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Extraction of Lemongrass Oil & Formation of Perfume

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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, concretes, or butters, depending on the amount of waxes in the extracted product. In this work, essential oil has been extracted from the leaves of lemongrass with the help of solvent extraction methodology. The effect of parameter namely time, size on the yield of oil was studied. The extracted essential oil was altered into perfume using a fixative and carrier solvent.
Keywords: lemongrass, distillation, extraction, solvent, yield.

I. INTRODUCTION

Extracts of biologically active components isolated from plant species finds numerous applications in perfume, aroma and pharmaceutical industries. Many plant extracts are very important from curatively viewpoints. Perfume industries are growing in demand as the living standards are improving day by day. There is increasing demand for perfumes. Plant and animal elements are traditionally used for perfume formation. Essential oils, pure grain oil and water are three key ingredients in relation to perfume. Essential oils are extracts of various plant materials and do not derive from flowers, but from herbs, trees and various other plant materials. It is estimated that the global number of plants contains about 10% of essential oils and could be used as a source for their production. Their extracts are formed by combination of diverse and complex volatile mixtures of chemical compounds. In industry, the essential oils are extracted from fresh or partially dried leaves using various method of extraction like hydro distillation. 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. The main objective of this research is to extract essential oil and formulate perfume from Lemon grass (Cymbopogon Citratus). The research focuses on the production of perfumes from natural, plant sources as against synthetic chemicals and to study the various parameters such as time, size that affect the quantity of lemongrass oil.

A. Lemongrass Oil

Lemongrass (Cymbopogon Citratus), a persistent plant with long thin leaves, is one of the largely refined medicinal plants or its essential oils in parts of tropical and sub-tropical areas of Asia, Africa and America. Essential oil is one of the important components of lemongrass extracts and its applications include co-ingredients for perfumes and cosmetics. The leaves of Lemongrass (Cymbopogon Citratus) present lemony characteristic flavour due to its main content, citral which present great importance to the industry. Lemongrass oil is a viscous liquid, yellow to dark yellow or dark amber in colour turning red with age.

B. Economic Uses of Lemongrass

1) Flavouring

a) Add flavours to food such as in chicken recipes.
b) Used as flavouring for drinks such as tea.

2) Oil

a) Distillation yields commercial lemongrass oil or Indian verbena oil which has a reddish yellow colour with the intense odour and taste of lemons.
b) Small amount of oil is used in making soap, detergent and other preparations.

3) Medicinal

a) Crushed leaves are applied to the forehead and face as a cure for headache.
b) Chewed leaves are held in the mouth to alleviate toothache.
c) Excellent stomachic (stimulating the function of the stomach) for children.

C. Literature Review On Past Work

M.A. Suryawanshi studied different methods to know which method give higher yield as compared to another method under specific conditions.

They have used methods such as solvent extraction & steam distillation for extraction of lemongrass oil. They observed that the solvent extraction method was giving more yield as compared to the steam distillation. The reason behind this is almost all the constituents of the essential oil are heat sensitive.

Ranitha M. Used two methods, viz. microwave-assisted hydro-distillation (MAHD) and conventional hydro-distillation (HD) for extraction of Lemongrass oil. They optimized the MAHD method on the three parameters namely water to plant material ratio, microwave power and extraction time. Tajidin investigated the effect of three maturity stages at harvest of lemongrass on essential oil, chemical composition and citral contents. According to these studies, it is important to harvest at the appropriate level of maturity in order to achieve high quality of essential oil.

II. MATERIALS AND METHOD

A. Plant Sample

Lemongrass leaves were collected from the garden. For Lemongrass (Cymbopogon Citratus), the percentage essential oil yield for the partially dried leaves was found to be higher than that of the fresh leaves. Thus, once collected, the plant material were dried at room temperature for a week then kept in a sealed plastic bag at ambient temperature and protected from the light. Three plant samples were taken; having different size range, so as to know that which size range is giving maximum yield.

B. Reagents

N-Hexane was used as the solvent for the solid-liquid extraction (leaching operation). As N-Hexane is the cold solvent it reduces the chances of the decomposing of the lemongrass. Ethanol was used as the solvent for the liquid-liquid extraction. Solvents were purchased from Research lab. Methanol and vodka were used as the fixatives in the formation of perfume.

C. Solvent Extraction Method

1) Leaching:

a) 25gm. of three samples of fresh lemongrass leaves was taken. Samples were cut in different sizes. The first sample was in the range of 0.5-1 cm, sample two in the range of 1-1.5 cm and sample three in the range of 1.5-2cm.

b) 150 ml of n-Hexane (95%) in three beakers was taken. The chopped samples of lemongrass was dipped in each beaker and kept for about 48 hours at room temperature.

c) The top liquid solution obtained was separated from the insoluble solid settled at the bottom of each beaker. The volume of the solution and the weight of the insoluble solid before drying were measured.

2) Liquid-Liquid Extraction (Solvent Extraction):

a) 100 ml of ethanol (99%) was taken and added into the liquid solution obtained from the sample one. The solution was poured into the 200ml of separating funnel and waited till the two clear layers of the solvents were attained. The time required for the clear layers to attain was 24 hours.

b) The upper Hexane layer, lower ethanol layer and the interfacial layer was separated in different beakers. The volume of the interfacial layer was measured. The two layers of solvents were heated at 78˚C in round bottom flasks. The vaporized solvents at the top of the flask were condensed with the help of the condensers and collected in different containers. The volumes of recovered solvents were measured and the oil remained at the bottom of each flasks was weighed. The total weight of oil obtained was measured.

D. Formation of Perfume

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 was shaken and poured into a 50ml bottle.

1) Yield of essential oil = a m o u n t of essential oil (g) obtained / amount of raw materials (g) used

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III. RESULTS AND DISCUSSION

Quality and quantity of oil essential mainly depends on the extraction procedures. Therefore, optimizing extraction procedure is considered as a vital process. In current research, the following parameters were studied to identify the conditions giving the highest yield in extraction of essential oil from Lemongrass (Cymbopogon Citratus):

A. Size Parameter

Here we have studied how size of the raw material i.e. the lemongrass is affecting on the quantity of essential oil. We have varied the size of the lemongrass leaves from different ranges so as to know at what size range yield is maximum.

Table no. 1 shows the result obtaining by varying the size of lemongrass and keeping time constant. Recovery of solvents used is also shown.

run	size (cm)	total oil obtained (gm.)	solvent recovery (ml.) n-hexane	ethanol	Percentage recovery n-hexane	ethanol
1	0.5-1.0	1.4	90	60	60	60
2	1.0-1.5	1.2	90	58	60	58
3	1.5-2.0	0.9	95	60	63.3	60

Table no. 1: oil obtained by varying size parameter

Fig. 1: graph of weight of oil (ml.) to size (cm.)

From the analysis we come to know that the smaller the size greater is the amount of oil obtained. This is because of the fact that on decreasing the particle size, higher amount of oil is gets released due to available large surface area.

B. Time Parameter

Here we have studied how time given for the extraction process is affecting on the quantity of essential oil. We have varied the time for different samples so as to know at what time yield is maximum.

Table no. 2 shows the result obtaining by varying the time parameter and keeping size constant. Recovery of solvents used is also shown.

run	time (hrs.)	total oil obtained (gm.)	solvent recovery (ml.) n-hexane	ethanol	Percentage recovery n-hexane	ethanol
1	48	1.4	102	63	68	63
2	72	1.8	95	60	63	60
3	96	2.1	90	58	60	58

Table no. 2: oil obtained by varying time parameter

Fig. 2: graph of weight of oil (ml.) to time (hrs.)

From the analysis we come to know that the higher the time given for extraction greater is the amount of oil obtained. Continuing the process above 96 hrs. will cause the losses in solvent as cold solvent get evaporated after certain time.

IV. CONCLUSION

In this paper, solvent extraction method were studied based on two tested parameters namely size of raw material and time given for extraction process. Among the experiments performed for the different conditions of raw material, the conditions for the maximum yield and the cost effectiveness of the essential oil produced was proved to be the size of the lemongrass leaves should be in the range of 0.5-1.0 cm. and the time of 96 hrs. which is maximum time given for the extraction process. It is seen that the minimum size and maximum time is giving highest yield. Adding fixatives to perfume improves the longevity of the perfume. The perfume which have formulated from lemongrass has nice and pleasing smell.

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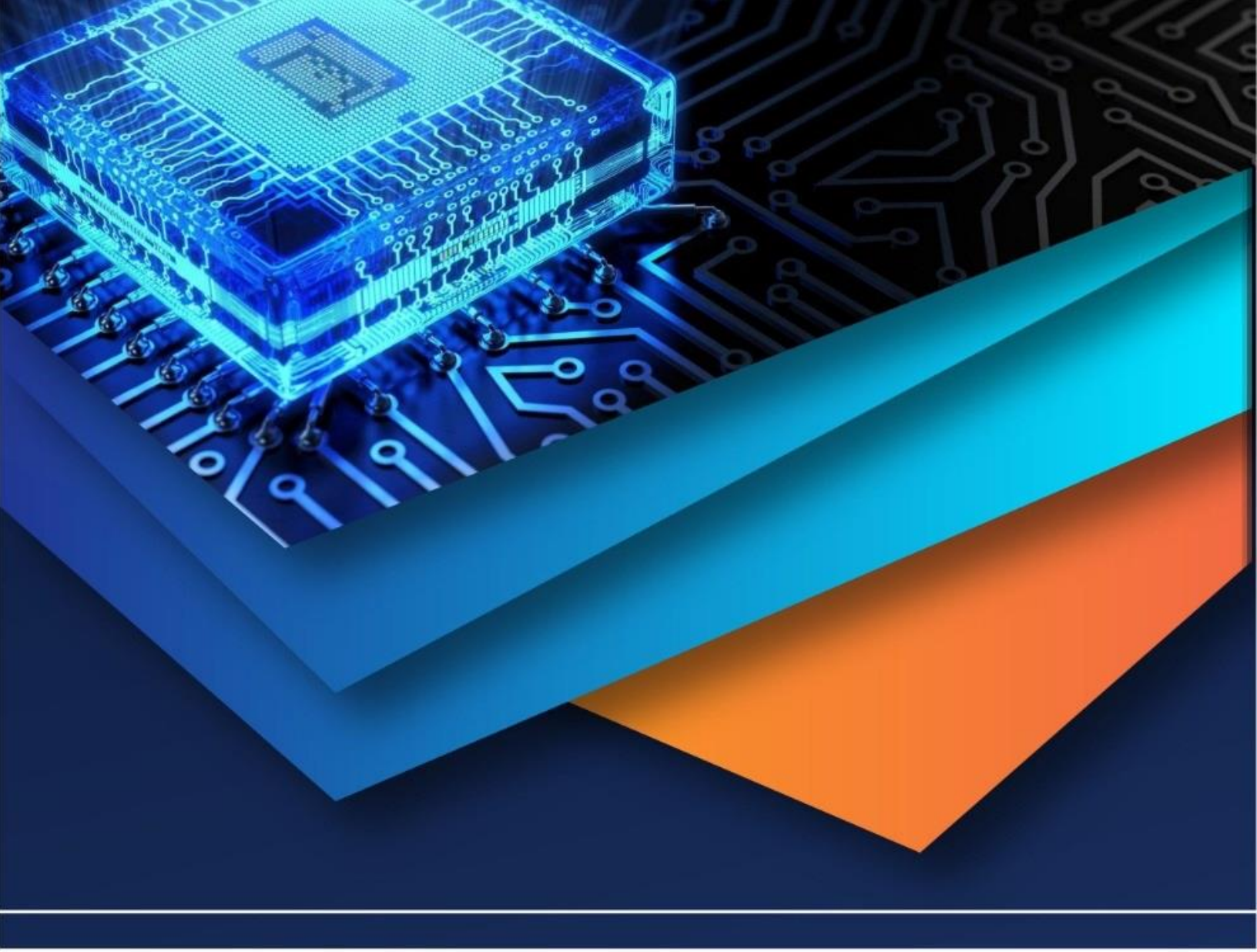

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