

Extraction and Formulation of Perfume from Lemongrass

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Abstract— Perfume extraction is the extraction of aromatic compounds from raw materials, using methods such as distillation, solvent extraction etc. The extracts are essential oils, absolutes, butters, depending on the amount of waxes in the extracted product. Here, in this work solvent extraction, Enflourage method, hydrodistillation and steam distillation methods were used to extract essential oil from lemongrass leaves. Distillation based recovery processes such as steam and vacuum distillation are preferred for the extraction of essential oils from plant materials. Other methods include solvent extraction, expression or enflourage. In the present work, four methods are used for oil extraction namely solvent extraction, hydrodistillation and enflourage. By using solvent extraction, 2.07% yield of essential oil was obtained. In enflourage method, we obtained 1.957% oil yield. 0.946% yield of oil was obtained by hydro distillation process. The steam distillation process gave 0.70% yield of oil. From the analysis solvent extraction gave the highest yield because of the less exposure air and heat and this confirm the literature value. The extracted essential oil was formulated into perfume using a fixative and carrier solvent.

Keywords— Perfumes, Lemongrass, Enflourage method, hydrodistillation.

I. INTRODUCTION

The problem of perfume extraction process is the distortion of the odor of the aromatic compounds obtained from the raw materials. This is due to heat, harsh solvents and also through the exposure to oxygen which will denature the aromatic compounds. These will either change their odor, character or render them odorless. The problem of formulation of perfume involves knowing the proportion in which essential oil, and other materials to be mixed to avoid skin irritation and increase the intensity and longevity of the perfume. Most imported perfumes are synthetic odorant which are not pure chemical substance but are mixture of organic compounds that are harmful when applied. There are limited perfume plants, from which perfume can be made; this can lead to importation of perfume thereby causing the decline of foreign reserves and unemployment.

This project focuses on the production of perfumes from natural/plant sources as against synthetic chemicals thereby will reduce any side effect resulting from synthetic chemicals.

This project work is on how perfumes are extracted and formulated from lemongrass. It further entails; the synthetic and aromatic sources of perfumes. The composition of perfumes and its concentration. The extraction methods and formulation process involved. The economic importance of lemongrass and the uses of lemongrass oil in perfume production process.

II. METHODS OF EXTRACTION

Fragrance extraction refers to the extraction of aromatic compounds from raw materials, using methods such as distillation, solvent extraction, expression or enflourage. To a certain extent, all of these techniques tend to distort the odour of the aromatic compounds obtained from the raw materials. Heat, chemical solvents, or exposure to oxygen in the extraction process denature the aromatic compounds, either changing their odour character or rendering them odourless

Before perfumes can be composed, the odorants used in various perfume compositions must first be obtained. Synthetic odorants are produced through organic synthesis and purified. Odorants from natural sources require the use of various methods to extract the aromatics from the raw materials. The results of the extraction are essential oils, absolutes, concretes, or butters, depending on the amount of waxes in the extracted produced.

2.1 Solvent Extraction

This is most used and economically important technique for extracting aromatics in the modern perfume industry. Raw materials are submerged in a solvent that can dissolve the desired aromatic compounds. Fragrant compounds from woody and fibrous plant materials are often obtained in this manner as are all aromatics from animal sources. The technique can also be used to extract odorants that are too volatile for distillation or easily denatured by heat. Commonly used solvents for maceration/solvent extraction include hexane, and dimethyl ether. The product of this process is called a "concrete".

2.2 Distillation

The process in which a liquid or vapour mixture of two or more substance is separated into its component fractions of desired purity, by the application and removal of heat. Distillation is a common technique for obtaining aromatic compounds from plants, such as orange blossoms and roses. The raw material is heated and the fragrant compounds are re-collected through condensation of the distilled vapour. There are two types of Distillation for extracting. Steam Distillation and Hydro-Distillation.

2.3 Steam Distillation

Steam from boiling water is passed through the raw material for 60-105 minutes, which drives out most of their volatile fragrant compounds. The condensate from distillation, which contains both water and the aromatics, is 42 settled in a Florentine flask. This allows for the easy separation of the fragrant oils from the water as the oil will float to the top of the distillate where it is removed, leaving behind the watery distillate. The water collected from the condensate, which retains some of the fragrant compounds and oils from the raw material, is called hydrosol and is sometimes sold for consumer and commercial use. This method is most commonly used for fresh plant materials such as flowers, leaves, and stems.

2.4 Hydro-Distillation

Mostly used by small scale producers of essential oils in water / hydro distillation the plant material is almost entirely covered with water as suspension in the still which is placed on a furnace. Water is made to boil and essential oil is carried over to the condenser along with the steam. It is useful for distillation of powders of spices and comminuted herbs etc. The Deg Bhabka method of India using copper stills is an example of this technique. Some process becomes obsolete to carry out extraction process like Hydro Distillation which often used in primitive countries. The risk is that the still can run dry, or be overheated, burning the aromatics and resulting in an Essential Oil with a burnt smell. Hydro distillation seems to work best for powders.

2.5 Enfluerage

This is the absorption of aroma materials into solid fat or wax and extracting the odorous oil with ethyl alcohol. Extraction by enfluerage was commonly used when distillation was not possible because some fragrant compounds denature through high heat. This technique is not commonly used in the present day industry due to its prohibitive cost and the existence of more efficient and effective extraction methods. Enfluerage is a two-step process during which the odour of aromatic materials is absorbed into wax or fat, and then extracted with alcohol.

III. FORMULATION OF OIL TO PERFUME

Formulation is a mixture of ingredients prepared in a certain way and used for a specific purpose. 10ml of lemongrass essential oil extract were measured and placed in a 120ml beaker containing 5ml of Methanol. 5ml of the Fixatives were added to the mixture (to improve the longevity of the perfume). The solution were shaken and poured into a 50ml bottle.

IV. PROCEDURES

4.1 Solvent Extraction

1. Weigh 150g of the dry sample of lemongrass from the sliced lemongrass sample and placed in 1 litre flat bottom flask.
2. Take 500ml of N-Hexane solvent & pour into the flask.
3. The flask and content are allowed to stand for 36 hrs; this is done to extract all the oil content in the lemongrass and for complete extraction.
4. After this decant the extract into another 1 litre beaker add 200ml of Ethanol to extract the essential oil since essential oil is soluble in Ethanol
5. The mixture is then transferred to 500ml separating funnel and separate by a process called liquid/liquid separation process. The content of the separating funnel are allowed to come to equilibrium, which separates into two layers (depending on their different density)
6. The lower Ethanol extract and the upper Hexane layer are collected into two separate 250ml beaker and are placed in a water bath at 78°C. This is done to remove the Ethanol leaving only the natural essential oil. The yield of oil is

determined by weighing the extract on an electronic weighing balance. The difference between the final weight of the beaker with extract and the initial weight of the empty beaker gave the weight of essential oil.

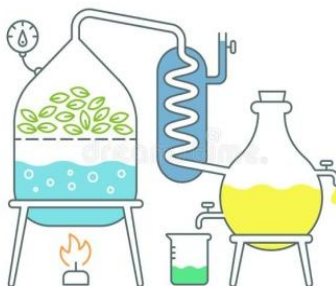


FIGURE 1: Solvent Extraction

4.2 Steam Distillation

1. Place 150 grams of fresh lemongrass sample into a 1 litre round bottom flask containing 250ml of distilled water.
2. The flask was fitted with a rubber stopper connected to condenser and heated. Water at 0oC flowed counter currently through the condenser to condense the ensuring steam.
3. When the water reached 100oC it started boiling ripping off the essential oil from the lemongrass.
4. When the lemongrass got heated up, the essential oil that was extracted from the leaf mixed with the water vapor. Both passed through the condenser and the vapor was condensed into liquid. With the use of ice block, cooling was made possible and volatilization of the essential oil was avoided.
5. The condensate was directly collected using a 500ml beaker and then poured into a separating funnel. This formed two layers of oil and water.
6. The tap of the separating funnel was opened to let out the water while the oil was immediately collected into a 100ml stoppered bottle. The bottle was closed tightly to prevent vaporization of the essential oil. The oil was collected and the volume of oil obtained was weighed.

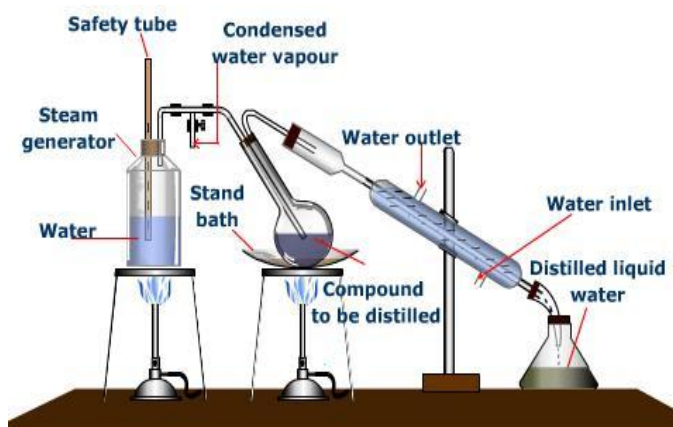


FIGURE 2: Steam Distillation

4.3 Enfleurage

1. 140 gram of the dry sample of lemongrass was pounded with mortar and pestle to reveal the tighter inner stem and to increase the absorption area.
2. 70ml of light-flavored olive oil were warmed and mixed with the mashed lemongrass (to allow for efficient absorption of the essential oil).
3. The aluminum foils were used to cover beaker. Then it was shaken for distribution of the lemongrass.

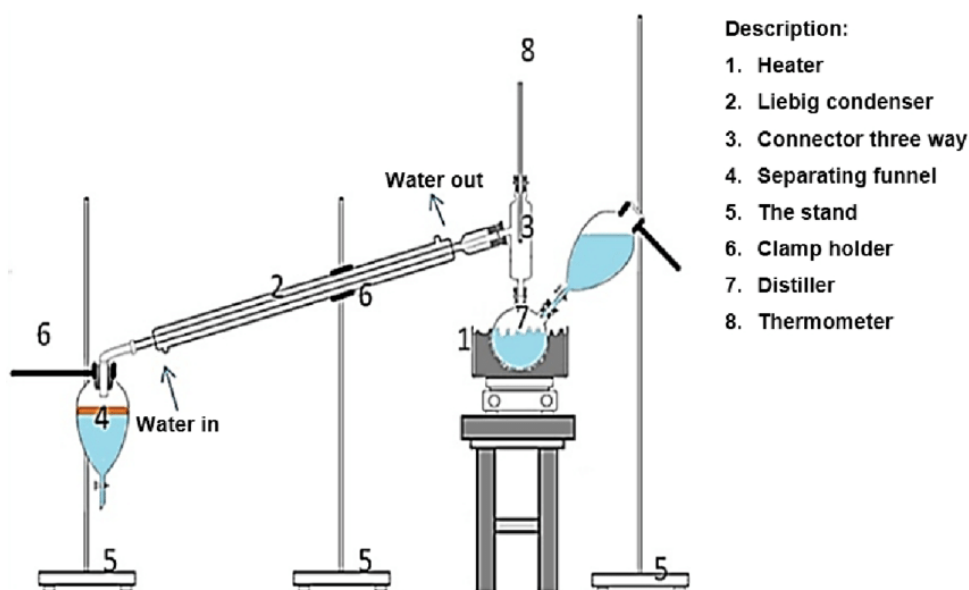
4. It was then allowed to stand for 24 hours at room temperature.
5. 140 ml ethanol was added to absorb the essential oil leaving behind the light-flavoured olive oil and the lemongrass residue.
6. The yield of oil was determined.



FIGURE 3: Enfleurage

4.4 Hydro-Distillation

1. 500 ml of distilled water and 140 gram of fresh lemongrass sample were placed into a round bottom flask.
2. The flask was fitted with a rubber stopper and connected to a condenser and heated. Water was allowed to flow counter currently through the condenser.
3. After reaching appropriate temperature, the essential oil, mixed with the water vapor was extracted from the leaves.
4. The oil-water overhead product was passed through the condenser. The vapours were condensed.
5. Volatilization was avoided by cooling with ice cubes. The condensate was collected using a beaker.
6. The condensate was then separated by a separating funnel. The oil was immediately collected into a stoppered bottle and closed tightly.



Description:

1. Heater
2. Liebig condenser
3. Connector three way
4. Separating funnel
5. The stand
6. Clamp holder
7. Distiller
8. Thermometer

FIGURE 3: Hydro-Distillation

V. RESULT

The result obtained from the study is shown in the table 1 below

TABLE 1
EXTRACTION AND FORMULATION OF PERFUME

Methods	Yield %
Solvent Extraction	2.07
Steam Distillation	0.70
Enflourage	1.957
Hydro-Distillation	0.957

VI. FUTURE SCOPE

This project work is on how perfumes are extracted and formulated from lemongrass rather than using synthetic chemicals thereby reduce the side effects.

The success of this work will stimulate the development of the perfume industry locally because of available, cheap raw materials.

More people will get engaged in cultivation of Lemongrass and more jobs will be created in Perfume Industry and help in development of local small scale industries in India.

VII. CONCLUSION

The experiment was carried out for the extraction of essential oil from lemongrass. Analyses carried out were to determine the various oil yields using different extraction methods and the formulation of perfume with the essential oil produced. The result from the experiment yielded more with solvent extraction, followed by the effleurance method and the hydro distillation method. The extraction of essential oils by distillation is governed by the sensitivity of the essential oil to the action of heat, water and alcohol. All these methods of extraction are special type of separation process used for heat sensitive materials like essential oils, resins, hydrocarbons, etc. which are insoluble in water and may decompose at their boiling point. The temperature of the steam must be high enough to vaporize the essential oil present, yet not destroy or burns the essential oils. In summary these methods used chemical engineering unit operations of leaching, liquid-liquid extraction and evaporation techniques.

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