comparison of making natural hair dye preparations from dragon fruit skin extract. This means that Ho was accepted and Ha was rejected.

CONCLUSION

A comparison of hair dye preparations using red dragon fruit skin extract based on laboratory test results showed that the dye preparations F1, F2, and F3 have pH levels of 11, 10, and 11. Based on the results of the research data analysis, it can be concluded that there was no significant difference in the results of the comparison of the manufacture of natural hair dye preparations using red dragon fruit skin extract (Hylocereus polyrhizus).

REFERENCES

Aliyah, K. R., & Pritasari, O. K. (2020). Pengaruh penggunaan silver shampoo terhadap hasil akhir pewarnaan rambut artistik menggunakan teknik tipping. *Jurnal Tata Rias, 9*(2), 325-339

Ardhany, S. D., & Soraya, L. (2017). Tingkat pengetahuan mahasiswa D-III Farmasi tentang bahaya penggunaan pewarna rambut dalam jangka panjang. *Jurnal Surya Medika (JSM), 2*(2), 49-55. https://doi.org/10.33084/jsm.v2i2.359.

Butar-Butar, M., Sianturi, S., & Fajar, F. (2022). Formulasi dan evaluasi blush on compact powder ekstrak daging buah naga (Hylocereus polyrhizus) sebagai coloring agent. *Majalah Farmasetika*, *8*(1), 27-43. https://doi.org/10.24198/mfarmasetika.v8i1.40591.

Farida, A., Holinesti, R., & Syukri, D. (2014). *Identidfikasi pigmen betasanin dari kulit buah naga merah (Hylocerius pholyhizus)*. Universitas Andalas: Fakultas Teknik Pertanian.

Kristanto, D. (2003). *Buah naga: Pembudidayaan di pot dan di kebun*. Jakarta: Penerbit Penebar Swadaya.

Masyithah, C. (2017). Penggunaan ekstrak kulit buah naga merah (Hylocereuscostaricensis (FAC Weber) Britton & Rose) dalam formulasi pewarna rambut. *Jurnal Farmanesia, 4*(2), 110-115.

Mufidah, A. F. (2020). *Formulasi dan evaluasi sediaan pewarna rambut ekstrak kulit buah naga merah (Hylocereus polyrhizus)*. Jakarta: Universitas Negeri Jakarta. Doctoral dissertation.

Nabilah, F., Herawati, E., & Ambarwati, N. S. S. (2020). Formulasi dan evaluasi sediaan kosmetik pewarna rambut dari kulit batang sacang (Caesalpina sappan L). *Jurnal Tata Rias, 10*(1), 48-60.

Rostamailis. (2008). *Tata kecantikan rambut*. Jakarta: Cable Book.

Saati, E. A. (2010). Identifikasi dan uji kualitas pigmen kulit buah naga merah (Hylocareus costaricensis) pada beberapa umur simpan dengan perbedaan jenis pelarut. *GAMMA: Jurnal Penelitian Eksakta*, *6*(1), 25-34.

P-ISSN (2963-0002) & E-ISSN (2963-0010)

Said, H. (2009). *Panduan merawat rambut*. Jakarta: Penebar Swadaya.

Sari, D. M. (2012). *Bahan ajar pewarnaan rambut*. Medan: Program Studi Tata Rias Jurusan Pendidikan Kesejahteraan Keluarga Fakultas Teknik Universitas Negeri Medan.

Sijabat, S. H. (2016*). Hubungan pengetahuan teori warna dengan hasil pewarnaan rambut komersil siswa kelas XI Tata Kecantikan SMK Negeri 1 Lubuk Pakam*. Medan: Universitas Negeri Medan. Disertasi doktor.

Tranggono, Iswari, R., & Latifah, F. (2007). *Buku pegangan ilmu pengetahuan kosmetik.* Jakarta: PT Gramedia Pustaka Utama.

Tranggono, Iswari, R., & Latifah, F. (2014). *Buku pegangan dasar kosmetologi*. Jakarta: Sagung Seto.

Turyani, Eka, S. M., Fatonah, Siti, E., Hidayat, & Ahmad. (2016). *Guru pembelajar modul paket keahlian tata kecantikan rambut SMK kelompok kompetensi G: pemangkasan, pengeritingan desain dan pelurusan rambut, komunikasi efektif*. Jakarta: PPPPTK Bisnis dan Pariwisata.

Zainuddin, Z., Newton, M., Sacco, P., & Nosaka, K. (2005). Effects of massage on delayed-onset muscle soreness, swelling, and recovery of muscle function. *Journal of Athletic Training*, *40*(3), 174-80.

P-ISSN (2963-0002) & E-ISSN (2963-0010)