Stick Perfume Formulation from Jeumpa Flowers (*Magnolia champaca* (L) Baill Ex. Pierre)

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Keywords: Essential Oil, Stick Perfume, Jeumpa Flowers.

Abstract: The abstract should summarize the contents of the Formulation of stick perfume from jeumpa flower's essential oil (*Michelia* champaca) has been conducted. Essential oil from jeumpa flowers was obtained by steam distillation method. There were two formulas examined in this study, those are F1 (cera alba 35,07%), F2 (cera alba 40,07%), using 8% concentrations of jeumpa flowers essential oil. Organoleptic, homogeneity, melting point, strength and stability were evaluated as quality parameters of stick perfume. The evaluation results showed that the stick perfume was homogeneous, the melting temperature was 56-59^{o}C, the strength was 343,33 g (F1), F2 and 380 g (F2), respectively. All formulas were stable and did not cause irritation so it safe to use. Hedonic test result showed that F1 is preferred by panellists rather than F2 from all of parameters (shape, fragrance, stickiness, flatness). Based on the results of the quality evaluation it can be concluded that jeumpa flowers essential oil can be used as perfume agent in stick perfume formulation and stable during the storage in room temperature for 30 days.

1 INTRODUCTION

Perfume or fragrance oil is a mixture of essential oils and scented compounds (aroma compounds), fixatives, and solvents that are used to provide fragrance to the human body, objects, or rooms (Sabini, 2006). Usually the basic ingredients of perfume come from synthetic materials that come from chemicals, but now the basic ingredients of perfume from natural ingredients tend to be more desirable. The aroma produced by natural ingredients as the basis for perfume is derived from plant's essential oils. One of the plants that contain essential oils and can be used as the basis of natural perfume is *Jeumpa* flower (*Magnolia champaca* (L.) Baill. Ex Pierre).

Jeumpa flowers contain 0.2% essential oil obtained through distillation (Bawa, 2011). It contains linalool, methyl benzoate, benzyl acetate, cis-linalool oxide pyranoid, phenyl acetonitrile, 2-phenethyl alcohol, dihydro-ionone, -ionone, -ionone, dihydro-ionol, methyl anthranilate, indole, methyl palmitate, ionone oxime and methyl linoleate (Rout, 2006). Linalool is one of the main components of Jeumpa flowers that is widely used in the perfume industry because of its strong aroma. While other components such as indole used as agent strengthening perceived aroma and increasing the stability of other aromatic compounds in essential oils. In other words, indole compound in Jeumpa flowers may act as fixative. (Pensuk et al., 2007).

There are several methods to isolate essential oils including the distillation method, enfleurage, and extraction with solvents. Jeumpa flower essential oil that will be used in this study was obtained using steam distillation process. This method was chosen based on previous research conducted by Pensuk (2007), in which the essential oil obtained from steam distillation contains linalool (66.92%) more than extraction using N-hexane solvent (28.92%) and enfleurage method (0.120 %) (Pensuk et al., 2007). Whereas based on research conducted by Punjee (2009) namely essential oils obtained from steam distillation containing 91.74% linalool (Punjee et al., 2009).

Essential oil or volatile oil can irritate the skin and damage skin color so it is not used in the form of a single compound (MOH RI, 1979). To be used safely, it must be formulated in dosage form with carrier oil as excipient. In this research, the essential oil was formulated into stick perfume preparation, where the essential oil acted as the fragrance. Stick perfumes are perfume preparations in solid or balm form that is used by smearing and rubbed on the points of the

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body such as behind the ears and behind the wrists (Groom, 1997). Stick perfume preparation was chosen due to its' ease of use and lack of alcohol content.

2 METHODS

2.1 Page Essential Oils Extraction using Steam Distillation

About 4.088 kg Bloomed Jeumpa flowers were picked and their petals were taken. The flower petals were placed on a filter located inside the steam distillation device. Distillation was carried out for 5-6 hours and repeated twice. The distillate obtained was stored in a separating funnel, collected, added with MgSO4.7H2O, shaken, and allowed to stand for 1 day. 4.8 mL essential oils obtained was collected and stored in dark colored bottles.

2.2 Stick Perfume Formulation

Stick perfume preparation was formulated as below:

Table 1: Formulation of jeumpa flower's preparation.

No	Ingredients	$F0_1$ (%)	$F0_2$ (%)	F1 (%)	F2 (%)
1	Cera alba	35,07	40,07	35,07	40,07
2	Liquid Paraffin	46	41	46	41
3	Microcrystalline wax	10	10	10	10
4	BHT	0,03	0,03	0,03	0,03
5	Essential Oil of *M. champaca* (L.) Baill. ex Pierre	-	-	8	8

2.3 Stick Perfume Evaluation

2.3.1 Organoleptic Test

Stick perfume preparations were observed for several parameters such as color, consistency, and aroma (Hernani, 2012).

2.3.2 Homogeneity Test

0.5 g of stick perfume were taken, applied to the glass preparation and covered with glass. Then it was observed by naked eye whether for the presence of coarse grains (Mappa et al., 2013).

2.3.3 Melting Temperature Test

Melting temperature test was carried out by placing the preparation in an oven with initial temperature of 50°C for 15 minutes. Then it was observed whether the preparations melted or not. After the initial observation, every 15 minutes' temperature was raised 1°C until the preparation began to melt. (Nazlinawaty et al., 2012).

2.3.4 Strength Test

Stick perfume was placed horizontally and about 1.5 cm from the edge of the stick, a load was hung to give pressure. Every 30 seconds the load was added (10 grams) until the preparation was broken. (Nazlinawaty et al., 2012).

2.3.5 Preference Test

This preference test was conducted visually on 30 non-standard and untrained panelists. Inclusion criteria were: men and women, age 20-30 years old, did not have sensitive or any skin allergy. Each panelist was required to apply each preparation to the skin at the back of the hand. Then the panelists were asked several questions regarding their opinion about the preparation. (Handayani et al., 2010). Data obtained from questionnaires that have been filled out by panelist are tabulated and their favorite value is determined by finding the average results on each panel with 95% confidence level.

2.3.6 Sensitivity and Irritation Test

The technique used was an open patch test on the inner upper arm of 30 panellists. Inclusion criteria as follows: men and women, aged between 20-30 years, no history of allergic disease, stating their willingness to be used as an irritation test panellist. 30 panellists were non-standard and untrained panellists. Open patch test was done by applying preparations made at the location of the attachment with a certain area (2.5 x 2.5 cm), left open and then observed. This test was carried out 3 times a day for three consecutive days. A positive irritation reaction was characterized by redness, itching, or swelling in the skin of the inner forearm treated. The presence of red skin was marked (+), itching (++), swelling (+++), and skin that did not show any reaction is marked (0) (Nazlinawaty et al., 2012).

3 RESULTS AND DISCUSSION

3.1 Jeumpa Flowers' Identity Determination

The plant's identity was determined at Indonesian Institute of Sciences of the Research Center for Biology, Bogor. The results of the determination show that the sample used was *Magnolia champaca* (L.) Baill ex Pierre type from the Magnoliaceae tribe.

3.2 Jeumpa Flowers' Distillation

Jeumpa flower essential oil was obtained by steam distillation. Distillation of jeumpa flower produced yellow oil and has a distinctive scent of jeumpa. This was in accordance with another research that extracted essential oil from the same species which resulted yellow colored oil with distinctive aroma of the flower (Punjee, 2007). 4.8 mL essential oil was obtained from 4.088 kg of jeumpa flowers (1.174%).

Table 2: Chromatography profile of Jeumpa flowers' essential oil.

No	Component	Minimum (%)	Maximum (%)
1	Methyl 2-methylbutanoate	0,7	6,3
2	1,8-Cineole	0,3	0,8
3	Trans-β-Ocimene	1,1	3,4

3.3 Stick Perfume Formulation

In this study, the preparation used solid and liquid base combination, stiffening agent, antioxidant, and Jeumpa flowers' essential oil. This research used cera alba (white wax) and liquid paraffin as a base. Cera alba concentration used were 35.07% (F1) and 40.07% (F2). Cera alba was chosen because it can increase the consistency of the preparation and can dissolve in essential oils. Liquid paraffin was used with concentrations of 46% (F1) and 41% (F2) and which was still within safe limits (Rowe et al., 2009). Liquid paraffin was chosen because it can dissolve in essential oils. The combination of liquid paraffin and microcrystalline wax can increase the consistency of the preparation because of the ability of the microcrystalline wax to incorporate itself into the structure of the liquid paraffin to form the structure and consistency of the preparation (Rowe et al., 2009).

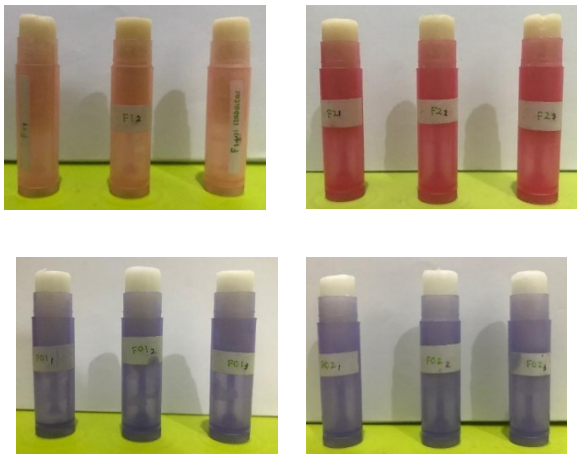

Figure 1: Stick perfume preparation.

The maximum stiffening agent concentration for a stick perfume preparation is 10%. This study used a 10% microcrystalline wax as a stiffening agent. Other ingredients used are antioxidants because the ingredients used in this formulation are easily oxidized so that they can produce preparations with changes in color, consistency and rancidity if stored for a certain period. BHT (Butylatedhydroxytoluene) was chosen as an antioxidant in this study because it can dissolve in essential oils. The concentration of BHT used in this study was still within safe limits (0.02 - 0.5%) (Rowe et al., 2009).

Jeumpa flower essential oil was chosen as a source of aroma for the preparation of stick perfume in this study because it contains linalool which has a strong aroma and idol compound which has the ability to increase the strength of the aroma so that it can be used as a fixative in the Stick perfume made (Pensuk et al., 2007). The concentration of essential oils in various types of perfumes was in the 1-30% (Valerie, 2016). The Jeumpa flower essential oil concentration used in this study was 8% which was still within the safe limit.

3.4 Organoleptic Test

Organoleptic test was carried out to determine the level of liking and acceptability of the color, taste, aroma and consistency of the preparation (Lamusu et al., 2012). Observation of organoleptic test of color, aroma and consistency of stick perfume preparations can be seen in Table below:

Table 3: Appearance of jeumpa flower stick perfume preparation.

Formula	Appearance		
	Color	Odor	Consistency
F01	White	Wax	Solid
F02	White	Wax	Solid
F1	Yellow	Jeumpa	Solid
F2	Yellow	Jeumpa	Solid

Note: F01: Stick perfume base (Cera alba 35,07%), F02: Stick perfume base (Cera alba 40,07%), F1: Jeumpa Stick perfume (cera alba 35,07%), F2: Jeumpa Stick perfume (cera alba 40,07%)

3.5 Homogeneity Test

A preparation must be homogeneous and flat so as not to cause irritation (Naibaho, 2013). Homogeneity test results (Table 2) showed that all stick perfume preparations did not show any coarse grains when the preparation was applied to transparent glass. This showed that the preparations made have a homogeneous arrangement (MOH RI, 1979). All homogeneous preparations indicated that all formula ingredients were well mixed because the ingredients used are soluble in essential oils so that there were no lumps or coarse grains in the preparations.

Table 4: Homogeneity test result.

Formula	Homogeneity
F01	Homogeneous
F02	Homogeneous
F1	Homogeneous
F2	Homogeneous

3.6 Melting Temperature

Melting temperature test was carried out to determine the exact temperature when the preparation started to melt in the container. The temperature (obtained) indicated the maximum storage temperature allowed for the preparations to be safe during the process of making, packaging, transporting and storing preparations (Aher et al., 2012).

Table 5: Temperature of melting test result.

Formula	Mean Temperature (°C) ± SD
F01	56 ± 0,00
F02	59 ± 0,00
F1	56 ± 0,00
F2	59 ± 0,00

Note: F01: Stick perfume base (Cera alba 35,07%), F02: Stick perfume base (Cera alba 40,07%), F1: Jeumpa Stick perfume (cera alba 35,07%), F2: Jeumpa Stick perfume (cera alba 40,07%)

The melting temperature test results show that the Stick perfume preparations from F1, F2 and base F01, F02 have a melting temperature range between 56 - 59 °C. Formula F1 and F01 have lower melting temperatures than formulas F2 and F02. This was due to the concentration of cera alba used in F1 and F01 which was less than the formula F2 and F02. Cera alba has a high melting point of 61 - 65 °C (Rowe et al., 2009). The higher the concentration of essential oil in the preparation, the lower the melting point of the preparation and vice versa due to the low melting point of Linalool compound which is 25 °C (Rusli et al., 2018). However, in this study there was no difference in melting temperature between Stick perfume without Jeumpa essential oil and Jeumpa essential oil. This indicated that the addition of Jeumpa flower essential oil in the preparation did not affect the melting temperature of the preparation because the concentration of essential oil used is small. Based on the melting temperature value shows that all preparations made have a good melting temperature and meet the requirements of SNI 16-4769-1998 i.e. the melting point for lipstick is 50-70 °C. According to Vishwakarma et al. (2011) that a good lipstick has a melting point above 50 °C, but the melting temperature for Stick perfume preparations do not yet have standards and references so that the melting point standards and reference of the lipstick are used.

3.7 Strength Test

The strength test was carried out to examine the strength of the preparation during the process of packaging, transportation, and storage (Risnawati et al., 2012).

Table 6: Strength test result.

Formula	Mean (g) ± SD
F01	380 ± 10,00
F02	490 ± 10,00
F1	343,33 ± 5,77
F2	380± 10,00

Note; F01: Stick perfume base (Cera alba 35,07%), F02: Stick perfume base (Cera alba 40,07%), F1: Jeumpa Stick perfume (cera alba 35,07%), F2: Jeumpa Stick perfume (cera alba 40,07%)

Stick perfume strength test results showed that F1 and F01 have lower strengths (343.33 g and 380 g) than F2 and F02 (380 g and 490 g. This result was due to the different concentration of cera alba and liquid paraffin used in the formula. Cera alba can increase the amount of solids in the preparation so that the formed form will be harder than the addition of liquid paraffin causing the preparation to break more easily because it increases the amount of liquid in the preparation so that the formed form will be softer and appear creamy and easily broken (Sampebarra et al., 2016).

Based on the results of the strength test, the Stick perfume formula (F1, F2) produced in this study has good strength. This conclusion was drawn by comparing the weight of the load used in testing the Stick perfume F1, F2 with the base F01, F02 Base F01 and F02 has a greater strength range than F1 and F2, so it can be concluded the addition of essential oils in the Stick perfume preparation can reduce the strength preparation.

3.8 Preference Test

Preference test was done to see the panellists' assessment of the preparation that would mimic the consumer assessment should this formula be marketed (Yap et al., 2011). Calculation of the average preference value interval is performed for each preference test parameters which include shape, aroma, stickiness, flatness (National Standardization Agency, 2006). A comparison of the average preferred intervals of each hedonic test parameter of F1 and F2 formulas can be seen in Figure 2.

Based on the average preference score of the Stick perfume dosage form, it can be concluded that the F1 formula is preferable to F2. This was due to the consistency of F2 that was tougher than F1. The This tough consistency of F2 was due to higher concentration of cera alba and liquid paraffin. Cera alba can increase the number of solids in the preparation so the preparation would have tougher consistency (Sampebarra et al., 2016).

For the aroma parameter, panellists preferred F1 preparation to F2, because F2 has weaker aroma. Preparation's viscosity can affect the release of essential oils. The higher the viscosity, the greater the base resistance to release essential oils and the smaller the diffusion rate so that the perceived aroma will decrease (Yuliani, 2005). As for stickiness, F1 formulas was preferred to F2 which has higher stickiness. Cera alba makes preparations can be long attached to the skin, not easily lost by water and sweat, and provide protection to the skin (Fitriana, 2009).

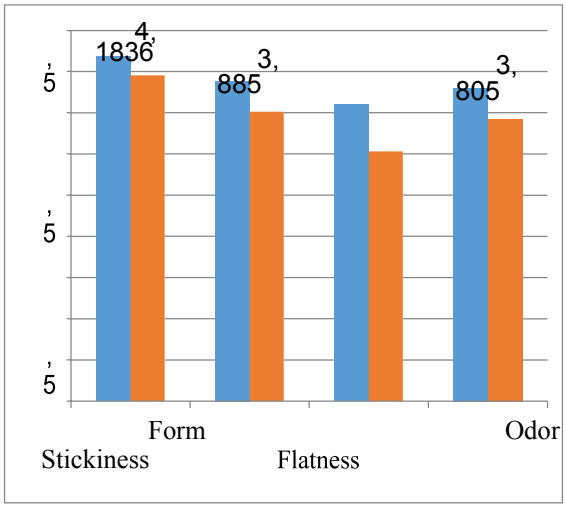

Figure 2: Preference test result.

The flatness of F1 formula was preferable to F2 because F1 formula. F1 had better spread ability so the flatness when applied was also better. Scattering power was influenced by viscosity, because spreadability was inversely proportional to viscosity. If the viscosity of a preparation is greater, the spread of the preparation will be smaller and vice versa (Mardikasari et al., 2017). Cera alba can increase the viscosity of the preparation so that the formula F2 with a greater concentration of cera alba had less dispersal power compared to F1 formula so that F1 formula had better flatness.

3.9 Sensitivity/Irritation Test

The irritation test aimed to determine the safety of the preparation made for use. Observation of irritation test from Stick perfume preparation can be seen in Table 6.

Table 7: Sensitivity/irritation test result.

Formula	Panelists			
	Redness	Itchiness	Edema	Repetition
F1	-	-	-	30
F2	-	-	-	30
F01	-	-	-	30
F02	-	-	-	30

F01: Stick perfume base (Cera alba 35,07%), F02: Stick perfume base (Cera alba 40,07%), F1: Jeumpa Stick perfume (cera alba 35,07%), F2: Jeumpa Stick perfume (cera alba 40,07%)

Based on the results of irritation tests conducted on 30 panellists by applying Stick perfume

preparations made on the skin of the forearm for three consecutive days, it showed that all panellists gave negative results to the observed irritation i.e. the absence of red, itchy skin itching, or swelling. From the results of the irritation test it can be concluded that the preparations made are safe to use (DG POM, 1985) and the addition of essential oils did not cause irritation. This was due to the concentration of the essential oil that was used in the preparation. Concentration of essential oils allowed in various types of perfumes is 1-30% and in this research, we used 8% Jeumpa flowers' essential oil (Valerie, 2016. Another aspect that might contribute to the negativity of irritation reaction in this research is homogeneity of the preparation, where the preparation must be homogeneous and flat so as not to cause irritation (Naibaho et al., 2013).

4 CONCLUSION

Based on the research that has been done, Jeumpa flower essential oil can be formulated into Stick perfume preparation in which the F1 formula (contained cera alba 35.07%) is a better formula based on each test parameter and economic value.

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