

## **Production of Herbal Perfume from Peppermint, Kaffir Lime and Pandan**

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**Abstract:** Perfumes and fragrances can be traced to multiple ancient cultures. For example, ancient Egypt used it to bathe daily, Greek medical thinker used as an ancient form of aromatherapy for health and vitality and Chinese used scent in the form of incense instead of perfumes to be worn. Leaves perfume are originate from essential oil which have a lot of benefit for health. However, this perfume is not famous among young people as they do not know that leaves has greater quality of chemical compound than flowers. Therefore, in this study, the essential oil from pandan, mint and kaffir lime were extracted and tested to college students. The extraction of essential oil is done by using stem and leaf from the plant, and then by drying up the solution and lastly mixing with carrier oil. A survey had been conducted at Universiti Tun Hussein Onn Malaysia with total of 90 respondents. The results of the questionnaire were analyzed using SPSS. For mint, Scent Lasting Effect, the overall mean is 3 with standard deviation 0.93; Mood Elevating Effect, the overall mean is 4 with standard deviation 0.75 and Olfactory Sensation, the overall mean is 4 with standard deviation 0.69. For kaffir lime, Scent Lasting Effect, the overall mean is 3.1 with standard deviation 0.91; Mood Elevating Effect, the overall mean is 3.5 with standard deviation 0.87 and Olfactory Sensation, the overall mean is 3.9 with standard deviation 0.91. For pandan, Scent Lasting Effect, the overall mean is 3.2 with standard deviation 0.76; Mood Elevating Effect, the overall mean is 3.4 with standard deviation 0.98 and from Olfactory Sensation, the overall mean is 3.7 with standard deviation 1.02. In conclusion, students are willing to use perfume from herbal leaves. Based on the questionnaire, mint perfume is the most preferred by the young people among the 3 perfumes.

**Keywords:** Perfume, Herbal, Pandan, Peppermint, Kaffir Lime

### **1. Introduction**

Perfumes and fragrances can be traced to multiple ancient cultures. In ancient Egypt, cleanliness was highly valued, and it was common to bathe daily or after each meal. Given the influences of ancient Egypt on the ancient Roman and Greek civilizations, the use of scents spread throughout the ancient world. Greek medical thinkers of the time practiced an ancient form of aromatherapy, finding certain smells to improve health and vitality. Other ancient cultures, such as ancient Iranians and the ancient Chinese, also prized fragrances, though the Chinese used scent in the form of incense instead of perfumes to be worn

Historically, perfumes were composed exclusively of natural ingredients, mainly essential oils, and were reserved for the wealthiest people. Nowadays, perfumes are available to everyone and are present in a wide range of consumer goods. The methods used to extract perfume ingredients from their natural sources have changed over time as technology has advanced. Depending on the material, expression, distillation, and solvent extraction are the main techniques used to extract the odorant components from a natural source. Synthetic organic chemistry has provided perfumers with novel ingredients that are cheaper and more stable than many natural materials over the years

There are three types of perfume: fruity, leaves and root. As we know, there are some common benefit of perfume like fragrance, enhances mood, boost confidence, makes you attractive, aphrodisiac, boost health, triggers memories, aromatherapy, treats insomnia and cures a headache [1]. Leaves perfume have a lot of benefit for health. However, herbal perfumes are not very famous among young people. This is due to lack of knowledge of the chemical content in fragrance [2]. GC-MS analysis of eucalyptus leave oil extracted using different methods show that leaves has greater quality of chemical compound than flowers [3]. Therefore, in this research, pandan, mint and kaffir lime perfumes were produced and tested among college students.

Leaves can also contain essential oils that can be used in a perfume [4]. Leaves, or its singular word, leaf are green appendages found usually on branches or by the stem of a plant [5]. Some plants are even shown to have large scent structures on its leaves that help attract pollinating insects to the plant [6]. Most leaves can be categorized into a group of greens, herbs and fougères that are characterized by its “green” notes and its fresh smell [7]. Because of this, leaves can be used in either top or heart notes of a perfume either to make a fresh first impression or to leave a long lasting “green” smell [8]. In this experiment, the main source of our perfume is mint, kaffir lime and pandan.

### 1.1 Pepermint

First of all, mint is a popular herb and a well-known mouth freshener that has been used for hundreds of years for its medicinal properties [9]. Mint also can be used in many culinary preparations in its fresh or dried form and things like toothpaste with a mint are the most used [10]. Hence, mint has a lot of benefits to human body. Furthermore, mint can be use as skin care. It soothes the skin, relieve some of the symptoms of acne and its anti-pruritic properties can be used to treating bug and insects [11]. Other than that, Swiss Institute of Bioinformatics mentions that mint can relieve headache [12]. Lastly, a research done in 2014 mentioned that mint essential oils can help reduce depression and fatigue if a person feels sluggish, anxious, depressed or exhausted [13].

### 1.2 Kaffir Lime

Kaffir lime are known as a citrus plant that has a very strong scent that exist in Southeast Asia [14]. By taken internally, kaffir lime leaves and fruits are a digestion stimulant which reduces gas, bloating and indigestion. It was used to promote regularity in the case problems faced during menstruation. For medicinal uses, kaffir lime is known as a blood purifier which is an antioxidant with properties that prevent cancer and are used to treat high blood pressure [15]. Kaffir lime leaf oil possesses some important bioactivities, such as antioxidant [16], antileukemic [17], antitussive which is cough reliever, antihemorrhage which is used to seal blood vessel [18], and antibacterial properties [19]. Extract of

kaffir lime leaves showed antioxidant, antimicrobial, anti-inflammatory, and inhibit activity against cancer cells [20].

### 1.3 Pandan

Pandan have a potential antiviral activity against human viruses like herpes simplex virus type=1 (HSV-1) and influenza virus (H1N1) [21]. Pandan leaves were proved to have a good activity against MCF-7 cancer line, so that pandan leaves are potential for natural aromatic herbal medicine [22]. Another benefit of pandan leaves is it can lower high blood pressure, remove dandruff, prevent hair loss, relieve arthritis and relief of pain [23]. Pandan leaf contain chemicals such 2-acetyl-1-pyrroline (2AP) that keep insects away from the surrounding that have pandan leaves [24].

## 2. Materials and Methods

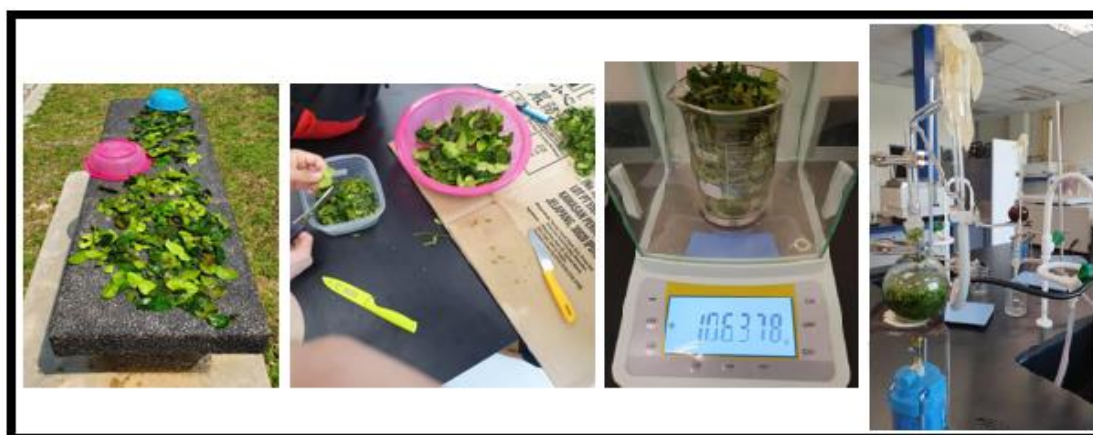
### 2.1 Materials

Materials used in extraction and production of the perfumes are steam distillation set apparatus, 50 ml beakers, 10 ml measuring cylinder, glass rod, funnel and dropper used in extracting and producing herbal perfumes. Three types of leaves used are mint, kaffir lime and pandan. For extraction method, mint, kaffir lime and pandan were dried up in open air for 3-7 days to remove the moisture content from plants. Carrier oil (sweet almond oil) and alcohol (methylated spirit) were used in the production of herbal perfumes. Rotary evaporation was used to collect essential oil of pandan that was extracted using solvent extraction (hexane and ethanol).

### 2.2 Methods

#### 2.2.1 Steam Distillation Procedure

At the beginning, the leaves were washed and dried. There are two ways to dry the leaves such as dry under the sunlight or using the drying oven. The leaves were chopped to reduce the size of the leaves to make the chemical compound in leaves can be easily extracted. The 100g of dried mint and kaffir lime filled in a beaker and weighed. Boiling flask were filled with water to the half and the leaves were filled in biomass flask. Setup the steam distillation set. Make sure the condenser use a cold water to change the vapor into liquid. Then boiled the boiling flask on electric hotplate for 1-3 hours. Always pay more attention to this set because higher temperature can degrade the chemical composition of the leaves. The procedure of the steam distillation is shown in **Figure 1**.



**Figure 1: Steam Distillation Procedure**

#### 2.2.2 Solvent Extraction Procedure

The product that directly extracted from steam distillation are consist of water and oil (hydrosol).

Hydrosol that collected from steam distillation process are added with ethanol and hexane. The water will mix with alcohol and will let oil from plant stay at the surface of the solution. For pandan, 10g of pandan solution mixed with 150 ml hexane and another 8g of pandan solution mixed with 100 ml ethanol.

### 2.2.3 Drying Solution Procedure

After mix with alcohol, the mixtures then were dried in drying oven. Different alcohol has different boiling point where ethanol boiling point is 78.37°C and hexane is 68°C. The drying process should be set at 45°C to 55°C to prevent the oil become dry and stick. For pandan, rotary evaporation was used to collect oil from the hexane and ethanol.

### 2.2.4 Essential Oil Mixture Procedure

Determine which essential to be used as base note, middle note and top note. Each essential oil needs to be diluted with carrier oil (sweet almond oil) because essential oils are really highly concentrated and can risk damage to skin. Pour 19 mL of carrier oil into the 50 ml beaker. Add a total of 30 drop of essential oils into the beaker that contain carrier oil. Start with base notes follow by middle notes and top notes. The essential divided by using the 2:5:3 which is 20% base notes, 50% middle notes and 30% top notes. The solution are mixed with 9.5 ml of alcohol (methylated spirit). Slowly drop alcohol using dropper into essential oil solution. Alcohol are used as diluting agent. Stir the mixture using glass rod until the mixture dissolved together and well mix in the beaker. Then keep the beaker that shut with parafilm for at least 48 hours. The longer the time, the stronger the scent. Store the perfume in a dark room to prevent the decreasing of the scent quality. After 48 hours, transfer the perfume from beaker into 30 ml of amber glass bottle. Then, shake the glass bottle for 1 minutes.

### 2.2.5 Questionnaires Reliability and Validity

The data was analyzed using SPSS, and a pilot test was done where ten respondents were randomly selected to answer the questionnaire. The pilot test was done in order to determine the validity of the questionnaire. The main aim is also to determine the respondents' understanding of all the questions. The result from the pilot test is 0.873 for Part A, 0.836 for Part B and 0.905 for Part C. where if the *Apha-Cronbach* value is below 0.6, then some modification must be done. Content validity issue of the questionnaire the implementation of this research was solved by asking an expert, Puan Rabeah binti Adam, from the Universiti Tun Hussein Onn Malaysia.

## 3. Results and Discussion

### 3.1 Results

For mint, the respondents' background is given in **Table 1**.

**Table 1: Respondents of Mint Perfume**

Item	Category	No of Respondents	Percentage %
Gender	Male	20	66.67
	Female	10	33.33
Race	Malay	27	90
	Chinese	3	10
Program	Mechanical	19	63.33
	Applied Science	11	36.67
Year of Study	2	2	6.67
	3	28	93.33

The statistical analysis of scent lasting effect for Mint Perfume is given in **Table 2**.

**Table 2: Scent Lasting Effect of Mint Perfume**

No	Attribute	Mean	Std Dev
1	The smell of the perfume last longer.	3.0	0.83
2	After using half day, the scent still last.	3.0	0.97
3	The scent still last even though after sweating.	2.6	0.97
4	I like the last longer of the perfume.	3.5	0.90
5	The smell of perfume are still last at the end of the day.	2.8	0.99
Overall		3.0	0.93

The statistical analysis of mood elevating effect for Mint Perfume is given in **Table 3**.

**Table 3: Mood Elevating Effect of Mint Perfume**

No	Attribute	Mean	Std Dev
1	It enhance my mood.	4.1	0.63
2	It makes me feel more attractive.	3.8	0.93
3	I feel more healthier after used it.	4.0	0.74
4	It trigger a good memory when apply the perfume.	3.9	0.79
5	I feel comfortable.	4.1	0.68
Overall		4.0	0.75

The statistical analysis of olfactory sensation for Mint Perfume is given in **Table 4**.

**Table 4: Olfactory Sensation of Mint Perfume**

No	Attribute	Mean	Std Dev
1	The perfume smell fresh.	4.4	0.62
2	The perfume smell like fragrance	4.1	0.71
3	The smell of this perfume is soft.	4.3	0.74
4	The smell of this perfume are so pleasant to smell.	4.4	0.63
5	I really like the smell of this perfume.	4.4	0.72
Overall		4.3	0.69

For kaffir lime, the respondents' background is given in **Table 5**.

**Table 5: Respondents of Kaffir Lime Perfume**

Item	Category	No of Respondents	Percentage %
Gender	Male	14	46.67
	Female	16	53.33
Race	Malay	28	93.33
	Other	2	6.67
Program	Chemical	1	3.33
	Mechanical	9	30.00
	Applied Science	20	66.67
Year of Study	2	2	6.67
	3	28	93.33

The statistical analysis of scent lasting effect for Kaffir Lime Perfume is given in **Table 6**.

**Table 6: Scent Lasting Effect of Kaffir Lime Perfume**

No	Attribute	Mean	Std Dev
1	The smell of the perfume last longer.	3.3	0.88
2	After using half day, the scent still last.	2.9	0.82
3	The scent still last even though after sweating.	3.0	0.89
4	I like the last longer of the perfume.	3.2	0.89
5	The smell of perfume are still last at the end of the day.	2.9	1.08
	Overall	3.1	0.91

The statistical analysis of mood elevating effect for Kaffir Lime Perfume is given in **Table 7**.

**Table 7: Mood Elevating Effect of Kaffir Lime Perfume**

No	Attribute	Mean	Std Dev
1	It enhance my mood.	3.7	0.96
2	It makes me feel more attractive.	3.1	0.52
3	I feel more healthier after used it.	3.4	0.86
4	It trigger a good memory when apply the perfume.	3.5	1.07
5	I feel comfortable.	3.9	0.92
	Overall	3.5	0.87

The statistical analysis of olfactory sensation for Kaffir Lime Perfume is given in **Table 8**.

**Table 8: Olfactory Sensation of Kaffir Lime Perfume**

No	Attribute	Mean	Std Dev
1	The perfume smell fresh.	4.1	0.78
2	The perfume smell like fragrance	4.0	0.72
3	The smell of this perfume is soft.	3.6	1.10
4	The smell of this perfume are so pleasant to smell.	3.8	1.00
5	I really like the smell of this perfume.	3.9	0.94
	Overall	3.9	0.91

For *Pandan*, the respondents' background is given in **Table 9**.

**Table 9: Respondents of Pandan Perfume**

Item	Category	No of Respondents	Percentage %
Gender	Male	18	60.00
	Female	12	40.00
Race	Malay	29	96.67
	Chinese	1	3.33
Program	Mechanical	13	43.33
	Applied Science	17	56.67
Year of Study	3	30	100

The statistical analysis of scent lasting effect for Pandan Perfume is given in **Table 10**.

**Table 10: Scent Lasting Effect of Pandan Perfume**

No	Attribute	Mean	Std Dev
1	The smell of the perfume last longer.	3.3	0.92
2	After using half day, the scent still last.	2.8	0.97
3	The scent still last even though after sweating.	2.9	0.92
4	I like the last longer of the perfume.	3.5	1.01
5	The smell of perfume are still last at the end of the day.	3.3	0.00
	Overall	3.2	0.76

The statistical analysis of mood elevating effect for Pandan Perfume is given in **Table 11**.

**Table 11: Mood Elevating Effect of Pandan Perfume**

No	Attribute	Mean	Std Dev
1	It enhance my mood.	3.6	0.86
2	It makes me feel more attractive.	3.3	0.98
3	I feel more healthier after used it.	3.5	0.86
4	It trigger a good memory when apply the perfume.	3.2	1.09
5	I feel comfortable.	3.5	1.14
Overall		3.4	0.98

The statistical analysis of olfactory sensation for Pandan Perfume is given in **Table 12**.

**Table12: Olfactory Sensation of Pandan Perfume**

No	Attribute	Mean	Std Dev
1	The perfume smell fresh.	3.9	0.94
2	The perfume smell like fragrance	3.6	0.89
3	The smell of this perfume is soft.	3.8	1.22
4	The smell of this perfume are so pleasant.	3.5	1.01
5	I really like the smell of this perfume.	3.7	1.02
Overall		3.7	1.02

For mint, from Table 2: Scent Lasting Effect, the overall mean is 3 with standard deviation 1, from Table 3: Mood Elevating Effect, the overall mean is 4 with standard deviation 1 and from Table 4: Olfactory Sensation, the overall mean is 4 with standard deviation 1.

For kaffir lime, from Table 6: Scent Lasting Effect, the overall mean is 3 with standard deviation 1, from Table 7: Mood Elevating Effect, the overall mean is 4 with standard deviation 1 and from Table 8: Olfactory Sensation, the overall mean is 4 with standard deviation 1.

For pandan, from Table 10: Scent Lasting Effect, the overall mean is 3 with standard deviation 0, from Table 11: Mood Elevating Effect, the overall mean is 3.4 with standard deviation 1 and from Table 12: Olfactory Sensation, the overall mean is 3.7 with standard deviation 1.

### 3.2 Discussions

Based on the questionnaire done towards 90 students, it was observed that mint was more liked or accepted other than the other 2 perfumes. It was accepted that it has benefits and smelled nice although not lasting as long as the Pandan variant. Kaffir lime can be seen to be the least favoured perfume as it has a strong citrus smell that has a similar scent to that of tom yum, a dish that uses Kaffir lime as one of its ingredients. This is why both Pandan and Kaffir Lime have an almost similar result and both of them are usually associated with food. We were also able to extract essential oil from all the leaves which mint, pandan and kaffir lime using steam distillation and solvent extraction.

## 4. Conclusion

After analysing the results of the questionnaires, it can be concluded that all the students are willing to use herbal perfume. We were also able to identify which type of perfume preferred by the young people and determine whether they prefer leaves perfume based on our questionnaire. From the results, it can be seen that the Mint variant of perfume is the most preferred by the young people among the 3 perfumes.

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