



EXTRACTION AND FORMULATION OF PERFUME FROM LEMON GRASS LEAVES

¹Prof.Vijay.B.Mane, ²Prachi Gharat, ³Shruti Patil, ⁴Pratibha Pandagale

¹Assistant Professor, ²Student, ³Student, ⁴Student

¹Department Of Chemical Engineering ,

¹Bharati Vidyapeeth College Of Engineering ,Navi Mumbai, India

Abstract: Perfume extraction is the extraction of aromatic compounds from raw materials, using methods such as distillation, solvent extraction, Enfleurage method, hydro distillation and steam distillation methods were used to extract essential oil from lemongrass leaves. In this paper we will study about manufacturing of perfume from extracted lemongrass oil. In this paper we used soxhlet extraction method using ethanol as a solvent for extraction of lemongrass oil. The effects of particles size, contact time and solvent volume on oil yield were considered. The extracted essential oil was formulated into perfume using a fixative and carrier solvent.

KEYWORDS: ESSENTIAL OIL, LEMONGRASS OIL, SOXHLET EXTRACTION, PERFUME

I. INTRODUCTION:

Perfume:

Perfume is a fragrant liquid made from an extract that has been distilled in alcohol and water. Perfume comes from the Latin “per” meaning “through” and “fume” or “smoke”. Perfume can be produced locally using commonly available resources such as lemongrass leaves. Many ordinary and man made materials have been used to make perfume. Many ancient perfumes were made by extracting natural oils from plants through pressing and steaming. Most modern perfumes are alcohol-based and contain synthetic scents. While the term ‘perfume’ usually refers to fragrances in general, in the more technical language of the perfumer, a perfume must contain over 15% of fragrance oils in alcohol. Techniques involved in perfume extraction from plants include; solvent extraction, distillation and effleurage method. These methods to a certain extent, distort the odour of the aromatic compounds that are obtained from the raw materials. Essential oils, or volatile oils, are found in many different plants. These oils are different from fatty oils because they evaporate or volatilize on contact with the air and they possess a pleasant taste and strong aromatic odour.

Lemongrass:

Lemongrass is also known as C.citrus plant belonging to Graminae (Poaceae) family and genus. Cymbopogon. The plant has long, thin leaves and is largely cultivated as a medicinal plant. The leaves of lemongrass and its oil have a lemon-like flavor due to its citral content. Dry leaves of lemongrass contain approximately 1%-2% essential oil. The oil has a light yellow color. The essential oil composition of lemongrass does vary with agronomic treatment, climatic conditions, and geographical locations. Citral is extensively used in perfumes, bath salts, cosmetics and as a good flavouring. Citral content in the leaves is very high (70-80%).

Properties	Values
Acid Value	2.805
Saponification Value	140.25
Ph	5.5
Boiling Point	212 °C
Moisture Content	20.7
Acid Value	4.09
Saponification Value	299
Specific gravity	0.896
Peroxide Value	6.0
Yield	1.9%
Refractive Index	2.487
Solubility	Insoluble in water
Colour	Dark Yellow
Refractive index	1.483
Density	0.873
Color Parameter	97.04

II. REVIEW OF DIFFERENT METHODS OF EXTRACTION

1. Supercritical Fluid Extraction:

In supercritical CO₂ extraction method, carbon dioxide is heated around 31- 32 0 C and this carbon dioxide is pumped through plant materials. Here lemongrass leaves are at pressure around 5.5 N/m². When pressure is released, carbon dioxide escape in the form of gas and leaving the essential oil behind. In this method due to high temperature and pressure conditions , it may change the molecular structure of oil. This method uses co₂ which is dangerous. Investment cost is also high.

2. Microwave Extraction:

Water in the leaves of lemongrass absorbs the energy which is produced by the microwave, results in increasing the pressure inside the leaves due to which the cell structure of leaves break. After the breaking of cell structure, the solvent ethanol is penetrated into the cell matrix and extract volatile matter along with it. After the extraction, it is filtered by whatman filter paper, rinsed with solvent mixture. Oil is separated by evaporation using rotary evaporator with heating bath having temperature of 65oC

3. Hydro distillation:

In hydro distillation, hydro stands for water and distillation for separation process. It is oldest method and is used especially for essential oils. There are three types of hydro distillation :

- i. water immersion
- ii. Direct vapour injection
- iii. Both water and vapour injection

The principle of hydro distillation is based on isotropic distillation. Disadvantages of hydro distillation includes less amount of product extracted and temperature is variable . It is a slow process. Degradation of sensitive compounds occurred because of long exposure.

4. Cold Pressing:

In cold pressing method, plant residues are pressed under high pressure and oil is extracted from them. Cold pressed method is mainly used for extracting essential oils from plants, flower, seeds, lemon, tangerine oils. In this method the outer layer of plant residue is first scrubbed.

5. 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 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.

III. METHOD CHOSEN FOR EXTRACTION

1. SOXHLET EXTRACTION PROCESS:

The extraction of lemongrass oil was performed with Soxhlet extractor apparatus using ethanol as Solvents. The extraction will carry out with lemongrass sample with particle size 200 μm , 300 μm , 350 μm and the respective oil yields were noted.

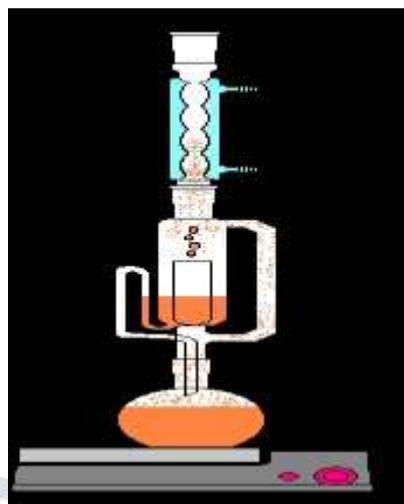


Fig. 1: Soxhlet extraction apparatus

Appratus - weighing balance , Two necked round bottom flask, heating mantle, thermometer, heater 500 ml , measuring cylinder , screening apparatus , Ethanol.

Procedure

First assembled the setup for soxhlet extractor

2. Then next weight 40 gm. Lemongrass on weighing balance.
3. Make thimble from filter paper add the lemongrass into the Thimble.
4. Place the thimble in the Soxhlet chamber.
5. Add 150 ml ethanol into the bottom flask.
6. Place the flask in the heating mantle.
7. Set the temperature at 90 degree Celsius.
8. Adjust the temperature of the heating mantle.
9. Set the time of process for 1 hour then 1.20 min then 1.40 min. And take the runs according to the parameters.

2. FORMULATION OF PRFUME FROM ESSENTIAL OIL

Appratus – Pipette, Funnel, 50ml and 120ml beakers, Perfume bottle

Reagents- Fixatives, Distilled water, Lemongrass essential oil & Aqua silk solvent

Procedure

- Take 10ml of lemongrass essential oil extracted.
- For making alcohol free perfume 5ml of aqua silk solvent is used in the place 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 ANALYSIS TECHNIQUES

Determination of lemongrass oil composition using GC-FID analysis:

1. GC-FID analysis will perform using a Buck scientific gas chromatography instrument equipped with a capillary column.
2. Helium will apply as carrier gas at constant (steady) flow rate of 1.2ml/min and split ratio 1:30.
3. Oven temperature will initially held at 50°C for 1 minute, and later programmed to be 280°C at a rate of 5°C/min.
4. Helium flux is 30ml/min and air flux is 300ml/min. The injector temperature was 280°C and that of detector (FID) temperature was 300°C.
5. Injection volume is 1 μl . The per cent (%) Compositions of various compounds will be obtained by GC-FID analysis.
6. Identification of lemongrass oil composition will be based on retention index (RI) in co-injection with standards (Sigma Aldrich and standard isolates).
7. And finally, the percentage (%) Composition of individual constituent of the sample lemongrass oil will determined from GC-FID peak areas Without using any correction factors.

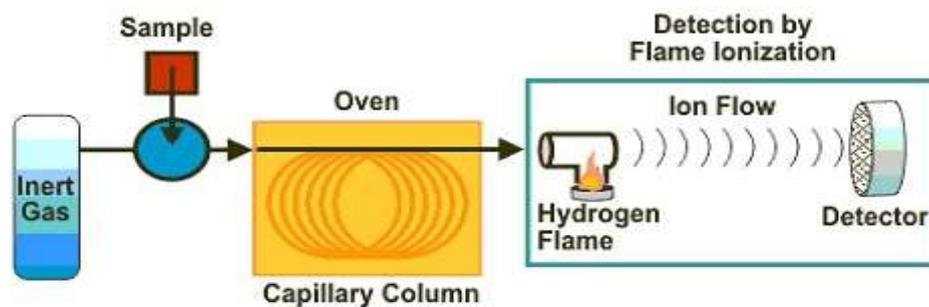


Fig.2: Gas Chromatography

GD-FID analytical technique will determine the chemical composition contents in lemongrass oil for example any functional group alkane, alkyne etc. and any bioactive chemical like 2-nonanone, acetonitrile, β -cedrenes, camphor, citronellal, 4-nonanone, terpinolene, decanal, α -cedrol, citral A etc.

Determination of functional groups using FT-IR analysis:

1. Determination of functional groups in the lemongrass oil will be done with Buck scientific FTIR Spectrometer.
2. The instrument will fit with deuterated Triglycine sulphate detector and potassium bromide beam splitter.
3. Gram A1 software will use to obtain spectra. About 1.0g of sample will properly place on the salt pellet.
4. Thereafter, the FT-IR spectrogram will be obtained at Frequency range between 4,000 – 600 cm^{-1} and co-added at 32 scans and at 4 cm^{-1} resolution.
5. The functional groups were numerated with the assistance of IR correlation charts.



Fig.3: Fourier transform infrared spectroscopy

The FTIR spectra analysis of lemongrass oil will be done and the absorptions will be compared with standard IR spectrum table and chart using frequency range, the lemongrass oil spectra affirm the presence halo compound, alkene, alkane, sulphate, aldehyde, aromatic compound, isothiocyanate, thiol, Carboxylic acid, alcohols as functional groups.

V. RESULTS AND DISCUSSION

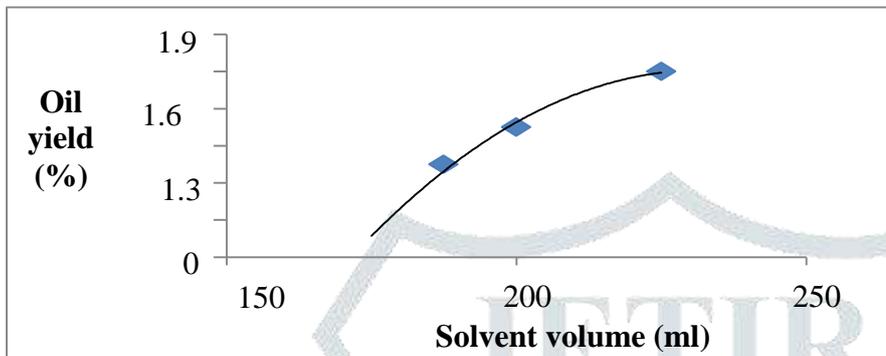
The quality and quantity of lemongrass essential oil is mainly depend upon the methodology and procedure which is used in our review paper . Extraction of essential lemongrass oil from dried lemongrass leaves were carried by Soxhlet extraction method by using different particle size by varying organic solvents and parameters. The effects of parameter such as temperature, time and particle size were studied. Results were tabulated in the following tables. Three replicate measurements were done for each parameters and also the graphs were plotted. The tables were represented the result of Soxhlet extraction method.

The experiment was conducted considering the operating variables, as stated below:

- a. The effect of particle (solid material) size on oil yield was done using 150 ml of different solvents and 40g of particle sizes – 250, 300, 350 micron of lemongrass sample for 60 minutes. The results were recorded accordingly.
- b. The effect of contact time on yield was done using 150ml of different solvents and 40g of 250micron particle size lemongrass sample. Five different contact times of 60 minutes intervals were used to study the effect of contact time on yield. The results were recorded according.

Table 1: show result of soxhlet extraction techniques using ethanol with different particle sizes and varying time at constant temperature.

Partical size(mm)	Solvent(ml)	Time (mintes)	Quantity (gm)	Yeild(%)
0.25	150	60	40	1.9
0.30	200	80	40	1.6
0.35	250	100	40	1.3



Fig(4) Graph of the oil yeild (%) of essential oil to the solvent volume (ml)

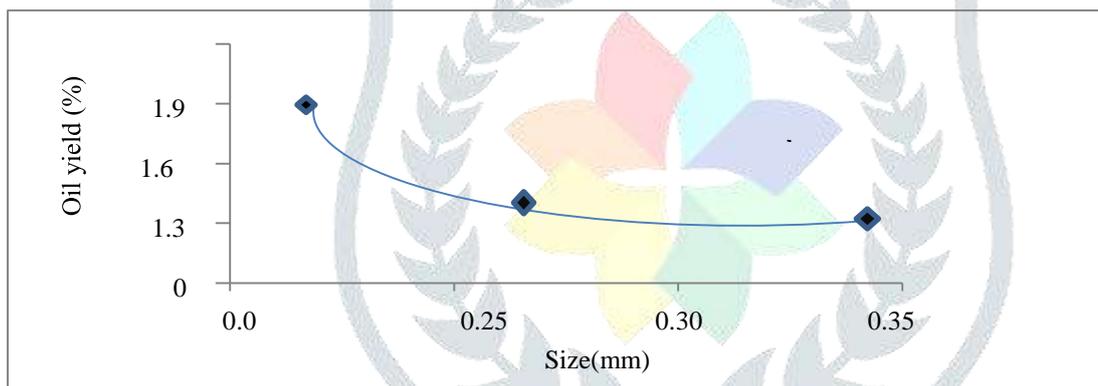


Fig (5) Graph of the oil yeild (%) of essential oil to the size (mm).

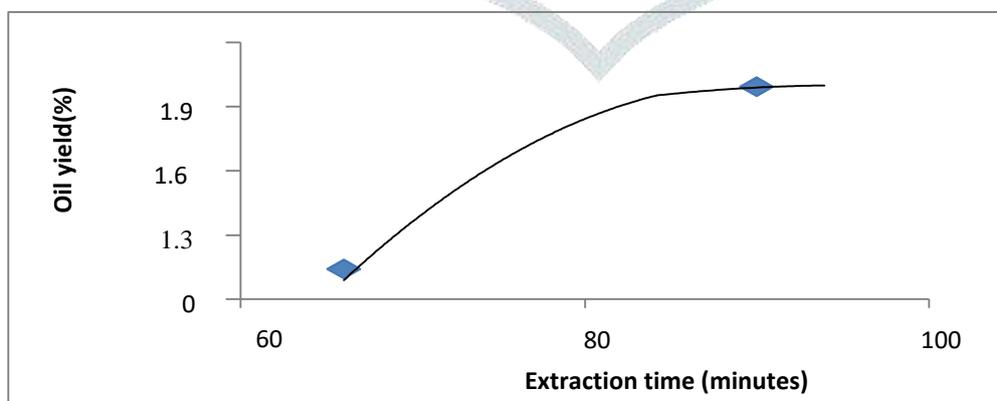


Fig (6) Graph of the oil yeild (%) of essential oil to the extraction time (min).

VI.CONCLUSION

In this project, extraction of essential oil from Lemongrass which has high essential oil content, this will be used for perfume formulation. Analyses will be carried out to determine the various Oil yields using soxhlet extraction method and the Formulation of perfume with the essential oil will be produced. The method is solvent extraction method by Soxhlet apparatus. We have used

different particle size with constant temperature for same quantity of raw material and also we have vary contact time. We can conclude that 250 micron Particles size gives highest yield. The yield of extracted essential oil is 1.9%. For characterization and to analyse the composition of lemongrass oil we have used GC-FID analysis method and FT-IR analysis method which will give the correct chemical composition of lemongrass essential oil. We can easily analyse the functional groups and various chemicals present and also we can check the quality of lemongrass essential oil. very inexpensive, lowering the overall processing and solvent recovery costs.

VII. REFERENCES

1. Bhavana Pandey- "screening of antibacterial activity of essential oil of lemon grass(*Cymbopogon citratus*)"ISSN: 0976-2876.
2. Thien Hien Tran Nguyen, Duy Chinh Nguyen – "Research on Lemongrass Oil Extraction Technology (Hydro distillation, Microwave-Assisted Hydro distillation)"Indones. J. Chem., 2019, 19 (4), 1000 – 1007.
3. Venkat s. mane, dilip d rajguru-" FORMULATION OF PERFUME FROM LAMONGRASS" ISBN: 978-93-85465-29-1.
4. Okpo Samson , Otaraku Ipeghan – GC-FID and FT-IR characterization of lemongrass oil extracted With SOXHLET extraction apparatus using ethanol as solvent. IOSR Journal of Engineering (IOSRJEN) ISSN €: 2250-3021, Vol.10.
5. Alhassan, M., Lawal, A., Nasiru, Y., Suleiman, M-"Extraction and Formulation of Perfume from Locally Available Lemon Grass Leaves" ChemSearch Journal 9(2): 40 – 44, December, 2018
6. Mahouachi Wifek, Asma Saeed, Rafia Rehman and Shafaq Nisar- "LEMONGRASS: a review on its botany, properties, applications and active components."
7. Chahat Thakur, Mohit Bhardwaj, Anil Kumar Verma and Avinash Bhatia-" A Review on Post Harvest Management of Lemongrass" Vol.1 Issue-3, November 2020
8. Werotaw Sisay Yeshitila-" Herbage and Essential Oil Yield of Two Lemmon Grass (*Cymbopogon Citratus*) Varieties as Affected by Harvesting Cycle And Number of Tillers Per Planting Slips" International Journal of Research Studies in Agricultural Sciences (IJRSAS) Volume 5, Issue 2, 2019, PP 18-22 ISSN No. (Online) 2454–6224
9. Sudeep Mishra and A.K Rathore –"Comparative study of the performance of Supercritical Fluid Extraction, Microwave assisted Hydro-distillation and Hydro-distillation of Lemongrass (*Cymbopogon Citratus*): A Review"G- Journal of Environmental Science and Technology G- J. Environ. Sci. Technol. 8(2): 20-27 (2021) ISSN (Online): 2322-0228
10. Ranitha M. , Abdurahman H. Nour , Ziad A. Sulaiman, Azhari H. Nour, and Thana Raj S.-" A Comparative study of lemongrass Essential oil extracted by Microwave Assisted Hydro-distillation & Conventional Hydro-distillation method."International Journal of Chemical Engineering and Applications, Vol.5, No. 2, April 2014
11. Ronak R. Shetty, Prajwal K. Shetty, Ketan B. Bagade-" Laboratory scale oil extraction and perfume formulation from locally available lemongrass leaves" Galore International Journal of Applied Science and Humanities Vol 1; Issue: 1; Jan- March 2017
12. Miss Diwan Tapoja , Dessai S.A.-" Studies on extraction of ingredient oil from lemon grass" International Journal of Engineering research & technology (IJERT) ISSN: 2278-0181 Vol.3 ISSUE II , November – 2014
13. Raju K. Marag , Nupur S.Berde , Roshan R. Jadhav-" Extraction of lemongrass oil and formation of perfume" Internal Journal For Research in Applied Science & Engineering technology (IJRASET) ISSN: 2321-9653 Volume 7 Issue III, Mar 2019
14. M.A.Suryawanshi, V.B.Mane, G.B.Kumbhar-" Methodology to extract essential oils from lemongrass leaves: solvent extraction approach" International Research Journal of Engineering and Technology (IRJET): www.irjet.net Vol: 03 Issue: 08 Aug-2016
15. Mustapha Bala mohammed , Abdullahi Zaharadden Yamusa , Brahim sani mamman-" Extraction of oil and formulation of perfume from lemongrass" Bima Journal of Science and Technology Vol.4(2) Dec , 2020 ISSN: 2536-6041
16. S. J. Kulkarni-" Oil Extraction and Perfume Formulation from Plants: A Review" Journal of Emerging Technologies and Innovative Research (JETIR) (ISSN-2349-5162), JETIR 2105480, JETIR May 2021, Volume 8 , Issue 5
17. Samson Onoriode Okpo and Ipeghan Jonathan Otaraku-'Modelling of Soxhlet Extraction of Lemongrass Oil" ,SSRG International Journal of Chemical Engineering Research (SSRG-IJCER) - Volume 7 Issue 2 May to Aug 2020
18. Wahida Binti Amat Fadzil-" Extraction Of Zingiber Zerumbet (L) Smith Oil By Using Soxhlet Extraction Method", University Malaysia Pahang, 2010